

THE AMERICAN LAND AND
FRESH-WATER
ISOPOD CRUSTACEA

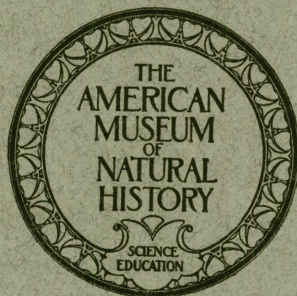
BY WILLARD G. VAN NAME

BULLETIN

OF

THE AMERICAN MUSEUM OF
NATURAL HISTORY

VOLUME LXXI, 1936



NEW YORK

May 14, 1936

THE AMERICAN LAND AND
FRESH-WATER
ISOPOD CRUSTACEA

BY WILLARD G. VAN NAME

BULLETIN
OF
THE AMERICAN MUSEUM OF
NATURAL HISTORY

VOLUME LXXI, 1936



NEW YORK

May, 14 1936

THE AMERICAN MUSEUM OF NATURAL HISTORY
SEVENTY-SEVENTH STREET AND CENTRAL PARK WEST
NEW YORK CITY

BOARD OF TRUSTEES

(As of March 31, 1936)

PRESIDENT

FREDERICK TRUBEE DAVISON

FIRST VICE-PRESIDENT

J. P. MORGAN

SECOND VICE-PRESIDENT

CLEVELAND E. DODGE

TREASURER

E. ROLAND HARRIMAN

SECRETARY

CLARENCE L. HAY

EX-OFFICIO

THE MAYOR OF THE CITY OF NEW YORK
THE COMPTROLLER OF THE CITY OF NEW YORK
THE PRESIDENT OF THE DEPARTMENT OF PARKS

ELECTIVE

GEORGE F. BAKER
GEORGE T. BOWDOIN
DOUGLAS BURDEN
SUYDAM CUTTING
F. TRUBEE DAVISON
CLEVELAND EARL DODGE
LINCOLN ELLSWORTH
CHILDS FRICK
MADISON GRANT
CHAUNCY J. HAMLIN
E. ROLAND HARRIMAN
CLARENCE L. HAY
ARCHER M. HUNTINGTON
OGDEN L. MILLS

J. P. MORGAN
JUNIUS SPENCER MORGAN
A. PERRY OSBORN
FREDERICK H. OSBORN
DANIEL E. POMEROY
H. RIVINGTON PYNE
A. HAMILTON RICE
JOHN D. ROCKEFELLER, 3d
KERMIT ROOSEVELT
HENRY W. SAGE
LEONARD C. SANFORD
WILLIAM K. VANDERBILT
ARTHUR S. VERNAY
FREDERICK M. WARBURG

CORNELIUS VANDERBILT WHITNEY

ADMINISTRATIVE AND SCIENTIFIC STAFFS

(As of March 31, 1936)

OFFICERS OF ADMINISTRATION

HONORARY DIRECTOR

GEORGE H. SHERWOOD

DIRECTOR

ROY CHAPMAN ANDREWS

VICE-DIRECTOR AND EXECUTIVE SECRETARY

WAYNE M. FAUNCE

SCIENTIFIC STAFF

OFFICERS OF ADMINISTRATION (*Continued*)

FREDERICK H. SMYTH, Bursar	CHARLES E. BANKS, Power Plant Engineer
FRANCIS BUSHELL, Assistant Bursar	J. B. FOULKE, Custodian
REX P. JOHNSON, General Superintendent	CHARLES J. O'CONNOR, Membership Supervisor
CHARLES C. GROFF, Mechanical Superintendent	RICHARD H. COOKE, Business Manager, Hayden Planetarium

HANS CHRISTIAN ADAMSON, Assistant to the President

SCIENTIFIC STAFF

(As of March 31, 1936)

ROY CHAPMAN ANDREWS, Sc.D., Director
 WAYNE M. FAUNCE, Sc.B., Vice-Director and Executive Secretary
 CLARK WISSLER, Ph.D., LL.D., Dean of the Scientific Staff
 H. E. ANTHONY, D.Sc., Secretary of the Council of Heads of the Scientific Departments

ASTRONOMY AND THE HAYDEN PLANETARIUM

CLYDE FISHER, Ph.D., LL.D., Curator
 WILLIAM H. BARTON, JR., B.S., M.S., Associate Curator
 DOROTHY A. BENNETT, A.B., Assistant Curator
 MARIAN LOCKWOOD, Assistant Curator
 ARTHUR L. DRAPER, Assistant Curator
 HUGH S. RICE, B.S., Associate in Astronomy
 CHARLES A. FEDERER, JR., Staff Assistant
 CHESTER A. REEDS, Ph.D., Research Associate in Meteorites

MINERALOGY AND GEMS

HERBERT P. WHITLOCK, C.E., Curator
 FREDERICK H. POUGH, Ph.D., Assistant Curator

VERTEBRATE PALAEOLOGY

CHILDS FRICK, B.S., Honorary Curator of Late Tertiary and Quaternary Mammals
 WALTER GRANGER, D.Sc., Curator of Fossil Mammals
 BARNUM BROWN, Sc.D., Curator of Fossil Reptiles
 G. G. SIMPSON, Ph.D., Associate Curator of Vertebrate Palaeontology
 CHARLES C. MOOK, Ph.D., Associate Curator of Geology and Palaeontology
 EDWIN H. COLBERT, Ph.D., Assistant Curator of Vertebrate Palaeontology
 RACHEL HUSBAND NICHOLS, A.M., Staff Assistant
 WALTER W. HOLMES, Field Associate in Palaeontology

GEOLOGY AND INVERTEBRATE PALAEOLOGY

CHESTER A. REEDS, Ph.D., Curator

SCIENTIFIC STAFF

v

LIVING INVERTEBRATES

ROY WALDO MINER, Ph.D., Sc.D., Curator
WILLARD G. VAN NAME, Ph.D., Associate Curator
FRANK J. MYERS, Research Associate in Rotifera
HORACE W. STUNKARD, Ph.D., Research Associate in Parasitology
A. L. TREADWELL, Ph.D., Research Associate in Annulata
ROSWELL MILLER, JR., C.E., Field Associate

ENTOMOLOGY

FRANK E. LUTZ, Ph.D., Curator
A. J. MUTCHLER, Associate Curator in Coleoptera
C. H. CURRAN, D.Sc., Assistant Curator
WILLIS J. GERTSCH, Ph.D., Assistant Curator
FRANK E. WATSON, B.S., Staff Assistant in Lepidoptera
WILLIAM M. WHEELER, Ph.D., LL.D., Research Associate in Social Insects
CHARLES W. LENG, B.Sc., Research Associate in Coleoptera
HERBERT F. SCHWARZ, M.A., Research Associate in Hymenoptera
E. L. BELL, Research Associate in Lepidoptera

LIVING AND EXTINCT FISHES

WILLIAM K. GREGORY, Ph.D., Curator¹
JOHN T. NICHOLS, A.B., Curator of Recent Fishes
E. W. GUDGER, Ph.D., Bibliographer and Associate Curator
FRANCESCA R. LAMONTE, B.A., Associate Curator
CHARLES H. TOWNSEND, Sc.D., Research Associate
C. M. BREDER, JR., Research Associate
LOUIS HUSSAKOF, Ph.D., Research Associate in Devonian Fishes
WILLIAM BEEBE, Sc.D., Research Associate in Oceanography
E. GRACE WHITE, Ph.D., Research Associate
VAN CAMPEN HEILNER, M.S., Field Representative

AMPHIBIANS AND REPTILES

G. KINGSLEY NOBLE, Ph.D., Curator
HARVEY BASSLER, Ph.D., Research Associate in Herpetology

EXPERIMENTAL BIOLOGY

G. KINGSLEY NOBLE, Ph.D., Curator
H. J. CLAUSEN, Ph.D., Assistant Curator
DOUGLAS BURDEN, M.A., Research Associate
FRANK S. MATHEWS, M.D., Research Associate
HOMER W. SMITH, Sc.D., Research Associate
O. M. HELFF, Ph.D., Research Associate
CHARLES E. HADLEY, Ph.D., Research Associate
WILLIAM ETKIN, Ph.D., Research Associate
R. H. ROOT, Ph.D., Research Associate

¹ Also Research Associate in Palaeontology and Associate in Physical Anthropology.

SCIENTIFIC STAFF

ORNITHOLOGY

FRANK M. CHAPMAN, Sc.D., Curator
 JOHN T. ZIMMER, M.A., Executive Curator
 ROBERT CUSHMAN MURPHY, D.Sc., Associate Curator, Oceanic Birds
 JAMES P. CHAPIN, Ph.D., Associate Curator, Continental Old World Birds
 ERNST MAYR, Ph.D., Associate Curator, Whitney-Rothschild Collections
 CHARLES E. O'BRIEN, Assistant Curator
 ELSIE M. B. NAUMBURG, Research Associate
 ALBERT R. RAND, Associate in Ornithology

MAMMALOLOGY

H. E. ANTHONY, M.A., Curator
 GEORGE G. GOODWIN, Assistant Curator
 J. E. HILL, Ph.D., Assistant Curator
 G. H. H. TATE, M.A., Assistant Curator of South American Mammals
 T. DONALD CARTER, Assistant Curator of Old World Mammals
 RICHARD ARCHBOLD, Research Associate
 WILLIAM J. MORDEN, Ph.B., Field Associate
 ARTHUR S. VERNAY, Field Associate

COMPARATIVE AND HUMAN ANATOMY

WILLIAM K. GREGORY, Ph.D., Curator
 H. C. RAVEN, Associate Curator
 S. H. CHUBB, Associate Curator
 G. MILES CONRAD, B.A., Assistant Curator
 J. HOWARD MCGREGOR, Ph.D., Research Associate in Human Anatomy
 DUDLEY J. MORTON, M.D., Research Associate
 FREDERICK TILNEY, M.D., Ph.D., Research Associate

ANTHROPOLOGY

CLARK WISSLER, Ph.D., LL.D., Curator
 N. C. NELSON, M.L., Curator of Prehistoric Archaeology
 GEORGE C. VAILLANT, Ph.D., Associate Curator of Mexican Archaeology
 HARRY L. SHAPIRO, Ph.D., Associate Curator of Physical Anthropology
 MARGARET MEAD, Ph.D., Assistant Curator of Ethnology
 W. C. BENNETT, Ph.D., Assistant Curator of Anthropology
 BELLA WEITZNER, Assistant Curator of Anthropology
 WILLIAM W. HOWELLS, Ph.D., Associate in Physical Anthropology
 CLARENCE L. HAY, A.M., Research Associate in Mexican and Central American
 Archaeology
 MILO HELLMAN, D.D.S., D.Sc., Research Associate in Physical Anthropology
 GEORGE E. BREWER, M.D., LL.D., Research Associate in Somatic Anthropology
 FREDERICK H. OSBORN, Research Associate in Anthropology

SCIENTIFIC STAFF

vii

ASIATIC EXPLORATION AND RESEARCH

ROY CHAPMAN ANDREWS, Sc.D., Curator

WALTER GRANGER, D.Sc., Curator of Palaeontology

CHARLES P. BERKEY, Ph.D., Sc.D. [Columbia University], Research Associate in Geology

AMADEUS W. GRABAU, Sc.D. [National Geological Survey of China], Research Associate

PÈRE TEILHARD DE CHARDIN [National Geological Survey of China], Research Associate in Mammalian Palaeontology

EDUCATION

GEORGE H. SHERWOOD, Ed.D., Curator

GRACE FISHER RAMSEY, Associate Curator

WILLIAM H. CARR, Assistant Curator

HERMAN A. SIEVERS, Staff Assistant

JOHN SAUNDERS, Staff Assistant

FARIDA A. WILEY, Staff Assistant

AGNES G. KELLEY, A.M., Staff Assistant

WILLIAM LORD SMITH, M.D., Staff Assistant

GEORGINE MASTIN, Staff Assistant

PAUL B. MANN, A.M., Associate in Education

GLADYS L. PRATT, Associate in Education

LIBRARY

HAZEL GAY, Librarian

HELEN GUNZ, Assistant Librarian

JEANNETTE MAY LUCAS, B.S., Assistant Librarian—Osborn Library

PREPARATION AND EXHIBITION

JAMES L. CLARK, Director

ALBERT E. BUTLER, Associate Chief

FRANCIS L. JAQUES, Staff Associate

RAYMOND B. POTTER, Staff Assistant

ROBERT H. ROCKWELL, Staff Assistant

SCIENTIFIC PUBLICATIONS

ETHEL J. TIMONIER, Associate Editor of Scientific Publications

NATURAL HISTORY

TOM DAVIN, Manager of Publications and Printing

EDWARD M. WEYER, JR., Ph.D., Editor

A. KATHERINE BERGER, Associate Editor

PUBLIC AND PRESS INFORMATION

HANS CHRISTIAN ADAMSON

BULLETIN
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME LXXI, 1936

59.53,72 (7/8)

THE AMERICAN LAND AND FRESH-WATER
ISOPOD CRUSTACEA

BY WILLARD G. VAN NAME

FIGURES 1 TO 323

CONTENTS

	PAGE
INTRODUCTION.....	2
ACKNOWLEDGMENTS.....	6
THE ISOPODA.....	7
Their General Characters and Relationships.....	7
The Oniscoidea.....	8
Structure and Terminology.....	9
Origin and Distribution.....	20
NAMES AND GENERAL DISTRIBUTION OF THE AMERICAN LAND AND FRESH- WATER ISOPODA.....	23
LIST OF NEW SPECIES DESCRIBED.....	32
REGIONAL DISTRIBUTION.....	33
DESCRIPTIONS OF SPECIES.....	42
Land Isopoda.....	42
Fresh-water Isopoda.....	417
Additional Isopoda Reported Incorrectly as Fresh-water Species.....	490
BIBLIOGRAPHY.....	491
SUPPLEMENT.....	509
INDEX.....	525

INTRODUCTION

In the present work I have attempted to give brief descriptions and illustrations of the land and fresh-water Isopoda known from North and South America and the neighboring islands, and to describe the new species contained in the collection of the American Museum of Natural History in New York, as well as a few others that have come to my attention.

The preparation of this work has been undertaken in the belief that it will fill an actual deficiency in zoölogical literature, as considerable experience in trying to identify and label the undetermined material in the collection of Crustacea of that Museum has convinced me of the scattered and incomplete character of the literature dealing with the Isopoda of tropical and South America, especially the land and fresh-water species, and of the need for bringing the information together in accessible form. Many new species have been described since the publication of Richardson's very useful and convenient 'Monograph on the Isopods of North America' (1905, Bulletin No. 54, United States National Museum) and, moreover, that work covers only the region from Panama northward and, because of the lack of material from tropical America available to its writer, is very incomplete as regards the terrestrial species of the warmer parts of the area with which it deals.

Although in European countries the land isopods, chiefly those of the Old World, have been the subject of minute study by a number of able specialists, in America there have been thus far but two, Dr. Oscar Harger, who died in 1887, and Mrs. Harriet Richardson Searle, whose work was mainly published prior to 1913, who have devoted themselves to the Isopoda as an exclusive specialty, and they concerned themselves more with marine than with land forms. In spite of many excellent minor contributions by other zoölogists, some European, some American (among the latter we may mention Prof. A. S. Pearse, Prof. B. E.

Stafford, Miss Lee Boone, and, lately especially, Dr. C. H. Blake of the Massachusetts Institute of Technology), our knowledge of the American land and fresh-water isopods is in a backward state, so much so that much of the information essential for the preparation of a satisfactory monograph is lacking at the present time, and its acquisition will take many years of work and study.

The subject is such a large one, our knowledge of it is so incomplete, and the labor of studying and illustrating animals of the character of the isopods is so time-consuming, that I have found it necessary to keep the work within the scope and dimensions of a handbook or manual which I might reasonably hope to bring to completion, rather than to attempt an exhaustive monograph, since otherwise I would be likely never to finish more than a small part, covering only a few of the genera or families.

In the present state of our knowledge of the American forms it is not possible to carry out so minute a subdivision of the genera into new genera of narrower scope, subgenera and sections, as the European specialists have been able to do with the Old World forms. Our American species in many cases do not fit into the narrow diagnoses by which the older and more familiar genera are now limited by European students, or into the new groups of generic and subgeneric rank that they have established. Often we are not yet able to judge whether this implies that the modern limitations of the genera are too narrow, or that new groups should be formed for the American species. Though the latter course will doubtless be necessary in many instances, I have avoided it in the present work, using some of the generic names with greater inclusiveness than is the practice of the modern European writers who are dealing with this group. This is not due to an underestimation of the need of more minute classification, but because of the insufficiency of the available descriptions and illustrations of such a large proportion of our species. Even in the case of many species which I have examined or described myself, the specimens have been too few or too poorly preserved, or too much mutilated and lacking important parts and appendages, to be suitable for minute study, and in the case of unique or borrowed specimens, I have often not felt at liberty to subject them to an amount of handling that would inevitably result in great damage to them or in their going entirely to pieces. I hope that the publication of the present work, providing a summary of our present information, will serve to point out where more investigation is most needed, and in that way be a step to a more satisfactory classification of the American

members of the group, and perhaps do more toward attaining it than would a premature attempt, based on insufficient data.

Necessarily such a work as this one must be, to a very large extent, a compilation, as many of the species included are rare and known from but few specimens; many of them as yet have not been found a second time. I have been able to examine or study personally only a small minority of the species, and have had to depend for the others on the original descriptions and figures of other authors. Though their species may clearly be valid, their descriptions, especially in the case of the older writers, are often far too brief and incomplete, and the figures, if any, are often very insufficient, yet they furnish all the information we have.

These descriptions have usually been quoted, wholly or in part, in their original wording without any attempt to reduce them to a uniform system of terminology of parts. Yet there can rarely be any doubt as to the structures referred to, especially as the authors' figures have also been reproduced. Descriptions written in foreign languages other than French or Latin have been translated.

I have not had the services of an artist in preparing or copying illustrations and, unfortunately, I am very far from being one myself, so that I must take the blame for the crudity of some of the figures, though in many cases the originals are not all that might be desired. In most figures I have attempted to give only the essential outlines, though sometimes the original authors give beautifully shaded figures.

The illustrations, where no credit is given, may be understood to be original. It might seem an easy matter to secure accuracy in drawing outlines of parts and appendages of definite shape, as those of Crustacea are supposed to be, but in the smaller isopods the minute size and great delicacy of the parts and their liability to shrinkage and change of form from handling, pressure, or partial desiccation, as well as the different outline of some parts when seen from even slightly different angles, introduce difficulties that are greater than might be expected. They often occasion apparent discrepancies between illustrations given by different authors, which may be misleading if the possibility of explaining them by the above causes is not kept in mind.

To state its scope more exactly, this book attempts to cover the land and fresh-water Isopoda of North and South America, including Greenland, Bermuda, the West Indies, and the Galapagos, Juan Fernandez, and Falkland Islands. A total of 254 terrestrial species, includ-

ing several determined only generically by the authors recording them, and 49 fresh-water species are dealt with as inhabitants of this area.

As already stated, I have described the new species contained in the collection of the American Museum of Natural History and a number of others that have come to my notice (see pages 32 and 33), but my main aim has been to give a convenient résumé of the knowledge and literature of the subject as it stands up to the present time, and I have not felt justified in delaying its publication for lengthy research of my own, or for the purpose of studying the large amount of undescribed material that exists in the various other museums, interesting and important as the results of such a study might be. Certainly the addition of a number of new and interesting forms to the fauna would have resulted from such a study, but it would have postponed and jeopardized too much the completion of a task which has already consumed more years than I like to contemplate.

A few additional points need to be explained or mentioned. In covering so extensive a field, non-essentials had to be reduced to a minimum. The bibliography therefore lists, with very few exceptions, only works and articles referring to American species or referring to the more widely distributed forms as inhabitants of America. The latter limitation has (except in the case of original descriptions) usually been adopted in the lists of synonyms and references also. In the case of tropical and South American species I have sought out all the references I could find, even the briefest mention of the most common and most widely distributed species; in the case of those of the United States, I have tried to exercise similar care for the rarer species, but to carry this out for some of the abundant, almost semi-domesticated ones would have been neither practicable nor worth while.

Economy of space and other considerations have led me to avoid superfluous perfunctory explanations of the figures or plates. The animals here dealt with are remarkably uniform in general structure, and usually no one with even a superficial knowledge of the Isopoda will be in doubt as to just what aspect or what part of the animal is shown, especially with the aid of the self-evident lettering, such as *mxp* for maxilliped, *pl*² for second pleopod, etc. The thoracic segments and appendages are designated with Roman numerals, I to VII (the morphological fact that the true segment I really forms part of the head being ignored, as is the usual practice), and the abdominal segments and parts with Arabic numerals 1 to 6. In special cases, however, additional lettering and explanatory matter has been given if it seemed needed. The iso-

Pods here dealt with differ in size within only comparatively small limits. They attain their adult form and structure while quite small and maintain this as they grow. Therefore the exact degree of enlargement of the figures is not of significance and, following the practice of many other works, has not been given, but it can be deduced approximately from the dimensions stated in the descriptions.

ACKNOWLEDGMENTS

To the authors from whose works extracts, illustrations, or information (often quoted in condensed form) have been taken, credit is given in the proper places. It remains for me to express here my thanks and deepest sense of obligation to all of them, and also to those who have personally and directly aided me, or helped to make it possible to carry out this undertaking; first of all the authorities of the American Museum of Natural History, especially Dr. Roy W. Miner, head of the Department of Living Invertebrates of the Museum. To his continued and unfailing interest and sympathy, and his understanding of the delays and difficulties that invariably arise in the course of so lengthy an undertaking, the completion of the work has largely been due.

I thank also all those, both individuals and institutions, who have given or loaned me specimens for study or made exchanges enabling me to study cotypes and other original material, especially the authorities of the United States National Museum (with special obligations to Drs. Waldo L. Schmitt and Clarence R. Shoemaker); to Dr. Stanley C. Ball of the Yale University Museum; and Prof. Edwin P. Creaser of the University of Michigan. I wish also to express my appreciation of the assistance of Mrs. Walter C. Langsam, of the American Museum of Natural History, for her interest and care in verifying references and quotations and reducing to a minimum the errors that creep into the manuscript of such a work in spite of all efforts. For such mistakes and omissions as have escaped our discovery I hope the readers will be lenient.

THE ISOPODA

THEIR GENERAL CHARACTERS AND RELATIONSHIPS

The Isopoda are a group now usually given the rank of an order of the Malacostraca or highest subclass of the Crustacea, that which contains the crabs, crayfishes, etc. Together with the order Amphipoda, they are often grouped as a super-order called Arthrostraca (from the segmented condition of the thorax) or Edriophthalmata (from the fact that the eyes are sessile instead of being raised on stalks), which forms one of the lower divisions of the Malacostraca.

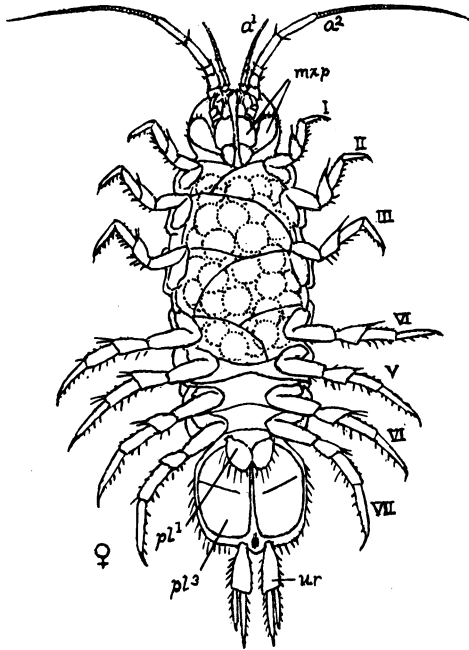


Fig. 1. An aquatic isopod, *Asellus communis* Say, of the suborder Asellota. Lower surface of female. Roman numerals show the seven thoracic segments.

a^1 , a^2 , first and second antennae; *mxp*, maxilliped; pl^1 , pl^2 , appendages (pleopoda) of first and third abdominal segments; *ur*, uropod.

From the higher orders of the Malacostraca they differ most conspicuously in that the dorsal plates of the segments of the anterior parts of the body are not extensively fused into an immovable carapace, and in the usually immovably fixed, unstalked eyes, as well as in the generally much smaller size, a length of 20 to 30 mm. being attained by only a

small minority of the species, and larger dimensions by only very few. The body is somewhat elongated, and composed, in addition to the head, of thirteen clearly apparent segments, which generally each bear a pair of jointed limbs or appendages variously modified for walking, prehension, swimming, respiration, etc.

Leaving parasitic and other aberrant forms of both groups out of consideration, the Isopoda are conspicuously distinguished from their near allies, the Amphipoda, by the limbs or appendages, especially by those of the hinder part of the body—the so-called abdomen, comprising the last six segments. These abdominal limbs are usually reduced to flattened plates, modified (except the last, or sixth, pair) for respiratory purposes, while in the Amphipoda the first three abdominal appendages commonly form short swimming feet and the last three are modified into processes for jumping or sudden progression either on land or water, accomplished by suddenly straightening the body. In the Isopoda the body is usually of a somewhat flattened, dorsoventrally compressed form; in the Amphipoda it is compressed from side to side. The heart is in the anterior part of the body in the Amphipoda, in the rear part in the Isopoda; this may be explainable by the fact that in the latter the abdominal limbs are the respiratory organs, while the Amphipoda have gills borne on the legs of the fore part of the body. In both groups the eggs and developing young are carried by the mother in a brood pouch or MARSUPIUM formed by overlapping, plate-like outgrowths (OÖSTEGITES) which extend inward from the bases of some of the legs, forming a cavity between themselves and the ventral surface of her body. Both groups comprise both marine and fresh-water forms; the Isopoda have also one large group of completely terrestrial forms (the ONISCOIDEA), while among the Amphipoda only one family, the Orchestiidae, comprising the well-known beach fleas which live under damp seaweed or burrow in wet sand on sea beaches, has acquired terrestrial habits to some degree.

THE ONISCOIDEA

The most familiar members of the Isopoda are terrestrial ones, the Oniscoidea. They are small, usually rather slow moving, insect-like creatures with a transversely segmented body like a small armadillo, found under logs, stones, pieces of board, etc., which have lain on the ground for some time and afford a more or less dark, damp retreat in which these small creatures can take refuge. They seldom measure over 12 to 18 mm. long and many of them, when frightened, can roll up into

a complete ball, protecting the delicate limbs and under parts, and exposing only the hard chitinous plates of the back. They are popularly known by various names, such as wood-lice, slaters, or sow-bugs, or in the case of those that roll up, as pill-bugs, but are of course crustaceans, not insects, as their larger number of legs (seven pairs) at once shows. The Oniscoidea are for the most part entirely inoffensive creatures; they are not in any case actually predacious, though not averse to such animal food as they can get. They feed chiefly on vegetable matter, often apparently on decaying wood or leaf mould, which they swallow, and digest out what nourishment it contains. In occasional cases, when numerous, they have been reported as doing damage to vegetables, to plants in greenhouses, or to cultivated mushrooms.

STRUCTURE AND TERMINOLOGY

As an example for study, both of the Isopoda in general and of the Oniscoidea especially, we shall take *Porcellio scaber* Latreille, a species which may be found near human habitations in such situations as have been mentioned, throughout a large part of the United States and Europe. This species has the body of rather flattened form, and is unable to roll up into a ball. Its body is composed of thirteen distinct segments besides the head, which is narrow and somewhat set back into the first body segment. The head bears a pair of jointed antennae and a pair of compound eyes; the mouth is on the inferior side. The seven following segments compose the principal part of the body (called the THORAX) and each bears a pair of legs; the remaining six segments are smaller and constitute the so-called ABDOMEN. The terminal (or sixth) of these segments forms a triangular piece, the TELSON, which bears as its appendages a pair of short, stout stylets (the UROPODA), each with two pointed terminal branches. Turning the animal over, we see that the other five abdominal segments bear pairs of overlapping, mostly plate-like appendages (called PLEOPODA) certain of which are narrowed and modified in the males, thus furnishing an easy means of recognizing that sex. Raising the external overlapping plates, we find that the abdominal appendages of which they form a part comprise also soft vascular, inner leaf-like plates which serve for respiration.

Female individuals may be distinguished by the lack of the above-mentioned sexual modification of the pleopoda and by the usual presence of the marsupium or brood pouch already mentioned. In this the eggs, which are not very numerous in Oniscoidea (in small species usually very few), and the young into which they develop, are carried until the

young are able to run around. The development in the land Isopoda (though not in most aquatic forms) is very direct, the larval stages not differing very greatly from the adult, though the seventh thoracic segment, and especially the pair of legs it bears, lag behind the preceding six in development, so that a stage with six pairs of legs is passed through.

As in other Crustacea, the external surface of the body and its appendages is covered with a chitinous integument secreted by the external epithelium of the body and strengthened and hardened in the

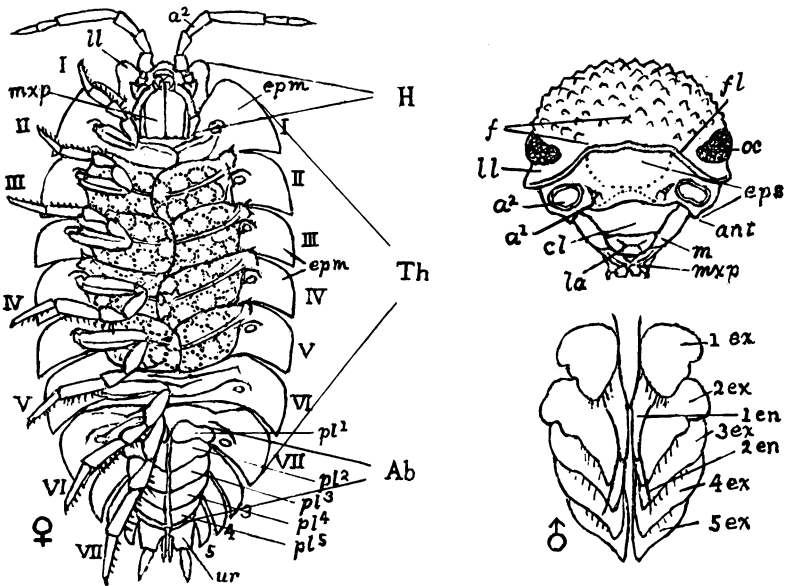


Fig. 2. A typical land isopod, *Porcellio scaber* Latreille. Lower surface of female (left legs removed), front view of head, and pleopoda of male.

*a*¹, first antenna; *a*², second antenna or socket for same; *ant*, antennary tubercle; *cl*, clypeus; *en*, endopodite; *epm*, epimera; *eps*, epistome; *ex*, exopodite; *f*, forehead; *fl*, frontal line; *la*, labrum; *ll*, lateral lobe; *m*, mandible; *mxp*, maxilliped; *oc*, eye; *pl*, pleopod; *ur*, uropod. Ab, abdomen; H, head; Th, thorax.

larger species by the deposit of calcareous matter, also secreted by the epithelial cells. This integument is shed or moulted at intervals to permit of growth; a new integument, that is at first soft and flexible having been first secreted beneath the old one.

Beside the coarser elevations and tubercles (in a few cases even actual spines) with which the dorsal surface of the body and head is ornamented in many Oniscoidea, the dorsal surface on higher magnification exhibits a minute granulation or sometimes reticulation, and

frequently a scabrous pubescence of short hairs or setae. In some genera the setae are variously modified into small scale-like or clavate appendages.

The integument is also penetrated by pores, mostly very minute. In the case of the American Oniscoidea the detailed study of these microscopic surface features has hardly been begun, so that we are not yet in a position to discuss them in detail or to employ them as taxonomic characters. So far as the native American species are concerned, they offer a practically untouched field of study for the investigators who may make them the subject of their research.

Though many Isopoda, especially those living in dark situations, are almost without pigment, and are practically wholly of the pale yellowish or whitish color of the chitinous integument, in most of the Oniscoidea the dorsal surface is more or less deeply colored with a brownish, grayish, blackish, or somewhat purplish pigment that contrasts, sometimes quite handsomely, with the lower parts of the body, which are usually pigmented slightly, if at all, and with the borders of the segments and such other parts of the upper surface as may be devoid of the pigment. One feature of the distribution of the pigment occurs so widely in the Oniscoidea and in some other Isopoda as well, that it can not fail to attract notice; this is the presence on each side of the median dorsal region of each thoracic segment of an area of light-colored, unpigmented, oval spots, or short irregular bars, which mark the insertion on the inner surface of the body wall of the strong muscles that move the legs. This part of the back is, moreover, apt to be more or less roughened or rugose, even in the species where the general surface of the integument is very smooth.

The structure of some of the more important parts of the Isopoda, especially as they are developed in the Oniscoidea, will now be taken up in more detail, using, as before, *Porcellio scaber* as the typical example, but dealing also with some of the variations occurring in other members of the group.

Head

The HEAD, though appearing as a single segment, is in reality a fusion of five or (according to the view that the eyes and first antennae represent the appendages of somites, seven segments or somites) as is shown by the number of pairs of appendages arising from it.

The EYES are sessile and immovable and usually composed of a number of ocelli. The eyes, however, are very subject to degeneration

or even practically complete disappearance in species that live in caves or underground, or in other dark places.

The FIRST ANTENNAE or ANTENNULES, though well developed and composed of many joints in most aquatic isopods, are minute and reduced to only two or three joints in the Oniscoidea. They are also peculiar in their situation in this group, arising directly between, instead of anterior to, the SECOND ANTENNAE. The latter are, in the

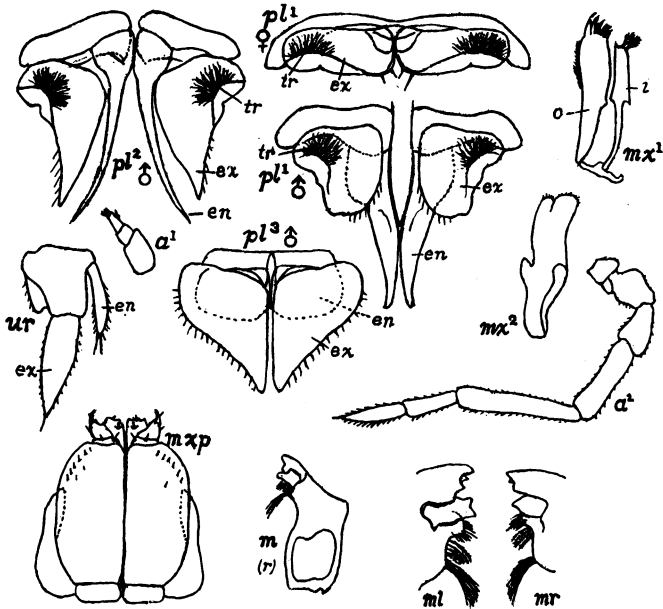


Fig. 3. *Porcellio scaber* Latreille. Adapted from Sars, 1899.

Details: *i*, inner, *o*, outer branch of first maxilla; *ml*, *mr*, tips of left and right mandibles; *mx*, maxilla; *tr*, tracheae; other lettering as in Fig. 2. (Maxillipeds and pleopoda of both sides are shown.)

Oniscoidea, so much larger and more conspicuous that they are commonly referred to simply as the ANTENNAE, ignoring the existence of the minute and inconspicuous first pair. The second antennae arise from sockets having a well-defined, more or less raised border, situated lower down on the face than the eyes and somewhat nearer the median line yet leaving a wide space between them in which, as already stated, the minute first antennae are inserted. Between the latter there may be a median tubercle or elevation. The second antennae usually consist of

a PEDUNCLE of five distinct movable joints, the first two very short, the fifth usually the longest, and a FLAGELLUM or slender terminal part which, in aquatic isopods and in the more primitive land forms (Ligiidae), can be elongate and composed of many small joints called ARTICLES. In the majority of the Oniscoidea, however, its articles are reduced in number to three, or often, as a result of the fusion of the two terminal articles into one larger one, to only two, as is the case in *Porcellio scaber*. On the lower side of the head there is the BUCCAL MASS, an obtusely conical mass of structures protruding downward and forward, composed of certain unpaired structures (in front the FRONTAL LAMINA, second, the CLYPEUS, and below it the LABRUM or upper lip) and four pairs of appendages modified into masticatory or accessory feeding organs. All these, commonly spoken of collectively as the MOUTH PARTS, surround the mouth and fit closely together when not in use, forming collectively the above-mentioned conical, projecting buccal mass.

The unpaired structures named above form the upper and anterior surface of the buccal mass. The paired appendages or mouth parts, naming them from front to rear, are as follows:

First: a pair of strong MANDIBLES, each ending in a curved process or apex bearing a few strong teeth. In the Oniscoidea the mandibles have no jointed appendage or palpus.

Second and third: two pairs of flattened appendages called MAXILLAE. The first maxillae consist mainly of two (outer and inner) elongate branches or divisions arising from a slender, more or less transverse basal segment. The outer and longer branch bears a row of eight or more somewhat curved teeth on its obliquely truncated terminal edge; the inner, or more median branch, which is slenderer and weaker, bears two (or rarely more) brush-like tufts of setae. The second maxillae are shorter, broadly plate-like, without teeth, and with only a partial indication of division into inner (median) and outer lobes.

Fourth: behind the maxillae a pair of somewhat oblong, flattened appendages, the MAXILLIPEDS, whose median borders are straight and fit closely together, so that they serve as a cover or operculum for the other mouth parts and form the posterior or lower surface of the buccal mass. They bear, near the free end, a short, flattened palp of several joints.

It is universally admitted that the parts of the head from which these pairs of appendages (perhaps excepting the eyes and first an-

tennae) arise represent somites which are fused to form the head. More will be said about the maxillipedal somite below.

The head is set back into the concave anterior border of the first thoracic segment and is so articulated as to permit of considerable tilting, or up-and-down motion, but not so much lateral motion.

The completeness of the fusion of many of the elements (somites and parts of somites) composing the head, and the displacement or suppression of some of those elements, especially in those forms that roll up into a ball, render the morphology of the head of the land isopods a very difficult subject to clear up satisfactorily, and authorities are by no means in agreement on many of the questions regarding the homologies of the elements constituting the head and in respect to the terminology and nomenclature of these parts which they employ in their works.

In the present work, however, we are concerned chiefly with those external features of the head that are sufficiently prominent and conspicuous to be employed in the descriptions and diagnoses published by the various authors. Yet in spite of this, uncertainty and confusion are sometimes caused by the obliteration in some species of lines and sutures that are prominent and conspicuous features in other species.

If the face (or anterior, more or less vertical aspect of the head) of *Porcellio scaber* is examined, there will be seen a very prominent sinuous projecting ridge extending across it, passing below the eyes at the sides and arching upward in the middle. Viewed from above, this ridge, which is called the **FRONTAL LINE** (*linea frontalis*), extends forward in the present species into three obtuse lobes, a median one and one under each eye, though in many other Oniscoidea these lobes are absent or greatly reduced. This ridge marks the lower front boundary of the upper surface of the head, the surface above it resembling the general surface of the back of the animal in character, pigmentation and tuberculation, while below it the head is narrower and the sides and front of it are smoother, resembling more in character the under surface of the animal, and sutural lines indicating the building up of the head out of several distinct segments are recognizable. According to widely prevailing usage, including that of Budde-Lund, Dollfus, and others, the upper part of the face above the frontal line is termed the **FOREHEAD** (*frons*). This merges above and behind into the **VERTEX**, or upper surface of the head. The part of the face below the frontal line, down to the beginning of the clypeus, which latter forms the projecting upper surface of the buccal mass, is called the **EPISTOME** (*epistoma*). By some authors the clypeus is also included in the epistome.

Jackson (1926a, 1928a) to whom we are indebted for by far the most thorough and systematically carried out study of the head in the land Isopoda, rejects the term "epistome" entirely, as one that has been loosely and inexactly applied to parts of the head in various Crustacea (Jackson, 1926a, p. 893). He uses the term "frontal" for the regions below the frontal line, instead of applying it according to the general usage to the region above that line.

He distinguishes the area immediately below the frontal line as the PROFRONS, the transverse area next below this and separated from the profrons by the supra-antennal line (see below) as the POSTFRONS, and the next lower area, extending to the superior border of the clypeus and including the sockets of the second antennae, as the FRONTAL LAMINA. All these three areas are, in the usual terminology, parts of the epistome.¹ (See Fig. 4.)

Jackson, as he himself states (1926a, p. 894), has endeavored to adapt his usage of the terms frons, frontal, vertex, etc., to correspond to their use in insects. I believe, however, that entomology is a sufficiently specialized subject to have its own uses for terms without there being any obligation for other branches of zoölogy to conform to them, especially if confusion will be increased rather than diminished thereby, and though the studies on which Jackson's conclusions regarding the structure and homologies of the head in isopods are based must command a general acceptance of his views regarding the homology of the parts, it will not be easy to bring about the abandonment of a term so convenient for use in describing Isopoda as the word "epistome," or to change the usual applications of the terms "frons" and "frontal."

The description of the head of *Porcellio scaber* requires important modifications in order to apply to some of the other Oniscoidea, as well as to various aquatic forms. On account of lack of space, most of these modifications must be left to the systematic part of this book for such consideration as they need. A few of them, however, are of such common occurrence that they require mention here.

The frontal line, though forming a very prominent transverse sinuous ridge in *Porcellio scaber*, is much reduced in many Oniscoidea, and often becomes practically obliterated in forms having the head rounded and the lateral lobes vestigial or wanting, especially when the dorsal body surface is smooth or nearly so. Usually, however,

¹ Dollfus, who described many tropical American land isopods, divided the epistome into three sections: the PROSEPISTOMA, corresponding to the profrons of Jackson; the MESEPISTOMA, lying below it and including the region of the sockets of the antennae; and the METEPISTOMA, consisting of the clypeus.

there are at least indications of it in a sudden change to a more vertical direction in the surface of the face along a curved line arching between the eyes.

In many Oniscoidea, especially in forms such as *Philoscia*, where the frontal line is poorly developed or is not recognizable, there is another distinct and sometimes somewhat raised line crossing the face lower down. This is the SUPRA-ANTENNAL LINE (the linea transversa epistomatis of Budde-Lund). (See Fig. 4.) This arches over the sockets of the second antennae at the sides, passing either close above them or somewhat higher up on the face; in the middle it usually dips downward, forming there a distinct, though wide, V-shaped angle. (The

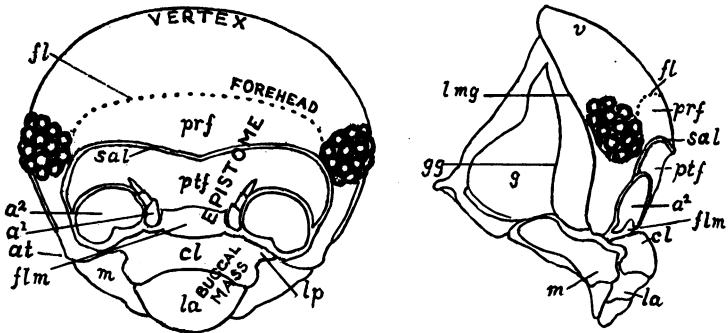


Fig. 4. Head of *Philoscia muscorum* Scopoli, a land isopod in which the frontal line and lateral lobes are not distinct. Adapted from Jackson, 1928a.

a^1, a^2 , antennae; $a t$, antennary tubercle; cl , clypeus; fl , frontal line; la , labrum; lmg , marginal line; lp , lateral process of clypeus; m , mandible; sal , supra-antennal line; v , vertex. The following letters show terminology used by Jackson (1926a, 1928a); flm , frontal lamina; g , gena; $g g$, genal groove; prf , profrons; ptf , postfrons. Only the socket for the second antennae is shown.

area between this line and the frontal line above it is the profrons of Jackson. It forms the upper part of the epistome of most authors and the prosepistoma of Dollfus.)

The clypeus, which, as already stated, projects forward to form the upper surface of the buccal mass, is narrower than the areas of the face above it, the outline of the head being here built out on each side by the large basal part of the mandible. The upper lateral angles of the clypeus, however, are extended into a pair of lateral processes which in most species are small and flush with the surface of the head below the antennal sockets, but are larger and more or less prominent in some genera, as *Cubaris* and its allies. Another feature of the head that

should be mentioned is the ANTENNARY TUBERCLE, a prominence on the side of the head in the region of the antennal socket but variously situated in relation to the latter. These tubercles may be more or less confluent with the lateral lobes of the frontal line when the latter are rudimentary and directed downward and appressed to the sides of the head, as they often are.

Thorax

The main division of the body lying next behind the head and comprising seven separate segments is called the THORAX, mesosome, or pereion. These segments bear the seven pairs of LEGS (pereiopods) and are designated in this work, as are also the legs they bear, by the Roman numerals I to VII. However, by comparison with other Crustacea and from studies in the development, it is clear that the maxillipeds, which form part of the buccal mass already mentioned in describing the head, with the somite to which they belong which forms the rear part of the head, really represent thoracic elements, and from a theoretical point of view should be called segment I of the thorax,¹ making the number of thoracic segments eight.

The seven pairs of legs (pereiopods) are usually much alike in their structure (whence the name isopod, = equal-legged), although they usually become longer toward the rear of the body. However, there may be some sexual differences in the form of the joints and in the arrangement and number of the spines borne on them, especially in the three anterior pairs.

They consist of six movable joints or segments, termed, respectively, (beginning at the basal end) the BASIS, ISCHIUM, MERUS, CARPUS, PROPODUS, and DACTYLUS.² This is one less than is found in many Crustacea, the reason being that in the Oniscoidea the true first or proximal joint (the COXA or COXOPODITE) is coalesced completely with and consolidated into the lateral part of its somite, forming an integral part of the latter. The broad lateral extensions of the body segments called the EPIMERA (singular, EPIMERON), which arch outward and greatly increase the apparent width of the body, are actually largely composed of this coxal joint or coxopodite. In some Oniscoidea, especially in female specimens, a slightly impressed line crossing the surface of the segment from

¹ It may not be out of place to compare with this the modification in the Decapoda of not one pair only, but three pairs of thoracic limbs into mouth parts (the first, second, and third maxillipeds), which results in a corresponding reduction in the number of legs to five, the anterior pair of which are often modified into large grasping claws or chelae. In most Decapoda also the dorsal plates of the head and all the thoracic segments, instead of only one, are fused into an immovable carapace, leaving only the abdominal segments movable.

² Of these only the immovable coxa and the basis represent the protopodite of the typical two-branched crustacean limb, the remaining segments the endopodite. An exopodite is wanting.

front to rear some distance from each lateral end marks the junction of the epimeron with the TERGUM or TERGITE, the median part of the segment.

The marsupium or brood pouch of the female has already been mentioned. In *Porcellio* it will be found to be composed of five pairs of plates called OÖSTEGITES (the first pair very small) arising at the bases of legs I to V.

The first thoracic segment is usually the longest and largest. It is often provided with a more or less well-developed outwardly bent or rolled border along the lateral margin and, in forms that roll up, often with a cleft at the rear lateral corner into which the edge of the epimeron of the second segment is received when the animal is rolled. This cleft is very frequently continued forward as a furrow (COXOPODITE SULCUS) on the lower aspect of the border of the first segment; this sulcus separates off a ridge (the COXOPODITE RIDGE) parallel to and within the actual margin of the segment. Similarly, on the second segment there is often a process (COXOPODITE PROCESS) on the inner aspect of the epimeron. The process forms between the latter and itself a small notch or cleft to receive the anterior edge of the third segment when the animal is rolled up. These structures assist in maintaining the segments in position. Their shape and the manner in which they are developed furnish good characters for distinguishing the species in *Cubaris* and certain allied genera. A coxopodite process is not usually developed on the segments following the second.

Abdomen

Behind the thorax are the six smaller segments constituting the ABDOMEN, metasome or pleon. These, and the appendages borne by them, are designated in this book by Arabic numerals (1 to 6) to distinguish them from the Roman numerals used for the thoracic parts.

In the Oniscoidea the first two abdominal segments are overlapped, especially at the sides, by the concave rear border of the seventh thoracic segment. Their epimera are not much developed, but segments 3 to 5, inclusive, usually have well-developed, more or less backwardly curved epimera. The sixth segment or TELSON¹ is narrow, usually somewhat triangular in Oniscoidea that do not roll up, but often widely truncated at the end in those that do so, so that it may fit closely against the anterior margin of the head when in the rolled position.

¹ The telson in Isopoda is a compound segment consisting of a sixth abdominal segment which bears its pair of appendages, the uropoda (see below) and a median terminal piece (the latter the true telson). Hence Dollfus and some other authors term it the PLEOTELSON, a usage doubtless more strictly correct, but not very generally followed.

Abdominal Appendages

Although the abdominal appendages (PLEOPODA and UROPODA¹) and their functions have been briefly alluded to above, the importance of their characters in classification makes it necessary to consider them in more detail.

The pleopoda consist of a short basal segment (PROTOPODITE) and an INNER and OUTER PLATE or division (ENDOPODITE and EXOPODITE, respectively), each composed, with certain exceptions, of only a single segment, usually of flattened leaf-like form. The endopodites, as already stated, are soft and vascular and respiratory in function, except that those of the first and second (in Ligiidae only the second) pairs in the male are produced into elongate stylets for copulatory organs. The exopodites or outer plates are chitinous and serve as protective covers or opercula; in the male one or more pairs are elongated for the protection of the stylets.²

In the less specialized families (Ligiidae and Trichoniscidae) and in some members of other families, the exopodites or outer plates apparently have only a protective and moisture-conserving function, but in most members of the higher families of Oniscoidea they contain TRACHEAE or respiratory air tubes, either in the first two pairs of pleopoda or in all five pairs, so that they assume important respiratory functions. These tracheae exhibit different characters and arrangements in different groups and evidently have arisen independently in some cases. They may exhibit quite different arrangements in genera otherwise very closely allied, as notably in *Porcellio* and *Tracheoniscus*. In *Porcellio* they are present only in the two anterior pairs in the form of an extensively branched system which opens by a single large orifice, while in *Tracheoniscus*, a genus but slightly distinguishable in most characters from *Porcellio* and formerly universally included in it, the tracheae open by minute tubules ending in small pores in the margin of the plate.

In *Armadillidium* the tracheae are, as in *Porcellio*, confined to the exopodites of the first two pleopoda, but there are several openings situated along a furrow instead of a single opening for all the tracheae.

In *Cubaris* and certain allied forms we have the maximum of development of respiration by means of the exopodites of the pleopoda,

¹ The uropoda, which are merely the modified appendages of the sixth abdominal segment should, strictly speaking, be included in the pleopoda. Ordinarily, however, the appendages of segments 1 to 5 only are implied in using the latter term.

² In the males of the higher or more specialized Oniscoidea, as the Oniscidae, Armadillidiidae, etc., the two pleopoda of the first pair together with a median male sexual appendage between them are united into a single structure.

with a somewhat diminished development of the endopodites. All five pairs of exopodites have well-developed tracheae opening by a single aperture in a laterally placed pocket like depression.

In *Oniscus*, on the other hand, and in true members of the genus *Philoscia* and its near allies there are no tracheae in the exopodites. *Oniscus*, however, has a radial fluting of a part of the dorsal surface of all five pairs, which, in the opinion of Verhoeff (1920, p. 415), is a step toward the development of true tubular tracheae.

The *Philoscias* and allied forms are mostly small species with a delicate cuticle, and an especially efficient respiratory apparatus is less essential. Its absence may be due to its never having been developed, or to its having been lost accompanying decrease in size.

The *Tylidae* are representatives of a very small aberrant group which, if it belongs to the same phylogenetic stem as the other Oniscoidea, must have branched off at an early date. They have tracheae in the exopodites of the pleopoda which open in the middle of the inferior lamella of the exopodite. Their tracheae have apparently developed independently of those which occur in any other groups.

For a detailed discussion of this subject the reader is referred to Verhoeff, 1917*a* and 1920. In those articles that author establishes a classification based largely on the development of the respiratory apparatus in the pleopoda. This classification is used in the present work as far as its main features are concerned.

In the less highly specialized Oniscoidea the UROPODA or appendages of the sixth abdominal segment or telson consist of a BASAL SEGMENT or PROPODITE, usually rather short and wide, bearing two styliform branches of a single piece each, the ENDOPODITE or INNER BRANCH and the EXOPODITE or OUTER BRANCH, which are, however, not very elongate except in the family Ligiidae. The outer branch is generally of tapering form and usually longer and stouter than the inner, but in some of the more specialized Oniscoidea in which the body is adapted for rolling up into a ball, both branches are reduced and the outer may be a mere rudiment. In one family (Tylidae) of the Oniscoidea the uropoda are developed into an operculum to protect the other abdominal appendages, and various other modifications are found in some of the aquatic Isopoda.

ORIGIN AND DISTRIBUTION

The isopods are, geologically speaking, a moderately old group, though their small size and the delicacy of their structure has not been

favorable for their preservation as fossils. Although the isopod nature of the few Paleozoic fossils that have been referred to this order is regarded as more or less open to question, true Isopoda, probably referable to existing families of the suborders Flabellifera and Valvifera, are found in Jurassic and later formations.¹ All the earlier ones are aquatic species; land isopods are known only from the upper Eocene and more recent formations, though since even the earliest land forms are referable to existing families (Oniscidae, Trichoniscidae), we cannot doubt that they existed for a considerable time previous.

Interesting as the early ancestry and history of the Isopoda would be if we could clear them up, it is with the problems of their more recent evolution and dispersal that we are concerned in the present work.

In the case of our fresh water species these appear relatively simple, for with the exception of those of the family Asellidae, they appear to have acquired a fresh-water habitat comparatively recently and often independently, as in many cases they belong to genera having marine representatives in neighboring seas, or may themselves sometimes occur in salt water. With the Asellidae the case is different. These evidently have long been inhabitants of fresh water and have undergone some differentiation, with the formation of several genera, as well as many species, since their emigration from the sea. They are probably of Old World origin and may have reached North America by way of some past land connection in the Behring Strait region. So far as we know, they have not reached South America.

In the case of the land Isopoda, or Oniscoidea, we are probably dealing with the survivors of a much larger group which has passed its maximum and period of dominance, leaving today only the terminal parts of some of its phylogenetic branches and giving but little clue as to how these branches were formerly connected.

The Ligiidae are doubtless correctly regarded as the most primitive family of the Oniscoidea because of the structure of their respiratory organs, the morphology of the head and other parts, and from their more or less amphibious habits. The latter, however, may have been secondarily acquired, for they have legs as perfectly specialized as those of any isopods for rapid locomotion on land. The Tylidae, though having some primitive features, are an aberrant lateral branch with some highly specialized characters.

The land isopods fall into two classes from the point of view of dis-

¹ Van Straelen, V. 1928. 'Contribution à l'étude des isopodes Méso-et Cénozoïques.' *Mém. Acad. Roy. Belg., cl. sci.* IX, fasc. 5, pp. 1-68, Figs. 1-4, 1 Pl.

tribution. Those of markedly littoral (sea coast) habits, including most of the Ligiidae, the Tylidae, the genus *Deto*, and some of the *Philoscia* group which can stand considerably immersion in sea water, are naturally more likely to be accidentally transported on floating logs, etc., and we find such forms to be widely distributed, or represented even on widely distant coasts by very closely related, nearly indistinguishable, allies.

The problems of the origin and distribution of the remaining land isopods, those which are not littoral in habits, are more difficult and complicated. Of course, in the case of genera and species known only from America we shall usually be correct in assuming that they evolved there, yet there seem to me strong reasons for the belief that a large part of the American land isopod fauna did not originate on this continent, but that it reached America from the Old World in various ways at various past times.

Among the facts supporting this belief may be mentioned the very great scarcity of land isopods in temperate North America, except for a few littoral ones whose comparatively easy dispersal has been alluded to above, and excepting also a few originally European or Asiatic species that in some cases quite certainly, and in others very probably, have been accidentally introduced through human agency. These are species that have adapted themselves to life under the conditions of human occupation of the land, and have become so abundant that they constitute by far the greater part of the land isopod population of temperate North America.¹ It is only from the southern boundary of the United States southward that we begin to find a land isopod fauna well developed, yet even there it probably does not approach that of the warmer parts of the Old World in number of species and variety of forms, even allowing a considerable margin for the American species and genera that still remain to be discovered. Neither does there appear to me to be sufficient ground for assuming that any of the larger and more important groups are probably of American origin, with the possible exception of the *Philoscia-Oniscus* assemblage of genera, which is very well represented in America.

On the other hand, among the larger and more important groups of Oniscoidea there are a number to which we can ascribe an Old World origin without much doubt, in some cases with hardly any at all. The

¹ *Porcellio scaber*, *P. laevis*, *P. spinicornis*, *Porcellionides pruinosus*, *Tracheoniscus rathkei*, *Cylisticus convexus*, *Oniscus asellus* and *Armadillidium vulgare* may be mentioned as the chief examples in the United States; in certain tropical American places *Cubaris murina* has a similar status.

Eubelum group (the Eubelidae, if we allow them the rank of a family) and the Armadilliidae have reached America with only a few members, the latter family perhaps only through human agency, though they are important groups in the Old World. The large groups of genera centering about *Porcellio* and *Cubaris* are so much better represented in the Old World than in America, in respect to numbers and to variety of form, that we can hardly doubt their origin in the eastern hemisphere also.

How and at what periods these various groups of Oniscoidea reached America we do not know, but evidently in some cases they arrived at some fairly remote time, as much differentiation has taken place since their arrival; in other cases they may have come rather recently.

Land isopods are most numerous in tropical and warm-temperate regions. Only a few extend northward to or over the United States-Canadian border, and reasons seem insufficient for believing in any considerable migration by means of a past land connection across Behring Strait. Most of those that are of foreign origin appear to have found some means of crossing the ocean in warmer latitudes.

The prevailing oceanic currents apparently have had the effect of carrying a few littoral forms, as *Deto* and *Trichoniscus magellanicus* to South American shores from the New Zealand region, but the specific identity of the forms from the two regions is none too well established, and no real relationship appears to exist between the South American land isopod fauna and that of the New Zealand region, such as Budde-Lund seems to have believed.

NAMES AND GENERAL DISTRIBUTION OF THE AMERICAN LAND AND FRESH-WATER ISOPODA

(A few species additional to those in the present list and the regional lists that follow are dealt with in the Supplement to this work.)

ABBREVIATIONS.—A, America; Ber., Bermuda; cen., central; C. A., Central America; e., eastern; Fla., Florida; F. I., Falkland Islands; Gal., Galapagos; J. F., Juan Fernandez; litt., littoral; Mex., Mexico; n., northern; N. A., North America; nw., northwestern; N. Z., New Zealand; O. W., Old World; Pac., Pacific; s., southern; S. A., South America; tr., tropical; w., western; W. I., West Indies, wi. dis., widely distributed. New species are marked with an asterisk (*).

LAND ISOPODA

SUBORDER ONISCOIDEA

Superfamily ATRACHEATA Verhoeff

Family LIGIIDAE

- Ligia (Ligia) oceanica* (Linnaeus), 1767, n. O. W. (n. N. A.).
Ligia (Ligia) pallasii Brandt, 1833, nw. N. A.
Ligia (Megaligia) exotica Roux, 1828, wi. dis. A., O. W.
Ligia (Megaligia) occidentalis Dana, 1853, w. N. A., Mex.
Ligia (Megaligia) cinerascens Budde-Lund, 1885, w. S. A.?
Ligia (Megaligia) hawaiiensis Dana, 1853, wi. dis. Pac. region
 (w. Mex.?).
Ligia (Megaligia) olfersii Brandt, 1833, e. tr. A., Fla. (w.
 Africa).
Ligia (Megaligia) flicornis Budde-Lund, 1893, tr. S. A.
Ligia (Nesoligia) novae-zealandiae Dana, 1853, w. S. A., J. F.,
 N. Z. `.
Ligia (Nesoligia) cursor Dana, 1853, w. S. A.?
Ligia (Nesoligia) litigiosa Wahrberg, 1922, J. F.
Ligia (Hirtiligia) baudiniana Milne-Edwards, 1840, Ber.,
 Fla., e. tr. A., Gal.
Ligia cajennensis Koch, 1847, e. tr. S. A.
Ligia (Pogonoligia) platycephala Van Name, 1927, tr. S. A.
Ligia (Pogonoligia) simoni (Dollfus), 1893, tr. S. A.
Stymphalus dilatatus (Perty), 1834, e. tr. S. A.
Ligidium gracile (Dana), 1856, nw. N. A.
Ligidium longicaudatum Stoller, 1902, e. N. A.
Ligidium hypnorum (Cuvier), 1792, O. W. (e. N. A.?).
Ligidium latum Jackson, 1923, w. N. A.
Ligidium kofoidi Maloney, 1930, w. N. A.
Ligidium elrodii (Packard), 1873, cen. N. A.

Family TRICHONISCIDAE

- Trichoniscus demivirgo* Blake, 1931, e. N. A.
Trichoniscus pygmaeus Sars, 1899, O. W. (e. N. A.).
Trichoniscus pseudopusillus Arcangeli, 1929, W. I.
Trichoniscus magellanicus (Dana), 1853, s. S. A., F. I. (N. Z.?).
Trichoniscus murrayi Dollfus, 1890, w. S. A.
Trichoniscus (Clavigeroniscus) riquieri Arcangeli, 1930, C. A.
Trichoniscus (Cordioniscus) stebbingi Patience, 1907, O. W.
 (e. N. A.).
Trichoniscus (Miktoniscus) halophilus Blake, 1931, e. N. A.
Haplophthalmus danicus Budde-Lund, 1877, O. W., e. N. A.
Oligoniscus monocellatus (Dollfus), 1890, J. F.
Brackenridgia cavernarum Ulrich, 1902, s. N. A.
Cylindroniscus seurati Arcangeli, 1929, W. I.

Superfamily PLEUROTRACHEATA Verhoeff

Family SCYPHACIDAE

- Scyphacella arenicola* Smith, 1873, e. N. A.
Deto bucculenta (Nicolet), 1849, w. S. A. (N. Z., etc.?).
Detonella papillicornis (Richardson), 1904, nw. N. A.
Armadilloniscus ellipticus (Harger), 1878, e. N. A., Ber.
Armadilloniscus tuberculatus (Holmes and Gay), 1909, w. N. A.
Armadilloniscus lindahli (Richardson), 1905, w. N. A.

Family ONISCIDAE

- Pentoniscus pruinus* Richardson, 1913, C. A.
Pentoniscus exilis Van Name, 1925, tr. S. A.
Philoscia (*Philoscia*) *muscorum* (Scopoli), 1763, O. W. (e. N. A.)
Philoscia (*Philoscia*) *vittata* Say, 1818, e. N. A.
**Philoscia* (*Philoscia*?) *geiseri*, new species, s. N. A.
Philoscia (*Ischioscia*) *variegata* Dollfus, 1893, C. A., tr. S. A.
Philoscia (*Ischioscia*) *nitida* (Miers), 1877, tr. S. A.
**Philoscia* (*Ischioscia*) *mineri*, new species, W. I.
Philoscia (*Oniscophiloscia*) *mirifica* Wahrberg, 1922, J. F.
Philoscia (*Benthana*) *picta* Brandt, 1833, e. S. A.
Philoscia (*Benthana*) *olfersii* Brandt, 1833, e. S. A.
Philoscia (*Benthana*) *pauper* Jackson, 1926, w. S. A.
Philoscia (*Benthana*) *villosa* Jackson, 1926, w. S. A.
Philoscia (*Benthana*?) *angustata* (Nicolet), 1849, w. S. A.
Philoscia (*Benthana*?) *bilineata* (Nicolet), 1849, w. S. A.
Philoscia (*Balloniscus*) *sellowii* Brandt, 1833, e. S. A.
Philoscia (*Balloniscus*) *brevicornis* Budde-Lund, 1885, s. N. A.
Philoscia (*Balloniscus*) *nigricans* Budde-Lund, 1885, s. N. A.
Philoscia (*Balloniscus*) *maculata* Budde-Lund, 1885, e. S. A.
**Philoscia paraguayana*, new species, e. S. A.
**Philoscia omissa*, new species, tr. S. A.
**Philoscia kartaboana*, new species, tr. S. A.
**Philoscia roraimae*, new species, n. S. A.
Philoscia seriepunctata Budde-Lund, 1885, tr. S. A.
**Philoscia inquilina* new species, tr. S. A.
Philoscia richmondi, Richardson, 1901, W. I.
Philoscia incerta Arcangeli, 1932, W. I.
**Philoscia moneaguensis*, new species, W. I.
Philoscia walkeri Pearse, 1915, tr. S. A.

- Philoscia demerarae* Van Name, 1925, tr. S. A.
Philoscia diminuta Budde-Lund, 1893, tr. S. A.
Philoscia gatunensis Van Name, 1926, C. A.
Philoscia paulensis Moreira, 1927, e. S. A.
Philoscia briani Arcangeli, 1929, W. I.
Philoscia baldonii Arcangeli, 1930, C. A.
**Philoscia langi*, new species, tr. S. A.
**Philoscia pearsei*, new species, tr. S. A.
Philoscia spinosa Say, 1818, s. N. A.
Philoscia culebrae Moore, 1901, W. I. (e. N. A.).
Philoscia culebroides Van Name, 1924, Gal.
Philoscia richardsonae Holmes and Gay, 1909, w. N. A.
Philoscia nomae Van Name, 1909, Gal.
Philoscia bermudensis Dahl, 1892, Ber.
Phalloniscus anomalus (Dollfus), 1890, w. S. A., J. F.
Pseudophiloscia inflexa Budde-Lund, 1904, w. S. A.
Pseudophiloscia (?) *angusta* (Dana), 1853, s. S. A.
Troglyphoscia silvestrii Brian, 1929, W. I.
Oniscus asellus Linnaeus, 1758, wi. dis., A., O. W.
Oniscus armatus Nicolet, 1849, w. S. A.
Calycuoniscus bodkini Collinge, 1815, tr. S. A.
Calycuoniscus spinosus Collinge, 1817, tr. S. A.
Trichorhina barbouri (Van Name), 1926, C. A.
Trichorhina thermophila (Dollfus), 1896, tr. A.
Trichorhina tomentosa (Budde-Lund), 1893, tr. S. A.
Trichorhina quisquiliarum (Budde-Lund), 1893, tr. S. A.
Trichorhina simoni (Dollfus), 1893, tr. S. A.
Trichorhina papillosa (Budde-Lund), 1893, tr. S. A.
Trichorhina ambigua (Budde-Lund), 1893, tr. S. A.
Trichorhina marianii Arcangeli, 1930, C. A.
Trichorhina pittieri (Pearse), 1921, tr. S. A.
Trichorhina isihmica (Van Name), 1926, C. A.
Trichorhina giannellii Arcangeli, 1929, W. I., C. A.
**Trichorhina bequaerti*, new species, W. I.
Bisilvestria marassinii Arcangeli, 1929, W. I.
Lyprobius pusillus Budde-Lund, 1885, w. N. A.
Lyprobius modestus Budde-Lund, 1885, e. S. A.
Alloniscus cornutus Budde-Lund, 1885, w. N. A.
Alloniscus perconvexus Dana, 1856, w. N. A.
Alloniscus mirabilis (Stuxberg), 1875, w. N. A.

- Alloniscus compar* Budde-Lund, 1893, tr. S. A.
Alloniscus borellii Dollfus, 1897, cen. S. A.
Alloniscus argentinus (Dollfus), 1897, e. S. A.
Alloniscus griseus Dollfus, 1897, cen. S. A.
Alloniscus sp. Richardson, 1913, C. A.
Synuropus granulatus Richardson, 1901, W. I.
Arhina porcellioides Budde-Lund, 1904, W. I.?
Porcellio scaber Latreille, 1804, wi. dis., O. W., A.
Porcellio laevis Latreille, 1804, wi. dis., O. W., A.
Porcellio spinicornis Say, 1818, e. N. A., O. W.
Porcellio pubescens Dollfus, 1893, tr. S. A.
Porcellio granarus Nicolet, 1849, w. S. A.
Porcellio liliputanus Nicolet, 1849, w. S. A.
Porcellio (Proporcellio) quadriseriatus Verhoeff, 1917, O. W.,
s. N. A.
Porcellionides pruinosus (Brandt), 1833, wi. dis., O. W., A.
Porcellionides sexfasciatus (Koch), 1847, O. W., Ber.
Porcellionides virgatus (Budde-Lund), 1885, s. N. A.
**Porcellionides habanensis*, new species, W. I.
Porcellionides saussurei (Dollfus), 1896, Mex.
Porcellionides chilensis (Dana), 1853, w. S. A.
Porcellionides advena (Stuxberg), 1872, e. S. A.
Porcellionides fuegiensis (Dana), 1853, s. S. A.
Porcellionides brunneus (Brandt), 1853, tr. S. A.
Porcellionides minutissimus (Boone), 1918, W. I.
Porcellionides bermudezi Boone, 1934, W. I.
Leptotrichus granulatus Richardson, 1902, Ber. (tr. S. A.?).
Leptotrichus vedadoensis Boone, 1918, W. I.
Nagara cristata (Dollfus), 1889, tr. A., O. W.
Cylisticus convexus (De Geer), 1778, wi. dis., e. N. A., O. W.
Tracheontiscus rathkei (Brandt), 1833, wi. dis., e. N. A., Mex.,
O. W.
Rhyscotus parallelus Budde-Lund, 1893, tr. S. A.
Rhyscotus ortonedae Budde-Lund, 1908, w. S. A. (Samoa).
Rhyscotus cubensis Budde-Lund, 1908, W. I.
Rhyscotus ciferrii Arcangeli, 1930, W. I.
Rhyscotus laxus Van Name, 1924, Gal.
Rhyscotus sphaerocephalus Budde-Lund, 1893, tr. S. A.
Rhyscotus nasutus Budde-Lund, 1908, C. A.
Rhyscotus turgifrons Budde-Lund, 1885, W. I.

Rhyscotus albidemaculatus Budde-Lund, 1908, e. S. A.

Rhyscotus jacksoni Arcangeli, 1930, W. I.

Rhyscotus texensis (Richardson), 1905, s. N. A.

Family ARMADILLIDIIDAE

Armadillidium vulgare (Latreille), 1804, wi. dis., O. W., A.

Armadillidium nasatum Budde-Lund, 1885, O. W., e. N. A.

Eluma caelatum (Miers), 1877, O. W., tr. S. A.

Family CUBARIDAE

Scleropactes concinnus Budde-Lund, 1885, w. S. A.

Scleropactes incicus Budde-Lund, 1885, w. S. A.

Scleropactes zeteki Van Name, 1926, C. A.

**Scleropactes tatei*, new species, w. S. A.

Scleropactes tristani Arcangeli, 1930, C. A.

Scleropactes estherae Arcangeli, 1930, C. A.

Scleropactes cavifrons Jackson, 1928, tr. A.?

Spherarmadillo schwarzi Richardson, 1907, C. A.

Sphaeroniscus flavomaculatus Gerstaecker, 1854, tr. S. A.

Sphaeroniscus frontalis Richardson, 1912, tr. S. A.

Sphaeroniscus portoricensis Richardson, 1901, W. I.

**Sphaeroniscus guianensis*, new species, tr. S. A.

**Sphaeroniscus tukeitanus*, new species, tr. S. A.

Sphaeroniscus columbiensis Pearse, 1915, tr. S. A.

Sphaeroniscus peruvianus (Budde-Lund), 1885, w. S. A.

Sphaeroniscus senex (Budde-Lund), 1893, tr. S. A.

Sphaeroniscus granulatus Dollfus, 1893, tr. S. A.

Sphaeroniscus gaigei Pearse, 1915, tr. S. A.

Sphaeroniscus sp. Dollfus, 1893, tr. S. A.

Sphaeroniscus sp. Dollfus, 1896, C. A.

Circoniscus bezzii Arcangeli, 1931, tr. S. A.

Circoniscus gaigei Pearse, 1917, tr. S. A.

**Circoniscus hamatus*, new species, tr. S. A.

Circoniscus spinosus Collinge, 1918, tr. S. A.

Cozopodias tristani (Richardson), 1910, C. A.

Cozopodias ruthveni (Pearse), 1915, tr. S. A.

Haplarmadillo monocellatus Dollfus, 1896, W. I.

Globarmadillo armatus Richardson, 1910, C. A.

Periscyphis sp. Kraepelin, 1901, e. S. A.?

Pseudarmadillo carinulatus Saussure, 1857, W. I. (Mex.?).

Pseudarmadillo dollfusi Richardson, 1905, W. I.

- Pseudarmadillo welchi* Boone, 1934, W. I.
Pseudarmadillo gillianus Richardson, 1902, W. I.
Pseudarmadillo buscki Boone, 1934, W. I.
Delatorreia hoplites Boone, 1934, W. I.
 **Cubaris watsoni*, new species, W. I.
Cubaris colomboi Arcangeli, 1929, W. I.
Cubaris zigzag (Dollfus), 1896, W. I.
Cubaris boliviana (Dollfus), 1897, tr. S. A.
 **Cubaris booneae*, new species, W. I.
Cubaris hendersoni Boone, 1934, W. I.
Cubaris aguayoi Boone, 1934, W. I.
Cubaris congenera (Budde-Lund), 1904, tr. S. A.
Cubaris venusta (Budde-Lund), 1893, tr. S. A.
Cubaris silvarum Dollfus, 1896, W. I.
Cubaris sanchezi Boone, 1934, W. I.
Cubaris clausa (Budde-Lund), 1885, tr. S. A.
Cubaris walkeri Pearse, 1911, Mex.
Cubaris multipunctata (Budde-Lund), 1885, tr. S. A.
Cubaris rubropunctata (Budde-Lund), 1893, tr. S. A.
Cubaris pumila (Budde-Lund), 1893, tr. S. A.
Cubaris viticola (Dollfus), 1896, W. I.
Cubaris scaberrima (Dollfus), 1893, tr. S. A.
Cubaris perlata (Dollfus), 1896, W. I.
 **Cubaris phylax*, new species, W. I.
 **Cubaris moneaguensis*, new species, W. I.
 **Cubaris oaxacana*, new species, Mex.
Cubaris grenadensis (Budde-Lund), 1893, W. I., tr. S. A.
Cubaris nigrorufa (Dollfus), 1893, tr. S. A.
Cubaris similis (Budde-Lund), 1885, S. A.?
Cubaris pisum (Budde-Lund), 1885, Fla.
Cubaris gigas Miers, 1877, C. A.
Cubaris dumorum (Dollfus), 1896, W. I.
Cubaris dugesi (Dollfus), 1896, Mex.
Cubaris beebei Van Name, 1924, Gal.
Cubaris truncorum (Budde-Lund), 1893, tr. S. A.
Cubaris vincentis (Budde-Lund), 1904, W. I. (tr. S. A.?).
 **Cubaris culebrae*, new species, W. I.
Cubaris jamaicensis Richardson, 1912, W. I.
Cubaris verrucosa (Budde-Lund), 1904, tr. S. A.
Cubaris galapagoensis Miers, 1877, Gal.

- Cubaris tuberosa* (Budde-Lund), 1904, W. I.
Cubaris ramsdeni Boone, 1934, W. I.
 **Cubaris wheeleri*, new species, W. I.
Cubaris brevispinis Pearse, 1915, tr. S. A.
 **Cubaris mineri*, new species, tr. S. A.
Cubaris longispinis Richardson, 1912, C. A.
Cubaris murina Brandt, 1833, wi. dis., tr. A., O. W.
Cubaris cinerea Brandt, 1833, e. S. A.
Cubaris brunnea Brandt, 1833, tr. S. A.
Cubaris flavobrunnea (Dollfus), 1896, C. A.
 **Cubaris cinchonae*, new species, W. I.
Cubaris tenuipunctata (Dollfus), 1896, W. I.
Cubaris depressa (Dollfus), 1896, W. I.
Cubaris affinis (Dana), 1854, w. N. A.
Cubaris californica (Budde-Lund), 1885, w. N. A.
Cubaris cacahuamilpensis (Bilimek), 1867, Mex.
Cubaris granaria (Nicolet), 1849, w. S. A.
Diploexochus echinatus Brandt, 1833, tr. S. A.
Acanthoniscus spiniger Kinahan, 1859, W. I.
Ethelum americanum (Dollfus), 1896, W. I., tr. S. A.
Ethelum reflexum (Dollfus), 1896, W. I.
Ethelum modestum (Dollfus), 1896, W. I.
Ethelum sp. Kraepelin, 1901, tr. S. A.

Superfamily HYPOTRACHEATA Verhoeff

Family TYLIDAE

- Tylos latreillei* Adouin and Savigny 1826, wi. dis., Ber., Fla.,
 tr. A.
Tylos punctatus Holmes and Gay, 1909, w. N. A.
 **Tylos insularis* Van Name, new species, Gal.
Tylos niveus Budde-Lund, 1885, Fla., W. I.
Tylos spinulosus Dana, 1853, s. S. A.
Tylos sp., De Borre, 1886, w. S. A.

Total species of land Isopoda for all of America 254, of which 26 are described as new in this work. Six species, probably all additional, are mentioned by various writers under generic names only.

Twenty-two of these 254 are known from Europe, Asia, or Africa also, some of which are now so well established and widely distributed in America that we cannot be certain whether they are introduced or indigenous; others are very local, if really effectively colonized in

America, besides four species that appear to have reached America from the New Zealand region by natural means.

FRESH-WATER ISOPODA

SUBORDER OR ORDER CHELIFERA

Family TANAIDAE

Tanais fluviatilis Giambiagi, 1923, e. S. A.

Nototanais beebi Van Name, 1925, tr. S. A.

SUBORDER FLABELLIFERA

Family CIROLANIDAE

Cirolana cubensis Hay, 1903, W. I.

**Cirolana browni*, new species, W. I.

Conilera stygia Packard, 1901, Mex.

Cirolanides texensis Benedict, 1896, s. N. A.

Family EXCORALLANIDAE

Excorallana herbicensis Boone, 1918, tr. S. A.

Family CYMOTHOIDAE

Nerocila fluviatilis Schioedte and Meinert, 1881, e. S. A.

Braga cichlae Schioedte and Meinert, 1883, e. S. A.

Braga patagonica Schioedte and Meinert, 1884, e. S. A., also marine

Braga fluviatilis Richardson, 1911, e. S. A.

Telotha hensellii (von Martens), 1869, tr. and e. S. A.

Telotha lunaris Schioedte and Meinert, 1884, e. S. A.

Livoneca symmetrica Van Name, 1925, tr. S. A.

Livoneca guianensis Van Name, 1925, tr. S. A.

Livoneca lazzari Pearse, 1921, tr. S. A.

Asotana formosa Schioedte and Meinert, 1881, w. S. A.

Artystone trysibia Schioedte, 1866, tr. S. A.

Family SPHAEROMIDAE

Sphaeroma terebrans Bate, 1866, Fla., wi. dis., also marine.

Exosphaeroma dugesi (Dollfus), 1893, Mex.

Exosphaeroma thermophilum (Richardson), 1905, s. N. A.

Exosphaeroma oregonensis (Dana), 1853, nw. N. A.

SUBORDER VALVIFERA

Family IDOTHEIDAE

Pentidotea lacustris (Thomson), 1879, s. S. A., (N. Z.?).

Cleantis linearis, Dana, 1849, s. S. A.

Mesidotea entomon (Linnaeus), 1767, nw. N. A.

SUBORDER ASELLOTA

Family ASELLIDAE

Asellus communis Say, 1818, e. N. A.*Asellus intermedius* Forbes, 1876, e. N. A.*Asellus aquaticus* Linnaeus, 1761, O. W., Greenland.*Asellus tomalensis* Harford, 1877, w. N. A.*Asellus attenuatus* Richardson, 1900, e. N. A.*Asellus brevicauda* Forbes, 1876, cen. N. A.*Asellus hoppinae* Faxon, 1888, cen. N. A.**Asellus incisus*, new species, cen. N. A.*Caecidotea stygia* Packard, 1876, e. and cen. N. A.*Caecidotea alabamensis* Stafford, 1911, s. N. A.*Caecidotea nickajackensis* Packard, 1881, cen. and s. N. A.*Caecidotea richardsonae* Hay, 1902, cen. N. A.*Caecidotea smithii* Ulrich, 1902, s. N. A.*Caecidotea tridentata* Hungerford, 1922, cen. N. A.*Caecidotea antricola* Creaser, 1931, cen. N. A.*Mancasellus tenax* (Smith), 1871, n. N. A.*Mancasellus dilatatus* (Smith), 1871, n. N. A.*Mancasellus brachyurus* Harger, 1876, e. N. A.*Mancasellus macrourus* Garman, 1890, cen. N. A.*Mancasellus danielsi* Richardson, 1902, cen. N. A.**Mancasellus herricki*, new name, s. N. A.*Mancasellus lineatus* Say, 1818, e. N. A.

SUBORDER EPICARIDEA

Family BOPYRIDAE

Probopyrus bithynis Richardson, 1904, s. N. A., tr. A.*Probopyrus oviformis* Nierstrasz and Brender à Brandis, 1929,
W. I.

Total fresh-water Isopoda, 49 species (2 new and 1 new name).

Total land and fresh-water Isopoda, 303 species (28 new and 1 new name).

LIST OF NEW SPECIES DESCRIBED¹*Philoscia geiseri**Sphaeroniscus guianensis**Philoscia mineri**Sphaeroniscus tukeitanus*¹ Additional new species described in Supplement *Exosphaeroma bondi*, *Porcellionides mulaiki*.

<i>Philoscia paraguayana</i>	<i>Cubaris watsoni</i>
<i>Philoscia omissa</i>	<i>Cubaris booneae</i>
<i>Philoscia kartaboana</i>	<i>Cubaris phylax</i>
<i>Philoscia roraimae</i>	<i>Cubaris moneaguensis</i>
<i>Philoscia inquilina</i>	<i>Cubaris oaxacana</i>
<i>Philoscia moneaguensis</i>	<i>Cubaris culebrae</i>
<i>Philoscia langi</i>	<i>Cubaris wheeleri</i>
<i>Philoscia pearsei</i>	<i>Cubaris mineri</i>
<i>Trichorhina bequaerti</i>	<i>Cubaris cinchonae</i>
<i>Porcellionides habanensis</i>	<i>Tylos insularis</i>
<i>Scleropactes tatei</i>	<i>Cirolana browni</i>
<i>Circoniscus hamatus</i>	<i>Asellus incisus</i>
	<i>Mancasellus herricki</i> (new name)

New subgenus, or new name, *Hirtiligia*, subgenus of *Ligia* Fabricius, type *Ligia baudiniana* Milne-Edwards, 1840. This is perhaps equivalent to *Ligyda* in the restricted sense used by Verhoeff, 1926.

REGIONAL DISTRIBUTION

Of the 254 land isopods, very nearly 75 per cent are found in that part of America that lies within or close to the tropics, including the West Indies as well as the continental areas.

In the case of fresh-water isopods, there is no such preponderance of tropical species (only 17 out of 49); this is due, however, largely to the considerable number of species of the family Asellidae which have been described from the United States, but which may not all be valid.

SPECIES FROM THE WEST INDIES (EXCLUSIVE OF TRINIDAD)

(73 species, 54 peculiar to the region)

Those which, so far as known, are exclusively West Indian are indicated by the abbreviation "excl." These number 42.

Land Isopods

(70 species, 51 peculiar to the region)

- Ligia exotica* Bahamas, Antigua, Santo Domingo, Puerto Rico, Cuba
Ligia olfersii Bahamas, St. Thomas, St. John, Guadeloupe
Ligia baudiniana Bahamas, Culebra, Puerto Rico, Jamaica, Cuba
Trichoniscus pseudopusillus (excl.) Cuba
Cylindroniscus suerati (excl.) Cuba
Philoscia mineri (excl.) Dominica
Philoscia culebrae Culebra, Puerto Rico
Philoscia richmondi (excl.) Puerto Rico, Mona

- Philoscia incerta* (excl.) Dominica
Philoscia moneaguensis (excl.) Jamaica
Philoscia briani (excl.) Cuba
Troglyphoscia silvestrii (excl.) Cuba
Oniscus asellus Cuba
Trichorhina thermophila Haiti, Jamaica
Trichorhina giannellii Cuba
Trichorhina bequaerti (excl.) Cuba
Bisilvestria marassinii (excl.) Cuba
Synuropus granulatus (excl.) Puerto Rico
Arhina porcellioides "On plants from West Indies"
Porcellio scaber St. Croix
Porcellio laevis Bahamas, Puerto Rico, Santo Domingo, Cuba
Porcellionides pruinus Bahamas, Culebra, Puerto Rico, Mona, Desecheo, St. Croix, St. Thomas, Dominica, Cuba, Jamaica
Porcellionides habanensis (excl.) Cuba
Porcellionides minutissimus (excl.) Bahamas
Porcellionides bermudezi (excl.) Cuba
Leptotrichus vedadoensis (excl.) Cuba
Nagara cristata Dominica
Rhyscotus cubensis (excl.) Cuba
Rhyscotus ciferrii (excl.) Santo Domingo
Rhyscotus turgifrons (excl.) St. John
Rhyscotus jacksoni (excl.) Santo Domingo
Sphaeroniscus portoricensis (excl.) Puerto Rico
Sphaeroniscus guianensis Dominica
Haplarmadillo monocellatus (excl.) St. Vincent
Pseudarmadillo carinulatus (excl.) Cuba
Pseudarmadillo dollfusi (excl.) Bahamas
Pseudarmadillo welchi (excl.) Cuba
Pseudarmadillo gillianus (excl.) Cuba
Pseudarmadillo buscki (excl.) Cuba
Delatorreia hoplites (excl.) Cuba
Cubaris watsoni (excl.) Jamaica
Cubaris colomboi (excl.) Cuba
Cubaris zigzag (excl.) St. Vincent
Cubaris booneae (excl.) Jamaica
Cubaris hendersoni (excl.) Haiti
Cubaris aguayoi (excl.) Cuba
Cubaris silvarum (excl.) St. Vincent

- Cubaris sanchezi* (excl.) Cuba
Cubaris viticola (excl.) Grenada
Cubaris perlata (excl.) St. Vincent or Grenada
Cubaris phylax (excl.) Santo Domingo
Cubaris moneaguensis (excl.) Jamaica
Cubaris grenadensis Grenada, Bequia, Cuba
Cubaris dumorum (excl.) Mustique
Cubaris vincentis (excl.?) St. Vincent
Cubaris culebrae (excl.) Culebra, St. John, Desecheo
Cubaris jamaicensis (excl.) Jamaica
Cubaris tuberosa (excl.) Haiti, St. Thomas
Cubaris ramsdeni (excl.) Cuba
Cubaris wheeleri (excl.) Culebra
Cubaris murina Puerto Rico, St. Thomas, Haiti, Dominica, Cuba,
 Jamaica
Cubaris cinchonae (excl.) Jamaica
Cubaris tenuipunctata (excl.) Mustique
Cubaris depressa (excl.) St. Vincent
Acanthoniscus spiniger (excl.) Jamaica
Ethelum americanum St. Vincent
Ethelum reflexum (excl.) St. Vincent or Grenada
Ethelum modestum (excl.) St. Vincent
Tylos latreillei Puerto Rico
Tylos niveus Cuba

Fresh-water Isopods

(3 species, all peculiar to the region)

- Cirolana cubensis* (excl.) Cuba
Cirolana browni (excl.) Cuba
Probopyrus oviformis (excl.) St. Croix

The following additional land isopods are known from Trinidad.

- Philoscia demerarae?* tr. S. A.
Calycuoniscus bodkini tr. S. A.
Calycuoniscus spinosus (excl.)
Diploexochus echinatus tr. S. A.

SPECIES FROM NORTH AMERICA NORTH OF MEXICO

(80 species, 52 peculiar to the region)

Abbreviations as in General List above, except that species peculiar to this region are designated by the abbreviation "excl.," and that

common and more or less widely distributed species are marked with one or two asterisks.

Land Isopods

(52 species, 29 peculiar to the region)

- Ligia oceanica* litt. n. e., chiefly O. W.
*Ligia pallasii** (excl.) litt. nw.
*Ligia exotica** litt. s., also O. W.
*Ligia occidentalis** litt. w.
Ligia olfersii litt. s., also O. W. (West Africa)
*Ligia baudiniana** litt. Fla.
Ligidium gracile (excl.) litt. nw.
Ligidium longicaudatum (excl.) e.
 (*Ligidium hypnorum* O. W., doubtfully American)
Ligidium latum (excl.) litt. w.
Ligidium kofoidi (excl.) w.
Ligidium elrodii (excl.) cen.
*Trichoniscus demivirgo** (excl.) e.
 (*Trichoniscus pygmaeus* e., O. W., once reported in America)
 (*Trichoniscus stebbingi* e., O. W., once reported in America)
Trichoniscus halophilus (excl.) litt. e.
Haplophthalmus danicus e., chiefly O. W.
Brackenridgia cavernarum (excl.) cen.
*Scyphacella arenicola** (excl.) litt. e.
Detonella papillicornis (excl.) litt. nw.
*Armadilloniscus ellipticus** (excl.) litt. e.
Armadilloniscus tuberculatus (excl.) litt. w.
Armadilloniscus lindahli (excl.) litt. w.
Philoscia muscorum litt. e., chiefly O. W.
*Philoscia vittata** (excl.) litt. e.
Philoscia geiseri (excl.) s.
Philoscia brevicornis (excl.) s.
Philoscia nigricans (excl.) s.
Philoscia spinosa (excl.) s.
Philoscia culebrae litt. e.
Philoscia richardsonae (excl.) litt. w.
*Oniscus asellus*** wi. dis., also O. W.
Alloniscus cornutus (excl.) litt. w.
Alloniscus perconvexus (excl.) litt. w.
Alloniscus mirabilis (excl.) w.
Lyprobius pusillus (excl.) w.

- Porcellio scaber*** wi. dis., also O. W.
*Porcellio laevis*** wi. dis., also O. W.
*Porcellio spinicornis*** e., also O. W.
Porcellio quadriseriatus Texas, O. W.
*Porcellionides pruinosus*** wi. dis., also O. W.
Porcellionides virgatus (excl.), s.
*Cylisticus convexus*** wi. dis., e., also O. W.
*Tracheoniscus rathkei*** wi. dis., e., also O. W.
*Armadillidium vulgare*** wi. dis., also O. W.
Armadillidium nasatum e., chiefly O. W.
Cubaris pisum (excl.) Fla.
Cubaris affinis (excl.) w.
Cubaris californica (excl.) w.
Tylos latreillei litt. Fla., also O. W.
Tylos punctatus (excl.) litt. w.
Tylos niveus litt. Fla.

At first sight 52 would appear to be a fairly large number of species for a temperate region, but in reality the scarcity of land isopods in North America is remarkable.

No less than 22, or more than half these North American species, are littoral or coastal species and hence absent from most of the area, even though some may be locally common. No less than 9 out of the 52, though they were described many years ago, have never been recorded again. Many others are rare or local, or only barely reach the southern border of the United States. 19 of them are natives of, or known also from the Old World, and of these at least 3 are known in America only as accidental importations, evidence of their establishment on this continent being lacking. Only those species (16 in number) marked with one or two asterisks can be considered at all common and well known in this region; indeed it is a safe statement that 95 per cent of the land isopods that will come to the notice of the ordinary observer in most parts of the United States or Canada will belong to one or another of the 8 species marked with two asterisks. All of these 8 are Old World species for whose introduction man is either certainly or very probably responsible.

Fresh-water Isopods

(28 species, 23 peculiar to the region)

- Cirolanides texensis* (excl.) s.
Sphaeroma terebrans wi. dis., Fla., also marine

- Exosphaeroma thermophilum* (excl.) s.
Exosphaeroma oregonensis n. w. (chiefly marine)
Mesidotea entomon n. w. (chiefly marine)
Asellus communis (excl.), the only very common and widely distributed
 fresh-water isopod in North America
Asellus intermedius (excl.) e.
Asellus aquaticus O. W. (reaches Greenland and perhaps northwestern
 North America)
Asellus tomalensis (excl.) n. w.
Asellus attenuatus (excl.) e.
Asellus brevicauda (excl.) cen.
Asellus hoppinae (excl.) cen.
Asellus incisus (excl.) cen.
Caecidotea stygia (excl.) e. and cen.
Caecidotea alabamensis (excl.) s.
Caecidotea nickajackensis (excl.) cen. and s.
Caecidotea richardsonae (excl.) cen.
Caecidotea smithii (excl.) s.
Caecidotea tridentata (excl.) cen.
Caecidotea antricola (excl.) cen.
Mancasellus tenax (excl.) n.
Mancasellus dilatatus (excl.) n.
Mancasellus brachyurus (excl.) e.
Mancasellus macrourus (excl.) cen.
Mancasellus danielsi (excl.) cen.
Mancasellus herricki (excl.) s.
Mancasellus lineatus (excl.) s.
Probopyrus bithynis s.

Of these 28 species, no less than 22* belong to the single family Asellidae, a group characteristic of temperate latitudes.

SPECIES FROM THE TEMPERATE REGION OF SOUTH AMERICA

(37 species, 19 peculiar to the region)

Land Isopods

(32 species, 16 peculiar to the region)

Excluding a few recently described forms and those of wide distribution well known from other parts of the world, the species of this region have for the most part been insufficiently described and figured. Species peculiar to the region are designated by the abbreviation "excl." in the following list.

- Ligia exotica* litt. w.
 (*Ligia cinerascens* litt. w., doubtfully South American)
Ligia novae-zealandiae litt. s., also N. Z., etc.
Ligia cursor (excl.) litt. w.
Trichoniscus magellanicus s. S. A. (N. Z.?), only land isopod known
 from Falkland Islands
Trichoniscus murrayi w.
Deto bucculenta w. (N. Z., etc.?)
Philoscia picta e.
Philoscia olfersii e.
Philoscia pauper (excl.) w.
Philoscia angustata (excl.) w.
Philoscia bilineatus (excl.) w.
Philoscia sellowii (excl.) e.
Philoscia maculata (excl.) e.
Philoscia paraguayana (excl.) cen.
Philoscia paulensis (excl.) e.
Phalloniscus anomalus litt., also J. F.
Pseudophiloscia inflexa (excl.) w.
Pseudophiloscia angusta (excl.) s.
Oniscus armatus (excl.) w.
Alloniscus borellii cen.
Alloniscus argentinus w. cen.
Lyprobius modestus e.
Porcellio scaber wi. dis., O. W.
Porcellio granarus (excl.) w.
Porcellio liliputanus (excl.) w.
Porcellio pruinosus wi. dis., O. W.
Porcellionides chilensis (excl.) w.
Porcellionides fuegiensis (excl.) s.
Armadillidium vulgare wi. dis., O. W.
Cubaris granaria (excl.) w.
Tylos spinulosus (excl.) s.

Fresh-water Isopods

(5 species, 3 peculiar to the region)

- Tanais fluviatilis* (excl.) e.
Braga fluviatilis (excl.) cen.
Braga patagonica (excl.) e.
Telotha henselii e.
Artystone trysibia e.

SPECIES FROM THE OUTLYING ISLAND GROUPS

The few land isopods (there are no fresh-water isopods) that are known from the Bermuda, Galapagos, and Juan Fernandez Islands are largely species from the Old World and littoral forms.

There are in each case certain species (designated "excl." in the following lists) peculiar to the islands. The others are largely widely distributed forms, for whose introduction man may have been responsible in most cases.

Only one land isopod, *Trichoniscus magellanicus*, a form closely allied to if distinct from one found in New Zealand, has been reported from the Falkland Islands.

From Greenland the widely distributed *Porcellio scaber* and (less reliably) *Oniscus asellus*, also the European fresh-water form *Asellus aquaticus*, have been recorded.

SPECIES FROM BERMUDA

(12 species, 2 peculiar to the islands)

Two supposed species, *Porcellio parvicornis* and *Uropodias bermudensis*, recorded by Richardson, are to be eliminated, as they are based on immature stages of other species.

- Ligia baudiniana* litt., e. tr. A., Gal.
Ligia exotica litt. wi. dis., O. W.
Armadilloniscus ellipticus litt., e. N. A.
Philoscia bermudensis (excl.)
Porcellio scaber wi. dis., O. W.
Porcellio laevis wi. dis., O. W.
Porcellionides sexfasciatus O. W.
Porcellionides pruinosus wi. dis., O. W.
Leptotrichus granulatus (excl.)
Armadillidium vulgare wi. dis., O. W.
Tylos latreillei litt., e. tr. A., O. W.
Tylos niveus litt., W. I., Fla.

SPECIES FROM THE GALAPAGOS ISLANDS

(11 species, 6 peculiar to the islands)

- Ligia baudiniana* litt., also e. tr. A.
Ligia exotica litt. wi. dis., O. W.
Philoscia culebroides (excl.) litt.
Philoscia nomae (excl.) litt.
Porcellio scaber wi. dis., O. W.

- Porcellio laevis* wi. dis., O. W.
Porcellionides pruinosus wi. dis., O. W.
Rhyscotus laxus (excl.)
Cubaris galapagoensis (excl.)
Cubaris beebei (excl.)
Tylos insularis (excl.)

SPECIES FROM THE JUAN FERNANDEZ ISLANDS

(8 species, 3 peculiar to the islands)

- Ligia litigiosa* (excl.) litt.
Ligia novae-zealandiae litt., s. S. A., also N. Z., etc.
Oligoniscus monocellatus (excl.) litt.
Philoscia mirifica (excl.) litt.
Phalloniscus anomalus litt. (also Chile)
Porcellio scaber wi. dis., O. W.
Porcellio laevis wi. dis., O. W.
Armadillidium vulgare wi. dis., O. W.

DESCRIPTIONS OF SPECIES

LAND ISOPODA

SUBORDER ONISCOIDEA

This suborder is composed of all the terrestrial or land Isopoda and contains no species that cannot justly be called terrestrial, though a few are littoral in habits and can endure lengthy immersion in fresh or salt water without harm.

The outstanding characters of the group are the adaptation of the seven pairs of legs for progression on land, the reduction of the first antennae (antennules) to small rudiments of two or three joints, and their insertion between, instead of in front of, the second antennae, the absence of a palp or jointed appendage on the mandibles, and the adaptation of the pleopoda for respiration in air.

Other facts regarding the structure, distribution, and classification of this group have been dealt with in the introductory part of this work or are given under the three superfamilies (Hypotracheata, Atracheata, and Pleurotracheata) into which it is divided in Verhoeff's classification, which has been followed in the present book as far as its main features are concerned.

Superfamily **Atracheata** Verhoeff

Tracheae absent from the exopodites of the pleopoda. Uropoda styliform, their endopodites (inner branches) widely separated. Mandibles with a molar process. Body not capable of rolling into a ball.

This is a moderate-sized group comprising the most generalized and primitive Oniscoidea. Many of them are more or less amphibious in habits.

Ligiidae

(Syn. Ligydididae)

In this family the body is oval or elliptical in a dorsal view with more or less loosely articulated segments, the head rounded in front, without projecting lobes, and the forehead is not very conspicuously defined from the epistome. The second antennae are very long with a flagellum of numerous articles. The first pair of pleopods are similar in both sexes; in the male those of the second pair each bear a long slender stylus enlarged at the end. One or both branches of the uropoda are long and styliform.

Though structurally this is a primitive group of the Oniscoidea, it is questionable whether the littoral and almost amphibious habits of many of its members are primitive or acquired, as they have legs as well specialized for rapid locomotion on land as those of any other isopod.

LIGIA FABRICIUS, 1798

(Syn. *Ligyda* Rafinesque, 1814)

Figure 5

The generic name *Ligia*, though formerly universally accepted and still employed by most authorities, was abandoned in favor of *Ligyda* Rafinesque, 1814, by Richardson (1905, Proc. Biol. Soc. Washington, XVIII, p. 10) and by some other American authors, including myself, in consequence of the following statement by Miss M. J. Rathbun:

"*Ligia* Weber (1795) has three species, *inflexa*, *cuspidata* and *granaria* Herbst, the last is *Cancer granarius* Herbst, which is a megalopa stage of an undetermined crab. *Ligia*, therefore may be considered a synonym of *Cancer* and the name cannot be used for an isopod." (Rathbun, Proc. Biol. Soc. Washington, XVII, p. 172.)

In the present article I have returned to the use of *Ligia* in preference to *Ligyda*, as it does not seem to me that *Ligia* Weber has a very valid standing as a genus, having neither a diagnosis nor any recognizable species as its type. To upset and abandon so well established a genus as *Ligia* Fabricius on such grounds seems to me insufficiently justified.

This genus is composed of species of large or rather large size, having large eyes with very numerous ocelli; the first antennae very small; the second antennae long and stout with numerous articles in the flagellum. The last segment of the abdomen is broad with its lateral regions well developed and often produced into points at the rear lateral angles; the basal segment of the uropoda is not produced at the rear inner angle; both its branches are long and styliform.

Its members inhabit the shores of the sea just at or close to the water line, or in a few cases those of rivers and streams in forests, and are of more or less amphibious habits.

As a means of identifying the species of this region, I would recommend first consulting the figure which shows the rear end of the telson of the several species, the outline of which is often characteristic. The general resemblance between the species is so great that they are best dealt with by devoting attention chiefly to the distinguishing characters, rather than by giving full descriptions that would be chiefly mere repetition of characters common to all. While there are often differences between the species in the relative length of the uropoda and antennae and in the number of articles in the flagella of the latter, these features are subject to far greater variation individually, as well as with age

and sex, than has been commonly supposed, and differences in them are not necessarily significant or reliable as specific characters.

Ligia for a long time enjoyed unusual immunity from genus splitting, but Verhoeff (1926, pp. 347, 348) has divided it into a number of genera, retaining *Ligia* for *L. oceanica* L. and "*L. italica* B. L.," giving full generic rank to *Geoligia* Dollfus and "*Ligyda* Pearse," and establishing *Megaligia* (type "*exotica* B. L."), *Nesoligia* (type "*novaezealandiae* Chilton"), etc. In considering this innovation, it should be remarked that Budde-Lund was not the describer of *italica* or of *exotica*, nor Chilton of *novae-zealandiae*, and that the types of Verhoeff's restricted genera

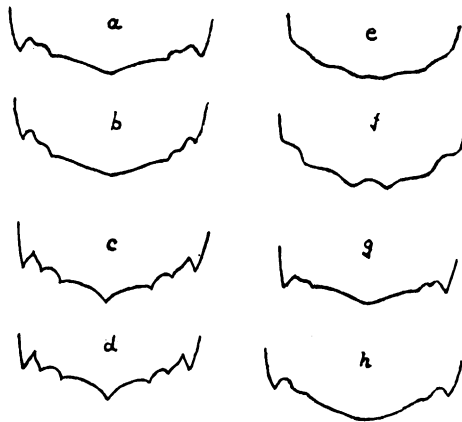


Fig. 5. Genus *Ligia*. Fig. b, after Jackson, 1922; Fig. h, after Chilton, 1916. Outline of rear border of telson in:

a, *L. baudiniana*
b, *L. hawaiiensis*
c, *L. exotica*
d, *L. olfersii*

e, *L. richardsonae* (= *simoni*)
f, *L. platycephala*
g, *L. occidentalis*
h, *L. novae-zealandiae*

Geoligia and *Ligyda* are apparently one and the same species, aside from the question of the propriety of using *Ligyda* in such a manner. Jackson, 1922, in his monograph of *Ligia* kept the group nearly intact. The genus *Geoligia* Dollfus, 1893, is discussed below under *Ligia simoni*.

The two following species belong to the typical subgenus *Ligia*. (Detailed diagnosis in Verhoeff, 1928, p. 119.)

***Ligia (Ligia) oceanica* (Linnaeus), 1767**

Figure 6

Ligia oceanica FABRICIUS, 1798, Suppl., 'Ent. Syst.,' p. 301.—LEIDY, 1855, p. 150.—BUDDE-LUND, 1879, p. 8; 1885, p. 259.—SARS, 1899, p. 156 (descr.), Pl. LXX.—

RICHARDSON, 1900a, p. 306; 1901, p. 574.—VERRILL, 1902, p. 845.—JACKSON, 1922, p. 691.

Ligyda oceanica RICHARDSON, 1905, p. 684 (descr.), Figs. 728, 729.—RATHBUN, 1905, p. 47, check list, p. 4.—FOWLER, 1912, p. 516.—SUMNER, OSBURN, AND COLE, 1913, p. 661.—PRATT, 1916, p. 380.—WALKER, 1927, p. 176.—BLAKE, 1931, p. 349.—PRATT, 1935, p. 444.

Oniscus oceanicus LINNAEUS, 1767, I, part 2, p. 1061 (orig. descr.).

“Male specimen described. Length, 25 mm. Breadth, 12 mm. Surface moderately coarsely granulated. Eyes of moderate size,

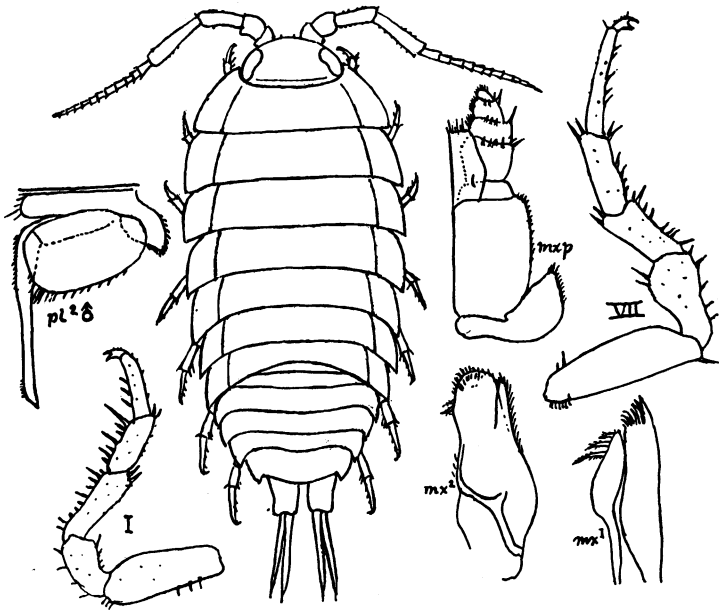


Fig. 6. *Ligia oceanica* (Linnaeus). Adapted from Sars, 1899.

rounded, and separated by twice their horizontal length. Antennae moderately long and stout; flagellum reaching as far as the hind border of the 4th thoracic somite, the peduncle halfway down the 2nd somite. Flagellum with 12 to 14 very short and stout segments. Coxal plates divided by very distinct grooves from terga of every thoracic somite in both sexes. Abdomen not abruptly contracted. Telson arcuate; the postero-lateral processes acute and nearly as long as the middle of the hind border; accessory processes not produced, but the inner forming a

prominent undulation. Mouthparts: 2nd maxilla bilobed, with two hairy bristles on inner side. Maxillipede palp clearly divided into five joints. First peraeopod of the male only has merus, carpus, and propodus produced on inner side to a flat plate-like expansion, with free border fringed with short setae. The surface of this expansion is covered by oblique serrations. Uropods, 7 mm." (Jackson, 1922, p. 691.)

DISTRIBUTION.—According to Sars, 1899, it occurs on the "coasts of Denmark, Prussia, Belgium, France, Spain, Britain, and the Faroe Islands. Along the western coast of Norway this form occurs plentifully and extends northward at least to the Trondhjem Fjord." It "deserves its specific name, being apparently restricted to those coasts that are open to the oceans. It is always found close to the shore, just above high water mark, beneath decaying algae and stones." (Sars, 1899.)

The only American records appear to be those given by Richardson, 1901, "Off Newport, Rhode Island," and Blake, 1931, p. 349, who found a cast skin on the rocks at East Gloucester, Mass.

Verrill, 1902, p. 845, speaking of Bermuda, says, "*Ligia oceanica* probably also occurs but we did not obtain it. Its distribution is world wide in warm climates." This is undoubtedly a mistake for *L. exotica*. There is not the slightest reason to expect the occurrence of this northern species in the almost tropical waters of Bermuda. A *Ligia* was, according to Harger, 1880, p. 310, doubtfully reported by Leidy, 1855, from Point Judith, Rhode Island (see also remarks under *L. exotica*).

This species is the type of the genus and hence of the typical subgenus (*Ligia*). For detailed information of it on the European coast see Nicholls, A. G., 1931, 'Studies on *Ligia oceanica*,' Jour. Marine Biol. Assoc., Plymouth, XVII, pp. 655-706, 1 Pl., 14 text figs.

Ligia (Ligia) pallasii Brandt, 1833

Figure 7

Ligia dilatata STIMPSON, 1857, p. 507, Pl. xxii, fig. 8.—SMITH, 1880, p. 218.—UNDERWOOD, 1886, p. 360.

Not *L. dilatata* BRANDT, 1833; not *L. dilatata* PERTY, 1834 (= *Stymphalus dilatatus* BUDE-LUND).

Ligia pallasii BRANDT, 1833, p. 172 (orig. descr.).—BUDE-LUND, 1879, p. 8; 1885 (descr.), p. 261.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1899, p. 866 (Ann. Mag. Nat. Hist., (7) IV, p. 334); 1900a, p. 306; 1904, p. 670; 1904a, p. 226.—JACKSON, 1922, p. 691 (descr.), Pl. I, fig. 4.—JOHANSEN, 1928, p. 106.

Ligia septentrionalis LOCKINGTON, 1877, p. 46 (descr.).

Ligia stimpsoni MIERS, 1877a, p. 671.

Ligyda pallasii RICHARDSON, 1905, p. 682 (descr.), Figs. 726, 727; 1909a, p.

125.—JOHANSEN, 1926b, p. 167.—FEE, 1927, p. 30 (descr.).—WALKER, 1927, p. 176.—JOHNSON AND SNOOK, 1927, p. 292, Fig. 251.—PRATT, 1935, p. 444 (*pallasii*).

“Male specimen described. Length, 35 mm. Breadth, 20 mm. Surface coarsely granulated. Eyes of moderate size, rounded, and separated by twice their horizontal length. Antennae moderately long and stout; flagellum reaching as far back as hind border of 5th somite, peduncle to hind border of 2nd somite; flagellum with 15 short and stout segments, without large setae but densely covered with exceedingly minute setae. Coxal plates divided by deep and distinct grooves on every thoracic somite in both sexes. Abdomen not abruptly contracted, with prominent oblique carinae on each side of 3rd, 4th, and 5th

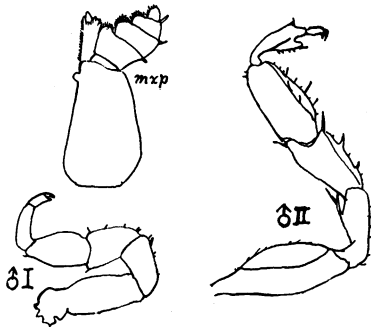


Fig. 7. *Ligia pallasii* Brandt. Adapted from figures of Richardson, 1905, and Jackson, 1922.

somites. Telson arcuate; posterolateral processes acute, produced as far as, or beyond, middle of hind border; accessory processes not produced, but the inner forms a prominent undulation. Telson twice as broad as long. Mouth parts as in *L. oceanica*. First, 2nd, and 3rd pereopods with carpus and merus expanded as in *oceanica*. Second and 3rd legs with small process on propodus not reaching beyond the dactyl in both sexes. Uropods 8 mm.” (Jackson, 1922, p. 691.)

DISTRIBUTION.—Coasts of Alaska including the Aleutian Islands, and southward along the American coast at least to the Farallone Islands, California (Richardson); Litycha (Jackson). Found on rock beach under stones (Richardson).

Closely similar to, if distinct from, *L. oceanica*. Walker, 1927, states that Stimpson's figure, which is reproduced by Richardson, 1905,

is wider than any specimen he had seen, though large females are wider-bodied than males and smaller females. It is said to be distinguished from *L. oceanica*, which it resembles in the rounded rear outline of the telson, by the uropoda, which are much longer in *L. oceanica* with longer and slenderer branches. Walker states that "the branches of the uropoda in *L. pallasii* are one-fifth . . . as long as the entire body from the tip of the terminal abdominal segment," but unless this species is unique among other members of the family, considerable allowance for variation with age, sex, etc., and individually, must be made in the case of such a character.

SUBGENUS MEGALIGIA VERHOEFF

See remarks under the genus *Ligia*. Detailed diagnosis of *Megaligia* in Verhoeff, 1928, p. 120. Type *Ligia exotica* Roux, 1828.

***Ligia* (*Megaligia*) *exotica* Roux, 1828**

Figures 5c, 8

Ligia exotica ROUX, 1828, 'Crustacés de la Méditerranée et de son littoral' (orig. descr.), p. 3, Pl. XIII, fig. 9.—BRANDT, 1833, p. 173.—MILNE-EDWARDS, 1840, VII, p. 157.—BUDE-LUND, 1879, p. 8; 1885, p. 266 (incorrectly includes *L. baudiniana* as a syn.).—DOLLFUS, 1890, p. 7; 1893b, p. 24, Fig. 3; 1896b, p. 2; 1896d, pp. 46, 48 (incorrectly includes *L. baudiniana*).—PORTER, 1899, p. 180.—RICHARDSON, 1899, p. 866; 1901, p. 575; 1902, pp. 306, 307, Pl. XL, figs. 62a, 62b.—MOORE, 1901, p. 175.—PORTER, 1903, p. 153.—CHILTON, 1916, p. 462 (new detailed description), Figs. 1-22.—JACKSON, 1922, p. 693 (new descr.), Pl. II, fig. 10.—ARCANGELI, 1927, p. 268; 1930a, p. 5.—PANNING, 1928, p. 196, etc., Fig. 11m.—BARNARD, 1932, p. 192, Figs. 1b, 2d, 3c.

Ligia gaudichaudii MILNE-EDWARDS, 1840, III, p. 157 (descr.).—NICOLET, 1849, p. 265.—DANA, 1853, p. 741, Pl. XLIX, figs. 6a, 6b.—STUXBERG, 1875, p. 43.

Ligia grandis PERTY, 1830-1834, p. 212 (descr.), Pl. XL, fig. 13.

Ligyda exotica RICHARDSON, 1905, p. 676 (new descr.), Figs. 716-718b.—PRATT, 1916, p. 380, Fig. 611.—VAN NAME, 1924, pp. 185, 208; 1925, pp. 467, 497; 1926, p. 2.—MOREIRA, 1927, p. 194.—GIAMBIAGI, 1931, p. 425, Pls. VIII, IX.—MOREIRA, 1932, p. 433.—PRATT, 1935, p. 443, Fig. 612.

Megaligia exotica VERHOEFF, 1926, p. 348; 1928, p. 116, Figs. 24-29 (details).

NOTE.—The *L. baudiniana* of von Martens, 1869, p. 33, appears to be really *exotica*, while those of Bate, 1868, and Miers, 1877, may also be *exotica*. *L. exotica* var. *hirtitarsis* Dollfus, 1890, p. 7., and 1893b, p. 25, however, is certainly *L. baudiniana*.

This species, the most widely distributed and probably the largest of the genus, is characterized by the form of the body, which widens rapidly in the anterior part of the thorax and then tapers gradually to the last segment of the abdomen; the soft integument; loose articulation of the segments and their appendages (few specimens reach the

museum with the antennae and uropoda attached and unbroken); the large epimera separated from the body of the segment by distinct sutures in both sexes; the large bulging eyes and very long antennae and uropoda. It sometimes reaches a length of about 30 mm. exclusive of the long uropoda. Body surface noticeably granulated.

The males have on the distal end of the propodus of the first leg a small process that overlaps the base of the dactylus on the inner aspect of the limb, and the inner edges of the carpus and merus are devoid of spines and roughened with regular minute file-like ridges. In the fe-

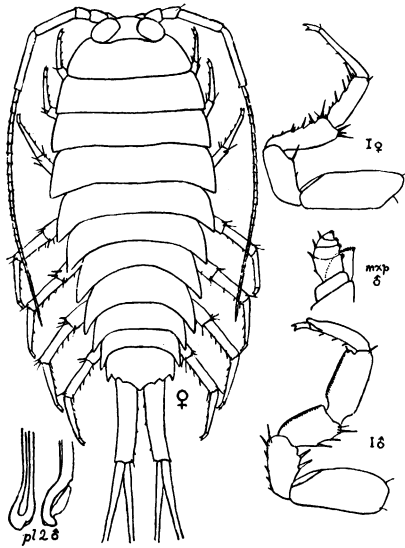


Fig. 8. *Ligia exotica* Roux.

male the process and file-like ridges are wanting, but a number of spines are present in the position of the latter. The antennae in some individuals reach, when fully drawn back, to or even beyond the end of the body, but are often shorter. 'See Figure 5 for outline of the telson. Styloid process of the second pleopod of the male straight with a longitudinal furrow on the ventral aspect and a small expansion at the tip which is asymmetrically oval in a ventral view, but in a lateral view it exhibits a double curvature slightly suggesting the head of a violin, though less curved.

DISTRIBUTION.—Undoubtedly of Old World origin, but now found

on the rocks and piles just above the water in harbors, sometimes in great abundance, in many of the warm and in some of the cooler parts of both hemispheres. On the American coasts, it occurs from North Carolina (Fort Macon, Harger, 1880, genus only reported) (and probably also Norfolk, Virginia) to Rio de Janeiro, including the Bahamas and Antigua, Cuba, Porto Rico, Santo Domingo, and Guadeloupe in the West Indies, and from California to Chile (Balandra Bay near Point Diablo and Puntarenas). Also reported from the Galapagos and Hawaiian Islands.

In former times, when wooden ships were more in use, this species was probably sometimes carried to more northern ports. Gould, 1841, p. 337, records a *Ligia*, perhaps this species, or perhaps *L. oceanica*, from the piles of a wharf, probably at Boston, but it is not likely that the present species could survive the winter in that latitude.

Verhoeff, 1926, p. 348, makes this species the type of a genus, *Megaligia*.

***Ligia (Megaligia) occidentalis* Dana, 1853**

Figures 5g, 9

Ligia occidentalis STIMPSON, 1857, p. 506.—HARFORD, 1877a, p. 116.—BUDDELUND, 1879, p. 8; 1885, p. 264 (descr.).—UNDERWOOD, 1886, p. 360.—RICHARDSON, 1899, p. 866 (1899, Ann. Mag. Nat. Hist., (7) IV, p. 334); 1900a, p. 306; 1904, p. 670; 1904a, p. 226.—CHILTON, 1916, p. 466.—JACKSON, 1922, p. 692 (descr.), Pl. II, figs. 7, 8.

Ligyda occidentalis RICHARDSON, 1905 (descr.), p. 681, Figs. 724, 725.—STAFFORD, 1912, p. 121 (descr.), Figs. 67, 68.—HILTON, 1915, p. 211, Figs. 1 and 2, 6 Pls. (development).—JOHNSON AND SNOOK, 1927, p. 292, Fig. 250.—PRATT, 1935, p. 444.

Lygia occidentalis DANA, 1853, p. 742 (orig. descr.), Pl. XLIX, figs. 7a-7e; 1856, p. 176.

The following is quoted from Jackson, 1922, p. 692:

“Male specimen described. Length, 25 mm. Breadth, 11 mm. Surface minutely granulated. Eyes large and quadrangular, separated by less than the horizontal length of one eye. Antennae moderately long and slender; flagellum reaching as far back as hind border of 6th thoracic somite, peduncle to hind border of 2nd. Flagellum with 22 long and slender segments. Division of coxal plates lightly marked on all thoracic somites. Abdomen not abruptly contracted. Telson very obtusely triangulate; postero-lateral processes are as long as or longer than median process; accessory processes very small. Mouth parts: 2nd maxilla weakly bilobed, with no hairy bristles; maxillipede with five distinctly marked joints. Propodus of 1st peraeopod with promi-

ment process on inner side of distal end, which projects forward by the side of the dactyl. Carpus and merus of 1st and 2nd legs and carpus of 3rd flattened and striated as in *oceanica*. Uropods 10 mm."

Though there is a process on the distal end (inner aspect) of the propodus of the first legs of the male, as in *exotica*, this species has the apex of the telson obtuse instead of sharply angular, as it is in *exotica*, which it much resembles in other respects.

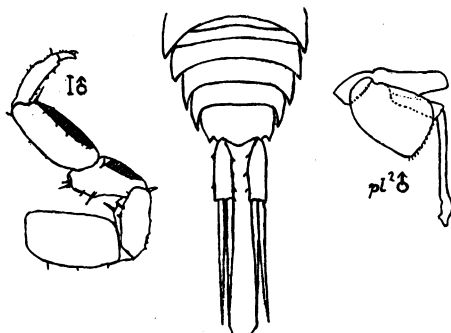


Fig. 9. *Ligia occidentalis* Dana. Adapted from Dana, 1853 (middle figure), and Stafford, 1912.

DISTRIBUTION.—Pacific seacoast on rocks, piles, etc., just above the water, from the Farallones to Lower California (S. Bartolomé Bay) and the Gulf of California, inclusive. Type locality near Sacramento River, California.

***Ligia (Megaligia) cinerascens* Budde-Lund, 1885**

Ligia cinerascens BUDDE-LUND, 1885, p. 265 (orig. descr.).—JACKSON, 1922, p. 693 (new descr.), Pl. II, fig. 9 (antenna).—PANNING, 1928, pp. 196, 199.—MACCAGNO, 1931, p. 154.—BARNARD, 1932, p. 187.

Ligyda cinerascens RICHARDSON, 1909, p. 126.

Very closely related to *L. occidentalis* but described as having the posterior lateral points of the telson no longer than the adjacent accessory teeth just inside them, and antennae shorter though with even more numerous segments than in that species.

DISTRIBUTION.—Doubtful. Budde-Lund (1885, p. 265) says, "Specimen descriptum in Museo Kiloniensi asservatur, incertum, utrum in 'Manila' an in 'Chile' an in Japonia captum; hic locus mihi verisimillimus videtur."

This incompletely known species, even if valid, is probably not

South American. Jackson's description and figure seem to be based on Budde-Lund's original specimens. Specimens from Hakadote, Japan, are "hesitatingly" referred to this species by Richardson, 1909*a*, p. 126.

Ligia (Megaligia) hawaiiensis Dana, 1853

Figures 5*b*, 10

Ligia hawaiiensis DOLLFUS, 1889, p. 92 (descriptive notes) (specimens from Guayanas Bay, Mexico, doubtfully assigned to this species); 1893*b*, p. 25 (makes syn. of *L. exotica*).

Lygia hawaiiensis DANA, 1853, p. 740 (orig. descr.), Pl. XLIX, figs. 4*a*-4*c*.

Megaligia hawaiiensis VERHOEFF, 1928, p. 116, Figs. 18-23 (details).

See JACKSON, 1922, p. 696, Pl. II, fig. 16, for full description.

According to the statements and figures of Jackson (1922) this species is distinguished by the outline of the telson, which has the median

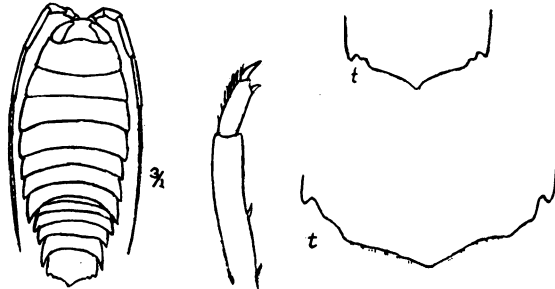


Fig. 10. *Ligia hawaiiensis* Dana. Adapted from Dana, 1853 (except lower right figure from Jackson, 1922).

part, though very obtusely angular, much more produced backward than the lateral teeth, which are distinct but very small. The first leg of the male has a distal process on the propodus and the carpus, merus, and propodus produced on the inner side into a flat plate-like expansion whose free border is fringed with short setae.

Verhoeff, 1928, p. 117, denies the existence of much difference in the telsons of *exotica* and *hawaiiensis* but considers the two species distinct on account of minor differences in the legs and mouth parts, and the much smoother body surface in *hawaiiensis*.

DISTRIBUTION.—Pacific Islands; China Straits; New Guinea. No reliable American record; the above-mentioned Mexican specimens of Dollfus were more probably *exotica*.

Ligia (Megaligia) olfersii Brandt, 1833

Figures 5d, 11

Ligia olfersii BRANDT, 1833, p. 173 (orig. descr.), Pl. iv, fig. 11 (detail).—MILNE-EDWARDS, 1840, p. 157.—BUDDE-LUND, 1879, p. 8; 1885, p. 268 (brief diagnosis); 1893, p. 129.—DOLLFUS, 1893a, p. 345; 1893b, p. 25 (*L. olfersi*); 1897, p. 212 (makes it var. of *exotica*).—RICHARDSON, 1901, p. 575.—MOORE, 1901, p. 175.—CHILTON, 1916, p. 466.—JACKSON, 1922, p. 694.—PANNING, 1928, pp. 196, 199 (*olfersi*).—BARNARD, 1932, p. 187 (*olfersi*).

Ligyda olfersii RICHARDSON, 1905, p. 674 (new descr.), Figs. 714, 715.—VAN NAME, 1920, p. 77 (descr.), Figs. 31–34.—MOREIRA, 1932, p. 433.

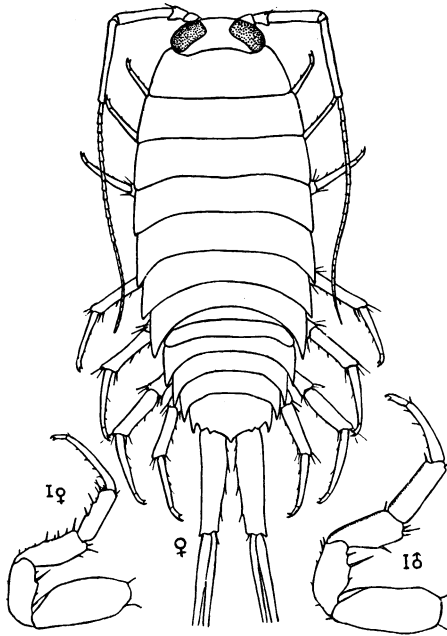


Fig. 11. *Ligia olfersii* Brandt. Adapted from Van Name, 1920.

Smaller than *L. exotica*; usually not over 17 or 18 mm. in body length. The body is proportionately narrower, especially in its anterior portion, so that the outline when seen from above is elliptical rather than oval. The surface is less granulated, appearing smooth when wet; the antennae shorter; the eyes more elongate transversely and less bulging, the epimera more completely fused with the body of the segment, the difference being especially noticeable in the male; the integument firmer and the articulation more compact. The sexual differences

in the first pair of legs resemble those in *exotica*, except that there is no process on the propodus in either sex. Outline of rear end of telson very similar in both species; there is also great similarity in the styloid processes of the males.

DISTRIBUTION.—Florida to Brazil (type locality); also certain of the West Indies (St. Thomas, St. John, Guadeloupe, Andros Island, Bahamas); west coast of Africa, Belgian Congo (Van Name, 1920). Moreira, 1932, reports it common at Rio de Janeiro.

This is a species which has often been confused with *L. exotica*. Brandt, 1833, in describing it, is not sure of its distinctness from *exotica*, and Milne-Edwards, 1840, Dollfus, 1893*b*, p. 25, and 1897, p. 212, express the same doubt or regard it only as a variety, but with well-preserved material the species are easily distinguished.

***Ligia (Megaligia) filicornis* Budde-Lund, 1893**

Ligia filicornis BUDDE-LUND, 1893, p. 128 (orig. descr.).—DOLLFUS, 1893*a* p. 345; 1893*b*, p. 25.—BARNARD, 1932, p. 187.

Budde-Lund's description is here quoted:

"*Ligiae olfersii* similis et affinis. Superficies laevis, nitida. Antennae corpore paulisper breviores (9:10) flagellum scapo duplo longius, 35 articulatam. Linea transversa epistomatis in medio subrecta vel potius levissime recurva (in *Ligia olfersii* haec linea subrecta vel levissime procurva, in *Ligia exotica* manifeste in medio procurva). Tarsi trunci pedum primi paris apud marem simplices. Long. 10.5. Lat. 5 mm."

TYPE AND ONLY LOCALITY.—Lighthouse at Puerto Cabellos, Venezuela.

Nothing additional to Budde-Lund's description has been recorded. It is certainly very close to *L. olfersii* and requires further investigation.

SUBGENUS **NESOLIGIA** VERHOEFF, 1926

See remarks under genus *Ligia*.

***Ligia (Nesoligia) novae-zealandiae* Dana, 1853**

Figures 5*h*, 12

Ligia cursor (see remarks under *L. cursor*) STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 8; 1885, p. 265.—DOLLFUS, 1890, p. 67; 1893*b*, p. 25.

Ligia novae-zealandiae BUDDE-LUND, 1885, p. 271.—CHILTON, 1901, p. 106 (full description), Pl. XL (detailed illus.).—JACKSON, 1922, p. 697 (descr.).—PANNING, 1928, pp. 196*ff.*, Figs. 11*b*, 11*h*.—BARNARD, 1932 pp. 185, 187.

Ligia porteri MACCAGNO, 1931, p. 151, Pl. III.

Lygia novi-zealandiae DANA, 1853, p. 739 (orig. descr.), Pl. XLIX, figs. 2*a*–2*d*.

(Name emended to *novae*- by all subsequent authors.)

Nesoligia novaezealandiae VERHOEFF, 1926, pp. 348, 350.

See also *L. cursor* Dana, 1853, and *L. litigiosa* Wahrberg, 1922.

The following is quoted from Jackson, 1922, p. 697:

"Male specimen described. Length, 12 mm. Breadth, 5.5 mm. Surface minutely granular. Eyes rather small and quadrangular, and separated by twice their horizontal length. Antennae very long and slender; flagellum reaching as far back as hind border of 4th abdominal somite; peduncle to hind border of 3rd thoracic somite. Flagellum with 20 small and setose segments. The antennae are shorter in the female. The whole is as long as the thorax, and the peduncle reaches halfway

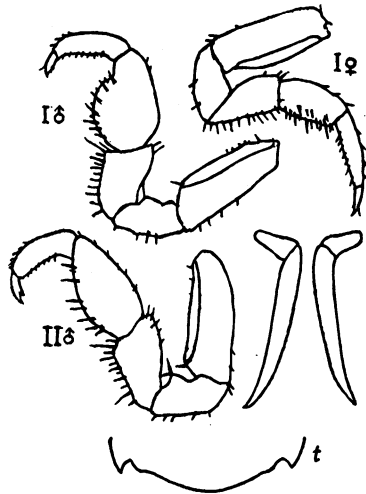


Fig. 12. *Ligia novae-zealandiae* Dana. Adapted from Chilton, 1901.

across the 3rd somite. The segments of the flagellum are more setose than in the male. Coxal plates very faintly marked or absent. In the female, they are marked by deep grooves on the 2nd, 3rd, and 4th thoracic somites. Abdomen abruptly contracted. Telson arcuate; posterolateral processes acute and produced, but shorter than middle of hind border; accessory processes marked by slight undulations. Mouth parts: 2nd maxilla with no trace of division into two lobes, without hairy bristles on inner side. Maxillipede with 1st and 5th joints only completely separated, remainder only indicated by indentations on inner side. First and 2nd peraeopods with carpus much swollen in male only; subchelate. Uropods 5 mm."

It is perhaps worthy of remark that in neither the descriptions nor the illustrations of Chilton or Jackson are there any allusions to areas of file-like ridges on the first legs of the male. As described and illustrated by Chilton (1901), the styloid processes of the second pleopoda of the male are longitudinally grooved and curve gradually outward, tapering to a sharp tip.

DISTRIBUTION.—Coast of New Zealand, Stewart Island; Sunday Island, Victoria; Chile; Juan Fernandez, shore (Jackson, 1922); Tierra del Fuego (*L. cursor* Stuxberg, 1875). The American Museum of Natural History has several specimens from the Chincha Islands, Peru. Type locality: Bay of Islands (shore), New Zealand. *Ligia porteri* Maccagno, from Bahia Carumhilla, Chile, appears to be a synonym.

Ligia (*Nesoligia*) *cursor* Dana, 1853

Figure 13

Ligia cursor BUDE-LUND (part), 1879, p. 8; 1885, p. 265.—STEBBING, 1893, p. 421.—JACKSON, 1922, pp. 701 (697).—BARNARD, 1932, p. 187.

Lygia cursor DANA, 1853, p. 743 (orig. descr.), Pl. XLIX, figs. 8a-8c.

Other references appear to apply chiefly or entirely to *L. novae-zealandiae*. See under that species.

Dana's description is as follows:

"Antennae as long as the cephalothorax, flagellum twenty-one-jointed (in the specimen examined, after the fourteenth joint, a constriction and then seven smaller joints); surface of the joints towards extremity bearing many setae, which are as long as the diameter of the joints, and have often a setule on either side. Abdomen sparingly longer than its breadth, abruptly a little narrower than thorax; last segment triangulate at apex, the posterior angles short acute.

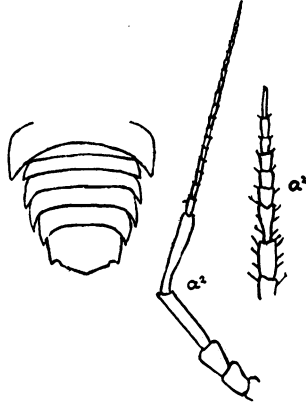
"Length of body, exclusive of stylets, ten lines. The stylets were not present in our specimen. The last joint of the flagellum is much longer than the preceding, and as in other species, has a tuft of setules or very short hairs at apex, as seen when magnified. The constriction in the flagellum appears to separate the extremity from the rest, and as it occurs just seven joints from the extremity (one-third the whole number), it may be a permanent characteristic of the species."

LOCALITY.—"Valparaiso?"

This is a very doubtful species, perhaps identical with *L. novae-zealandiae* Dana. Jackson, 1922, pp. 697, 698, though he does not unite it with *L. novae-zealandiae*, says that it apparently has not been found again, and that the examples referred to it by Budde-Lund were

in reality *L. novae-zealandiae*. This is probably true of the references of other authors to "*Ligia cursor*" except possibly to the very limited extent that they may apply to Dana's original example. Chilton, 1924,

Fig. 13. *Ligia cursor* Dana.
Adapted from Dana, 1853.



pp. 287, gives reasons for including Dana's *cursor* also as a probable synonym of *novae-zealandiae*. The latter name has page precedence in Dana's work.

Ligia (*Nesoligia*) *litigiosa* Wahrberg, 1922

Ligia litigiosa WAHRBERG, 1922a, p. 277 (orig. descr.), Fig. 1.

Although Wahrberg gives a description of considerable length, and several figures of certain details, it is not made clear why we should regard this species as distinct from *L. novae-zealandiae* Dana, which has also been recorded from Juan Fernandez. From the description the telson would seem to be of similar form to that of Dana's species. Wahrberg says the first legs are alike in the two sexes, but this might be due to immaturity of his male specimens.

TYPE AND ONLY LOCALITY.—Juan Fernandez (Masatierra) on the beach.

HIRTILIGIA, NEW SUBGENUS

Apparently *Ligyda*, either as a generic or subgeneric name is synonymous with *Ligia*, and is not available as a subgeneric name for the section of the genus to which the following species belongs, though Verhoeff, 1926, pp. 347, 348, seems to have intended to employ it that way. The group apparently being without a valid name, I propose the subgenus *Hirtiligia*, with *Ligia baudiniana* Milne-Edwards as the type. Its chief distinguishing character is the expanded, flattened merus and

carpus bordered with a single row of spiny hairs, of the first legs of the male.

Ligia (Hirtiligia) baudiniana Milne-Edwards, 1840

Figures 5a, 14

Ligia baudiniana IVES, 1891, p. 185, Pl. VI, fig. 2.

Ligia baudiniana MILNE-EDWARDS, 1840, III, p. 155 (orig. descr.).—SAUSSURE, 1858, p. 476.—(?)BATE, 1868, pp. 443-446.—STUXBERG, 1875, pp. 43, 46, 48.—(?)MIERS, 1877a, pp. 670, 671 (new descr., see below).—BUDDÉ-LUND, 1879, p. 8; 1885, p. 267.—IVES, 1891, pp. 185, 199, 200, Pl. VI, fig. 2.—DOLLFUS, 1893b, p. 25 (made syn. of *exotica*), Pl. XL, fig. 61.—VERRILL, 1902, p. 845, Fig. 233.—RICHARDSON, 1904, pp. 24, 30.—CHILTON, 1916, pp. 464, 466, 473 (compared with *L. exotica*).—JACKSON, 1922, pp. 689, 698 (new descr.), Pl. II, figs. 17, 18.—WAHRBURG, 1922, pp. 18, 37, 47, etc., details shown in Figs. 3, 4, 13, 19, 21, 27, 28.—PANNING, 1928, pp. 196, etc., Fig. 11k.—ARCANGELI, 1930a, p. 6.—BARNES, 1932, p. 496, etc.; 1934, p. 124, etc. See also note under synonymy of *L. exotica*.

Ligia exotica var. *hirtitarsis* DOLLFUS, 1890, p. 7 (descr.), Figs. 5, 6 (see Richardson, 1902, p. 307); 1893b, p. 25.

Ligia gracilis MOORE, 1901, p. 175 (descr.), Pl. XI, figs. 7-12 (see Richardson, 1902, p. 308).

Ligia hirtitarsis DAHL, 1892, p. 111, Pl. III, figs. 1, 6, 7, 11, 12.

Ligyda baudiniana MOREIRA, 1932, p. 433.

Ligyda baudiniana RICHARDSON, 1905, p. 678 (new descr.), Figs. 719-722.—PEARSE, 1915, p. 550.—VAN NAME, 1924, p. 205 (descr.), Figs. 31-36 (drawn from Galapagos specimens); 1925 p. 468; 1926, p. 2.

NOTES.—*L. baudiniana* is incorrectly made a doubtful synonym of *L. exotica* Roux by Budde-Lund, 1885, p. 267, and a synonym without question by Dollfus, 1890, p. 7, and 1896d, p. 46.

L. baudiniana von Martens, 1869, p. 33, is apparently really *L. exotica*.

A smaller and somewhat rougher species than *L. exotica*, having the head wider and the eyes more elongate laterally, the epimera more firmly united with the main part of the segments and the median apex of the telson slightly rounded off instead of angular. Antennae very variable in length; in some specimens they can be drawn back to the end of the body.

The first legs of the male lack the process at the distal end that occurs in *exotica*; they have the merus and carpus flattened and provided on the thin anterior edge with a single row of short, closely set spiny hairs, and are provided with elongate areas of fine, oblique, parallel, file-like ridges. The second and third legs of the male have an area of the file-like ridges on the carpus which is somewhat swollen, but they lack the row of closely placed spiny hairs. In the female the three

anterior pairs of legs are similar to the fourth and more posterior pairs, which are alike in both sexes.

The styloid process of the second pleopoda of the male was examined in West Indian and Galapagos specimens and was found to be very similar in both. These organs taper to a not very acute tip which

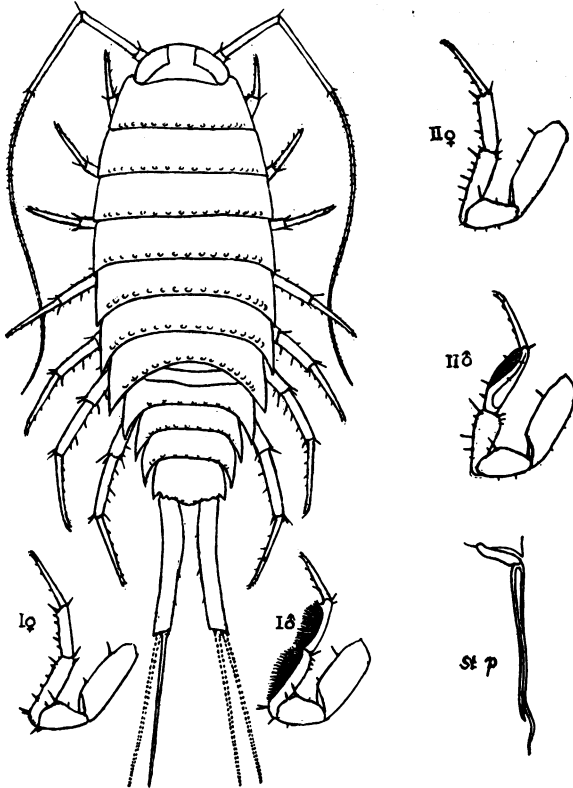


Fig. 14. *Ligia baudiniana* Milne-Edwards. From specimens from Galapagos Islands. Adapted from Van Name, 1924.

is twisted slightly inward toward the median line. The ventral aspect bears a shallow groove along the entire length of the organ. From a small cleft in the dorsal surface near the distal end, a tapering flexible fleshy process protrudes.

DISTRIBUTION.—Atlantic Gulf and Caribbean Sea coasts from

Florida (Miami) to Brazil (Rio de Janeiro), inclusive of Bermuda and the West Indies, under stones and on damp rocks, piles, etc., near the water's edge. There are no records from the Pacific side of the continent, but specimens from the Galapagos Islands that I have studied do not appear to be specifically separable from it (Van Name, 1924). Type locality: San Juan d'Ulloa, near Vera Cruz, Mexico. For specific localities see Richardson, 1905; Jackson, 1922.

This species has been confused with *L. exotica* Roux by some authors, and of the references above given those of Bate, 1868, and Miers, 1877, may apply to *exotica*. The distinguishing characters between the two are discussed in detail by Richardson, 1902, pp. 306, 307; Jackson, 1922, p. 698; and Van Name, 1924, p. 206 (see above).

***Ligia cajennensis* Koch, 1847**

Figure 15

Ligia cajennensis KOCH, 1847, p. 212 (orig. descr.), Pl. ix, fig. 102.—BUDDLUND, 1879, p. 8; 1885, p. 271.—JACKSON, 1922, pp. 689-701.

Ligia cayennensis STUXBERG, 1875, p. 43.

Ligyda cajennensis VAN NAME, 1925, p. 468.

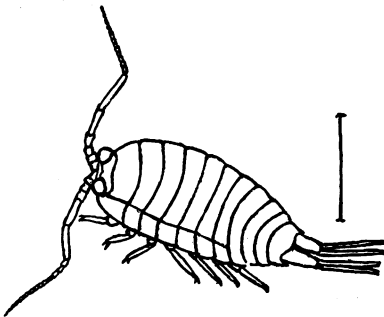


Fig. 15. *Ligia cajennensis* Koch. Adapted from Koch, 1847.

Koch describes this as extremely like the well-known *Ligia italica* of southern Europe, differing materially only in that the body is relatively narrower, the anterior margin of the head is not impressed, the surface of all the segments noticeably more coarsely granulated, the first branch of the uropoda wider and the second as well as the basal segment both twice as long as the first branch. The antennae are of the same length (as in *L. italica*), their flagellum also has fifteen articles.

Length, $6\frac{1}{2}$ lines. Color dark rusty yellow with antennae and legs lighter than the body; the eyes brownish black. (Translation of original description.)

DISTRIBUTION.—Cayenne.

Nothing is known about this species except what Koch's description and figure give us. Budde-Lund and Jackson treat it as an insufficiently known form.

SUBGENUS **POGONOLIGIA** JACKSON

Distinguished from the typical members of *Ligia* by having the telson with a median notch or emargination, and certain peculiarities of the mouth parts and first antennae, notably a conspicuous setose tuft on the outer side of the outer branch of the first maxilla near the tip. (See Jackson, 1927, p. 134.) This group may be synonymous with the unsatisfactorily characterized genus *Geoligia* Dollfus. See remarks under *Ligia simoni* below. Type *Ligia muscorum* Jackson, 1927, which apparently is a synonym of *Ligia platycephala* (Van Name), 1925.

Ligia (Pogonoligia) platycephala (Van Name), 1925

Figures 5f, 16, 17

Ligia (Pogonoligia) muscorum JACKSON, 1927, p. 130, Pl. II.

Ligyda platycephala VAN NAME, 1925, p. 497 (orig. descr.), Figs. 67-71.

Body soft and weakly articulated, as in *L. exotica*, the thorax more oblong when seen from above, but the abdomen more contracted than in that species. The head is longer antero-posteriorly, more prominently convex in its front outline and much more flattened. Eyes more elongate from side to side and less bulging, and the antennae considerably shorter, reaching when well drawn back about to the abdomen in the male and only to the sixth or seventh thoracic segment in the female. Epimera smaller than in *exotica* and more completely fused with their respective segments in both sexes.

Jackson, 1927, has described and figured several peculiarities of the mouth parts in which it differs from typical members of *Ligia*. The mandible has a large setose plume but no penicilli, the first maxilla has near the distal end a large brush of setae on the outer aspect, and the inner branch is tipped with a setose knob distal to the plumose tufts. The endopod of the maxilliped is large and longer than the basis. I have confirmed these characters in British Guiana specimens.

Sexual differences in the anterior legs were not found. Styloid appendages of male straight with a short, obliquely directed claw-like point at the tip. Examination of more and better material shows that there is a small longitudinal fin-like projection on the convex aspect of the tip, which apparently was worn or damaged in the original specimens and was not shown sufficiently large in the figure (Fig. 66,

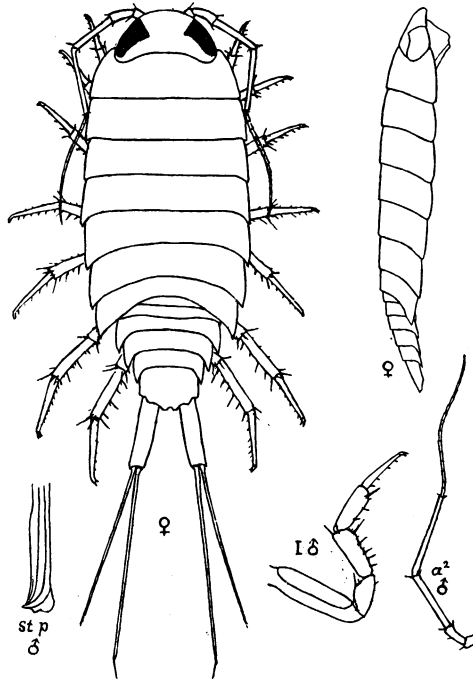


Fig. 16. *Ligia platycephala* (Van Name). From Zoologica, VI, p. 498, Figs. 67-71.

Van Name, 1925) given of this appendage. Rear outline of telson very characteristic, having a small median notch, each side of which are small rounded projections.

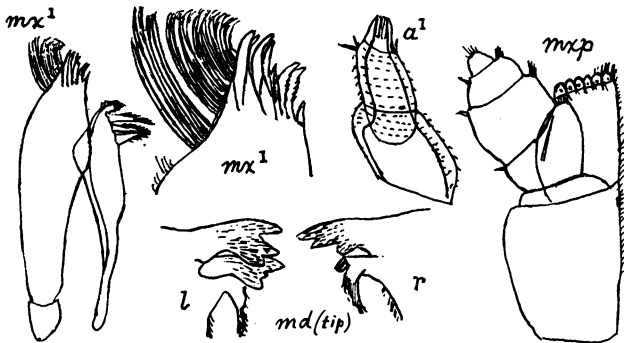


Fig. 17. *Ligia platycephala* (Van Name). Adapted from Jackson's (1927) figures of "*L. muscorum*."

The Kartabo specimens are handsomely colored with three broad longitudinal dark bands; one median, the others along the basal ends of the epimera which are very light-colored and form a conspicuous whitish border along each side of the body. The specimens from other localities have the dark bands less well marked.

Length of largest male 16.5 mm., of largest female 18 mm. See original description for more details.

DISTRIBUTION.—British Guiana, in damp forest along the rivers, under dead leaves, etc. Type and several other specimens from Kartabo; many specimens collected by Herbert Lang in 1922 along the Kurupung River and at the mouth of the Mermuc River. Type in the American Museum of Natural History.

This species is related to *L. simoni* (Dollfus), 1893 (see below), also an inland species, though unlike *platycephala* it is found in a mountainous region.

***Ligia (Pogonoligia) simoni* (Dollfus), 1893**

Figures 5e, 18, 19, 20

Geoligia simoni DOLLFUS, 1893a, p. 343 (orig. descr.), Pl. x, figs. 11a-11c.—CHILTON, 1922, p. 4; 1924 (referred to as "species from Venezuela").—VERHOEFF, 1926, p. 348.

Ligia richardsonae JACKSON, 1922, p. 701 (says probable syn. of *simoni*).

Ligyda richardsonae PEARSE, 1915, p. 549 (descr.), (534), Fig. 9.—JACKSON, 1922, pp. 688, 701 (probable syn. of *L. simoni*).—VAN NAME, 1925, p. 499, Fig. 72.

Ligia simoni JACKSON, 1922, pp. 688, 690, 701.—MACCAGNO, 1931, p. 153.

The original description is here quoted:

"Corps ovale, un peu rétréci postérieurement, très finement granulé-sétacé.

"Cephalon.—Front régulièrement arrondi. Prosépistome plan, mésépistome bien développé. Yeux très grands. Antennes atteignant environ les deux tiers du corps, fouet formé d'environ 16 articles.

"Pereion.—Premier somite à bord postérieur très faiblement sinueux de chaque côté.

"Pleon, Telson.—Pleotelson grand, présentant une dent de chaque côté et à bord postérieur arrondi. Uropodes à base très développée, aplatie et un peu carénée, dépassant le pleotelson d'une longueur égale à celui-ci; exopodite long et grêle; endopodite?

"Couleur.—D'un gris clair, finement moucheté de noir, avec une tache postéro-médiane sur chaque somite, et une bande également foncée de chaque côté du pereion.

"Dimensions.—13 × 7 mm."

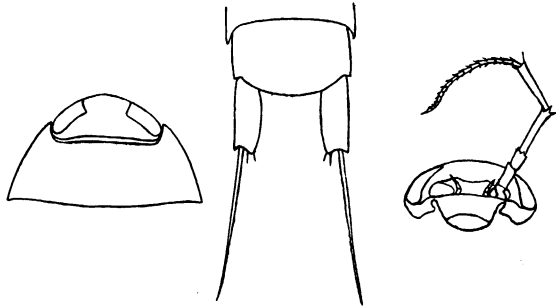


Fig. 18. *Ligia simoni* (Dollfus). After Dollfus, 1893a.

The following statements are condensed from Pearse's description of his *Ligyda richardsonae*.

Length, 13.3 to 18.3 mm. Color mostly gray with a broad light band at the sides of the thorax; sometimes a few white spots along the posterior borders of thoracic segments; usually a broad, rather in-

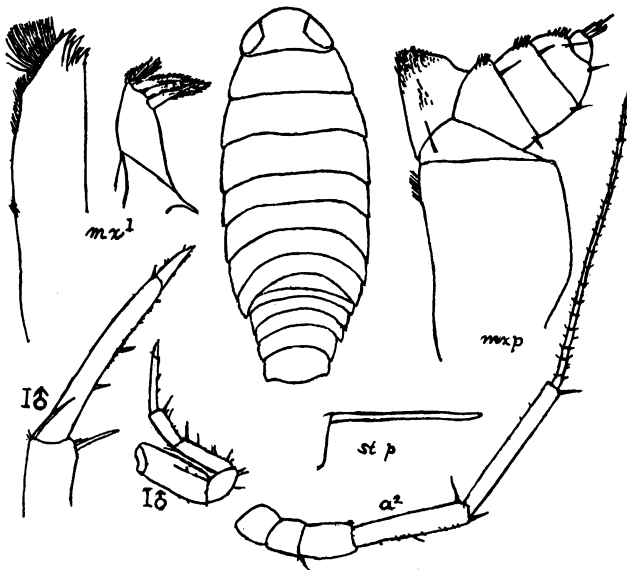


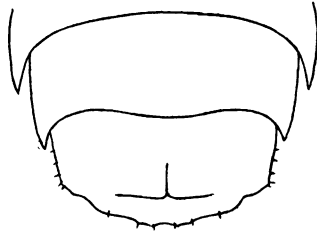
Fig. 19. *Ligia simoni* (Dollfus). Adapted from Pearse's (1915) figures of "*L. richardsonae*."

distinct darker band along median dorsal line. Flagellum of second antenna with about twenty segments; reaches to end of fourth thoracic segment. Epimera coalesced with segments of thorax. First pair of legs of male slender with vertical border of merus finely serrate; they lack the armature characteristic of *L. baudiniana*. Unlike most of the genus, this is not a seacoast species.

DISTRIBUTION.—Cumbre de Valencia, Venezuela, in forest at 1200 meters altitude (Dollfus, type locality); Santa Marta, Colombia, in damp places or in brooks in forest at 3800 feet (Pearse). Type of *richardsonae* in University of Michigan Museum, cotypes in U. S. National Museum.

Jackson, 1922, p. 701, points out the probability of the identity of Dollfus' and Pearse's species, and it seems so strong that I am venturing to treat them as synonyms. The figures of both authors are here re-

Fig. 20. *Ligia simoni* (Dollfus). Rear end of cotype of "*L. richardsonae*" in U. S. National Museum.



produced as well as one showing the rear end of the telson, made after a drawing by Dr. Shoemaker, of the U. S. National Museum, from a cotype of *richardsonae*. I cannot consider that the smoothly rounded outline of the rear end of the telson in Dollfus' figure is an obstacle to regarding the two species as identical, since Dollfus had only one specimen, and the slight undulations of the margin present in this species may readily have been overlooked or regarded as due to accident or injury.

Dollfus, 1893, made this species the type of a genus, *Geoligia*, giving as the only distinguishing character that the epimera are "not distinct." The distinctness of the line of demarcation between the epimera and the main part of the segments, however, is very variable and often very slight in the genus *Ligia*, and, moreover, is dependent on sex, in some species at least.

So far as I am aware, only one other species, *L. perkinsi* (Dollfus), has been assigned to *Geoligia*, no doubt because it is an inhabitant of

mountain forests like *L. simoni*. But it is not closely related to that species, being nearer to *L. exotica*, though distinct according to Jackson, 1927, pp. 134, 135. (Chilton, 1922, pp. 1, 2, had claimed it to be identical with *exotica*.)

If, as seems probable, this species belongs in the same subgenus as *L. platycephala*, the name *Geoligia* will have priority over *Pogonoligia* Jackson, 1927, but I feel in no haste to substitute an insufficiently characterized name which has never been anything but a source of confusion and uncertainty for *Pogonoligia*, for which Jackson gave a careful diagnosis.

STYMPHALUS BUDDÉ-LUND, 1885

See remarks under *Stymphalus dilatatus*, its type.

Stymphalus dilatatus (Perty), 1834

Figure 21

Ligia dilatata PERTY, 1830-1834, p. 212 (orig. descr.), Pl. XL, fig. 14.

Stymphalus dilatatus BUDDÉ-LUND, 1879, p. 9; 1885, p. 271.—STEBBING, 1893, p. 421.

Not *Ligia dilatata* Brandt, 1833, from the Cape of Good Hope; not *Ligia dilatata* Stimpson (= *L. pallasii* Brandt, 1833, and *L. stimpsoni* Miers, 1877) from Alaska.

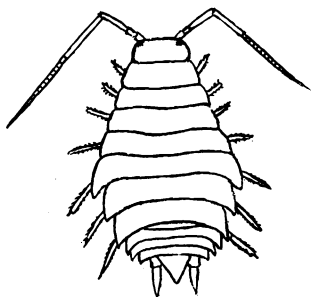


Fig. 21. *Stymphalus dilatatus* (Perty). After Perty, 1834.

The following is Perty's description:

"Olivaceo-grisea; corpore retrorsum valde dilatato; styli cauda brevioribus. Lg. 5.

"Habitat prope Bahiam.

"Species ab omnibus facillime distinguenda. Olivascens-grisea, segmentis mediis et caudalibus pallidioribus, granulis asperatis. Segmentum quintum, sextum et septimum praecedentibus multo latiora;

caudae segmentum primum et secundum maxima e parte sub praecedentibus occulta. Antennae externae corpore breviores; internae minimae, vix conspiciendae. Styli caudales cauda ipsa breviores."

LOCALITY.—Near Bahia, Brazil.

Nothing is known about this animal except what information is contained in Perty's work. On the strength of his figure Budde-Lund separated it from *Ligia*, establishing for it the new genus *Stymphalus* (1885, p. 271).

LIGIDIUM BRANDT, 1833

Small species inhabiting moist places, damp forests, etc., having the first antennae better developed than in *Ligia* and more or less conspicuously projecting in front of the head, and the lateral parts of the last abdominal segment less developed and never forming posteriorly projecting points. The uropoda have the inner rear angle of the basal segment produced and bearing at its apex the inner branch, which is smaller than the outer.

This genus has been monographed by Verhoeff, 1918, and Jackson, 1923.

Ligidium gracile (Dana), 1856

Figures 22, 23

Alloniscus maculosus HARFORD, 1877, p. 54 (descr.).

Ligidium gracile RICHARDSON, 1905, p. 690 (*L. gracilis*; descr. of Dana and Harford quoted), Fig. 732.—VERHOEFF, 1918, p. 114.—JACKSON, 1923, p. 832, Fig. 6.—JOHANSEN, 1926, p. 167 (*Ligidium* sp.).—WALKER, 1927, p. 176, Figs. 1-5.—FEE, 1927, p. 31.—MALONEY, 1930, p. 292, Fig. 4 (telson).—ARCANGELI, 1932, p. 140.

Ligidium tenue BUDDE-LUND, 1885, p. 258.—RICHARDSON, 1899, p. 867; 1900a, p. 306.—STOLLER, 1902, p. 208.—RICHARDSON, 1905, p. 688 (descr.).—VERHOEFF, 1918, p. 114.—JOHANSEN, 1926, p. 167.—WALKER, 1927, p. 176.

Styloniscus gracilis DANA, 1856, p. 176 (orig. descr.).—STIMPSON, 1857, p. 506.—BUDDE-LUND, 1879, p. 9; 1885, p. 271.—UNDERWOOD, 1886, p. 364.—RICHARDSON, 1899, p. 867 (1899, Ann. Mag. Nat. Hist., (7) IV); 1900a, p. 306.—HOLMES, 1904, p. 318, Pl. xxxvi, figs. 29-31.

See also remarks under *L. hypnorum*.

"Length: ♂ 7 mm., ♀ 9 mm. Breadth: ♂ 2 mm., ♀ 3 mm.

"Surface smooth and shining. Head: Frontal margin sinuate; median V sharply drawn out and produced to slight rostrum. Transverse groove deep and short, reaching to inner edge of eyes. Frontal grooves obsolete or very faintly indicated. Eyes rather small and somewhat pear-shaped. Thorax: 1st somite finished with bristles at regular intervals on lateral edges, none on posterior margin. A deep

lateral depression on each side reaching hind border. No bristle group. Coxal-plate sutures distinctly marked on last four somites in both sexes; drawn backwards on last three somites only, the 5th somite little if at all drawn back. Antennal flagellum reaching back to hind margin of 2nd somite; with 12 segments. Uropods: Inner process of base stout, slightly curved and about half as long as base. Endopod by itself slightly longer than exopod; combined with inner process exceeds exo-

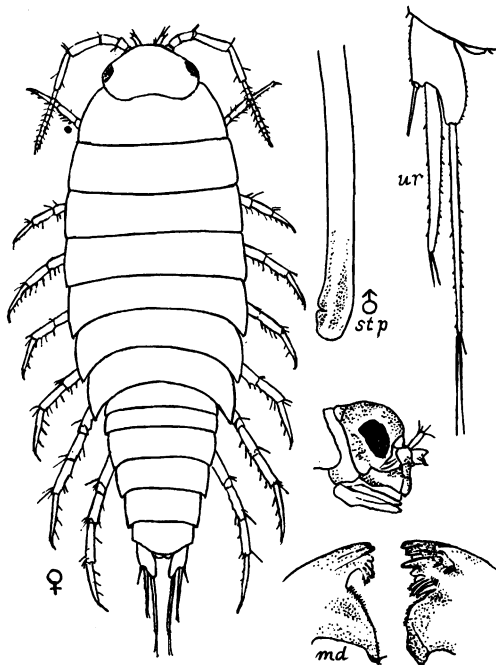


Fig. 22. *Ligidium gracile* (Stimpson). Adapted from Walker, 1927.

pod by about one-sixth of the latter. Exopod about four times as long as inner process. Telson with blunt postero-lateral angles moderately deeply notched over uropods.

“Pleopoda of ♂.—1st exopod with one long bristle; 1st endopod with process moderately drawn-out and blunt, with 3 bristles; 2nd endopod with small rounded lappet.

“Color.—Brown ground; brown median stripe; mottled on each side with yellow. Yellow stripe along and above sutures of coxal plates,

which are brown on each side. Legs yellow. Head mottled." (Jackson, 1923, p. 832.)

DISTRIBUTION.—California (Santa Clara, and Angel Island, San Francisco Bay) to Sitka, Alaska. It is not exclusively a species of the seacoast and its vicinity, as it is recorded by Arcangeli, 1932, from points in the Cascade Mountains. Harford records it from Angel Island, California, under the roots of the fern *Woodwardia radicans*, and Walker from under stones on the shore on Vancouver Island; Jackson records it from Massett on the Queen Charlotte Islands.

The investigations of Jackson, 1923, and Walker, 1927, have apparently cleared up the confusion regarding this species, which has been described from different localities under different names, and which

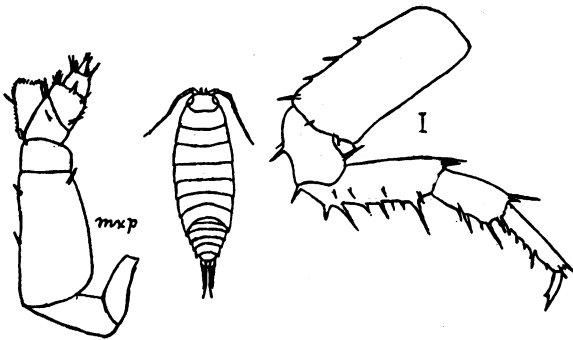


Fig. 23. *Ligidium gracile* (Stimpson). Adapted from Holmes, 1904.

appears to be somewhat variable in its characters. The type specimens of Harford were redescribed by Holmes, 1904, whose description was quoted in full by Richardson, 1905. Harford considered that his specimens were "doubtless identical with some specimens of this genus which Prof. Dana had before him while describing his *Alloniscus perconvexus* and which he says may probably be another species" (1854, Proc. Phila. Acad., p. 176). Holmes and all later writers have identified the form here described with Dana's *Styloniscus gracilis*.

Ligidium gracile variety flavum

A variety established by Jackson, 1923, p. 834, for some specimens from British Columbia which are unpigmented and have the eyes smaller. He believed them to have come from a cave.

Ligidium longicaudatum Stoller, 1902

Figure 24

Ligidium longicaudatum STOLLER, 1902, p. 208 (orig. descr.), Fig. 1.—RICHARDSON, 1905, p. 689 (descr.), Fig. 731.—PEARSE, 1910, p. 73.—FOWLER, 1912, p. 516.—VERHOEFF, 1916, p. 114.—JACKSON, 1923, p. 838.—JOHANSEN, 1926b, p. 167 (*Ligidium* sp.).—WALKER, 1927, p. 176, Figs. 6–10.—MALONEY, 1930, p. 292, Fig. 3 (telson).

Richardson's description, based on an examination of the original specimens, is here quoted in full:

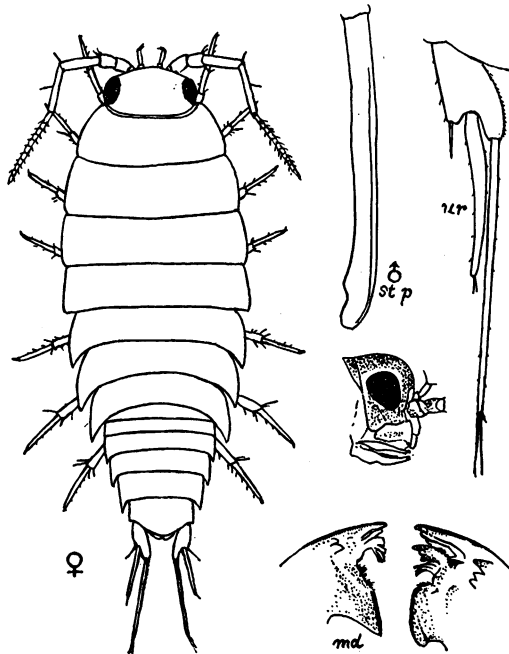


Fig. 24. *Ligidium longicaudatum* Stoller. Adapted from Walker, 1927.

“Body oblong-ovate, about twice as long as wide, 3 mm.: 6 mm. Uropoda, 2 mm. Length of body with uropoda, 8 mm. long.

“Head twice as wide as long, 1 mm. : 2 mm., with the anterior margin widely rounded. Eyes round, composite, and situated close to the lateral margins. The first pair of antennae are small and almost inconspicuous. They are composed of three articles—two subequal ones and a minute terminal one. They extend to the end of the second

article of the peduncle of the second pair of antennae. The second pair of antennae have the first two articles short and subequal; the third is but little longer than the second; the fourth and fifth are equal in length and each is about twice as long as the third. The flagellum is composed of eleven articles, the terminal article ending in a bunch of hairs. When retracted, the second antennae extend to the posterior margin of the third thoracic segment.

"The first four segments of the thorax are subequal and each is a little longer than any of the last three, which are subequal. The epimera are not distinctly separated on any of the segments.

"The first segment of the abdomen has the lateral parts concealed by the seventh thoracic segment. The four following segments have the lateral parts well developed. The sixth or terminal segment is rounded posteriorly, with a slight emargination on either side of the rounded median lobe for the reception of the basal articles of the uropoda. The basal article of the uropoda has the inner distal angle produced so that the inner side measures one and a half times longer than the outer side. The inner branch of the uropoda is two and a half times longer than the peduncle measured from the inner side; it terminates in two long subequal hairs, which are a little less than one-fourth the length of the inner branch. The outer branch is shorter than the inner branch, the inner branch being a little less than one and a half times longer than the outer branch. The outer branch is also tipped with two short hairs.

"All the legs are ambulatory.

"In color, it is a reddish brown, mottled with yellow, and with two longitudinal rows of yellow spots, one on either side of the body about the place where the epimera are united with segments." (Richardson, 1905, pp. 689, 690.)

LOCALITIES.—Schenectady, New York, type locality, "in a deep shaded ravine, under stones (at time when collected, late in November) at the foot of a limestone talus" (Stoller). Pearse, 1910, reports it from Ann Arbor, Michigan ("near the overflow"), and Walker, 1927, gives three localities in Ontario (Lake Simcoe, near Richmond Hill, and Credit River, in wet places). See also remarks on *L. hypnorum*.

Ligidium hypnorum (Cuvier) 1792

Figures 25, 26

Oniscus hypnorum CUVIER, 1792, Jour. d'Hist. Nat., II, p. 19 (orig. descr.), Pl. xxvi, figs. 3-5.

Ligidium hypnorum STUXBERG, 1875, p. 48 (see note below).—SARS, 1899, p.

158 (descr.), Pl. LXXI.—BUDDE-LUND, 1885, p. 254.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1899, p. 867 (Ann. Mag. Nat. Hist., (7) IV, p. 335); 1900a, p. 306.—STOLLER, 1902, p. 208.—RICHARDSON, 1905, p. 686 (descr.), Fig. 730.—JACKSON, 1923, p. 830; 1928a, p. 571, Fig. 3.—JOHANSEN, 1926b, p. 167.—WALKER, 1927, p. 176.—MALONEY, 1930, p. 292, Fig. 5 (telson).

“Body oblong oval, greatest width not attaining half the length, dorsal face rather convex, and perfectly smooth and shining. Cephalon of moderate size, and evenly rounded in front, dorsal face transversely

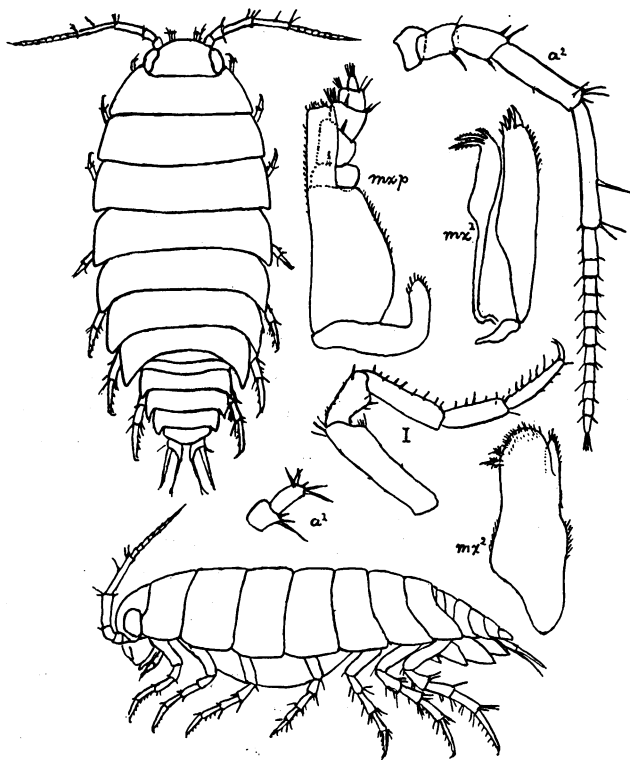


Fig. 25. *Ligidium hypnorum* (Cuvier). Adapted from Sars, 1899.

grooved behind the eyes. Lateral parts of the 3 anterior segments of mesosome but slightly prominent; those of the 4 posterior segments somewhat larger, and terminating behind in obtuse points. Metasome scarcely exceeding in length $\frac{1}{3}$ of the mesosome, and much narrower, with the epimeral plates small and appressed; last segment obtusely

rounded at the tip, with a slight angle on each side. Eyes very large, oval, extending down the sides of the cephalon. Antennulae with the 1st joint rather thick, 2nd longer but much narrower, both armed at the tip inside with 3 rather long diverging spines, last joint very small, narrow cylindrical. Antennae rather slender, though not nearly attaining half the length of the body, flagellum somewhat shorter than the peduncle, and composed of about 11 articulations, the last tipped with a dense bunch of delicate hair-like bristles. Legs armed with scattered slender spines, propodal joint very narrow and elongated, dactylus simple. Inner plate of 1st pair of pelopoda in male slightly produced at the tip, and provided with 4 apical bristles. Uropoda scarcely exceed-

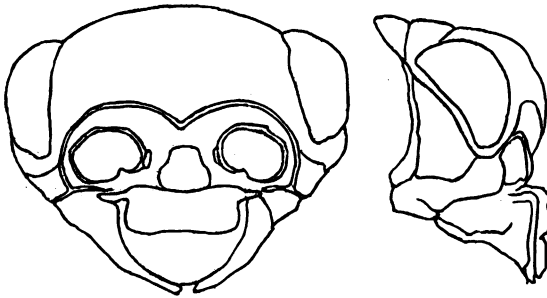


Fig. 26. *Ligidium hypnorum* (Cuvier). Head, adapted from Jackson, 1926a.

ing half the length of the metasome, inner projection of the basal part occupying about half its length, outer ramus gradually tapering distally and carrying on the tip 3 short bristles, inner ramus very narrow, linear, not extending to the tip of the outer, apical bristles nearly as long as the ramus. Colour of dorsal face light fuscous, variegated with irregular dark patches, which on each side, at the base of the lateral plates of mesosome, form a nearly continuous longitudinal band. Length of adult female 9 mm." (Sars, 1899, p. 158.)

DISTRIBUTION.—A widely distributed European species inhabiting very moist situations. Recorded by Stuxberg, 1875, p. 48, from "California" and "Niagara," the only American records. Their correctness is doubted by Budde-Lund, 1885, p. 256, and Walker, 1927, p. 176, and has not, so far as I know, ever been confirmed. Probably Stuxberg's records refer to *L. gracile* and *L. longicaudatum*, respectively.

Ligidium latum Jackson, 1923

Figure 27

Ligidium latum JACKSON, 1923, p. 834 (orig. descr.), Figs. 7, 8.—MALONEY, 1930, p. 292.

“Length: ♂ 6 mm., ♀ 8.5 mm. Breadth: ♂ 3 mm., ♀ 4 mm.

“Surface rough and covered with small scales. Head: Frontal margin sinuate; median V very sharp and produced. Transverse groove deep and passing behind eyes; frontal grooves very deep and curving back to join transverse groove abruptly. Eyes large and pear-shaped. Thorax: 1st somite without lateral depressions or bristle groups. Setae at intervals on lateral border, but absent on posterior border. Coxal-plate sutures well marked on last four somites in the female, only lightly

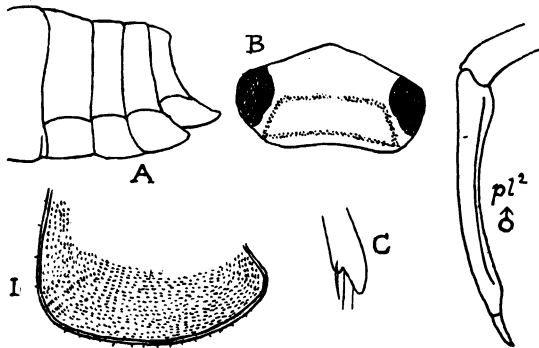


Fig. 27. *Ligidium latum* Jackson. A, last four thoracic somites from left side; B, head from above; C, uropod from below. I, Epimeron of first thoracic segment. Adapted from Jackson, 1923.

marked on last two in male; well drawn backwards on last three somites and slightly on fourth somite. Antennal flagellum long, reaching back as far as hind margin of 4th somite; with 12 segments. Uropods: Inner process of base shorter than base by about half its length, stout and conical. (None of my specimens have undamaged uropods.) The single seta arising from outer side of base, set on sharp and pointed process. Telson deeply notched over uropods; blunt, rounded posterolateral angles.

“Pleopods of ♂.—1st exopod with one (?) bristle; 1st endopod with moderate process and one (?) bristle; 2nd endopod ending in pointed process.

“Colour.—Brown and yellow mottled; slightly lighter streak down middle of back. Coxal plates light and sharply defined from brown of tergite at the suture. Legs banded with yellow and brown.” (Jackson, 1923, pp. 834, 835.)

LOCALITY.—San Francisco, California. This is distinguished from the other American species here included by the rough surface of the body.

***Ligidium kofoidi* Maloney, 1930**

Figure 28

Ligidium kofoidi MALONEY, 1930, Univ. Calif. Pub. Zool., XXXIII, p. 291 (orig. descr.), Figs. 5-13.

This form, described from two mutilated and incomplete female specimens, is included in *Ligidium* by its describer in spite of having no eyes, largely on account of the mandibles conforming to those of that genus.

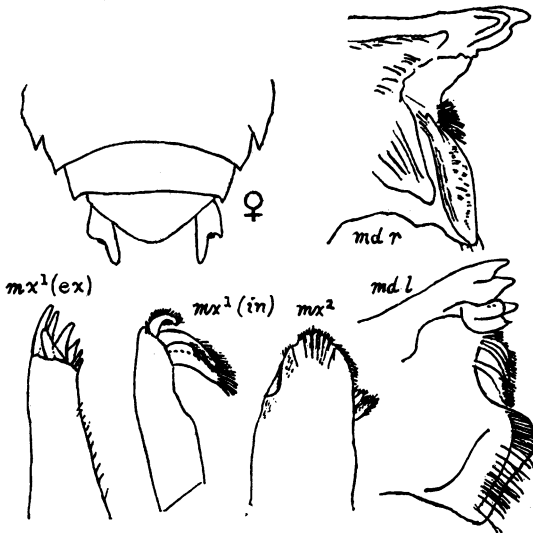


Fig. 28. *Ligidium kofoidi* Maloney. Adapted from Maloney, 1930.

“The body without antennae and uropod measures $5\frac{1}{2}$ mm. in length, in width $2\frac{1}{2}$ mm. Because of the diagnostic value of the first two pairs of pleopods in this genus, an individual of the male sex would have been preferable as the type; but the only two specimens found are of the opposite sex.

"Eyes wanting. Head twice as long as broad. The V-shaped process above and between the insertion of the antennae vestigial. Transverse groove shallow, and no frontal groove discernible. Outer branch of first maxilla with four large teeth and three smaller ones; inner branch with three hairy bristles, the two lower of which are about equal in size, while the upper is smaller and curved. A small spine behind upper bristle. Right mandible with four strong biting teeth. No lacinia mobilis found—perhaps broken off. Molar tubercle not high crowned, a bunch of non-setose bristles at its upper extremity. Left mandible with three biting teeth; a small spine on anterior tip of lower lobe of lacinia mobilis; four hairy bristles between lacinia mobilis and molar tubercle; molar tubercle high crowned. Thoracic segments about equal in length. First segment without lateral depressions or bristle groups. No coxal plate suture on any of the segments. Telson triangulate and with no trace of notches above the insertion of the uropods.

"Color.—In alcohol, a yellowish brown.

"Type Locality.—Potter Creek Cave, Shasta County, California.

"Remarks.—*Ligidium kofoidi* differs from the other known members of the genus in the shape of the telson and the absence of notches in the margin of the telson above the insertion of the uropods.

"Type in U. S. National Museum."

***Ligidium elrodii* (Packard), 1873**

Euphiloscia elrodii PACKARD, 1873, p. 97 (orig. descr.).—SMITH, 1875, p. 477.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 306; 1905, p. 692.

Nothing appears to be known about this animal except what is contained in Packard's (1873) original statements, from which it seems that it can be included in *Ligidium* as suggested by Richardson, 1905, p. 673, and that the genus *Euphiloscia* which he established for it is superfluous. His statements as quoted by Richardson, 1905, are below. I have not seen the original article.

"Having no other species with which to compare my two specimens of this species, I can only remark that it is of the usual color of the species of *Philoscia* found running about in moss, and the cave specimens had not been altered by their subteranean life. The eyes are dark as usual, while the body is mottled with brown and carneous, with no well-marked dorsal streak."

LOCALITY.—Indiana.

Other characters of this species are given in Packard's (1873, pp.

96, 97) diagnosis of his genus *Euphiloscia* which is quoted by Richardson as follows:

"The genus *Euphiloscia* differs from *Philoscia* in the flagellum of the outer antennae being subdivided into fifteen joints, while it is no longer than in the latter genus. The second and third joints are rather short; the inner (and smaller) antennae are very much larger. The body is longer and slenderer, and the abdomen much longer and wider in proportion to the rest of the body, being large and rounded, not mucronate. Uropoda much longer and slenderer than in *Philoscia*, being as long as the basal abdominal segment is wide; they are subequal. Eyes larger than in *Philoscia*. In the form of the legs and the setae this genus more closely resembles *Philoscia* than *Philougria*, and is in some respects intermediate between the two genera."

Trichoniscidae

As here restricted, this group is composed of a few genera (chiefly Old World) of small, rather narrow-bodied species with small eyes if any, small lateral lobes to the head, no tracheae in the external plates of the pleopoda. The endopodites of pleopoda 1 and 2 are modified in the male. Antennae with a flagellum of a few articles. Both the antennae and uropoda bear delicate terminal pencils of hairs. Telson narrowed and usually truncated at the tip.

Packard (1888, Pl. iv, fig. 5) illustrates a small, rather narrow-bodied terrestrial isopod which, if we disregard the telson and uropoda which are crudely and probably not correctly represented in the figure, may probably be assigned to this family. In the description of plates, page 151, where the only information about the figure is given, the statement is as follows:

"Fig. 5. Undetermined; locality unknown."

The locality, however, was doubtless somewhere in the central part of the United States. Eyes of fair size, a sinuous forehead and bulging epistome below it are shown in the figure, which is a dorsal view. The external branches of the uropoda are very wide, tapering to a point.

TRICHONISCUS BRANDT, 1833

In the typical members of this genus the eyes are small but composed of several ocelli. No longitudinal ribs or longitudinal rows of tubercles on the back. Reproduction mainly parthenogenetic in some species. See statements under *T. demivirgo*. Verhoeff, 1908, p. 196, makes this genus the type of a subfamily, Trichoniscinae.

Brandt, 1833, who established this genus, gave so brief a diagnosis of his type species, *T. pusillus*, that it is impossible to tell certainly which of several species he based it on. His type is not known to be in existence and the locality he gives, "Germania," is too vague to determine the question without any doubts. The use of the name *pusillus* therefore has been abandoned in some recent works on the European isopods. (See Graeve, 1914, pp. 203, 204.) Its application to the American form, here called *T. demivirgo* Blake, is incorrect according to Blake's opinion, though this has been the universal practice.

Owing to the uncertainty in regard to the type of the genus, there has been doubt as to what should be the typical subgenus. Apparently the group designated as the subgenus *Spiloniscus* by Racovitza, 1908 (Arch. Zool. Exper., (4) VII, p. 247), should be so considered and should become the subgenus *Trichoniscus*. Of the species here dealt with, *T. demivirgo* and *T. pygmaeus* unquestionably belong in this subdivision.

In the species that reproduce principally by parthenogenesis, which is the case with those of northern Europe and our North American species, males are very rare and in many cases unknown. This is the cause of the difficulty in distinguishing the species, as the males afford, in the form of the endopodite of the first pleopoda, the only conspicuous distinguishing character, the females being all very similar, though probably not without minor differences when closely compared.

The species of *Trichoniscus* and its near allies are animals of very active habits.

Trichoniscus demivirgo Blake, 1931

Figure 29

Trichoniscus demivirgo BLAKE, 1931, p. 341 (orig. descr.), Figs. 1a-1h; 1931, p. 350.—PROCTER, 1933, p. 247.—PRATT, 1935, p. 443 (*demiverge*).

Trichoniscus pusillus STUXBERG, 1875, p. 49.—BUDDE-LUND, 1885, p. 244 (descr.).—UNDERWOOD, 1886, p. 364.—RICHARDSON, 1900a, p. 307; 1901, p. 575; 1905, p. 694 (descr.), Fig. 733.—RACOVITZA, 1908, p. 248.—NORTON, 1909, p. 251.—FOWLER, 1912, p. 515.—PRATT, 1916, p. 381, Fig. 612.—ARCANGELI, 1922, p. 4.—JOHANSEN, 1926b, p. 167.—LOHMANDER, 1927, pp. 1, 2.—WALKER, 1927, p. 177.

Not *Trichoniscus pusillus* BRANDT, 1833. (European.)

"DESCRIPTION OF FEMALE.—The ground color is salmon. This is overlaid by a heavy, dark brown reticulation. The general form of the body is about as in *T. caelebs* (= *pusillus* G. O. Sars). The surface of the head, terga, and uropods is densely scaly. The head and dorsum are sparsely beset with short setae. Tubercles are wanting. Length, 3.2-4.0 mm.

“The eyes are conspicuous and triocellate. The antennal lobe is nearly semicircular, slightly angulated ventro-laterally, and ends abruptly ventrally to the middle of the eye. The anterior margin of the lobe bears three small spines, rather distant from one another. Seen from above, the medio-anterior margin of the lobe is slightly excavate.

“The telson has the posterior margin slightly excavate and provided with a pair of fine spines just mediad to the corners. Adventitious additional spines may occur still more medially.

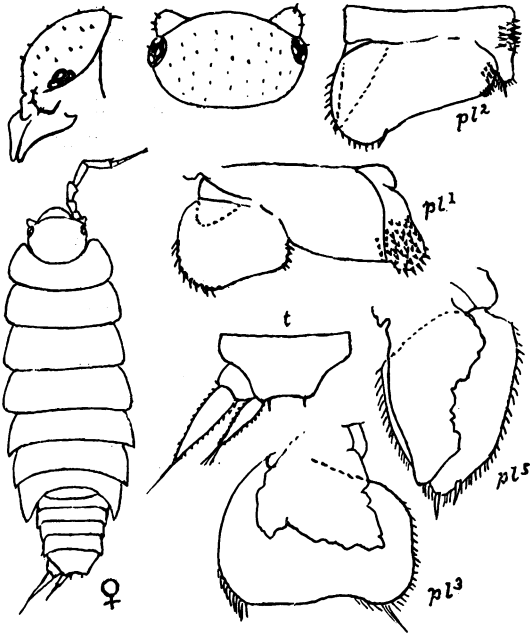


Fig. 29. *Trichoniscus demivirgo* Blake. Adapted from Blake, 1931.

“The mouth parts are as in other members of the subgenus. The thoracic legs and the uropods show nothing noteworthy, except that the uropods are strongly divergent.

“The pleopods are especially distinguished by the strong development of the lateral scaly areas on the bases of the first two pairs and the exopod of the second pair. The endopod of the third pair is about as wide as long and has a well-marked lateral lobe. The medial and posterior margins are somewhat indented or crenate. The endopod of the

fifth pair has the lateral margin concave and crenate." (Blake, 1931, pp. 341-342.)

LOCALITIES.—Blake, who established this species, records it from Mount Desert Island, Maine; Middlesex Falls (type locality), Boston, Forest Hills, Sharon, Wood's Hole, and Nantucket, in Massachusetts, apparently on the basis of specimens personally studied. The American Museum of Natural History has specimens from Fort Lee, New Jersey.

The following other records (all reported as *T. pusillus* Brandt, 1833) are probably to be referred here. St. Andrews, New Brunswick; Toronto and Lake Simcoe, Ontario (Walker); Westbrook, Maine (Norton); Chester County, Pa. (Fowler); Haverford, Pa. (Lohmander). The last named author also reports a specimen found in New York City "on a fern imported from England" and which might therefore possibly belong to one of some closely allied European species.

It occurs, according to Blake, in damp shady places under stones or the decaying leaves and wood of deciduous trees, avoiding exclusively coniferous woods, and is distinctly gregarious. The male has not been found.

Trichoniscus pygmaeus Sars, 1899

Figure 30

Trichoniscus pygmaeus Sars, 1899, p. 162 (orig. descr.), Pl. LXXII, fig. 2.—LOHMANDER, 1927, p. 3.—BLAKE, 1931, p. 345.

Spiloniscus pygmaeus VANDEL, 1933, pp. 41, 42, Fig. 7.

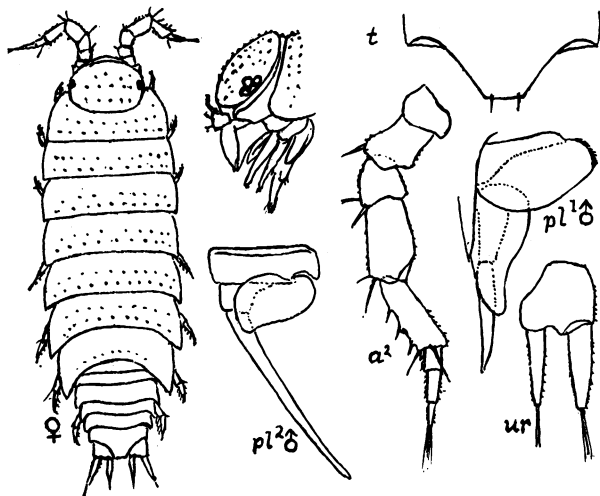


Fig. 30. *Trichoniscus pygmaeus* Sars. Adapted from Sars, 1899

Smaller than *T. demivirgo* (adult females are scarcely 2 mm. long), narrower-bodied and having numerous small tubercles arranged in transverse rows on the back. The flagellum of the second antennae has but three articles.

A species of northern Europe. It was once found at New York on lily bulbs imported from Sweden (Lohmander, 1927), but there is no evidence of its having become established in America.

***Trichoniscus pseudopusillus* Arcangeli, 1929**

Figure 31

Trichoniscus pseudopusillus ARCANGELI, 1929, p. 145 (orig. descr.), Fig. 6.

According to Arcangeli's description, which was based on a single female specimen, this species evidently closely resembles *T. demivirgo* in form and color. The head is set back half its length into the thorax and is a little wider than long. The frontal margin is slightly convex

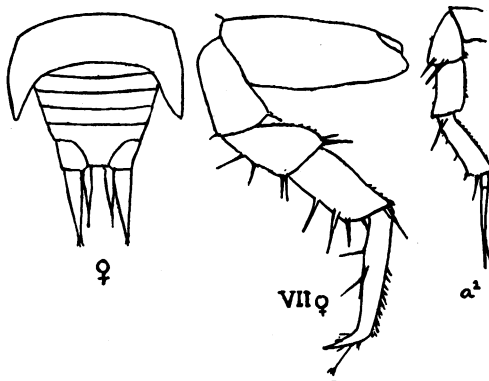


Fig. 31. *Trichoniscus pseudopusillus* Arcangeli. Adapted from Arcangeli 1929.

with small lateral lobes, which are triangular, not divergent, and have their apex right-angled and rounded off. Eyes relatively large with probably four indistinct ocelli. Second antennae about one-third the length of the body. Segmentation of the flagellum, except between the first and second articles, not noticeable.

Thoracic segments I to III with the rear lateral angle rounded but not produced backward. In segment VI, it is a right angle, becoming more acute and more produced backward in successive segments. Legs

gradually, but not greatly, longer toward the rear of the body.

Abdomen rather short, its third to fifth segments have the rear angles acute but bent down so as not to be seen in a dorsal view.

Length of only specimen (a female), 3.5 mm.; width, 1.5 mm.

LOCALITY.—Puerto Boniato, Santiago Province, Cuba, April 10, 1928.

NOTE.—The following two species (*T. magellanicus* and *T. murrayi*) doubtless belong to distinct subgenera, but they are too little known to determine their exact status.

Trichoniscus magellanicus (Dana), 1853

Figure 32

Styloniscus magellanicus Dana, 1853, p. 736 (orig. descr.), Pl. XLVIII, figs. 7-7a.—STUXBERG, 1875, p. 43.—MIERS, 1881, p. 77.—BUDE-LUND, 879, p. 9; 1885, p. 271.—DOLLFUSS, 1891, p. F2 (descr.), Pl. VIII, figs. 14-14c.—CHILTON, 1901, p. 106.

Trichoniscus magellanicus STEBBING, 1900, p. 566 (new descr.).—BUDE-LUNDE, 1908, p. 83, Pl. IV, fig. 25.—CHILTON, 1909, pp. 602, 606, 668, 799; 1910, p. 287; 1914, p. 453 (distribution).—STEBBING, 1914, p. 342.—WAHRBERG, 1922, p. 76.—GIAMBIAGI, 1925, p. 18.—MONOD, 1926, p. 41, Figs. 42, 43.—STEPHENSEN, 1927, Vidensk. Meddel. Dansk. Nat. Foren., LXXXIII, p. 370.

Trichoniscus verrucosus, see remarks below.

“Body shining, narrow elliptical, rounded in front. Abdomen abruptly a little narrower than thorax, oblong, second segment very short, last not longer than penult. Head a little shorter and narrower than next segment. Caudal stylets divaricate, nearly as long as abdomen, longer branch nearly twice the length of the other. Flagellum of antennae subulate, seven to ten-jointed.

“In damp woods, under rotten stumps and trunks of trees, near Nassau Bay, Tierra del Fuego.

“Length, four lines. Colour, dirty brown, a little clouded. The head is transverse, and arcuate less behind than before. The first three thoracic articulations are convex backward; the last two convex forwards. Lateral margins of thoracic segments finely serrulate, with a few minute spinules at intervals. Last joint of base of antennae longer than preceding and a little shorter than flagellum; posterior margin very minutely and evenly spinulous; anterior margin with four or five short spines. Claw of legs short and more or less spinous. In the posterior pair, the outer or superior margin of the fifth joint is finely pectinated for a part of its extent; on the inner side, adjoining the base, the

joint is enlarged and villose, and there are a few short spinules beyond. The pectination on the dorsal margin of the joint is seen only with a high magnifier, and is often not visible in dried specimens." (Dana, 1853, p. 736.)

The following, also other particulars, are given by Stebbing, 1900, p. 566:

Body smooth. Eyes dark with three visual elements. First maxillae; inner plate with their plumose setae; outer plate strap-shaped surrounded by eight unequal spines. The uropods are as Dana figures them, the inner ramus fully two-thirds as long as the outer, though in his description he says "longer branch nearly twice the length of the other."

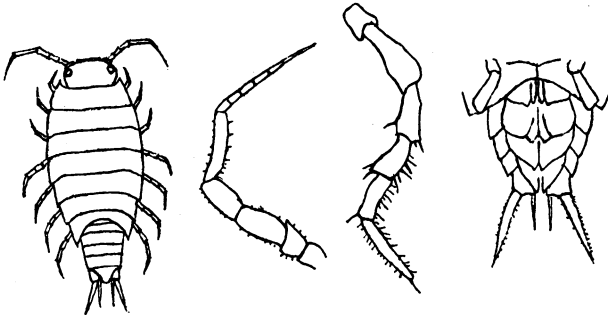


Fig. 32. *Trichoniscus magellanicus* (Dana). Adapted from Dollfus, 1891.

Color brown, mottled with yellowish white, especially in a series of light patches just above the side-plates of the pereion. Length about 8 mm.

DISTRIBUTION.—Region of the Straits of Magellan and Southern Patagonia (type locality: Nansan Bay, Tierra del Fuego, Dana), Trinidad Channel, Port Henry, Cochle Cove, Tom Bay (Miers), Lapataia, Beagle Channel (Monod); Falkland Islands (Stebbing). According to Chilton 1914, p. 453 (see also 1909, p. 602, etc.; 1910, p. 287) *Trichoniscus verrucosus* Budde-Lund, from the subantarctic islands of New Zealand and Marion Island, is identical with this species, giving it a wide distribution. It is apparently a fairly common species near the seashore, occurring according to Dana under rotten stumps and trunks of trees. Stebbing records it from a damp cave near Stanley, Falkland Islands, on a hill 450 feet high.

Trichoniscus murrayi Dollfuss, 1890

Figure 33

Trichoniscus murrayi DOLLFUS 1890, p. 68 (orig. descr.), Figs. 2-2a—BUDE-LUNDE, 1908, p. 83

“Corps ovale, rétréci postérieurement, très poilu et couvert de petites granulations.

“Cephalon.—Lobes frontaux latéraux arrondis; lobe médian nul et ligne frontale droite ou plutôt légèrement concave. Yeux moyens. Antennes externes poilues—spinescentes; fouet poilu, 5-articulé presque aussi long que l'article précédent, terminé par un pinceau de poils.

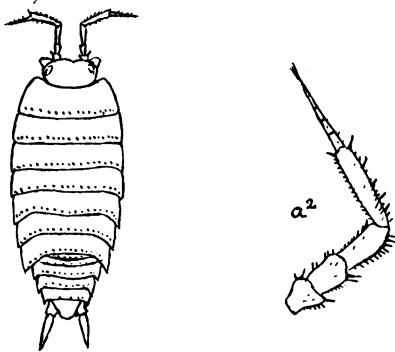


Fig. 33. *Trichoniscus murrayi* Dollfuss. Adapted from Dollfuss, 1890.

“Pereion.—Deux premiers segments à bord postérieur non sinueux. Le processus postéro-latéral des épimères de derniers segments est moins développé que dans la plupart des espèces du genre.

“Pleon.—Deux premiers segments très courts; les segments 3 à 5 à processus postéro-latéral plus développés.

“Telson.—Triangulaire tronqué, aussi long que large. Base des telsopodes n'atteignant pas tout à fait l'extrémité du telson; appendice extrême assez robuste, conique, appendice interne?

“Couleur.—Brunâtre avec une large zone claire plus ou moins marbrée de brun de chaque côté; une tache claire sur la région épiméri-euse des quatre premiers segments; telson claire; pattes et antennes plus ou moins tachées de brun.

“Dimensions.—Longueur, 6 millim.; largeur, 2 millim. $\frac{1}{2}$.

“1 exemplaire ♂ Valparaiso, November 1815.” (Dollfuss, 1890.)

DISTRIBUTION.—Only record, Valparaiso, Chile.

Though Dollfus, in a footnote, expresses doubt in placing this in the genus *Trichoniscus*, not having examined the mouth parts because of having but one specimen, Budde-Lund includes it there without question in his list (1908, p. 83) of the species of that genus.

SUBGENUS *CLAVIGERONISCUS* ARCANGELI

Arcangeli (1930a, p. 29) established this subgenus to contain the following species, but without giving any diagnosis.

Trichoniscus (*Clavigeroniscus*) *riquieri* Arcangeli, 1930

Figure 34

Trichoniscus riquieri ARCANGELI, 1930a, p. 25 (orig. descr.), Fig. 8; 1931a, p. 12.

The body is coarsely tuberculate on the thorax, the tubercles disposed in three not very regular rows (four rows on the front segment); on the abdomen the tubercles are smaller and less evident. Scattered hairs are also present on the dorsal surface.

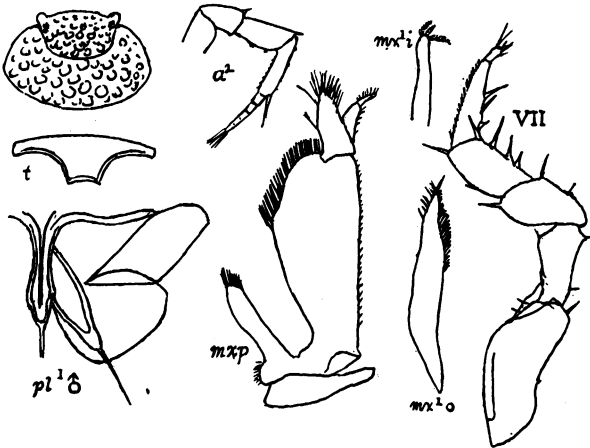


Fig. 34. *Trichoniscus* (*Clavigeroniscus*) *riquieri* Arcangeli. Adapted from Arcangeli, 1930a.

Eyes small with three or sometimes four ocelli. Antennae with a flagellum of four or perhaps five articles. The uropoda (not figured by Arcangeli) are stated to have the basal joint of truncated concave form with the external branches one and one-half times its length. The internal branches, though inserted near the base of the basal joint, reach more than two-thirds the length of the external branch.

Color.—Chestnut brown above, with yellowish markings.

Dimensions.—Length about 2.5 mm., width about 1 mm.

Many additional details will be found in the original description.

DISTRIBUTION.—Costa Rica: collected at Puente de Las Mulas, Orijuaco, and San José (Arcangeli).

SUBGENUS OR GENUS *CORDIONISCUS* GRAEVE, 1914

Established as a subgenus of *Trichoniscus* to contain the present species and a variety of it (var. *rhenana*) described previously (1913, Verh. naturh. Ver. preuss. Rheinlande u. Westfalen, ann. LXX, p. 191) from a single male specimen found in a greenhouse in Germany. Excellent figures of the details of this variety, which probably would serve equally to represent the typical form of the species, are given in Graeve, 1914, Pl. v, figs. 36-39, and Pl. vi, figs. 40-46.

Trichoniscus (*Cordioniscus*) *stebbingi* Patience, 1907

Figure 35

Cordioniscus stebbingi BLAKE, 1931, p. 350.—VANDEL, 1933, p. 44.

Trichoniscus stebbingi PATIENCE, 1907, Jour. Linnaean Soc. Zool., XXX, p. 42 (orig. descr.), Pl. vii.

“Body oblong oval in form, about two and a half times as long as it is broad. It attains the greatest width about half the total length. Dorsal face convex and very strongly tuberculated, the tubercles being arranged transversely in rows across the segments. Cephalon with the front obtusely rounded; lateral lobes moderately produced, and armed with two small spines on outer edge. Lateral parts of the segments of mesosome edged with very small spicules, which are concealed, however, in a fringe of short hairs; the lateral parts of the three posterior segments prominent, recurved, and acuminate. Metasome with the terminal expansion of last segment broadly and evenly rounded at the tip and armed with four triangular spines, the two central being the largest. Eyes consisting of three visual elements imbedded in dark pigment. Antennulae with the last joint much longer than the second and having five to seven filaments. Antennae about one-third the length of body, the flagellum being composed of from four to seven articulations. Left mandible with two, right with one, penicil behind the cutting part. Last pair of legs in both sexes with the last joint densely ciliated on the outside. Inner ramus of first pair of pleopoda in male not very conspicuous, biarticulate; the terminal joint about twice the length of first, slender and needle-shaped, and produced just slightly beyond the first joint of inner ramus of second pair. Inner ramus of second pair biarticulate, proximal joint short; the distal joint greatly produced, reaching

almost to tip of last pair of pleopoda, comparatively robust, and gradually tapering to a needle-like point. Uropoda with outer ramus about twice the length of basal part, inner ramus being narrower and shorter. Colour in the living animal dark reddish brown marbled with white. Length of largest males and females about 3.5 mm." (Patience, 1907, pp. 42, 43.)

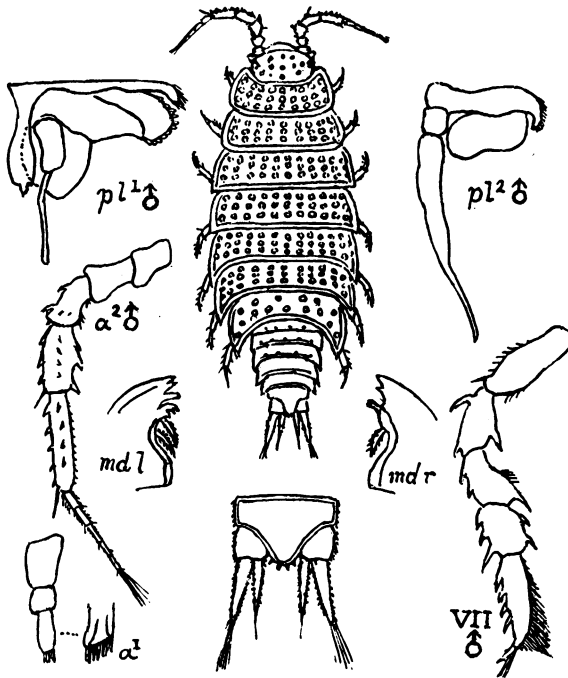


Fig. 35. *Trichoniscus* (*Cordioniscus*) *stebbingi* Patience. Adapted from Patience, 1907.

LOCALITIES.—Originally described from near Glasgow, Scotland. Recorded by Blake from a hothouse in Cambridge, Massachusetts.

SUBGENUS OR GENUS *MIKTONISCUS* KESSELYÁK, 1930

Members of this group differ from typical species of *Trichoniscus* in having eyes composed of only one ocellus, the back tuberculate, and in minor characters of the mandibles and pleopoda.

Trichoniscus (Miktoniscus) halophilus Blake, 1931

Figure 36

Miktoniscus halophilus BLAKE, 1931, p. 345 (orig. descr.), Figs. 1i-1j and 2a-2i; 1931, p. 350.—VANDEL, 1933, p. 43.

Trichoniscus halophilus BLAKE, 1930, p. 279 (*nomen nudum*).

“The female, when alive, is salmon-colored. This color fades out after death, leaving a yellowish, cutaneous pigment. The pereion has

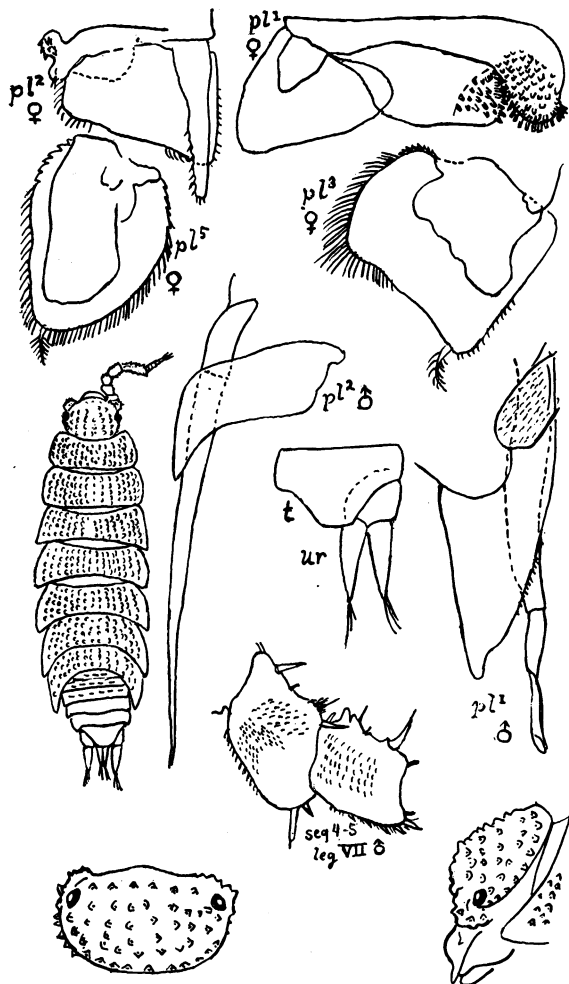


Fig. 36. *Trichoniscus (Miktoniscus) halophilus* Blake. Adapted from Blake, 1931.

two submedian bands of white spots (fenestrae in the pigmentation). The surface of the head and pereion is thickly, but irregularly, beset with acute tubercles. The first three pleon segments bear each a row of tubercles. Length of body, 4.5–4.7 mm.

“The eyes are densely black, each provided with a single large lens. The antennal lobe is large and seen from the side, semicircular.

“The tip of the telson is truncate and without spines. The terminal margin may be either slightly concave or convex.

“The appendages show nothing of especial note. Pleopods I–III and V are shown in Fig. 2, *f-i*. The scales on the lateral portion of pleopod I are blunt ended.

“The male is a little more slender than the female and shows the usual sexual peculiarities of the pleopods and pereopod VII (Fig. 2, *c-e*). Otherwise, the two sexes are alike. Length, 4.3–4.5 mm.

“The male pleopods are subject to some variation. The lateral margin of the exopod of pleopod I may or may not have a reëntrant angle about one-third the distance from tip to base. The inner distal angle of the basis may be rounded or rectangular. The serration of the inner margin of the exopod of pleopod II is almost imperceptible. The medial margin of the basis of pleopod I is produced basally into a lobe which is folded over ventrad.

“The medial, distal, scaly area on the third segment of pereopod VII is replaced by rows of minute spines, doubtless representing scales. There is a marginal double row of these spines, one-third the length of the margin, and two shorter sub-marginal rows rather distinctly separated from each other. The indentation of the medial edge of the fifth segment is sub-basal, not median as in *linearis*.” (Blake, 1931, pp. 345–347.)

DISTRIBUTION.—Coastal regions of Massachusetts (Woods Hole, Marthas Vineyard, and Nantucket Islands). Type locality Katama on Marthas Vineyard Island; type in collection of Boston Society of Natural History. According to Blake, it is exclusively an inhabitant of salt marshes and similar situations, living under dead eelgrass (*Zostera marina*), driftwood, etc., with *Armadilloniscus ellipticus*, *Scyphacella arenicola*, *Armadillidium vulgare*, and *Porcellio scaber*.

HAPLOPHTHALMUS SCHÖBEL, 1860

Eyes simple (each of a single ocellus).

Segments of thorax with longitudinal, raised ribs or rows of small tubercles.

Epimera well developed.

Unlike *Trichoniscus* and its allies, the members of this group are inactive and slow in their motions. Verhoeff, 1908, p. 196, makes this genus a subfamily (Haplophthalminae).

Haplophthalmus danicus Budde-Lund, 1879

Figure 37

Haplophthalmus danicus BUDDE-LUND, 1879, p. 9; 1885, p. 250 (descr.).—SARS, 1899, p. 168, Pl. LXXIV, fig. 2.—VERHOEFF, 1908, p. 189.—ARCANGELI, 1923, pp. 260, 274.—LOHMANDER, 1927, p. 3 (detailed descr.), Figs. 1, 2 (details.).—WALKER, 1927, p. 175.

Haplophthalmus puteus HAY, 1899, p. 871 (orig. descr.), Pl. LXXXVI.—RICHARDSON, 1905, p. 697 (descr.), Fig. 739.

The tubercles are in eight or ten rows, at least six of which are well marked, on the thoracic segments. On the last two, there is a tendency

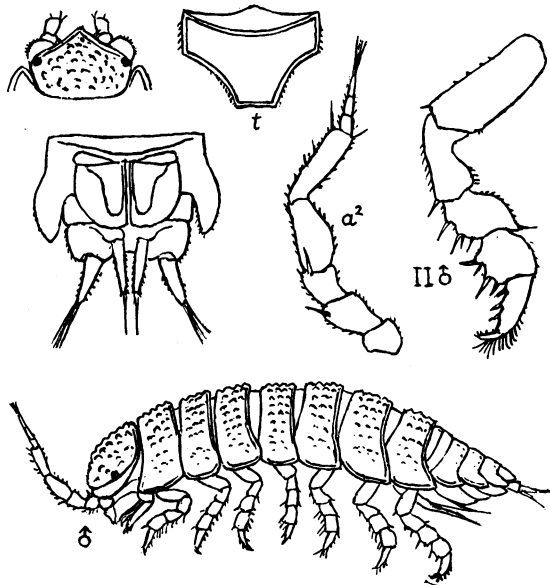


Fig. 37. *Haplophthalmus danicus* Budde-Lund. Adapted from Sars, 1899.

for the tubercles to form distinct raised longitudinal ribs. The epimera are conspicuously flared outward, those of the thorax are truncate and separated by notches, those of abdominal segments 3, 4, and 5 are acute and turned backward. No distinct rows of tubercles or ribs on the abdominal segments.

For detailed descriptions and figures, see Lohmander, 1927, and Sars, 1899.

Color, whitish.

Length, 3 to 4 mm.

DISTRIBUTION.—Widely distributed in Europe. It was first reported in America by Hay, 1899, "from an old well in Irvington, Marion County, Indiana," who described it as a new species (*puteus*) and incorrectly considered it aquatic. Lohmander, 1927, has reported it from Plummer's Island, Maryland, from a deep layer of old leaves, and on asparagus roots brought to Philadelphia from Germany. The American Museum has a specimen found with *Trichoniscus demivirgo* at Fort Lee, New Jersey.

The position of the following three genera is more or less uncertain. As suggested by Arcangeli, 1929, p. 145, *Cylindroniscus* may require the establishment of a subfamily.

OLIGONISCUS DOLLFUS, 1890

An imperfectly known genus containing only the following species.

Oligoniscus monocellatus (Dollfus), 1890

Figure 38

Microniscus monocellatus DOLLFUS, 1890, p. 7, Pl. II, fig. 4.

Oligoniscus monocellatus DOLLFUS, 1890a.—BUDE-LUND, 1908, p. 84 (says probably a *Trichoniscus*).

"Corps allongé, atténué postérieurement, granulé surtout antérieurement et très finement poilu.

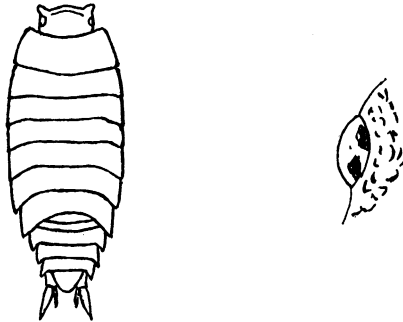


Fig. 38. *Oligoniscus monocellatus* (Dollfus). Adapted from Dollfus, 1890.

"Cephalon.—Infléchi en avant, le bord frontal empiétant aussi sur la région faciale; lobes latéraux médiocres. Yeux avec une double tache de pigment noir. Antennes?

“Pereion.—Segments antérieurs à bord postérieur un peu sinueux de chaque côté: bord postérieur des deux derniers segments régulièrement courbé.

“Pleon.—En retrait sur le pereion; processus postlateral des segments 3-5 court.

“Telson.—Triangulaire aussi long que large, à sommet tronqué arrondi. Telsopodes à base n’atteignant pas tout à fait l’extrémité des telson, appendice conique, l’extrême plus long d’un tiers environ que l’appendice interne (1).

“Couleur.—(Dans l’alcool) Blanc uniforme.

“Dimensions.—4 mm. $\frac{3}{4}$ × 1 mm. $\frac{3}{4}$.” (Dollfus, 1890, p. 7.)

DISTRIBUTION.—Only record, Juan Fernandez Island, beach.

The type and only species of its genus (first called by the preoccupied name *Microniscus*), which Dollfus says he cannot place, not having examined the mouth parts because of having but one specimen.

BRACKENRIDGIA ULRICH, 1902

The following is the only known species. As suggested by Lohmander, 1927, it may not belong in this family.

Brackenridgia cavernarum Ulrich, 1902

Figure 39

Brackenridgia cavernarum EIGENMANN, 1900, p. 230 (*nomen nudum*).—ULRICH, 1902, p. 90 (orig. descr.), Pl. XVI, figs. 1-9.—RICHARDSON, 1905 (descr.), p. 699, Fig. 740.—LOHMANDER, 1927, pp. 1, 2.—ARCANGELI, 1932, p. 137.

“Body oblong-ovate, about three times longer than wide, $1\frac{1}{2}$ mm.: $4\frac{1}{2}$ mm.

“Head wider than long, with the frontal margin almost straight, the median and lateral lobes being almost obsolete. Eyes absent. The first pair of antennae are rudimentary and inconspicuous. The second pair have the first and second articles subequal in length; the third article is a little longer than the second; the fourth is one and a half times as long as the third; the fifth is a little longer than the fourth. The flagellum is composed of seven articles.

“The segments of the thorax are subequal in length. The lateral margins are straight. The epimera are not distinctly separated from the segments.

“The abdomen is abruptly narrower than the thorax. The first two segments have the lateral parts covered by the seventh thoracic segment. The sixth or terminal segment has the posterior margin rounded. The basal article of the uropoda does not extend beyond the extremity

of the last abdominal segment. The inner branch is about half as long as the outer branch.

"The legs are all ambulatory in character. The seventh pair has the outer distal extremity of the propodus surmounted with a crest of hairs." (Richardson, 1905, pp. 699-700.)

Ulrich's description contains some details not in Richardson's, but

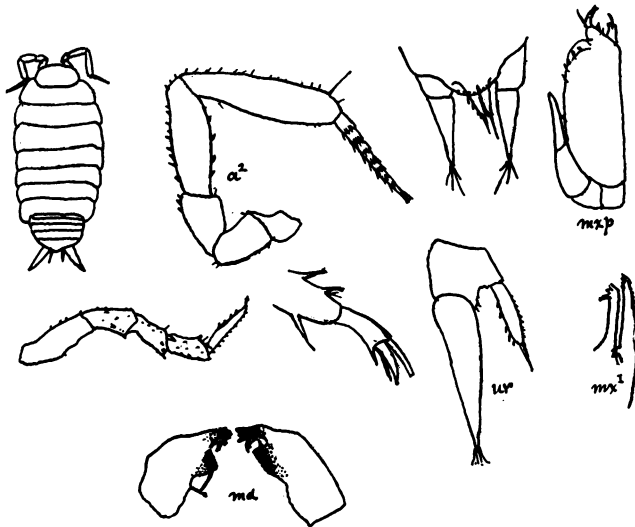


Fig. 39. *Brackenridgia cavernarum* Ulrich. Adapted from Ulrich, 1902.

most of these are discernible from the figures. The body seems to be practically without pigment.

LOCALITY.—Ezell's and Beaver Caves, near San Marcos, Texas.

CYLINDRONISCUS ARCANGELI, 1929

A genus established for the following peculiar species which Arcangeli, 1929, p. 145, places in the family Trichoniscidae, with the remark that perhaps it should constitute a subfamily.

Cylindroniscus seurati Arcangeli, 1929

Figure 40

Cylindroniscus seurati ARCANGELI, 1929, p. 141 (orig. descr.), Fig. 5; 1932, p. 137.

The reader must be referred to Arcangeli's description for the details of this species. Only females were obtained. Some of its more conspicuous features are as follows:

The body is elongate, narrow, convex, covered with scattered fine

setae not abruptly contracted in the abdominal region, the integument soft and flexible.

Head without lobes; eyes wanting, antennae moderately long; the flagellum short, of three articles.

Thoracic segments with the epimera small, only the sixth and seventh have the rear corner angular. Legs of moderate length and all approximately equally long; in the sixth and seventh pairs the propodus is widened and of somewhat rectangular outline and provided with a comb-like row of curved, pointed bristles on its distal margin, external to the insertion of the dactylus.

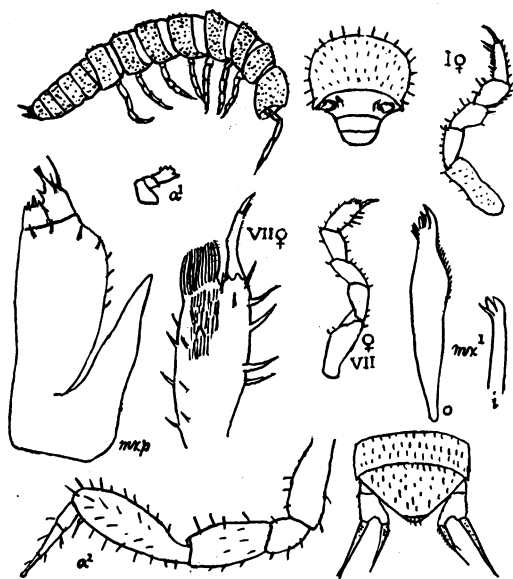


Fig. 40. *Cylindroniscus seurati* Arcangeli. Adapted from Arcangeli, 1929.

No tracheae in the external plates of the pleopoda.

The body is unpigmented and somewhat translucent.

Length, 2.4 mm.; width, 0.4 mm.

LOCALITY.—Guayabal, Cuba. Seven females collected in October, 1928. Probably lives in humus.

Superfamily **Pleurotracheata** Verhoeff

Tracheae commonly developed in the exopodites of two or five pairs of pleopoda, though sometimes wanting, especially in small species. They open in the lateral part of the appendage by one or more orifices.

Endopodites (inner branches) of uropoda near together and often capable, when pressed together, of forming a channel for absorbing water and leading it to the pleopoda to keep them moist. Molar process of mandibles replaced by a process bearing tufts of setae. Some of the members of the superfamily are capable of rolling the body into a ball.

This superfamily contains most of the Oniscoidea, and though the extremes of variation found among its numerous members are apparently far apart, there exist so many intermediate connecting forms and so many cases of convergence or parallelism in characters that its satisfactory division into families is difficult, and the determination of the phylogenetic relationship of the genera still more so. The most convenient way to handle the problem of its classification seems to be to recognize a very few families, each with sufficiently broad definitions.

Scyphacidae Chilton, 1901

A group of littoral genera related to the Oniscidae, and possibly not worthy of separation from it as a distinct family, found along the seacoasts of many parts of the world. With a few alterations the following diagnosis (and also that of the genus *Scyphacella*) is taken from Richardson, 1905.

Front not margined, but continuous with the epistome. Second pair of antennae with flagellum composed of four (or five?) articles. First maxillae with the inner lobe furnished with two plumose setae; outer lobe furnished with teeth. Second maxillae furnished with hairs. Mandibles with the molar process reduced, consisting of a low base and a tuft of setae. Maxilliped with masticatory lobe acutely produced; palp elongate, much longer than masticatory lobe, with articles large and not distinctly defined.

Abdomen not abruptly narrower than thorax. Uropoda extending beyond the tip of the abdomen; inner branch inserted at the upper inner angle of the basal article.

SCYPHACELLA SMITH

“Outer lobe of first maxillae furnished along the distal half of the inner margin with recurved spines. Inner lobe furnished with two widely separate plumose processes, one at the tip and the other on the inner margin. Second maxillae furnished with hairs at the tip. Both first and second maxillae long and slender. Palp of maxillipeds long and narrow, acutely produced at the tip. Eyes large, composed of many ocelli.

“Abdomen not narrower than thorax. Uropoda exposed, both branches styliform.” (Richardson, 1905, p. 671.)

Scyphacella arenicola Smith, 1873

Figure 41

Scyphacella arenicola SMITH (in Verrill and Smith), 1873, pp. 337, 568 (orig. descr.).—HARGER, 1879, p. 157; 1880, p. 307, Pl. I, fig. 2.—UNDERWOOD, 1886, p. 363.—STEBBING, 1893, p. 422.—HAY, 1899, p. 871.—RICHARDSON, 1900a, p. 307; 1901, p. 576; 1905, pp. viii, 671 (descr.), Fig. 710.—RATHBUN, 1905, p. 47, check list, p. 4.—FOWLER, 1912, p. 223 (descr.), Pl. LXVI.—BLAKE, 1929, p. 12, Fig. 2; 1930, p. 279; 1931a, p. 350.

Trichoniscus arenicola BUDDE-LUND, 1885, p. 249.

“Body oblong-ovate, a little more than twice as long as wide, 2 mm. : 4½ mm.; surface very scaly, thickly covered with small tubercles, each tipped with a small spine.

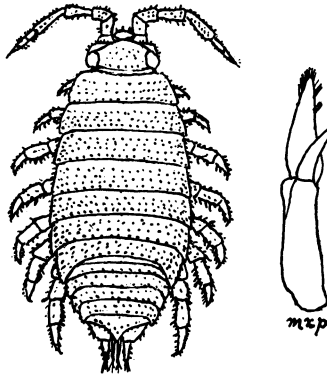


Fig. 41. *Scyphacella arenicola* Smith. Adapted from Harger, 1880.

“Head wider than long; frontal margin but little produced; lateral lobes small. Eyes large, round, composite, and placed at the sides of the head, close to the lateral margin. The epistome is continuous with the front of the head, so that the head seems to be produced forward in a triangular extremity which is rounded anteriorly. The first pair of antennae are small, inconspicuous, the terminal article fringed with hairs at the apex. The second pair of antennae have the first two articles short, the second one a little longer than the first; the third and fourth articles are nearly subequal, and each is a little longer than the second; the fifth is one and a half times longer than the fourth. The flagellum is composed of four articles, the first article being twice as long as the

second; the articles are with difficulty to be distinguished. The antennae are thickly beset with spines.

"The segments of the thorax are subequal; the last two have the post-lateral angles produced backward.

"All the segments of the abdomen are distinct. The first two have the lateral parts covered by the seventh thoracic segment. The three following segments have the post-lateral angles produced backward. The terminal abdominal segment is narrow, produced in the middle posteriorly in a long, narrow process, broadly rounded at the apex. The peduncle of the uropoda extends to the end of the terminal abdominal segment. The branches are of nearly equal length.

"Color of the specimens, for a long time preserved in alcohol, dark brown, with the margins of the segments of a lighter brown." (Richardson, 1905, p. 672, 673.)

To this it may be added that the color in life, according to Smith, is "nearly white with chalky white spots and scattered blackish dots arranged irregularly. Eyes black," and that in the specimens I have seen, as well as in Blake's figure, the body is somewhat narrower than in the figure here given (based on that of Harger). The width relative to the length, however, is largely dependent on the state of muscular contraction of the body.

DISTRIBUTION.—A littoral species that, according to Verrill and Smith, 1873, burrows in sandy sea beaches just above high-water mark making a little conical mound around the mouth of the holes. Recorded from the vicinity of Woods Hole, Massachusetts, southward to Dorchester, Maryland.

DETO GUÉRIN, 1836

Body not highly arched; epimera expanded; dorsal surface with spines or tubercles; head with broad lateral lobes. Eyes with many ocelli. Antennae with a four-jointed flagellum. Mandibles with one penicil behind the cutting edge. External plates of pleopoda without tracheae. Uropoda reaching considerably beyond the telson.

Considerable sexual differences exist in this genus; as a rule the body is more strongly tuberculate and the antennae are stouter in the male. The large balloon-like expansions of the first thoracic segment of the male apparently are peculiar to the species described below. (See Chilton, 1914, for further details.) It belongs, according to Chilton, to a subgenus or section *Vinneta* Budde-Lund, 1906, distinguished by having the external branch of the uropoda not reaching beyond the inner branch.

***Deto bucculenta* (Nicolet), 1849**

Figures 42, 43

Oniscus bucculentus + *O. tuberculatus* NICOLET, 1849, pp. 267, 268 (orig. descr.), Pl. III, fig. 9.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 1; 1885, p. 206.

Philoscia bucculenta DOLLFUS, 1890, pp. 67, 68.—STEBBING, 1893, p. 431.

Deto bucculenta CHILTON, 1909, pp. 603, 608; 1910, p. 288; 1914, p. 449 (new descr.), Pl. XL, figs. 45–49.—JACKSON, 1928a, p. 578, Fig. 8.—BARNARD, 1932, p. 224.

“*O. oblongus, spinosus, oleagino-fuscus*; antennis externis crassis, rugosis, elongatis; fronte bimarginata; lobis lateralibus latis, prominentibus, truncatis; segmento primo thoracis ad latera fortiter inflato; ultimo abdominis trianguliformi, lateraliter sulcato; pedibus antennisque pallide fuscis.”

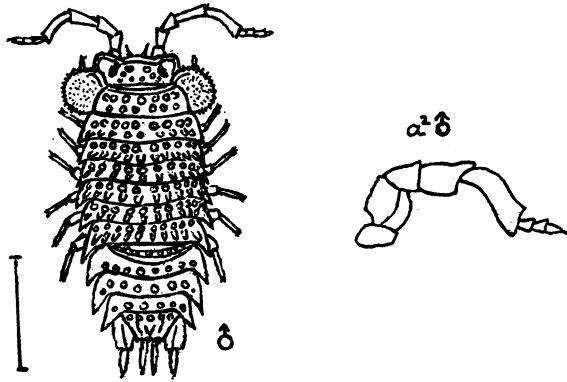


Fig. 42. *Deto bucculenta* (Nicolet). Adapted from Nicolet, 1849.

This species is bristly with strong obconical spiniform tubercles arranged in transverse lines, two lines on the thoracic and one on the abdominal segments; head also tuberculated above and subtriangular, rounded at the front end which is nearly vertical and separated from the lateral lobes by a deep notch which makes the projection of the lobes more considerable; these lobes are long, broad and roundly truncated at the end and directed very obliquely forward; their margin is raised into a border and forms between itself and the central part of the lobe a nearly circular canal. The external antennae are stout and irregular, angular and crooked, the internal antennae are scarcely visible. The lateral lobes of the first thoracic segments are inflated or dilated in such a way as to form on each side of the head near its base a swollen

cheek, very convex above and below, testaceous and bristly with spiniform papillae which make it rough to the touch like the tongue of a cat. The other segments have the latero-posterior angles directed backwards, increasing the length of the thorax so that it approximates to that of the abdomen. These angles in the three abdominal segments next to the last are very long and much curved backwards. The last segment ends in a rather pronounced angle truncated at the tip with raised lateral borders forming a broad oblique canal at the sides. Stylelets of the last appendages little elongate, and stout; their basal article very wide. Color olive-brown, with the posterior margins of the segments washed with dark yellow. (Nicolet, 1849, pp. 267, 268, translation of description of male.)

Length of a male, 11 mm.; female somewhat smaller (Chilton, 1914).

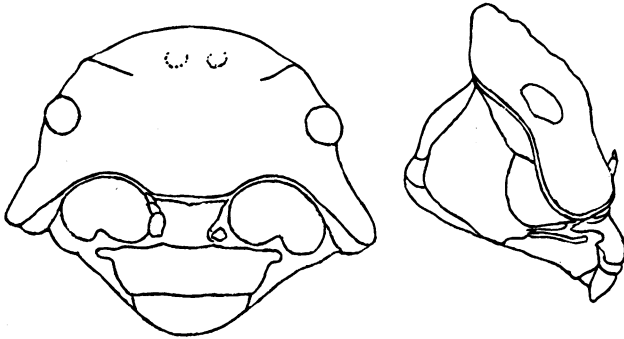


Fig. 43. *Deto bucculenta* (Nicolet). Adapted from Jackson, 1928a.

DISTRIBUTION.—“Bay of Valparaiso,” type locality (Nicolet); Chilton, 1914, includes as a synonym *Deto novae-zealandae* (Filhol), 1855, a species recorded from the Chatham Islands, Stewart Island, and Wellington, New Zealand, thus giving it a wide geographical range.

Two supposed species found together, *Oniscus bucculentus* and *O. tuberculatus*, were described by Nicolet. They differed in that the former possessed large rounded expansions of the lateral parts of the first segment of the thorax, which were covered with short spiny projections. The general surface of the back was covered with large tubercles in both. Dollfus, 1890, came to the correct conclusion that the two were male and female of one species, the rounded expansions being a sexual character of the male, but he thought that Nicolet's illustration

was incorrect and that the expansions were really on the first pair of legs, which in some species of *Philoscia* bear large flattened rounded expansions bordered with spines in the males. He consequently included the species in *Philoscia*, uniting both under the name *Philoscia bucculenta*.

Chilton appears to have been the first to recognize that the species belongs in *Deto*, thus establishing the correctness of Nicolet's figure. He calls attention to this in several articles and considers a New Zealand species of that genus, *D. novae-zealandiae*, as a possible synonym, and later (1914) as an actual synonym of the Chilean species. Chilton's figure, however (1914, Pl. XL, fig. 45), apparently shows the rounded expansions as smooth, although he states in the text (p. 451) that the specimens coming from the Chatham Islands have them spiny, as in Nicolet's figure. He also mentions, however, that they are smooth in a specimen from Stewart Island and apparently attaches small weight to the difference. As Nicolet's name has long priority, its validity is in no way affected, whether the New Zealand form is identical or not. It is certainly closely allied.

DETONELLA LOHMANDER, 1927

Established to contain the following species as the type and only known form. It differs from *Deto* chiefly in small details of the mouth parts, and in the smaller eyes, and the rank of a subgenus might perhaps suffice for it.

Detonella papillicornis (Richardson), 1904

Figure 44

Detonella papillicornis LOHMANDER, 1927, p. 10 (detailed descr. and figures), Figs. 3-6.

Trichoniscus papillicornis RICHARDSON, 1904, p. 670 (orig. descr.), Figs. 18-22; 1904a, p. 227 (descr.), Figs. 113-117; 1905, p. 695 (descr.), Figs. 734-738.—JOHANSEN, 1926b, p. 167.—FEE, 1927, p. 32 (descr.).—WALKER, 1927, p. 177.

The following extracts are quoted from Richardson's original description:

"Body covered with low tubercles. Color light brown.

"Head with sides produced at the antero-lateral angles in large lobes; front triangularly produced with a slight emargination at the apex of the triangle. Eyes situated on the lateral margins at the base of the antero-lateral lobes; they are small and black and apparently simple in structure. The peduncle of the antennae consists of five stout joints, the last three of which have the inner margins beset with numer-

ous strong tubercular-like papillae, each surmounted with a tuft of short stiff hairs or bristles; the fifth joint is also produced at the outer distal angle in an acute process. The flagellum is composed of about seven articles, rather indistinctly defined; the last article is tipped with a bunch of hairs. The buccal mass is very prominent below.

“The segments of the thorax are about equal in length. The post-lateral angles of all the segments, except the first, are produced backward, very slightly in the case of the second, third, and fourth, but becoming gradually more so, until the last two segments show this character very markedly.

“The abdomen is narrower than the thorax. All the segments are

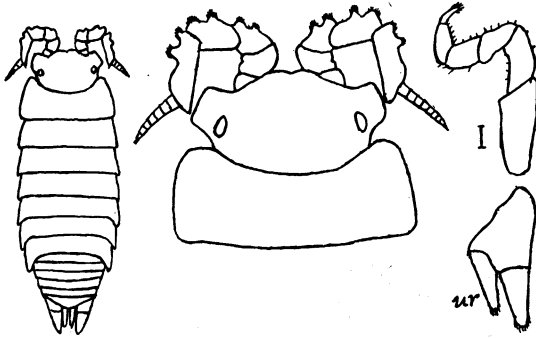


Fig. 44. *Detonella papillicornis* (Richardson). Adapted from Richardson, 1904.

visible in entirety, not being covered laterally by the last thoracic segment.”

Length, 3 mm.

LOCALITIES.—The type specimen was found on the beach at Selkovia, Cook Inlet, Alaska, and is in the U. S. National Museum (Richardson), which also contains additional specimens from Bering Island (Lohmander). Fee records it “in a tide pool” at Hammond Bay, British Columbia (one specimen).

According to the latter author, the number of articles in the antennal flagellum is only four; the length of the male is given as 3 mm. of the female as 3.8 mm.

ARMADILLONISCUS ULJANIN, 1875

Front outline of head very deeply three-lobed. Flagellum of second antennae described as having four articles, but apparently with also

a rudimentary fifth article. Basal joint of uropoda broad, both of its branches short and styliform, the outer one inserted about the middle of the inner margin of the basal joint. No tracheae in the external plates of any of the pleopoda (according to Verhoeff, 1916, p. 160). *Actoniscus* Harger, 1878, is a synonym of this chiefly Old World group (Budde-Lund, 1885, p. 239; Blake, 1930, p. 282). Verhoeff, 1916, pp. 160, 161, regards it as a subfamily (Armadilloniscinae) of the Oniscidae.

Armadilloniscus ellipticus (Harger), 1878

Figure 45

Actoniscus ellipticus HARGER, 1878, p. 373 (orig. descr.); 1879, p. 157; 1880, p. 309, Pl. 1, fig. 3.—BUDDE-LUND, 1879, p. 5.—RICHARDSON, 1900a, p. 307; 1901, p. 576; 1902, p. 305.—VERRILL, 1902, p. 845.—RICHARDSON, 1905, pp. 634 (orig. descr. repeated), 635, Fig. 678 (after Harger).—RATHBUN, 1905, p. 47, check list, p. 4.—HOLMES AND GAY, 1909, p. 378.—FOWLER, 1912, p. 517.—KUNKEL, 1918, p. 249, Fig. 83.—BLAKE, 1929, p. 12.

Armadilloniscus ellipticus BUDDE-LUND, 1885, p. 239.—BLAKE, 1930, p. 279, Figs. 1-11; 1931, p. 350.

The following statements are taken from Harger's description:

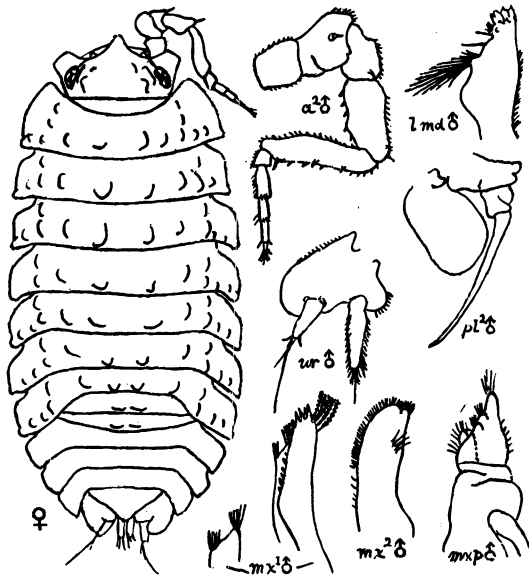


Fig. 45. *Armadilloniscus ellipticus* (Harger). Adapted from Blake, 1930.

"The body is oval in outline. The head appears triangular, as seen from above, and is angularly produced in a median lobe, but the lateral

lobes are also large and divergent and broadly rounded. The eyes are small, oval, black, and prominent. They are situated at the sides of the median triangular part of the head, and at the base of the lateral lobes. . . . Flagellum (of antennae) shorter than the last peduncular segment, tipped with setae and composed of four segments, of which the second and third are equal and longer than the first, while the last is the shortest and presents indication of another minute rudimentary terminal segment.

"The first thoracic segment is excavated at the front for the head, admitting it to the eyes. . . . The second and to an increasing degree the succeeding segments are produced backward at the sides. The legs are rather small and weak. . . .

"The third, fourth, and fifth (abdominal) segments are produced laterally into broad plates, which are close together and at their extremities continue the regular oval outline of the body with scarcely a perceptible break between the thorax and the pleon. This outline is further continued by the expanded basal segments of the uropods, which are even larger than the adjacent coxae of the fifth segment. . . .

"Length, 4 mm.; breadth, 2 mm.; color in life, slaty gray." (Harger.)

Blake (1930) calls attention to tubercles on the thorax not mentioned by Harger, and to white spots or markings on the dorsal surface especially on the thoracic segments each side of the median area. He states that it has a limited power of enrollment.

DISTRIBUTION.—Savin Rock and Stony Creek near New Haven, Connecticut (Harger); Woods Hole, Massachusetts (Blake); Bermuda, at Hungry Bay (Richardson). Occurs under stones and rubbish near salt water ("near high water mark" according to Blake), but appears to be a rare species, or at least very local in distribution.

***Armadilloniscus tuberculatus* (Holmes and Gay), 1909**

Figure 46

Actoniscus tuberculatus HOLMES AND GAY, 1909, p. 377 (orig. descr.), Fig. 5.

"Body elliptical in outline and furnished with small tubercles. Head deeply inserted, with an acute median lobe and prominent rounded lateral ones. Eyes oval. Antennae not one-third the length of the body, the second joint of the peduncle a little longer than the third and about twice the length of the first; fourth joint longer than the third but not quite so long as the fifth; flagellum with four evident joints and a minute terminal fifth joint. The peduncle is bent between the second and third, and the fourth and fifth joints.

“Maxillipeds with a rounded setose inner lobe; palp short and broad, the first joint much wider than long, the second triangular with slightly lobulated inner margin, the tip with a brush of long setae.

“Legs similar, spiny, a long ciliated spine on the lower margin of the fifth joint.

“Basal joint of uropods large, similar to the coxal plates of the preceding segments, and setose on the distal margin; rami extending about to the tip of the peduncle, the outer one inserted at the middle of the inner margin of the basal plate, the inner one near the base; both tipped with setae.

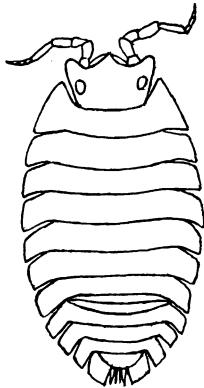


Fig. 46. *Armadilloniscus tuberculatus* (Holmes and Gay). Adapted from Holmes and Gay, 1909.

“Length, 3.25 mm.” (Holmes and Gay, 1909, pp. 377–378.)

LOCALITY.—San Diego, California, on moist ground near the seashore. Type in the U. S. National Museum.

“This species seems to be closely allied to *A. ellipticus* (Harger) from the Atlantic coast. The body is somewhat broader and the lateral processes of the segments are more nearly rectangular in outline, especially in the abdomen, and more prominent.” (Holmes and Gay, 1909, p. 378.)

***Armadilloniscus lindahli* (Richardson), 1905**

Figure 47

Actoniscus lindahli RICHARDSON, 1905, p. 635 (orig. descr.), Figs. 679, 680.—BLAKE, 1930, p. 282.

The concluding part of Richardson's description is as follows:

“This species is very similar to the type and only described species of the genus, *Actoniscus ellipticus* Harger, but differs in having the

surface of the body covered with low tubercles; in having the three lobes of the head anteriorly truncate, while in *A. ellipticus* the median one is acutely pointed, the lateral ones rounded; in having the fourth and fifth articles of the peduncle of the antennae subequal, and the second article of the flagellum longest, the terminal article not minute, but as long as the preceding one; in having the post-lateral angles of the first thoracic segment produced in acute processes, and in having the sixth or terminal segment of the abdomen triangular rather than rounded.

“Color reddish brown with wavy lines of a light yellow on either side of the median line.” (Richardson.)

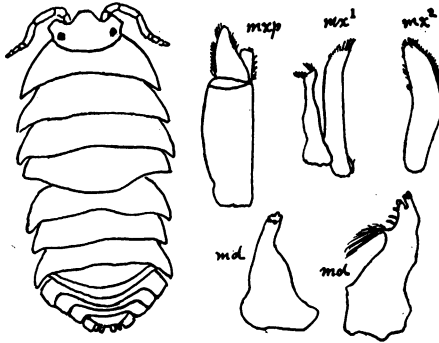


Fig. 47. *Armadilloniscus lindahli* (Richardson). Adapted from Richardson, 1905.

Length about 4.5 mm.

LOCALITY.—Oakland, California. About ten specimens collected by Prof. Josua Lindahl. Types in the Museum of the Cincinnati Society of Natural History. (Richardson.)

Oniscidae

“Body oval or oblong, with the lateral parts of the segments more or less expanded. Metasome with the 2 anterior segments rather small, and having the epimeral plates concealed; last segment much narrower than the preceding ones, and conically produced at the end. Eyes generally well developed, compound. Antennulae very small, with the apical sensory appendages short, papilliform. Antennae, as a rule, slender, with the flagellum pauciarticulate. Buccal mass not very prominent below. Mandibles with the cutting part highly chitinized and, as usual, composed of 2 superposed dentate lamellae, behind which

is a membranous hairy lappet and a varying number of penicils, molar expansion obsolete, without any triturating surface, it being replaced by a brush-like recurved seta. Anterior maxillae with the outer masticatory lobe very strong and coarsely spinous at the tip, inner lobe much narrower and provided with only 2 hairy bristles. Posterior maxillae distinctly bilobed at the tip, and having the outer edge angularly produced near the base. Maxillipeds with the basal part broad and laminar, though scarcely expanded distally, terminal part poorly developed and never composed of more than 3 joints, the last very narrow; masticatory lobe short, truncate at the tip; epignath large, flanking the basal part. Legs, as a rule, slender, increasing in length posteriorly. Sexual appendage of male simple, conic, and generally connected with the inner rami of the 1st pair of pleopoda; the latter very largely developed, terminating each in a highly chitinized, conical joint obliquely grooved below, for conducting the evacuated sperm. Inner ramus of 2nd pair of pleopoda in male terminating in a slender lash finely pointed at the tip. Uropoda with the outer ramus more or less flattened, lanceolate, inner much smaller, sublinear, and, as a rule, attached far in front of the outer." (Sars, 1899, pp. 169, 170.)

As above defined by Sars and as employed in the present work, this group is a very large and comprehensive one. It comprises a large part of the Oniscoidea, containing by far the greater part of those which do not have the ability to roll up into a ball, though a few (notably among them the widely distributed *Cylisticus convexus*) have acquired that power. It is composed of two main groups. One, more generalized and presumably more primitive in its characters (usually having no tracheae in the external plates of the pleopoda and commonly having the flagellum of the second antennae composed of three articles), centers around the genera *Philoscia* and *Oniscus*. The other, a more advanced group in which tracheae are generally present in the external plates of the pleopoda 1 and 2, if not of all the pairs, and which most frequently has only two articles in the antennal flagellum, centers about the genus *Porcellio*. There are also certain smaller outlying groups of which the genus *Rhyscotus* is the most striking instance among our forms. All these groups may deserve recognition as subfamilies; indeed, in some classifications the *Philoscia-Oniscus* and *Porcellio* groups are made separate families, Oniscidae (in a narrow sense) and Porcellionidae, respectively. I have not followed this course here, or attempted a formal division of the group into subfamilies partly because of the large number of more or less intermediate forms which often exhibit puzzling

combinations of characters, making the determination of their proper position difficult and breaking down the distinctness of, and rendering difficult the task of making exact and definite diagnoses of the subfamilies. My decision is due still more to the fact that in the case of many of our American forms we have so little information regarding the details of their structure that often we could not place them in the classification if we had it.

On the other hand the Oniscidae are mostly well separated from the Cubaridae, as far as the American forms are concerned. *Cylisticus*, which approaches the latter group in its adaptation for rolling up, must be considered an example of convergence, but we have a few genera with combinations of characters that make them difficult to place.

PENTONISCUS RICHARDSON, 1913

"Body with the abdomen abruptly narrower than the thorax.

"Head with median and antero-lateral lobes small.

"Second antennae with a flagellum composed of five articles, the third and fourth rather indistinctly separated.

"Mouth parts as in the other genera referred to this family. Inner lamella of the second maxilla furnished with two plumose setae. Mandibles with molar expansion obsolete, and replaced by a recurved seta; cutting edge formed of three blunt teeth. Maxillipeds with palp composed of three articles, the last very narrow and elongate; masticatory lobe short and truncate at tip.

"Terminal segment of abdomen triangular, with apex obtuse.

"Uropods of a structure similar to those in the other genera in the family." (Richardson, 1913, p. 337.)

As pointed out by Verhoeff, 1928, p. 31, this diagnosis is not sufficiently detailed, but additional details of the male pleopoda have been given in the case of the type species (*P. pruinus*) by Arcangeli, 1930a, p. 25. The structure is much as in the European genus *Chaetophiloscia* Verhoeff, the rear apices of the exopodites of the fifth male pleopoda being prolonged and channeled, forming when apposed a tubular organ in which the attenuated processes of the second pleopoda are contained.

Arcangeli has also described a species of this genus from Formosa and Japan.

Pentonicus pruinus Richardson, 1913

Figure 48

Pentonicus pruinus RICHARDSON, 1913, p. 338 (orig. descr.), Figs. 1-5.—PICADO, 1913, p. 337.—ARCANGELI, 1927, p. 266; 1930a, pp. 5, 23, Fig. 8; 1931a, p. 12; 1932c, pp. 1, 2.

"Body oblong-ovate, 4 mm. long and $1\frac{1}{2}$ mm. wide. Color reddish brown with wavy lines of yellow on either side of the median line.

"Head wider than long, with the front not margined. Antero-lateral lobes small; front slightly produced in the middle in a widely rounded lobe. Eyes very small, black, and situated about the middle of the lateral margin. The second antennae have the first article short, the second and third subequal, and each a little longer than the first;

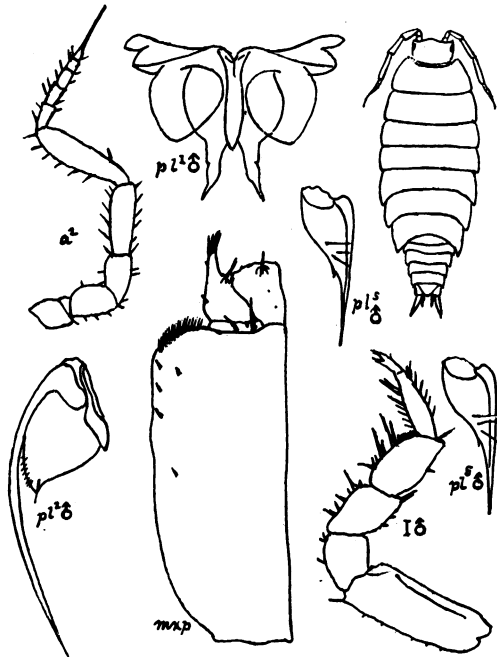


Fig. 48. *Pentoniscus pruinus* Richardson. Adapted from Arcangeli, 1930a (details), and Richardson, 1913 (dorsal view).

the fourth is one and a half times longer than the third; the fifth is a little longer than the fourth. The flagellum consists of five articles, the third and fourth being rather indistinctly separated, and a long terminal spine equal in length to the flagellum.

"The first segment of the thorax is a little longer than any of the following segments, which are subequal. The post-lateral angles of the last three segments are produced backward; those of the first four segments are rounded.

"The abdomen is abruptly narrower than the thorax. The lateral

parts of the first two segments are concealed by the seventh thoracic segment. The post-lateral angles of the three following segments are produced backward in very acute angles. The first segment is a little shorter than any of the others, which are subequal. The sixth or terminal segment is triangular, with the apex rounded. The peduncle of the uropoda extends almost to the extremity of the terminal abdominal segment. The branches are styliform, the inner being the shorter and about equal in length to the terminal abdominal segment; the outer branch is about one and a third times as long as the inner." (Richardson, 1913, pp. 338, 339.)

Arcangeli, 1930a, pp. 23-25, describes and figures the male pleopoda as noted above under the genus *Pentoniscus*.

LOCALITIES.—Various points in mountains of Costa Rica: Estrella, at an altitude of 2000 meters; La Mica (in mountains south of Orosé); Pitahaya (south of Cartago). Collected by Mr. C. Picado. Some of the specimens were found in bromeliads several meters from the ground. "Commum partout par tout l'année" (Picado, 1913). Type in U. S. National Museum. Arcangeli, 1930, records a number of other Costa Rican localities for this species.

***Pentoniscus exilis* Van Name, 1925**

Figure 49

Pentoniscus exilis VAN NAME, 1925, p. 500, Figs. 73-77.—ARCANGELI, 1927, p. 266; 1930a, p. 25.

Pentoniscus sp. VERHOEFF, 1928, p. 31.

Described from a single specimen.

"The individual is a female without a well-developed marsupium. It measures only 1.95 mm. long in a nearly straightened position of the body and while perhaps not fully grown, the fairly deep pigmentation and general characters of the specimen do not indicate any great degree of immaturity, and the species is evidently an exceedingly minute one.

"The body is rather elongate, more so actually than appears to be the case, as the epimeral parts of the segments are considerably developed, increasing its apparent width. Its surface is covered with small tubercles arranged on most of the thoracic segments in two rows, the anterior row being irregular and consisting of about twelve larger tubercles; the posterior row (situated along the rear margin) contains about seventeen tubercles. On the first thoracic segment the tubercles form three (on the lateral parts four) rows, and on the head the tubercles are smaller and quite numerous. The upper parts of the specimen are

brown with small light markings; the lower parts and legs are unpigmented.

“The head is fairly large and wide and somewhat set back into the thorax. The eyes are well pigmented, but the ocelli are rather indistinct, so that their number, which is evidently small, is difficult to determine. The mouth parts project prominently, not only downward but in a forward direction. The second antennae are large, reaching well along the second segment of the thorax, and are covered with short stiff hairs. The segments of the peduncle are rather short and fairly stout, the flagel-

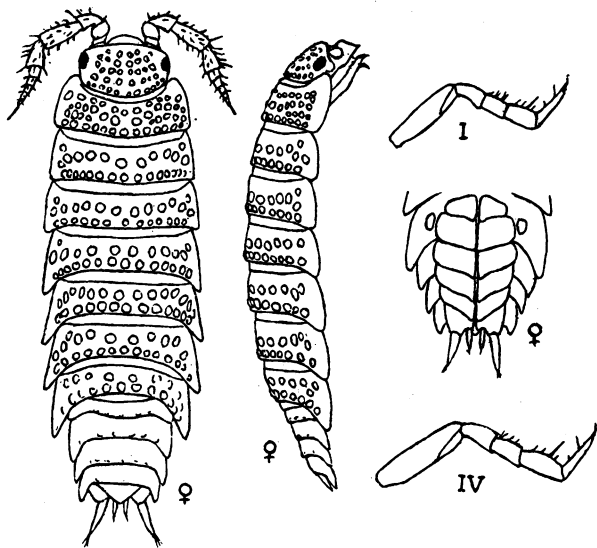


Fig. 49. *Pentoniscus exilis* Van Name. From Van Name, *Zoologica*, VI, p. 501.

lum is tapering and consists of five segments, decreasing in diameter, the last one bearing a very stout though rather short terminal bristle.

“The posterior lateral angles of the thoracic segments are extended back to a successively increasing extent, but the apices of the angles are in no case actually sharp. The specimen lacks some of the legs; none of the last three pairs are preserved, but those of the anterior four pairs that are present show them to be rather long and provided with but few spines. The abdomen forms about one-quarter of the total length and is considerably narrower than the thorax. Its third, fourth, and fifth segments have the posterior lateral angles considerably extended backwards. The telson is small, triangular, and somewhat wider than long;

its apex hardly projects farther back than the produced angles of the fifth abdominal segment. The basal joint of the uropods is large and wide; the branches are terete, tapering, and proportionately small (the inner ones especially so), and bear short, terminal hairs." (Van Name, 1925, pp. 500-501.)

LOCALITY.—Kartabo, British Guiana, collected by sifting in the jungle. Type in the American Museum of Natural History.

PHILOSCIA LATREILLE, 1804

In its older and broader sense, this group, a near ally of the well-known genus *Oniscus*, is one of the largest genera of land isopods. Its species for the most part are small, rather narrow-bodied, and of delicate structure, ranging from less than 4 mm. to usually not more than 7 or 8 mm. in length (only occasionally much larger), usually smooth or slightly setose, and generally devoid of conspicuous peculiarities in color or form of the body or its parts. The antennae, usually fairly long, have a flagellum of three elongate articles, the head is more or less rounded in front and with only slightly developed lateral lobes, if any at all; the frontal line is usually somewhat indefinite and never elevated into a sharply defined ridge, the abdomen small and tapering with the rear angles of segments 3, 4, and 5 produced into backwardly directed points; the telson widely triangulate, often rounded at the apex, and the outer branches of the uropoda elongate and tapering, the inner pair much shorter and usually laterally compressed. The body cannot be rolled up.

In coloration most of the species are much alike, having above a brown or purplish-brown ground color with yellowish (unpigmented) spots or elongate markings on the lateral regions of the back, and smaller spots on the head, and are mostly unpigmented below and on the legs, though some species have those parts somewhat marbled with the brown pigment of the back. Yet this simple color pattern is modified in some species so as to be very handsome, on account of the strong contrast between the dark and light areas, and by darker median and lateral longitudinal bands (the latter situated along the point of junction of the epimera) which may bear series of light spots; sometimes the entire epimera are nearly unpigmented, giving the dorsal surface a wide light border. There is much individual variation in the degree of contrast and in the shade of the ground color of the back even among examples of the same species.

The development of the eyes is very variable, some species being

blind or nearly so, and some having large eyes with many ocelli. Many of them have long, strongly developed legs and run rapidly. Their delicate integument compels them to inhabit chiefly damp and shaded places. The external plates of the pleopoda are without tracheae in the typical members of the group.

In the above broad sense, *Philoscia*, even after some of the more aberrant species have been split off as distinct genera, is still divisible into a large number of well-marked subgenera and sections, some of which have been treated as full genera in recent works, in some cases perhaps with justice, though I believe that to do so in many cases involves losing sight of important resemblances and relationships in the effort to emphasize small differences.

In some of these groups there are well-marked modifications of certain of the legs (especially pairs I, II, and III) in the male; in others there is little or none. Other characters available for classification are the form of the pleopoda in the male, the shape of the head and the development or absence of its more or less vestigial lateral lobes, the form and arrangement of the teeth and setose appendages of the mouth parts, especially the mandibles, first maxillae and maxillipeds. Tracheae, though usually absent in the external plates of the pleopoda, are said to occur in one section of the group, which may not be so closely allied to the typical members as their superficial appearance indicates.

In distinguishing closely allied species, as those of the same subdivision, the outlines of the thoracic and abdominal epimera and of the telson often afford easily observed characters. The relative lengths of the antennae and of their segments, especially the articles of the flagellum, are, in this group, too much subject to individual, age, and sex variation to be much trusted as specific characters. The subdivision of *Philoscia* has been carried out in detail in the case of the Old World forms, but the American species in many cases fail to fit into that classification, requiring either widening of the diagnoses or the establishment of new subdivisions.

Several American subgenera have already been established by European specialists for species that have happened to come to their notice, but no comprehensive and thorough study of the American *Philoscias* has yet been made, so that there are still a large proportion of our species that cannot as yet be satisfactorily assigned to a subgenus or section, either because their characters are not sufficiently known, or because no suitable subdivision has yet been established to receive them. In the present work, only such species are assigned to subgenera

as can be placed with more or less probability in those already established, as I believe the establishment of the necessary new subdivisions should await a more comprehensive study of the group than I have had the opportunity to make.

SUBGENUS **PHILOSCIA**

In this group the male has the carpal segments of the first and, to a less extent, the second and third thoracic limbs somewhat widened and with a brush of stiff hairs on the inner aspect. The lateral lobes of the head are practically wanting, the head though not greatly widened above, being contracted below the eyes. The frontal line is distinct but not very prominent. In the latest classification this is a very restricted group, evidently of Old World origin, though represented on the east coast of North America by one or two apparently indigenous representatives. See also remarks under the subgenus *Ischioscia*.

Philoscia muscorum (Scopoli), 1763

Figures 4, 50, 51

Oniscus muscorum SCOPOLI, 1763, 'Entomologica Carniolica,' p. 415 (orig. descr.).

Philoscia muscorum SARS, 1899 (descr.), p. 173, Pl. LXXVI, fig. 1.—?RICHARDSON, 1910a, p. 95 (record from Woods Hole, Mass., not those from Costa Rica, which are *P. variegata* Dollfus).

Not *P. muscorum* PICADO, 1913, p. 337 (= *P. variegata* Dollfus).

Probably not *P. muscorum* GEISER, 1928, which may be *P. geiseri*; not *P. cf. muscorum* GEISER, 1932, p. 6, which is *Porcellio quadriseriatus*. For other American records see *Philoscia vittata* Say, perhaps only a variety of this species.

Body oblong oval, slightly widening behind, greatest width not attaining half the length and occurring rather behind the middle; dorsal surface moderately convex, smooth and shining.

Head seen from above transversely oval, with the front outline evenly arched. Lateral lobes are practically wanting. The lower margin of the forehead is distinct and situated rather low, not reaching above the level of the middle of the eyes, and it dips down into an obtuse V-shaped angle in the middle. Eyes with about eighteen ocelli. Antennae, when well drawn back, reaching more than half the length of the body, with a very slender flagellum whose first article is more than one and one-half times the length of either of the others, the second being the shortest.

Only the first three, and to a less extent also the fourth, thoracic segments have the posterior angles rounded. Beginning with a very slight curvature of the fourth segment, the posterior angles of the thoracic segments are produced backward to an increasing degree. The legs increase considerably in length toward the rear of the body. In the male

the carpus and merus of the first three pairs of legs bear a brush-like setose area on the inner aspect, and, especially in the case of the first pair, the above joints are appreciably wider than in the female.

Abdomen abruptly narrower than the thorax, its third, fourth, and fifth segments have the lateral ends rather narrowly acute and bent directly backward, but not appressed to sides of the the abdomen. Telson triangular with concavely curved sides and a prominent, but not very acute, median apex.

Color of dorsal surface fulvous or reddish brown with the usual ir-

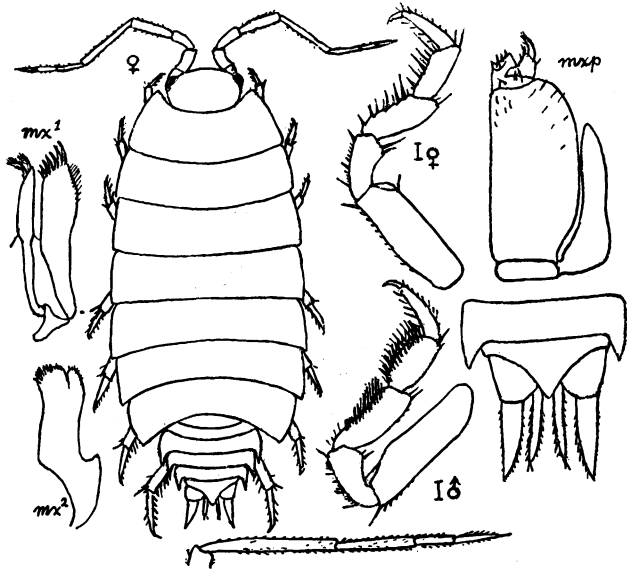


Fig. 50. *Philoscia (Philoscia) muscorum* (Scopoli). Adapted from Sars, 1899.

regular light markings on the dorso-lateral region and smaller ones on the head. The ground color is often darker along a median longitudinal stripe and along the bases of the thoracic epimera, which are mostly light (unpigmented). There are light spots on each thoracic segment on the median band and along the sides near the junction of the epimera with the main part.

Length of adult females about 8.5 mm. Males usually a little smaller.

This small species, the type of the genus *Philoscia* and of its typical subgenus, is found under stones, decaying logs, and rubbish in damp,

shady places, and is widely distributed in Europe, but the occurrence of the typical form in America is not any too well authenticated, though its establishment here by accidental importation on cultivated plants would not seem an improbability. Richardson (1910, p. 95), though

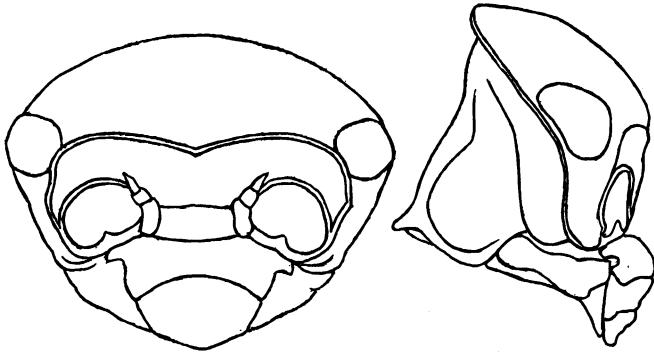


Fig. 51. *Philoscia (Philoscia) muscorum* (Scopoli). Head. Adapted from Jackson, 1928.

familiar with Say's "*P. vittata*," reported *P. muscorum* from Woods Hole, Mass., and the American Museum of Natural History has a specimen from Nahant, Mass., which in coloration and general appearance resembles supposedly typical specimens of *muscorum* from "Rheinland, Germany," received from Dr. Verhoeff.

Philoscia vittata Say, 1818

Figure 52

Philoscia muscorum var. *sylvestris* BLAKE, 1931, p. 351.—PROCTER, 1933, p. 248.

Philoscia vittata SAY, 1818, p. 429 (orig. descr.).—DE KAY, 1844, p. 50.—WHITE, 1847, p. 99.—VERRILL AND SMITH, 1873, p. 569.—HARGER, 1879, p. 157; 1880, p. 306 (descr.), Pl. I, fig. 1.—BUDDE-LUND, 1885, p. 209 (says very probably = *P. muscorum*).—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905 (descr.), p. 605, Figs. 661–663 (Fig. 662 not accurate).—PAULMIER, 1905, p. 181, Fig. 53.—RATHBUN, 1905, p. 45, check list, p. 4.—FOWLER, 1912, p. 233 (descr.), Pl. LXVI.—SUMNER, OSBURN, AND COLE, 1913, p. 661.—PRATT, 1916, p. 379, Fig. 606.—KUNKEL, 1918, p. 240 (descr.), Fig. 77.

Here probably may also be referred most of the following citations of *Philoscia muscorum* insofar as they apply to its occurrence in America:

Richardson, 1910a, p. 95 (see remarks above).—VAN NAME, 1926, p. 11.—JACKSON, 1928a, p. 582, Fig. 11.—ARCANGELI, 1930a, p. 4.—PRATT, 1935, p. 442, Fig. 611.

In the specimens of this form that I have examined, the antennae

are noticeably shorter and less slender, and they have the articles of the flagellum more nearly equal (though the first is the longest) than in European specimens of *muscorum* from "Rheinland, Germany," and the front outline of the head less smoothly curved when seen from above (being a trifle more prominent toward the sides); the epimera of the abdominal segments 3, 4, and 5 are a trifle wider and less sharply bent back, and the color pattern, though the same in its main features, is so developed as to give the animal a more conspicuously longitudinally banded appearance.

Whether these differences would hold good if extensive series of the two forms were to be compared, I cannot say, and the problem is

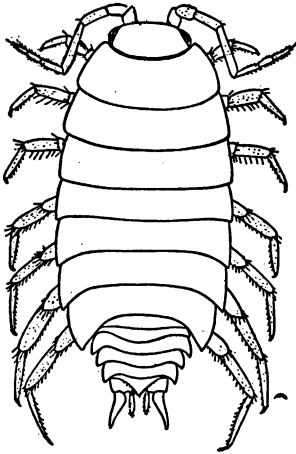


Fig. 52. *Philoscia*
(*Philoscia*) *vittata* Say.
After Harger.

complicated by the probable occurrence of true *P. muscorum* in America also, but I am considerably inclined to agree with the view of Blake, 1931, that this is no more than a variety of *P. muscorum*, and that it belongs to the variety *sylvestris* (Fabricius).

DISTRIBUTION.—In Europe, the above variety of *P. muscorum* is reported to be "associated with soils of marked salinity." In America, *P. vittata* occurs on the coasts of the northeastern states, being found under stones, rubbish, etc., in the vicinity of salt or brackish water, the only exception being a single record from Sharon, Mass., about eighteen miles inland. It has been reported from various points on the coasts of Maine (Blue Hill and Mt. Desert Island); Massachusetts (including Woods Hole, points on Cape Cod, Nantucket Island, etc.); Rhode Island; Connecticut; New York; and New Jersey (Egg Harbor, N. J., the type locality of *P. vittata* Say).

Philoscia (Philoscia?) geiseri, new species

Figure 53

Two incomplete female examples received from Prof. S. W. Geiser from Texas prove to be of a species having considerable superficial resemblance to *P. muscorum* but differing from it as shown in the figures and as stated below. In the absence of male specimens I do not know whether sexual differences in the legs similar to those of *P. muscorum* occur in this species.

Body somewhat narrower and more flattened; the dorsal surface with scattered granules or minute low tubercles.

Head with distinct though very small downwardly and slightly forwardly extending lateral lobes under the eyes. Their lower margin is sharply rounded off and they are not appressed to the sides of the head. These lobes are only slightly visible in a dorsal view when the head is in its ordinary position. Eyes with about twenty-three ocelli. Antennae missing in both specimens. The frontal line is very distinct, more arched than in *P. muscorum*, reaching to the level of the upper edge of the eyes. It starts from the inner margin of the lateral lobes of the head above described and is very prominent as it curves upward past the inner side of the eyes. In the median region it dips down slightly in a gentle curve.

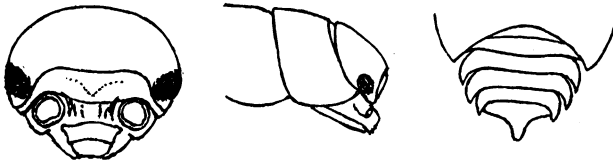


Fig. 53. *Philoscia (Philoscia?) geiseri*, new species.

Four (and to a slight extent also the fifth) thoracic segments have the posterior angle rounded off. Beginning (slightly) with the fourth segment the rear angles are produced backward to an increasing degree. The lateral ends of all the thoracic segments are less squarely cut off than in *muscorum*, the ends forming a noticeable though gentle curve.

Abdomen wider, with the lateral ends of segments three, four, and five more expanded laterally and curved backward and tapering to a triangular tip. Telson of similar shape to that of *P. muscorum* but with the median apex larger and more produced. Uropoda missing in these specimens.

Ground color of upper parts purplish brown with the usual small light markings on the head and lateral regions of the back. Though small light areas or spots are present in the median and epimeral regions, the general coloration is more uniform, without a longitudinally banded appearance.

Length of largest specimen (type, A. M. N. H. Cat. No. 5954) about 6.8 mm.

LOCALITY.—Texas, presumably near Dallas, two females collected by Prof. S. W. Geiser, for whom the species is named, June 8, 1928. Both in the collection of the American Museum of Natural History.

Perhaps the *Philoscia muscorum* reported by Geiser, 1928, should be referred to this species, but not *P. cf. muscorum* Geiser, 1932, p. 6.

SUBGENUS *ISCHIOSCIA* VERHOEFF, 1928

Hesca Budde-Lund, 1908

The males in this subgenus have the carpus of the three anterior pairs of legs expanded and flattened and fringed with spines, and armed with a brush of stiff hairs on the inner surface and, in some cases at least, a slight modification of the seventh legs also. The group is well distinguished from the typical *Philoscias* by the broad head, which is entirely without lateral lobes, but has a prominent rounded frontal margin extending between the eyes. These are widely separated and below them the head is abruptly contracted in width. It differs also in the considerably more developed abdominal epimera and stronger legs.

The group was recognized by Budde-Lund, 1908a, p. 289, and named *Hesca*, but he gave no characters, merely mentioning two species, *P. nitida* Miers and *P. debilis* Budde-Lund, as examples, and stating that it shows affinity to *Sphaeroniscus* (in what way I do not understand). Verhoeff (1928, p. 26) was the first to give a diagnosis of this group, which he named *Ischioscia*, giving it generic rank, and I am therefore employing his name in preference to that of Budde-Lund. Verhoeff's type species, *I. lobifera*, is perhaps identical with *Philoscia variegata* Dollfus, described below.

Philoscia (Ischioscia) variegata Dollfus, 1893

Figures 54, 55, 56

Hesca debilis WAHRBERG, 1922, p. 58.

?*Ischioscia lobifera* VERHOEFF, 1928, p. 27, Figs. 1-6.

Philoscia debilis BUDDE-LUND, 1893, p. 121 (orig. descr.).—DOLLFUS, 1893a, p. 345; 1896b, p. 2.—BUDDE-LUND, 1908a, p. 289. (This name may have priority over *variegata*.)

Philoscia muscorum RICHARDSON, 1910a, p. 95; 1913, p. 339.—PICADO, 1913, p. 337.—ARCANGELI, 1930a, p. 4 (part). Not *P. muscorum* (Scopoli), 1763.

?*Philoscia nitida* BUDDE-LUND, 1885, p. 222 (new descr.); 1893, p. 122.—DOLLFUS, 1896b, p. 2.—BUDDE-LUND, 1908, p. 289.—VAN NAME, 1925, p. 465 (only in part); not pp. 491-494 or Figs. 52-59. (The name *nitida* may have priority; see statements under that name.)

Philoscia nitida PEARSE, 1915, p. 542 (see remarks below), pp. 532, 534.

Philoscia variegata DOLLFUS, 1893a, p. 343 (orig. descr.), Pl. x, figs. 10a-10d; 1896b, p. 2.—RICHARDSON, 1912c, p. 30.—VAN NAME, 1926, p. 9 (descr.), Figs. 14-20.—ARCANGELI, 1930a, pp. 4, 5, 18, Fig. 5.—BARNARD, 1932, p. 250.—ARCANGELI, 1932c, p. 2 (see *P. mineri*).

?*Philougria nitida* MIERS, 1877a, p. 670 (orig. descr.), Pl. LXIX, figs. 3-3b.

NOTE.—The “*Philoscia* not yet described,” mentioned by Dollfus, 1890, p. 66, and the *Philoscia* sp. recorded by Allee, 1926, pp. 448, 453, are doubtless this species. Evidently *P. variegata* Dollfus, 1898, Weber Zool. Ergeb., IV, p. 377, from Celebes, has nothing to do with it.

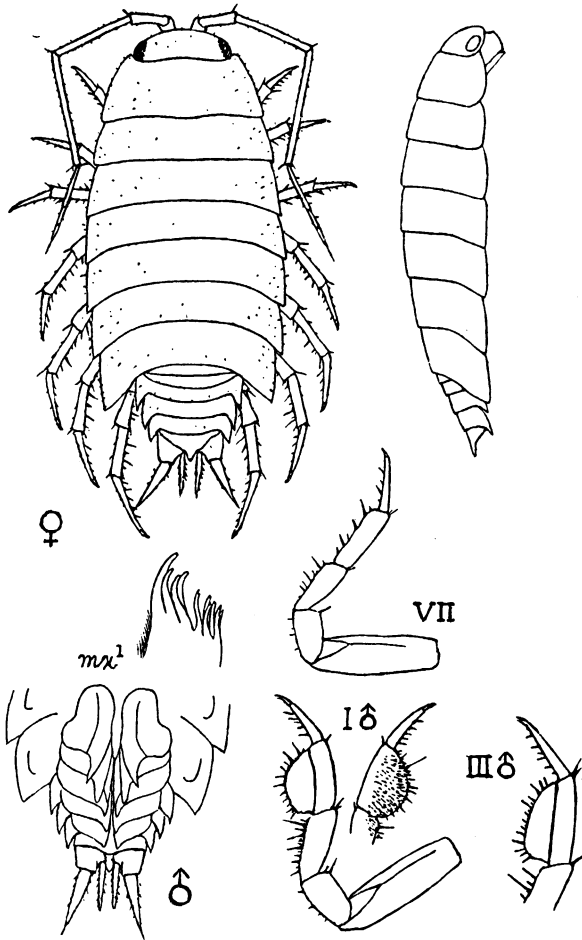


Fig. 54. *Philoscia (Ischioscia) variegata* Dollfus. Specimens from the Panama Canal Zone. Adapted from Van Name, 1926.

This a wide-bodied species with the abdomen small and short, and the head very broad and short with widely separated eyes and no lateral lobes. The body surface is smooth and shining, though bearing

scattered short stiff hairs. The following description is based on specimens from the Panama Canal Zone.

Head greatly and abruptly narrowed below the eyes. The forehead slopes down to form a horizontal, somewhat rounded-off border extending between the eyes and slightly convex when seen from above. Immediately below this for a short distance, the surface of the face is nearly vertical, only slightly inclined downward. Eyes wide from side to side, with 25 or more ocelli arranged in four rows. There is a low, broad, slightly indicated median tubercle or elevation between the antennules which is often divided into an upper and lower part by a transverse depression, also a prominent downwardly directed tubercle below each antennal socket. Second antennae long and slender, reaching, when well drawn back, along the sixth (in some individuals to the seventh) thoracic segment, but there is considerable individual variation, as well as variation with age and probably with sex, the antennae in old males



Fig. 55. *Philoscia (Ischioscia) variegata* Dollfus.

appearing to average longer. The flagellum is shorter than the last segment of the peduncle, which is itself very long and slender in many specimens. In adults, the first article of the flagellum is usually considerably the longest, and the terminal article, which bears a bristle of no great length, is the shortest.

The first three thoracic segments have the rear angles much rounded, the third has them less rounded. The posterior lateral angles of the third, fourth, and fifth abdominal segments are bent directly backward, and extend into quite prominent triangular projections. Telson triangular, broader than long, its apex moderately sharp and its lateral borders sinuously concave. The basal segments of the uropoda slightly exceed the tip of the telson. Their branches are rather long, the inner being slender and laterally compressed, and the outer somewhat widened from side to side and sharply tapering. Both the basal segment and the outer branches have a furrow along the external aspect.

Aside from the usual sexual differences in the pleopoda, the males have the carpus of the first three pairs of thoracic legs widened into a

broad, flat expansion whose inner or anterior face is covered with short stiff hairs; the corresponding surface of the merus is similarly covered with short hairs, though not expanded. This expansion of the carpus, when fully developed, may be almost semicircular on the first pair of legs; it is somewhat narrower on the second, and still more so on the third. On young males it is more or less narrow; on females it is entirely wanting, the anterior legs being similar in form and spination (except for being shorter) to those of the posterior segments. There are also, as shown by Verhoeff, 1928, small sexual differences in the ischium of the seventh leg of the male.

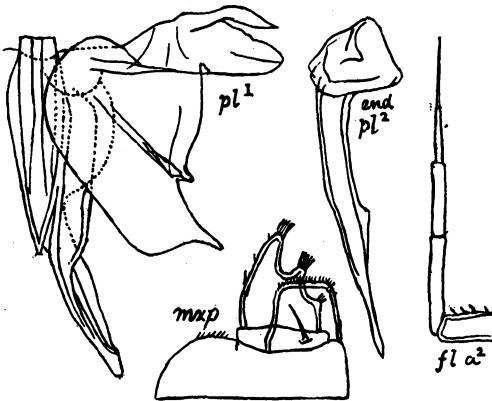


Fig. 56. Details of *Ischioscia lobifera* Verhoeff, probable synonym of *Philoscia variegata* Dollfus. Adapted from Verhoeff, 1928.

Length, largest individuals (females) in the American Museum collections, about 10 mm. (Dollfus mentions specimens 14 by 7 mm.)

Coloring usually quite conspicuous. In the Panama specimens the ground color of the upper parts is dark brown with a purplish shade, deepening to nearly black along the line of the basal ends of the epimera. Outside this darker stripe, there is a broad, light band or border (unpigmented except for scattered, stellate pigment dots of brown) occupying the whole epimeral part of each thoracic segment. On the abdominal segments the epimera are less conspicuously lighter. The usual small irregular light-colored bars and spots are present on the dorso-lateral regions of the thorax, also there is often a series of small median light spots in a darker median stripe. Below, the body and legs are practically unpigmented except for scattered, stellate, brown pigment dots.

Arcangeli (1930) deals at considerable length on the variability of this species, not only in color, but in other characters, such as the number of ocelli, the acuteness of the telson, and the relative lengths of the articles of the flagellum of the antennae, the last article sometimes equaling or exceeding the first, while in other cases the first is much the longest. Richardson also notes much variation in color in her supposed specimens of "*P. muscorum*" which are really of this species, and according to my own observations specimens from Santa Marta, Colombia, differ from those from the Canal Zone in having darker, more subdued coloration and in sometimes having the thoracic epimera nearly or quite as dark as the main part of the surface. They also have a conspicuous elongate light spot just inside the dark lateral stripe that is almost or entirely lacking in Panama specimens, but is mentioned by Verhoeff in his examples from Maracay, Venezuela.

DISTRIBUTION.—This appears to be a very common and widely distributed species in Central America and northwestern South America, occurring from near sea level to altitudes of 3700 meters in Colombia, and 2500 meters in Costa Rica. It inhabits forests, and while it apparently prefers damp situations (Pearse reports finding it in brooks), it can maintain itself where there are long continued dry seasons. Ordinarily, it is found under dead leaves, decaying logs, etc., on the ground. Picado collected it in bromeliads. It is of very active habits and is not only able to run rapidly and climb trees, but has some power of jumping.

Budde-Lund, 1893, recorded it (as *P. debilis*) from Caracas, La Moka, and St. Esteban, Venezuela. Dollfus, 1893 (as *P. variegata*), from Caracas (first mentioned and hence type locality), Corozal, Petairé, Cumbre de Valencia, and Colonie Tovar in the same country, and (1896) from Rio Lara, Darien; Verhoeff, 1928 (as *Ischiosia lobifera*), from Maracay, Venezuela. Richardson, 1912c, records it from various localities in Colombia at altitudes from 1200 to 3700 meters, including Bogota and Medellin, and Pearse, 1915 (as *P. nitida*), from the Santa Marta region at various altitudes up to 8300 feet. I have reported it (Van Name, 1926), as *P. variegata*, from Barro Colorado Island in the Panama Canal Zone at but little above the level of the canal. From Costa Rica, it has been reported by Richardson, 1910, 1913; Picado, 1913 (as *P. muscorum*); and Arcangeli, 1930 (as *P. variegata*), from various points at altitudes which range, when stated, from 1200 to 2500 meters. The U. S. National Museum has some imperfect specimens from Casitagna, Equador, 3600 meters, which are of this species or extremely close to it, also a specimen from the River Charape, Province

Jaen, in northern Peru, at 5000 feet altitude. I have not seen specimens from British Guiana, although I have studied several collections of Isopoda from that country, but if this species is not distinct from *P. nitida* (Miers), 1877, its range extends there also.

I include Richardson's "*P. muscorum*" from Costa Rica, and Pearse's "*P. nitida*" from the Santa Marta, Colombia, region in the above statement of the distribution after examining some of their material, through the kindness of the officials of the U. S. National and University of Michigan museums.

The only West Indian record appears to be one by Arcangeli, 1932c, from Dominica. There is however, a very similar but distinct species (*P. mineri*) described below, found on that island, to which Arcangeli's specimens may possibly belong, instead of to the true *variegata*.

The well-developed lateral lobes of the head, mentioned by Dollfus, 1893a, p. 343, apparently were a mistake in his description. His carefully drawn figure of the head shows no such lobes.

The question may well be raised whether this wide distribution and the variability ascribed to this species may not be due to the confusion of two or more allied forms. I would not deny this possibility, and even if that is not the case, distinct geographical races can probably be recognized. Nevertheless the variability, even in examples from one region, may be considerable, so that a hasty division of the species on the basis of the material now available would be likely to lead to errors.

***Philoscia (Ischioscia) nitida* (Miers), 1877**

Figure 57

Hesca nitida BUDE-LUND, 1988a, p. 289.

Philoscia nitida BUDE-LUND, 1879, p. 2; 1885, p. 222 (new descr.).—DOLLFUS, 1896b, p. 2.—BUDE-LUND, 1908, p. 289.—VAN NAME, 1925, p. 465 (only in part), not pp. 491-494 or Figs. 52-59.

Philougria nitida MIERS, 1877a, p. 670 (orig. descr.), Pl. LXIX, figs 3-3b.

While the probability that *Philoscia variegata* Dollfus, 1893, and *Philougria nitida* Miers, 1877, are the same is quite strong, I have been unwilling to replace Dollfus' name with the specific name *nitida* on account of the unsatisfactory description and figures given by Miers and the brevity of the description of Budde-Lund (1893) who examined original specimens of Miers' at the Warsaw museum. Miers' figures are very small and do not agree with each other in respect to the form of the head and anterior part of the thorax; Budde-Lund did not figure the species at all, and did not identify his *debilis* (described in 1893) with it.

The descriptions given by these two writers follow.

Miers (1877a, p. 670):

"Oblong-oval, shining, very convex; segments closely articulated, with minute scattered granules. Head transverse, with the anterior margin straight, without antero-lateral lobes. Eyes black, granulated, and extending along the whole length of the lateral margins. Segments of the body subequal, lateral margins with a raised marginal line; posterior margins of the first three segments straight, and forming a right angle with the lateral margins; last four segments slightly excavate on the sides, postero-lateral angles acute. Third, fourth, and fifth (exposed) segments of the tail with the lateral part bent backward, almost at a right angle to the median portion of the segment. Terminal segment much broader than long, obtusely triangular, with a well-marked depression between the bases of the uropoda (which, however, is more

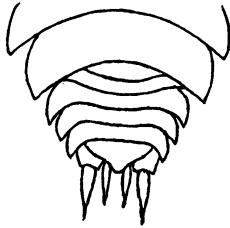


Fig. 57. *Philoscia (Ischioscia) nitida* (Miers). Adapted from Miers, 1877.

conspicuous in some specimens than in others). Antennae shorter than the body, very slender: flagellum three-jointed, and terminating in a long, slender, transparent filament. Legs very slender, with short hairs on the last three joints. Basal joints of the uropoda very short, terminal joint more than three times as long as the basal joint, acute. Colour purplish-brown; with irregular yellow spots and patches. Length $\frac{1}{3}$ inch, breadth $\frac{1}{6}$ inch. Hab. Peru, Guiana.

"Distinguished by its convex, shining appearance, the form of the head and of the terminal segment, and of the far longer slender terminal filament of the flagella of the external antennae, from the known species of the genus.

"The specimens from Guiana generally appear rather more coarsely granulated."

Budde-Lund, 1885, pp. 222-223, described it as follows:

"Oblonge ovalis, convexiuscula, nitidissima, glabra, vix vel minutissime et sparsissime punctata.

"Antennae exteriores dimidium corpus aequantes; flagelli articuli subaequales, articulus tertius seta apicali longa instructus. Oculi magni; ocelli numerosi, minus inter se discreti. Frons ante inter oculos crassius marginata; linea marginalis recta; lobi laterales nulli; epistoma linea transversa; subrecta.

"Trunci annuli tres priores margine posteriore subtransverso, utrinque ad latera levissime sinuato, angulis posticis subrectis; annuli sequentes post magis magisque margine posteriore medio sinuato; omnes annuli lateribus marginatis.

"Cauda trunci vix abrupte angustior; annuli duo priores breves, annuli 3-4-5 epimeris majoribus, distantibus, acutis. Annulus analis brevis, triangulus, lateribus leviter incurvis, apice obtusiore, supra vix impressus. Articulus basalis pedum analium brevis, annulo anali subbrevior; ramus terminalis exterior articulo basali plus duplo longior, teres, substiliformis; ramus interior exteriore vix brevior sed gracilior, compressiusculus.

"Color e nigro brunneus, crebro albedo irroratus, maxime in trunci epimeris; subtus flavus, pedes nigropunctati.

"Long. 7-8 mm. Lat. 3.5 mm. Alt. 1.7 mm."

***Philoscia (Ischioscia) mineri*, new species**

Figure 58

Specimens from Dominica Island, W. I., resemble those of *P. variegata* from the Canal Zone very closely, but exhibit the following differences that are evidently of specific importance.



Fig. 58. *Philoscia (Ischioscia) mineri*, new species.

Body slightly narrower with the back more arched. Head somewhat narrower in front outline, more convex in a dorsal view, the forehead higher and the eyes less widely separated. The surface of the epistome between the eyes is more obliquely forwardly and downwardly directed, the front border of the head thus forming a more sharply prominent transverse ridge. Antennae considerably shorter than in *variegata*, reaching only along the fourth or fifth thoracic segment when well drawn back. The

articles of the flagellum are successively shorter, as in *variegata*. The legs appear to be shorter proportionately than in that species.

The males have the carpal expansions very well developed, and of somewhat semicircular outlines on all the three anterior pairs of legs. The epimera of abdominal segments 3, 4, and 5, however, are somewhat less acute and less extended backward.

The coloration is similar in both forms, but, at least so far as the available specimens show, it is much less conspicuously contrasted in the Dominica form.

Length of largest specimens of either sex, 9 to 10 mm.

LOCALITIES.—Dominica, West Indies (Long Ditton near Roseau, and Laudat). Over 30 adult specimens collected by Dr. F. E. Lutz, June, 1911, by sifting dead leaves in the forest. The type specimen, a male, is from Long Ditton. The lots from each locality contain some additional very immature specimens, probably of this species also. All are in the American Museum of Natural History (type, Cat. No. 6509). It would seem possible that Arcangeli's (1932c, p. 2) record of *P. variegata* from Dominica really refers to this species.

This species is named for Dr. Roy W. Miner of the American Museum of Natural History.

SUBGENUS *ONISCOPHILOSCIA* WAHRBERG

Rear border of the epimera of thoracic segments 1 to 3 straight with slightly rounded angle. Lateral lobes of head small yet distinctly prominent; anterior marginal line clearly though slightly marked. Abdomen not set off from the thorax, its epimera well developed, not bent downward. The angles of the epimera of segment 5 reach as far as the tip of the telson. Telson triangular with lightly concave sides, the middle part not prominent.

Mandibles: left mandible with penicilla 1 (2) + 2; right mandible penicilla 1 + 1. Seta inferior with a short stem and many branches, so that a bristly tuft is formed.

First maxillae: Teeth 4-6, the six inner ones all with a single point. Inferior lacinia with two penicilla; the upper outer corner is rounded and provided with one spine. (Translated from Wahrberg, 1922a, p. 281.)

TYPE.—*Philoscia (Oniscophiloscia) mirifica* Wahrberg, 1922, from Juan Fernandez.

Philoscia (Oniscophiloscia) mirifica Wahrberg, 1922

Figures 59, 60

Philoscia (Oniscophiloscia) mirifica WAHRBERG, 1922a, p. 282 (orig. descr.), Figs. 2-4.

The following details are taken from Wahrberg's description:
"Body elongate oval; length 12-13 mm., width 6-7 mm. Color

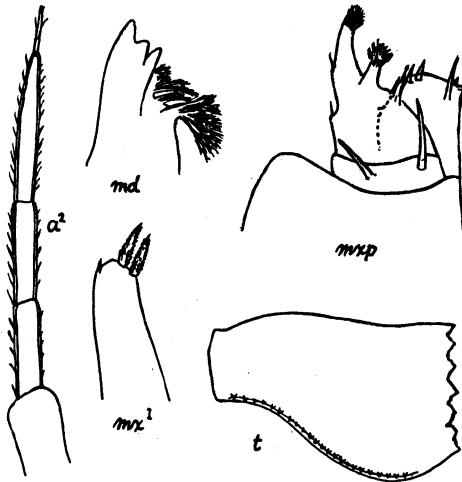


Fig. 59. *Philoscia (Oniscophiloscia) mirifica* Wahrberg. Adapted from Wahrberg, 1922.

brown of mingled shades with a long whitish yellow spot on each thoracic segment at the junction of the epimera and tergite.

"Head with a marginal line in front; about twice as wide as long. Lateral lobes small. Antennae slender, reaching to rear border of segment III, the articles 1, 2, 3, of the flagellum in the ratio of length 3:3.3:4, excluding from consideration the terminal sensory spine.

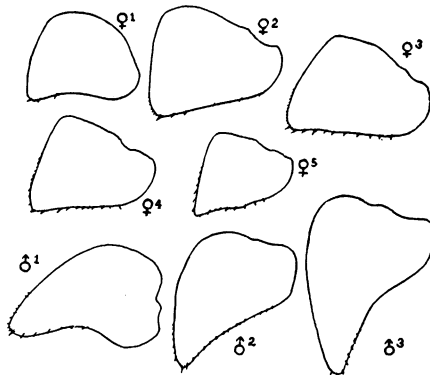


Fig. 60. *Philoscia (Oniscophiloscia) mirifica* Wahrberg. External lamellae of pleopoda. Adapted from Wahrberg, 1922.

“Thoracic segments I to III with pronotum over one-third their length, with posterior border straight and rear lateral angles rounded, not produced backward; segments IV–VII with the rear angles somewhat sharp and extended backward.

“In the females, the carpus of the first pair of legs has longer but fewer spines (about 6–7 larger ones); in the male, shorter and more numerous ones (11–12).

“Abdomen not abruptly set off from thorax but with outlines gradually merging into those of the latter. Abdominal epimera strong, sharply pointed and extended backward; not bent downward. Telson triangular, about twice as wide as long, with the apex rounded off, and with slightly concave sides. External laminae of pleopoda without tracheae.”

LOCALITY.—Juan Fernandez (Masatierra, beach) several specimens. (Wahrberg.)

SUBGENUS *BENTHANA* BUDDE-LUND, 1908

Subgenus of *Philoscia* (or genus) distinguished by having the teeth of the inner group on the outer division of the first maxilla serrate along their inner margin. Budde-Lund (1908a, p. 289), in establishing it, gave no further diagnosis but stated that it includes *P. olfersii* Brandt, *P. picta* Brandt, and others. As he gave a figure of *P. picia*, that species may be taken as the type.

Jackson, 1926, pp. 189–197, has recently made a study of this subgenus based on a re-examination of Budde-Lund's material, as well as other specimens. He includes five species in it, four South American (see below), and *P. minima* Dollfus, a small species, distinguished from the others by its simple eyes, which is known only from Spain and Portugal, but which Jackson suspects, from its relationship to the others, to be of South American origin.

Jackson gives the following key to the species.

- | | | |
|----|--|----------------------|
| 1. | { Eyes composite..... | 2. |
| | { Eyes simple..... | 5. |
| 2. | { Mesepistome plain..... | 3. |
| | { Mesepistome with large tubercle..... | 4. |
| 3. | { Telson rounded (colour of antenna uniform)..... | <i>B. olfersii</i> . |
| | { Telson acute (antenna with white band)..... | <i>B. picta</i> . |
| 4. | { Endopod of uropod very short (1/3 exopod), glabrous surface..... | <i>B. pauper</i> . |
| | { Endopod of uropod moderate (3/4 exopod), setose surface..... | <i>B. villosa</i> . |
| 5. | | <i>B. minima</i> . |

A detailed diagnosis of the subgenus is also given by Jackson. The following are some of the more conspicuous characters common to all the species and are stated here to avoid repetition in all the descriptions.

Body surface smooth and shining (except in *villosa*).

Forehead and upper border of epistome marked only by a change in curvature of the surface of the head. Only the last two thoracic somites have the rear corners angular and produced backward. The first four have the rear margin nearly straight.

Legs without special modification.

Abdomen abruptly contracted, small and narrow.

Telson triangulate, the sides straight or very slightly curved.

***Philoscia (Benthana) picta* Brandt, 1833**

Figure 61

Benthana picta BUDDE-LUND, 1908, Pl. XVI, fig. 43.

Philoscia (Benthana) picta BUDDE-LUND, 1908, p. 289, Pl. XVI, fig. 43.—JACKSON, 1926, p. 193, Pl. VII, figs. 133-136.

Philoscia picta BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 165.—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 2; 1885, p. 213 (new descr.).—DOLLFUS, 1897a, p. 2.—KRAEPELIN, 1901, p. 204.—GIAMBIAGI, 1931, p. 424, Pl. VII.

“Length, 7 mm.; breadth, 3 mm. Shape.—Oblong-oval. Head.—

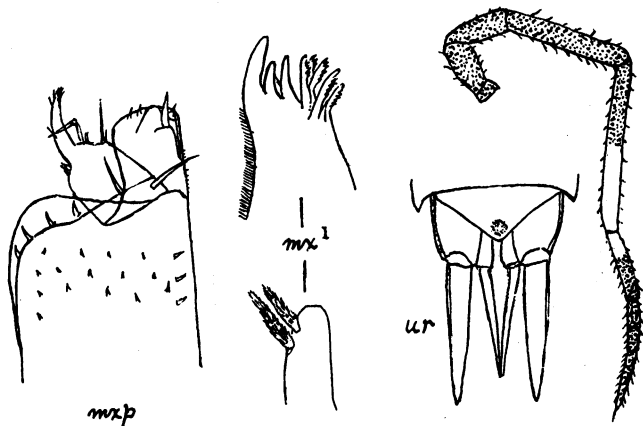


Fig. 61. *Philoscia (Benthana) picta* Brandt. Adapted from Jackson, 1926.

Eyes large, prominent, convex, 20 ocelli; lateral lobes slightly marked in front of eyes; transverse line of prosepistome sinuate, broadly

rounded in the middle, not confluent with posterior marginal line; mesepistome concave, no tubercle. Abdomen.—Postero-lateral angles of tergites sharp and prominent, but not so drawn out as in *olfersii*; telson moderately deeply sulcate at tip, which is subacute.

Appendages.—Antennula as *olfersii*. Antenna long and slender (equals length of thorax and head), proportion to body 5 to 7, 5th segment slightly grooved and equal to flagellum, 2nd segment of flagellum distinctly the smallest, 1st and 3rd nearly equal, first slightly the longer. Maxillula, maxilla, maxillipede, and pleopoda similar to *olfersii*. Uropod similar to *olfersii*, but exopodite is shorter.

“Colour (in spirit) reddish brown with yellow spots; yellow patches over coxal plates; indication of median yellow line on thorax; telson, yellow spots and with distinct yellow mid-line; distal end (not quite one-half) of 5th segment of antenna and proximal end of 1st flagellar segment white; lower surface yellow, bases of legs banded with brown pleopods spotted with brown. . . .

“Remarks.—This species is nearly related to *B. olfersii*, from which it differs in its small size, the marginal line of the prosepistome and frons is slightly more marked, the 5th segment of the antenna equals the flagellum, which is of slightly different proportions, the exopod of the uropod is shorter, the telson is more acute, and the antennae have a curious piebald appearance.” (Jackson, 1926, pp. 193–194.)

LOCALITY.—Brazil (Brandt); Buenos Aires (Dollfus, 1897, specimen compared with examples received from Budde-Lund who had examined Brandt's type). Reported from Hamburg, Germany, on plants imported from Brazil (Kraepelin, 1901).

Giambiagi, 1931, figures a specimen from Tigre, Province of Buenos Aires (Cat. No. 14,479, Mus. Nac. Buenos Aires) “found on aquatic plants” which she assigns to this species. From her figure of the uropoda it would appear that those appendages are shorter and stouter than Jackson's figure indicates for *P. picta*.

Philoscia (*Benthana*) *olfersii* Brandt, 1833

Figure 62

Oniscus nigrescens DANA, 1852, p. 728, Pl. XLVIII, figs. 1a–1c.—STUXBERG, 1875, p. 43.

Philoscia (*Benthana*) *olfersii* BUDDÉ-LUND, 1908, p. 289.—JACKSON, 1926 p. 193, Pl. VI.

Philoscia olfersii BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 164.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 2; 1885, p. 212 (new descr.).—KRAEPELIN, 1901, p. 204.—VAN NAME, 1925, p. 465 (in part).

Not *P. olfersii* PEARSE, 1917, p. 7.

Brandt's original description of this species is very brief. Budde-Lund's description was based on an examination of Brandt's type and specimens from Rio de Janeiro. His material was re-examined by Jack-

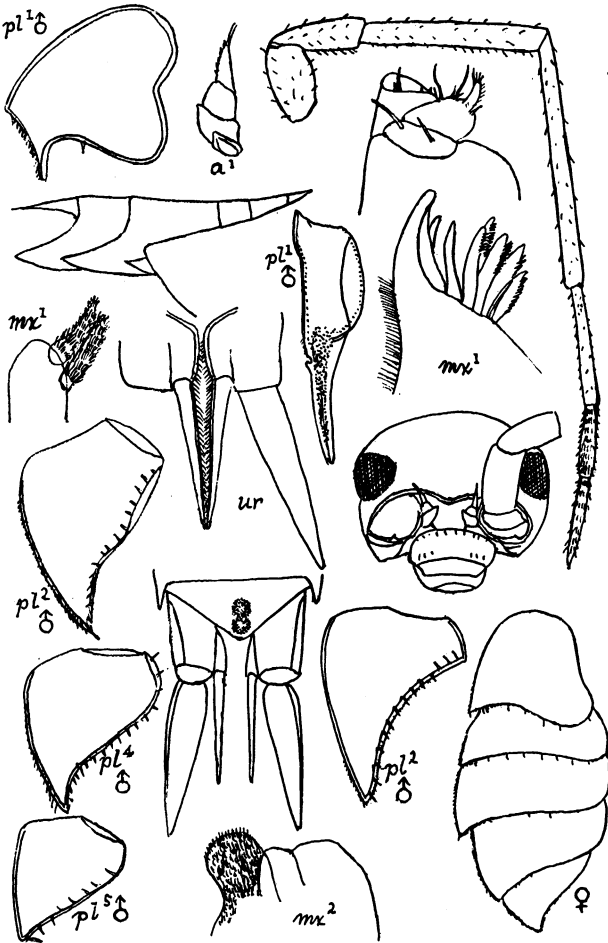


Fig. 62. *Philoscia (Benthana) olfersii* Brandt. Adapted from Jackson, 1926.

son, 1926, who gives a new description, quoted here in part, and figures of the details. (See also the characters of the subgenus.)

"Length 15-18 mm. Breadth 6-7.5 mm. Shape.—Oblong-oval. Head.—Eyes large, prominent, convex, 24 ocelli; lateral lobes slightly

marked in front of eyes; transverse line of prosepistome sinuate (almost angulate in mid-line), not confluent with posterior marginal line; mesepistome concave, no tubercle; metepistome slightly setose. Abdomen.—Postero-lateral angles of tergites sharply drawn back into long narrow spines; telson slightly sulcate, tip not acute and almost rounded.

“Appendages.—Antennula prominent, tip exceeding transverse line of epistome. Antenna long and slender, proportion to body 7 to 12; flagellum longer than 5th segment, very slender, setose, its proximal segment double as long as either of the others, which are equal, or the distal is slightly longer. Uropod.—Protopodite massive, much longer than telson; exopodite rather longer than endopodite; endopodite long, bladeliike.

“Colour (in spirit) reddish- or purplish-brown, mottled on head and body with yellow; large yellow patches over coxal plates, yellow marks on mid-line of each thoracic tergite; abdomen hardly mottled; under surface yellow, pleopods spotted with brown.” (Jackson, 1926, p. 193.)

LOCALITIES.—“Brazil” (Brandt), type in Berlin Museum; Rio de Janiero (Budde-Lund, three specimens in Copenhagen Museum); Rio de Janiero under stones (Dana); Hamburg, Germany, on orchids brought from southern Brazil (Kraepelin).

***Philoscia (Benthana) pauper* Jackson, 1926**

Figure 63

Philoscia (Benthana) pauper JACKSON, 1926, p. 194, Pl. VII, figs. 137-144.

“Male described. Length, 6 mm. Breadth, 2.5 mm. Shape.—Oblong-oval. Head.—Eyes moderate, not prominent, 14 ocelli; lateral lobe, ridge in front of eye is larger than previous two species; transverse line of prosepistome moderately curved in middle, confluent at sides with posterior marginal line; mesepistome with prominent semi-circular transverse tubercle in middle; lateral parts of metepistome (which is sparsely setose) project slightly in front of antennary sockets. Abdomen.—Postero-lateral angles sharp and abrupt but not long; telson not sulcate, apex obtuse.

“Appendages.—Antennula slender, not exceeding line of epistome. Antenna absent. Maxillula.—Outer lacinia 4 + 6 (1, 3, 4, 6 ctenate, 2 trifurcate, 5 acute and small); inner lacinia, penicilli short, thick, and nearly equal. Maxillipede absent on both specimens. Pleopoda.—I without posterior hook, inner edge moderately drawn out; remainder similar to *olfersii*, but with few bristles and not at all setose. Uropod.—

Protopodite not much longer than tip of telson; exopodite moderately long and 3.5 times longer than endopodite, which is very small and flattened.

“Colour (in spirit) light brown mottled with yellow; under surface yellow.

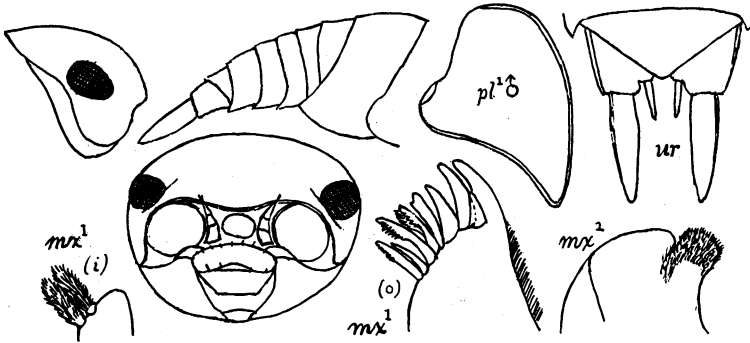


Fig. 63. *Philoscia (Benthana) pauper* Jackson. After Jackson, 1926.

“DISTRIBUTION.—Valparaiso (from Michaelsen in Mus. Hamburg). Type in British Museum (Nat. Hist.).

“Remarks.—Distinguished by the small size of the eyes, the large tubercle on the mesepistome, the telson and uropods, and the small size.” (Jackson, 1926, pp. 194–195.)

***Philoscia (Benthana) villosa* Jackson, 1926**

Figure 64

Philoscia (Benthana) villosa JACKSON, 1926, p. 195, Pl. VII, figs. 145–151.

“Female described. Length 8 mm. Breadth 3 mm. Shape.—Elongate-oval. Surface.—Minutely setose; row of large setae on each side of posterior border of thoracic somites, sides of head covered with large setae which encroach on eye; abdomen thickly, not densely, covered with large setae. Head.—Eyes moderate, not very prominent, 16–17 ocelli; lateral lobe only slightly marked; transverse line of prospistome broadly rounded in middle; confluent at sides with posterior marginal line; mesepistome with prominent rounded tubercle in middle. Abdomen.—Postero-lateral angles abrupt and sharp but not long; telson not sulcate, subacute.

“Appendages.—Antennula reaching to epistomial line but not surpassing it. Antenna absent. Maxillula.—Outer lacinia 4 + 6 (3, 4, 6

ctenate, 2 ctenate or acute, 1 fissured): inner lacinia, penicilli almost terminal, long, lower more slender and longer than upper. Maxillipede.—Small spine on inner side of top of endite. Pleopoda.—Bristles on posterior border and ventral surface of all but the first; no setae. Uropod.—Protopod short and broad, only slightly grooved; exopod short and conical; endopod stout and not grooved, only slightly flattened, $3/4$ as long as exopod, very hairy.

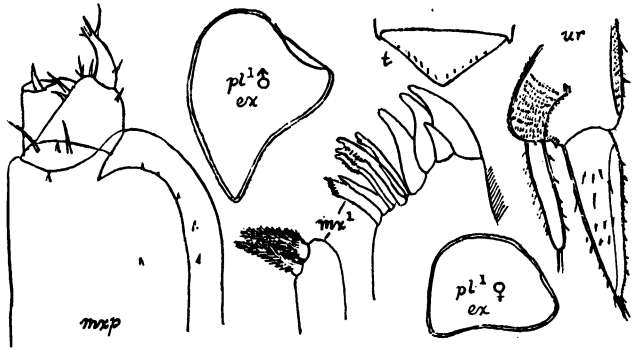


Fig. 64. *Philoscia (Benthana) villosa* Jackson. Adapted from Jackson, 1926.

“Colour (in spirit) yellow very slightly mottled with brown, paired brown bands on either side of mid-line, mottled brown band along coxal plates; middle of abdomen yellow, sides dark brown; under surface yellow.

“DISTRIBUTION.—Peru (Matucana, 2500 m. N. E. of Lima, by Mr. R. Paesler, Mus. Hamburg). Type in British Museum (Nat. Hist.).

“Remarks.—This species is distinguished by the shape, the comparatively hairy condition, the tubercle on the mesepistome, the telson and uropods, and the colour-pattern.” (Jackson, 1926, pp. 195–196.)

The two following species, *P. angustata* and *P. bilineata*, from Chile, described by Nicolet, 1849, may also belong in *Benthana*.

***Philoscia (Benthana?) angustata* (Nicolet), 1849**

Figure 65

Oniscus angustatus NICOLET, 1849, p. 268 (orig. descr.), Pl. III, fig. 8.—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 1; 1885, p. 213 (says allied to *Philoscia olfersii* Brandt).

“*O. fusco-rufescens*; corpore elongato, angustato; capite subgloboso; antennis externis filiformibus, fuscis; abdomine subparallelo, postice angulato.” (Nicolet, 1849.)

This species is very narrow, elongate, and shining, with the head somewhat globosely rounded, transversely widened and truncated in front, without noticeable median or lateral lobes; thorax a little wider than the head, with parallel sides. Lateral plates of the first five segments very short and having the outer border rounded; the two following segments have the posterior lateral angle much prolonged backward and sharply pointed. Abdomen narrower than the thorax, not much wider at its base than at its end. The lateral extremities of the dorsal plates are bent down so that its side outlines appear straight without indentations; the next to the last segment has the posterior

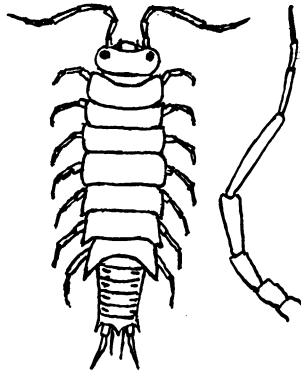


Fig. 65. *Philoscia* (*Benthana*?) *angustata* (Nicolet).
Adapted from Nicolet, 1899.

lateral angles ending in short points directed backward; the last segment ends in a very obtuse angle. Color rather light reddish, marbled with dark brown; the legs and antennae brown.

Length, 5 lines; width, 1 line.

The species presents a variety in which all the segments of the abdomen are bristly with small upright spines, while in the type individual only the last segment is spiny. (Translated from original description.)

LOCALITY.—Chile.

***Philoscia* (*Benthana*?) *bilineata* (Nicolet), 1849**

Oniscus bilineatus NICOLET, 1849, p. 269 (orig. descr.).—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 1; 1885, p. 213 (says allied to *Philoscia olfersii* Brandt).

“O. corpore oblongo, flavo fuscoque variegato, bilineata fusca in medio longitudinaliter ornato; antennis externis gracilibus, elongatis; articulo ultimo abdominis subangulato.”

Body shining, rather narrow and elongate; head small, transversely widened, forehead vertical with the median lobe slight, the lateral lobes

closely applied to the sides of the head and little noticeable; the external antennae long, slender, and shining; lateral ends of the thoracic segments little prolonged, wide and somewhat rounded; those of the last segment are directed backward and equal the first three segments of the abdomen. The latter is short and its segments, except the last, are equal and end in very acute points, sharp and much bent backward. The last segment forms a very obtuse triangle and is much shorter than the basal segment of the uropoda, whose external terminal stylet is elongate, conical, and very sharp.

Color.—The upper surface of the body is whitish, marbled and spotted with pale yellow and brown, with two parallel longitudinal brown lines separated by a whitish median stripe. The head is rather dark brown and the legs yellow. Length, 4 lines; width, 1 line. (Translated from original description.)

LOCALITY.—Chile.

SUBGENUS OR GENUS **BALLONISCUS** BUDDÉ-LUND, 1908

Established by Buddé-Lund (1908a, p. 289) without a diagnosis. He merely stated that its species are distinguished by having well-developed tracheae in the pleopoda, and mentioned *Philoscia sellowii* Brandt, *P. brevicornis* Buddé-Lund, *P. nigricans* Buddé-Lund, and *P. maculata* Buddé-Lund as members, naming them in that order. According to recent views on the importance of tracheae in the exopodites of the pleopoda this should have recognition as a group of at least generic rank, and possibly should be removed to a position nearer to *Porcellio*. I hesitate, however, to take any such step without more information about these species and about the type of tracheae that they have.

Philoscia (Balloniscus) sellowii Brandt, 1833

Philoscia (Balloniscus) sellowii BUDDÉ-LUND, 1908a, pp. 289, 290, Pl. XVI, fig. 3.

Philoscia sellowii BRANDT, 1833, p. 183 (orig. descr.).—MILNE-EDWARDS, 1840, p. 164.—STUXBERG, 1875, p. 43.—BUDDÉ-LUND, 1879, p. 2; 1885, p. 218 (descr.).

“Oblongae ovalis, laevis, vix punctata.

“Antennae exteriores sparse hirsutae, dimidio corporis vix longiores; flagellum scapi articulo quinto paulo brevius; flagelli articuli omnes subaequales, vel primus potius maximus.

“Linea marginalis frontalis oblitterata vel nulla; lobi laterales breviores, latiores, rotundati; epistoma medio linea elevata transversa, leviter sinuata.

“Trunci epimera linea marginali impressa.

"Cauda trunco vix abrupte angustior; epimera distantia. Anulus analis brevis, triangulus, lateribus leviter incurvis, apice subobtusos, supra planus.

"Color e subolivaceo brunneus, in lateribus flavomarmoratus et supra utrinque macularum oblongarum, flavarum, subrufescentium linea notatus." (Budde-Lund, 1885, p. 218.)

LOCALITY.—Montevideo, according to Brandt; "Brasilia," according to Budde-Lund.

Brandt's type (in the Berlin Museum) was the basis of Budde-Lund's description. The figure given by Budde-Lund (1908) represents only a minute detail of the mandible.

***Philoscia (Balloniscus) brevicornis* Budde-Lund, 1885**

Philoscia (Balloniscus) brevicornis BUDDE-LUND, 1908a, p. 289.

Philoscia brevicornis BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 218 (orig. descr.).—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905, p. 606 (descr.).

The following is Richardson's translation of the original description:

"Body oblong-oval, subconvex, smooth, slightly covered with a few dots.

"Second pair of antennae shorter than half the length of the body; articles of the flagellum short, subequal.

"Frontal margin produced a little in the form of an arch in the middle, almost entirely inconspicuous; epistome subconvex in the middle.

"Abdomen scarcely abruptly narrower than the thorax. The terminal segment short, almost triangular, with sides slightly incurved, and apex obtusely rounded; sulcate above.

"The color varies in the two specimens, being a very light or a very dark violet, covered with white spots, with the margins white. Legs all yellow, or covered with black dots.

"Length, 11 mm.; width, 5 mm.; height 2.5 mm." (Richardson, 1905, pp. 606-607.)

LOCALITY.—Biloxi, Mississippi. Two examples, apparently including the type, in the Copenhagen Museum (Budde-Lund).

Referred by Budde-Lund, 1908a, p. 289, to the subgenus *Balloniscus* and incorrectly called a South American species.

***Philoscia (Balloniscus) nigricans* Budde-Lund, 1885**

Philoscia (Balloniscus) nigricans BUDDE-LUND, 1908a, p. 289.

Philoscia nigricans BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 210 (orig. descr.).—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905 (descr.) p. 608.

The following is Richardson's translation of the original description:

"Body oblong-oval, rather convex, smooth, slightly covered with a few dots.

"Second pair of antennae lost in the specimen.

"Frontal margin straight; epistome with a median transverse line.

"Abdomen abruptly narrower than the thorax; epimera distant. The last segment of the abdomen short, subtriangular, with the sides straight or slightly incurved; apex obtuse, sulcate above.

"Color dark brown, covered with numerous white spots or little stripes. Legs yellow, with the coxae spotted with black.

"Length, 9 mm.; width, 4 mm.; height, 1.6 mm." (Richardson, 1905, pp. 608, 609.)

LOCALITY.—Biloxi, Mississippi; the type, which lacks the antennae, in the Copenhagen Museum (Budde-Lund).

Referred by Budde-Lund, 1908a, p. 289, to the subgenus *Balloniscus* (characterized by having well-developed tracheae in the pleopoda) and incorrectly called a South American species.

***Philoscia (Balloniscus) maculata* Budde-Lund 1885**

Philoscia maculata BUDDE-LUND, 1879, p. 2 (*nomen nudum*); 1885, p. 215 (descr.).—KRAEPELIN, 1901, p. 204.—BUDDE-LUND, 1908a, p. 289.

Not *Philoscia maculata* VAN NAME, 1925, p. 494, Figs. 60–63.

Budde-Lund's description is as follows:

"Oblongae ovalis, laevis, nitidissima, densissime punctata; caudae cum pedibus analibus sparse crinita.

"Antennae exteriores dimidio corporis satis longiores, ad apicem densius hirsutae; flagellum scapi articulo quinto brevius, articuli flagelli ad apicem longitudine gradatim paulo decrescentes. Linea marginalis frontalis nulla; lobi frontales laterales breviores, angustati; epistoma linea elevata transversa, medio leviter sinuata.

"Trunci epimera linea minuta longitudinali impressa.

"Cauda trunco abrupte angustior; epimera parva satis adpressa. Annulus analis brevis, triangulus, lateribus rectis, apice acute rectangulo, basi impressione minuto. Articulus basalis pedum analium latere exteriori canaliculato, articulo terminali sesqui brevior.

"Color ex nigro brunneus, maculis et striolis numerosis albidis conspersus; in lateribus trunci linea nigra et supra hanc linea albida macularum oblongarum; in dorsi medio niger; cauda medio lineis

tribus macularum subrotundarum albidis; pedes albid, coxis nigromaculatis; antennae griseae; articulus quintus ad apicem albidus.

"Long. 8 mm. Lat. 3.5 mm. Alt. 1.5 mm." (Budde-Lund, 1885, p. 215.)

LOCALITIES.—"America Australis. Ad St. Nicolas; ad Barodero prope Riacho del Oro; a cl. W. Sörensens pauca exempla capta sunt quae in Museo Hauniensis asservantur." (Budde-Lund, 1885.) These places are on the Paraná River northwest of Buenos Aires.

The specimens from British Guiana which I assigned to this species in my article of 1925 cannot belong here, as I can find no tracheae in the external plates of the pleopoda.

***Philoscia paraguayana*, new species**

Figure 66

Body rather widely elliptical in a dorsal view, the head and the short, rapidly tapering abdomen set quite deeply into the thorax, the dorsal surface, antennae and uropoda rough-pubescent with extremely short glandular hairs which are evenly

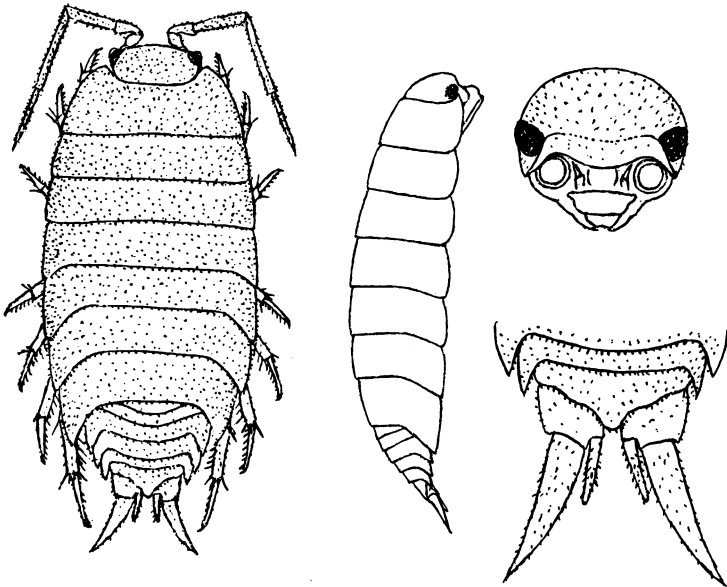


Fig. 66. *Philoscia paraguayana*, new species.

scattered without regularity except along the rear borders of each segment, where they form a regular row.

Head with the outline convex in front and with fairly large, somewhat square,

lateral lobes extending down below the eyes and somewhat appressed to the antennal sockets, so that they show very little in a dorsal view of the animal unless the head is tilted up. The upper line of the epistome is sinuous, but not very sharply defined in the median region where it dips down only slightly; toward the sides it forms a prominent ridge where it bends down along the inner border of the eyes. The latter have about eighteen well-developed ocelli. The antennae are rather long and would more than reach the fourth thoracic segment if well drawn back. The terminal joint of their peduncle is rather long and slender, slightly exceeding the flagellum, which is likewise long and slender and has the middle article a little shorter than either of the others. The terminal bristle is short. The inner teeth of the outer branch of the first maxilla are smooth and notched at the tip, as in most *Philoscias*.

The first three thoracic segments have the rear angles broadly rounded off; the fourth and fifth have them also slightly rounded; in the sixth and seventh the angles are acute. Beginning slightly with the third, these angles are extended back to an increasing degree. The legs are strong, increasing rapidly in length and stoutness toward the rear of the body, and are armed with well-developed spines. Sexual differences in the legs were not observed.

The epimera of the third, fourth, and fifth abdominal segments are extended back as triangular, somewhat appressed points, which are conspicuous in a dorsal, as well as lateral, view. Telson with outlines sinuously concave on the sides and produced into a prominent but slightly rounded point at the apex. The basal joint of the uropoda extends beyond the tip of the telson. Both branches are tapered, the inner, which is quite short, is inserted rather near the end of the basal joint, which is only slightly grooved on its external aspect.

The ground color of the upper parts is the purplish brown that is usual in this group. Small light spots on the head and the usual small irregular bars on the lateral regions of the back are present. In addition, the epimera of the thoracic segments are but little pigmented, so that the thorax has a broad, light border, inside of which is a narrow, longitudinal, very dark band in the region of the junction of the epimera with their segments. The region of the median line is also dark, giving the dorsal surface a longitudinally banded color-pattern, as in many allied species of this group.

Length of largest specimen nearly 10 mm. The above description is from a female; the single male specimen has the body proportionately a little narrower.

LOCALITY.—“Paraguay.” Three specimens (including the type, Cat. No. 6508), collected by Karl Fiebrig, are in the American Museum of Natural History collection. The long, strongly spined legs and well-developed eyes indicate a species of active habits.

***Philoscia omissa*, new species**

Figures 67, 68

Philoscia olfersii PEARSE, 1917, p. 7 (not Brandt, 1833).—VAN NAME, 1925, p. 465 (in part).

Philoscia nitida VAN NAME, 1925, p. 491, Figs. 52-59 (not Miers, 1877).

General outline of body elliptical, in a dorsal view rather wide (width often exceeding 0.4 of the length of body and head); the back well arched; the head and

abdomen very small. Body surface very smooth and shining, though bearing a few scattered setose hairs. These are more numerous on the antennae, pleopoda, and a few other parts. Lateral ends of thoracic segments with a very narrow slightly thickened border, but this is not conspicuous.

Head small and narrow, not very deeply set back into the thorax. Seen from above, its front outline is smoothly convex without a suggestion of lobes. Seen from one side or in front, the forehead slopes down to form a prominent though somewhat rounded-off horizontal border extending across between the eyes, below which the head is abruptly much contracted. The mouth parts form a downwardly and

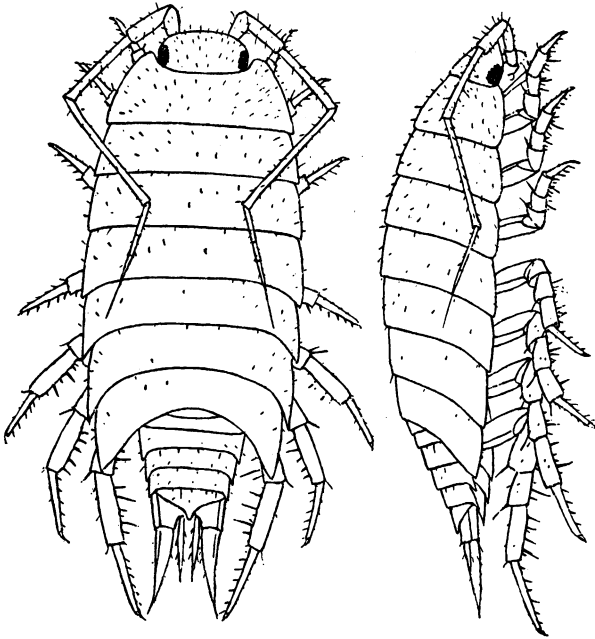


Fig. 67. *Philoscia omissa*, new species.

somewhat forwardly projecting mass of smaller proportionate size than in many other members of the genus. Eyes obliquely oval with sixteen to nineteen ocelli.

Antennae of very variable length in different specimens, always rather long and slender, especially the last joint of the peduncle and the flagellum, which is tipped with a very long bristle. The antennae, when drawn back, reach beyond the middle of the thorax, in some cases three-quarters way or more along it. Their flagellum has the first article considerably the longest, the second the shortest.

The thoracic segments have the rear lateral angle extended back slightly in the first segment, and attaining a maximum in the sixth. The first and second, and to a less degree the third, have these angles rounded off. The fourth has them nearly or quite acute, and in the remaining segments they are always acute. The legs are similar in the two sexes.

The abdominal segments 3 to 5 have the posterior lateral angles extended into narrow, sharp points directed straight backward. The telson is wider than long, of somewhat triangular outline with the curve of the sides very slightly sinuous or concave and a not very sharp though slightly acuminate tip. I did not succeed in finding tracheae in the external plates of the pleopoda. The basal joints of the uropoda are rather long, exceeding the tip of the telson, and are conspicuously furrowed on their external aspect. Their external branch is quite long and sharply tapering or subulate, little flattened, though slightly furrowed on the external aspect. The inner branches are quite slender, somewhat compressed from side to side and

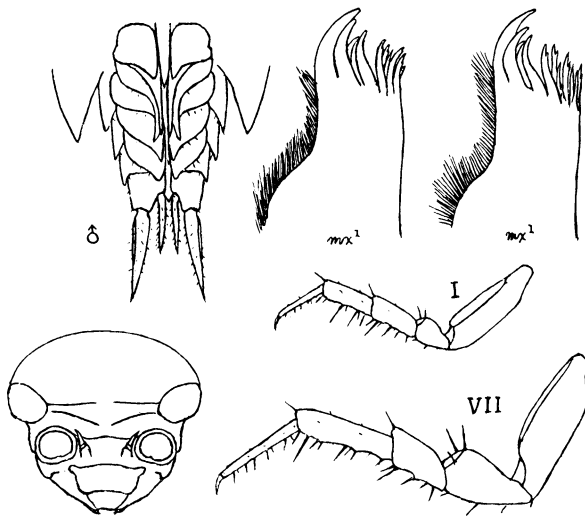


Fig. 68. *Philoscia omissa*, new species.

scarcely reach halfway along the outer ones. They are inserted considerably forward of the end of the basal joint.

Coloration rather conspicuous; in addition to the usual irregular light markings on the lateral regions of the back and on the head, the purplish-brown ground color of the back is variegated by a darker stripe on each side in the region of the bases of the thoracic epimera; in this stripe there is on each segment a large, conspicuous, more or less irregularly oblong light (unpigmented) spot; there is also a median series of light spots which in some individuals lie in a darker median stripe. On the thoracic epimera the purplish pigment fades out so that the thorax seems to be bordered by a broad, somewhat lighter stripe outside the dark lateral stripe in which the large spots lie. Abdomen and telson mostly purplish brown, though median lighter spots are present and the projecting angles of the segments are not pigmented. External branches of the uropoda with a light band across the middle.

Length of largest specimens: males, 11.2 mm.; females, 11.5 mm.;

DISTRIBUTION.—This is one of the commonest and most widely distributed land isopods in the forest regions of British Guiana. It is the species described and figured in Van Name, 1925, and there doubtfully referred (incorrectly) to *P. nitida* (Miers). Pearse, 1917, reports it as "*P. olfersii*," in rotten logs and under fallen leaves, near Dunoon, British Guiana (specimens in University of Michigan Museum). These specimens were kindly loaned to me for examination. The American Museum of Natural History has numerous specimens, including some collected by Mr. William Beebe at Kartabo (among these the type, Catalogue No. 5327), and many obtained by Mr. Herbert Lang at Kamakusa, Kurupung, Bartica, and at the mouth of the Meama River. Also two from Tukeit, collected by Dr. F. E. Lutz.

This species is certainly not identical with either of those to which it has been referred.

***Philoscia kartaboana*, new species**

Figures 69, 70, 71

?*Philoscia culebrae* PEARSE, 1915, p. 541, Fig. 3 (not Moore, 1901).

Philoscia maculata VAN NAME, 1925 p. 494, Figs. 60–63 (not Budde-Lund, 1885).

Body of oblong-elliptical outline in a dorsal view, broadly rounded in front, with the head rather narrow and somewhat set back into the thorax, the abdomen rather

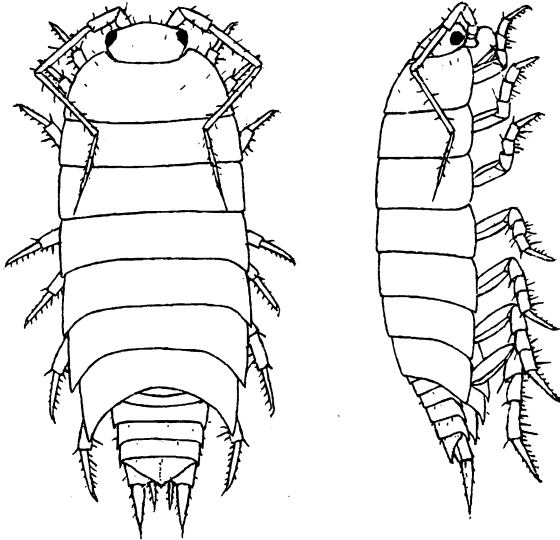


Fig. 69. *Philoscia kartaboana*, new species. After Van Name, 1925 (incorrectly identified with *P. maculata* Budde-Lund).

small and tapering. The body surface is very smooth and for the most part free from setose hairs, though a few are present on the head, antennae, uropoda, etc.

The front outline of the head, seen from above, is obliquely prominent in the middle, but no lateral lobes are visible, though in a lateral view slight vestiges of them, closely appressed to the antennal sockets, and of rather long narrow outline, rounded off below, appear to be present. Eyes rounded, with about fifteen well-formed ocelli. Antennae moderately long, especially in adult males, where they may reach the fifth thoracic segment when well drawn back. The first article of the flagellum is usually noticeably the longest in adult specimens, the terminal article is the next longest, and bears a long bristle at its tip.

The first three thoracic segments have the posterior lateral angles rounded and not at all extended backward. The fourth has the angle nearly sharp, in the remain-

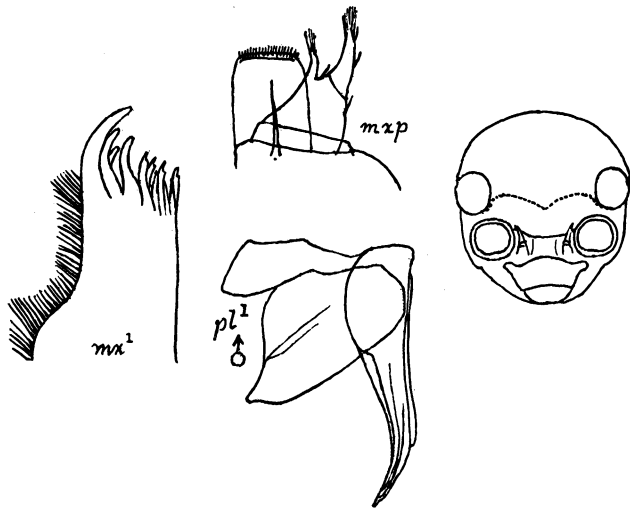


Fig. 70. *Philoscia kartaboana*, new species.

ing three it is actually so. Beginning with a very slight extension in the fourth, the remaining thoracic segments have the posterior lateral angles extended back to an increasing extent. Legs only moderately long, increasing considerably in length toward the rear of the body. No sexual differences in the legs were discovered, though the anterior pairs appear stouter in the male.

The third, fourth, and fifth abdominal segments have the posterior lateral angles extended back into small appressed triangular points. Telson triangular with nearly straight sides forming an angle of somewhat more than a right angle and meeting in a sharp but not acuminate apex. Basal joints of uropoda and outer branches of same with a furrow on the external aspect; the basal joints extend about as far as the tip of the telson. The outer branches are short and taper rapidly, and are tipped by a short bristle, which, however, is not always present. The inner branches are small and compressed from side to side. No tracheae were found in the external plates of the pleopoda.

Color, light brown or purplish brown usually with a noticeably darker median stripe and lateral stripes along the bases of the thoracic epimera. Inside the lateral dark stripe a row of large light spots, one on each thoracic segment on each side, besides the usual light spots and markings on the lateral regions of the back.

Length of largest specimens (females) slightly less than 7 mm.

LOCALITIES.—Apparently widely distributed and common in the forests of British Guiana, perhaps also in Colombia (see below).

Three specimens were obtained by Mr. William Beebe, at Kartabo, by sifting leaf mould in the forest, and numerous specimens at Kamakusa by Mr. Herbert Lang, who also obtained at Bartica, from underground ants' nests, a few small specimens that appear to belong to this species. All these specimens, including the type (from Kamakusa, Cat. No. 6510), are in the American Museum of Natural History.

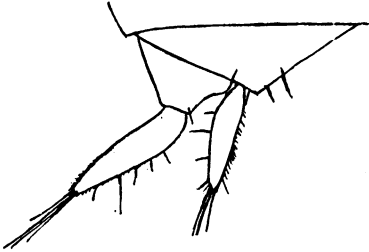


Fig. 71. *Philoscia kartaboana*(?), new species. After Pearse, 1915. Telson and uropoda of a species he regarded as identical with *P. culebrae* Moore. It is not *P. culebrae*, but is perhaps *P. kartaboana*.

This is not identical with *P. seriepunctata* Budde-Lund, as no rows of punctae are visible along the rear margins of the segments even on considerable magnification.

The species reported as *P. culebrae* Moore by Pearse (1915, p. 541, Fig. 3), common in the Santa Marta region, Colombia, in the forest at altitudes from 2000 to 4500 feet, though found also in a cane field at a low altitude, is evidently not Moore's species, but may be the present one, judging from the figure he gives of the telson and uropoda.

***Philoscia roraimae*, new species**

Figure 72

Some specimens from Mt. Roraima represent a species apparently rather closely allied to *Philoscia kartaboana*, described above.

The body is compactly articulated and moderately narrow, but quite highly arched for a *Philoscia*; the epimera of the thoracic segments are well developed, but extended almost directly downward. Integument hard, smooth, and shining, not noticeably setose or pubescent. In a dorsal view the body is elliptical, the abdomen tapering, rather small and short, its base considerably narrower than the last thoracic segment.

Head of moderate width, its front margin smoothly curved in a dorsal view. The head is abruptly contracted in width below the eyes and is without any trace of lobes, though a thickened area extends down from below the eye, lying upon and closely appressed to the socket of the second antennae. The anterior margin of this extension is somewhat notched and it ends in a prominent tubercle below and external to the antennal socket. No tubercle between the first antennae; the median area between them is smooth. Eyes rather large, oval, with twenty-five or more well-developed ocelli in four rows. The second antennae are broken off in all the specimens.

A detached antenna probably, but not certainly, belonging to a specimen of

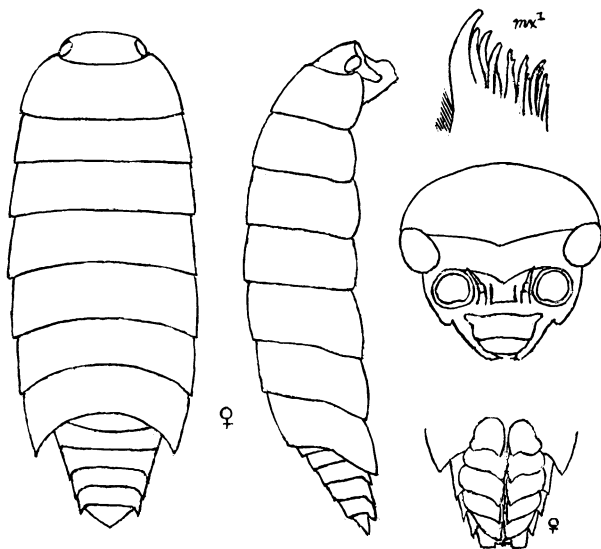


Fig. 72. *Philoscia roraimae*, new species.

this species is rather long and slender, especially the last segment of the peduncle. The flagellum is only slightly shorter than this segment, not including the long terminal bristle that the flagellum bears. The terminal article of the flagellum is somewhat the longest, exclusive of the bristle; the second is slightly shorter than the first.

The three anterior thoracic segments have the rear border slightly sinuous and the rear angle, which is very slightly less than a right angle, somewhat rounded off. The fourth segment has it rectangular and slightly rounded and the last three segments have it acute and extended backward.

The legs are strongly developed, indicating an animal of quite active habits. They are provided with strong, sharp spines and increase greatly in length toward the rear of the body. Sexual difference in the spines were not observed.

The rear angles of the third, fourth, and fifth abdominal segments are extended back in rather small triangular points. The telson is broadly triangular with practically straight sides and is not rounded off at the apex.

The basal segments of the uropoda extend slightly beyond the tip of the telson. The internal branch is quite long, laterally compressed and gradually tapered in a side view. The external branches were broken off in all the specimens.

The coloration is handsome, the polished body surface, dark brown ground color and light yellowish spots giving a tortoise shell effect. Besides the usual irregular bars on the lateral region of the back, there is a row of small median spots, a row on each side of quite large squarish spots at the base of the epimera, and usually also light spots on the epimera. The abdominal segments have three light spots, median and lateral. There is considerable brown pigment below on the legs, pleopods, etc.

The largest specimens, females, would be about 10 mm. long if straightened out.

LOCALITY.—Mt. Roraima (Venezuelan side). A dozen specimens, all females but one, were obtained by Mr. G. H. H. Tate at Rondon Camp at an altitude of 6900 feet, southwest of the plateau, about one-quarter of a mile from the base of the cliffs. The specimens, including the type (Cat. No. 6506) are in The American Museum of Natural History.

Two very small specimens in a soft condition, due apparently to recent moulting, obtained on Mt. Duida, Venezuela, at an altitude of 4800 feet by Mr. Tate, are perhaps also to be assigned to this species.

***Philoscia seriepunctata* Budde-Lund, 1893**

Philoscia seriepunctata BUDDÉ-LUND, 1893, p. 122 (orig. descr.).—DOLLFUS, 1893a, p. 345.

“Oblonge ovalis, convexiuscula, nitida, laevis, in margine posteriore trunci segmentorum series transversa punctorum minutissimorum.

“Linea frontalis marginalis nulla; epistoma vix transverse lineatum, infra inter antennulas tumidum.

“Trunci segmenta tria priora margine posteriore curvato.

“Epimera caudae segmentorum adpressa, segmentum anale triangulum, lateribus subrectis.

“Color flavo-brunneus.

“Long. 3 mm.” (Budde-Lund, 1893.)

LOCALITY.—Caracas, Venezuela, one mutilated specimen (Budde-Lund).

***Philoscia inquilina*, new species**

Figure 73

The body is moderately elongate, the integument firm, considering the small size of the species, smooth and glossy, and bearing scattered, short, stiff hairs which are more conspicuous on the antennae and uropoda.

The head is moderately wide and when seen from above is only slightly convex in front, and is without lateral lobes. It is considerably contracted in width just below the eyes, which are quite large, almond-shaped, and with about fourteen or

fifteen ocelli, rather poorly pigmented. No tubercle between the first antennae. Second antennae setose, over two-thirds as long as the body; their flagellum, excluding the rather long terminal bristle, is about three-fourths the length of the fifth joint of the peduncle and has the first article the longest and the middle one the shortest.

The lateral ends of the thoracic segments have decidedly curved outlines and the rear lateral angles of all seven segments are noticeably rounded off and, beginning

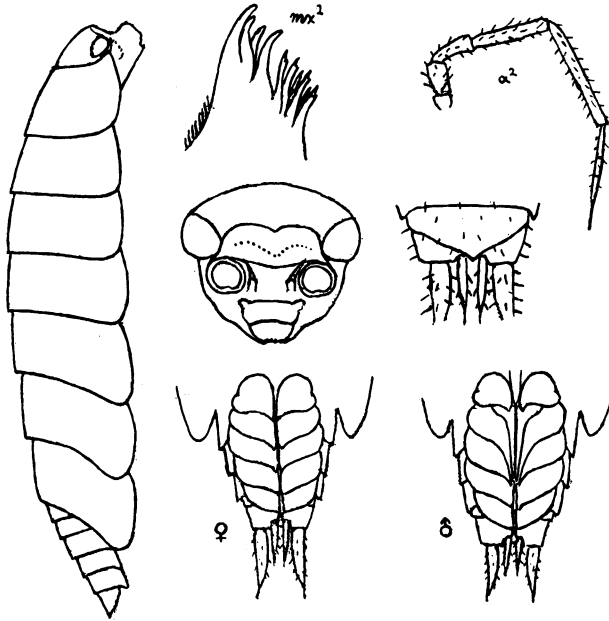


Fig. 73. *Philoscia inquilina*, new species.

with a slight extension in the third, are extended back to an increasing extent. Sexual differences in the legs were not observed.

The abdomen is fairly long and not greatly tapered in width. The abdominal segments three to five inclusive have their rear lateral angles produced into small, appressed, backwardly directed points which are not especially acute. The telson is almost parallel-sided for a short distance in its anterior part; the main portion is quite broadly triangular with nearly straight, very slightly sinuous, converging sides and an acute tip with a slight suggestion of acumination. The basal joints of the uropoda reach as far as the tip of the telson, or extend beyond it. Their exopodites are setose, strongly tapering, tipped with a stout bristle, and have a noticeable outward curvature. They appear to average a little longer in the females than in the males.

The coloration is of the usual pattern, but in many of the specimens the light areas are more extensive in proportion to the brown ground color than is usually the case. On the epimera the pigment often shades off gradually, leaving their greater part light-colored, while the bars and spots on the lateral regions of the back often become confluent, forming large, irregular light areas that give the body, when seen without much magnification, an appearance of being crossed by imperfect but noticeable transverse bands. There is a dark band across the front of the head between the eyes.

Length of largest specimen, a female, a little over 6 mm.

LOCALITY.—Bartica, British Guiana. Fourteen specimens, including the type (Cat. No. 6507) and comprising both male and female examples, were collected by Mr. Herbert Lang in October, 1922, and are in the American Museum of Natural History. His notes state that they were found in an underground ants' nest. A small specimen which he obtained at Kamakusa appears to be of this species also.

The coloration is rather more vivid than would be expected in a species of subterranean habits, but the large though imperfectly pigmented eyes may be an incipient adaptation to such a life. The noticeably rounded posterior lateral angles of all the thoracic epimera furnish an easy means of recognizing this species.

***Philoscia richmondi* Richardson, 1901**

Figure 74

Philoscia richmondi RICHARDSON, 1901, p. 564 (orig. descr.), Figs. 32, 33; 1905, p. 603 (descr.), Figs. 658, 659.

Body rather narrow and elongate, the surface smooth, practically without pubescence except for a few scattered hairs.

The head when seen from above is gently convex in front; when tilted up it is somewhat sinuous, with scarcely a vestige of lateral lobes. The line marking the upper border of the epistome is not very definite and only moderately arched in a front view. Eyes oval, moderately large, placed rather low.

Second antennae rather long, about two-thirds the length of the body. The three-jointed flagellum slightly exceeds the terminal segment of the peduncle, exclusive of a long spine with which it is tipped in the present species. The first of the articles of the flagellum, excluding the terminal spine, is somewhat the longest of the three, the middle one is the shortest.

The lateral ends of the thoracic segments, especially toward the rear end of the thorax, are cut off in a decidedly curved outline. The first four segments have the rear lateral angles conspicuously rounded off,

and those of the remaining three thoracic segments are not actually acute. The fourth very slightly, and succeeding ones to an increasing extent, have these angles produced backward.

No sexual differences were noted in the legs, which are rather long and stout.

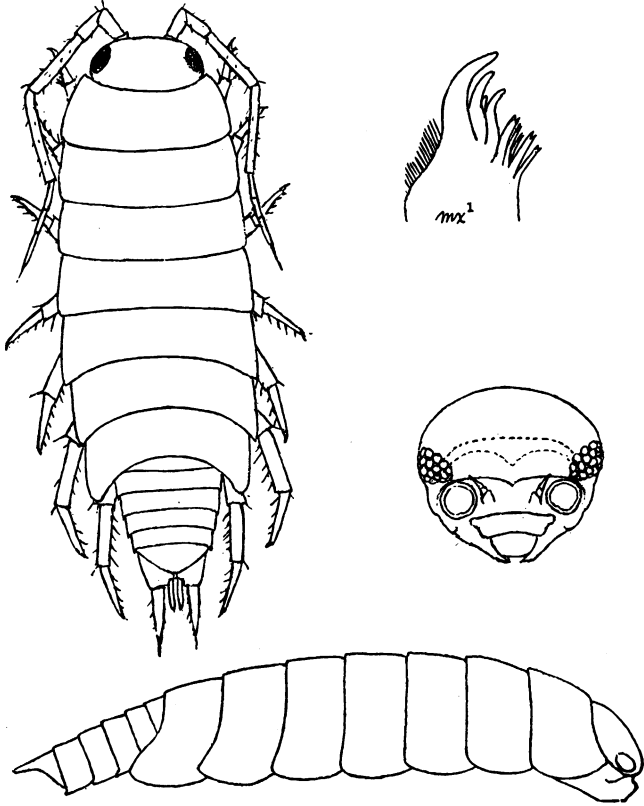


Fig. 74. *Philoscia richmondi* Richardson.

The third, fourth, and fifth abdominal segments have the rear angles only slightly produced back, forming only extremely small, short triangular points. The telson is triangular with slightly convex sides and is only rounded off at the apex.

Coloration often quite bright and conspicuous. Ground color of upper parts deep brownish purple with narrow but conspicuous light (unpigmented) borders to the segments and irregular elongate bars and

spots on the lateral regions of the back. A considerable area on the basal part of the thoracic epimera is conspicuously darker, as is also the case with the median area, so that the back appears to have three longitudinal dark bands, with a wide light border outside the lateral dark bands. Only a small light spot is present on each segment in the median dark band.

Length of largest specimen, a female, 6.7 mm.

LOCALITIES.—The type and a number of other specimens were collected by Dr. C. W. Richmond and Dr. L. Stejneger at El Yunque, Puerto Rico, at an altitude of 2800 feet, and are preserved in the U. S. National Museum. The America Museum of Natural History has two of them received in exchange, also other specimens obtained at Coamo Springs, Puerto Rico, on hills east of the hotel, among cacti, grass, and xerophytic bushes, June 6, 1915, F. E. Lutz and A. J. Mutchler, collectors. Three small specimens in the same museum (2 males, 1 female) collected by Dr. Lutz on Mona Island, a small island west of Puerto Rico, Feb. 21–26, 1914, also appear to be of this species.

***Philoscia incerta* Arcangeli, 1932**

Figure 75

Philoscia incerta ARCANGELI, 1932c, p. 2 (orig. descr.), Figs. 4–6.

The following description and figures were made from specimens in the American Museum of Natural History.

This is a very small and delicate, rather narrow-bodied species. The dorsal surface is smooth and glossy, bearing a few scattered hairs; these are more numerous and conspicuous on the antennae. The abdomen is rather short but fairly wide at the anterior end.

In a dorsal view the front border of the head is somewhat prominent in the middle. Lateral lobes extremely vestigial, though represented by a very slight, rounded projection close to and extending obliquely downward and under each eye. Head little narrowed below the eyes. Upper border of face fairly prominent, but not distinctly marked by a definite line except toward the sides, where it bends down below the eyes. Antennae setose, rather slender, about half the length of the body. The third article of their flagellum is the longest and is tipped with a fairly long terminal bristle. There is a slight median tubercle between the first antennae.

The first four thoracic segments have the posterior lateral angles well rounded, the fourth less rounded, and not at all extended back. The last three have them considerably and increasingly extended back and

moderately acute. The lateral margins of these segments, especially the more posterior ones, are rather straight.

The abdominal segments 3, 4, and 5 have the triangular backwardly directed points at the rear angles very slightly developed. The telson is broadly triangular, its sides straight. Its apex is not at all rounded off.

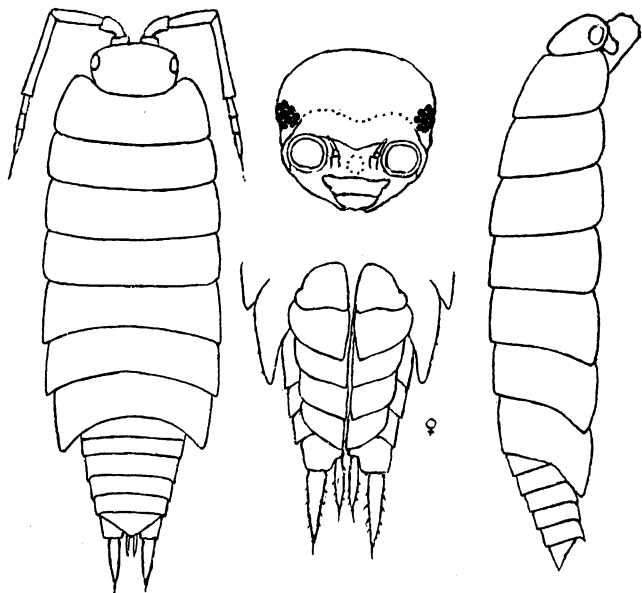


Fig. 75. *Philoscia incerta* Arcangeli.

The color is light brown with small light markings on the head and the lateral regions of the back.

Length of largest specimen (fragmentary) between 3 and 4 mm.

DISTRIBUTION.—Dominica, West Indies. Type locality, Laudat. The American Museum of Natural History has specimens from Laudat, Roseau, and Long Ditton, all in Dominica. Type in the museum of the University of Turin, Italy.

***Philoscia moneaguensis*, new species**

Figure 76

In this species the vestigial lateral lobes of the head, appressed to the sides of the head below the eyes, are small and in a lateral view appear rounded in outline; the telson has the apex rounded off and has its sides slightly convex.

The antennae and exopodites of the uropoda are missing; the legs are rather weak and slender. The eyes are rather large with about ten fairly well-formed ocelli, seven or eight of them pigmented. There is no noticeable median tubercle between the first antennae. The first four segments of the thorax have the rear angles rounded and not extended back, the fourth being somewhat less rounded than the others; V, VI, and VII have them increasingly extended back and moderately acute. The rear angles of the abdominal segments 3, 4, and 5 form only very small appressed points. If we may judge by the single example, the species is an exceptionally

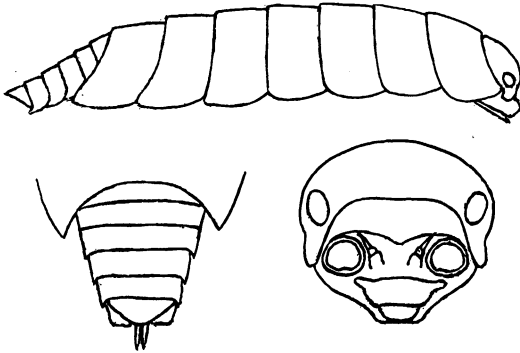


Fig. 76. *Philoscia moneaguensis*, new species.

small one, for the specimen, though apparently a fully adult female bearing four large embryos in the marsupium, two on each side of the body, is only 3.5 mm. long, though the inter-segmental muscles are in a fairly relaxed condition.

LOCALITY.—Moneague, Jamaica, where the type and only specimen was found, is some distance inland. Type in the American Museum of Natural History (Cat. No. 6511).

***Philoscia walkeri* Pearse, 1915**

Figure 77

Philoscia walkeri PEARSE, 1915, p. 541 (orig. descr.) Fig. 4.

“Body very slender; 4 by 1.1 mm. Head nearly one and one-half times as long as broad; front somewhat recurved between sides and middle; sides and posterior margin rounded. First segment of thorax little longer than those following, its anterior margin curved, the posterior margin nearly straight; anterior angles rounded and projecting laterally somewhat beyond the sides of the head. Next six segments about equal in length; last three with postero-lateral angles produced but rounded, angles of last reaching to end of third abdomi-

nal segment. First three abdominal segments about equal in length and shorter than either the fourth or fifth; lateral parts of the first concealed by the last thoracic segment. Telson short, about as long as preceding segment, apex triangular, rounded at tip.

"Eyes rather small, with 10 facets. Second antenna extending to end of third thoracic segment, spinulose; first segment short, second and third subequal in length; fourth one-fourth longer than third; fifth one-third longer than fourth; flagellum 3-segmented, without the slender terminal seta about as long as preceding segment. Mandible with 4-toothed tip; below tip are two plumose setae; lower down a brush; no palp. First maxilla with inner plate armed with two plumose processes; outer plate with eight curved spines.

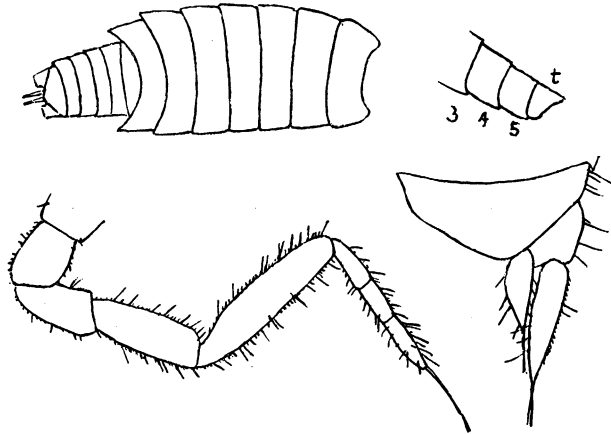


Fig. 77. *Philoscia walkeri* Pearse. Upper figure, outline of body and side view of abdomen, sketched from type in U. S. National Museum. Lower figures, antenna, and telson with uropoda, after Pearse, 1915.

"Legs slightly increasing in length from before backward. Uropods with basal segment broad; outer ramus one-third longer than inner one, tapering; inner ramus broad, oval (Fig. 4).

"Color.—Deep brown; a broad white band across the anterior margin of each thoracic segment (these bands give the isopod a striped appearance); a patch or irregular longitudinal bands extends back from the anterior band on each side of the thoracic segments; head with many small elongated white markings. Ventral surface white. Legs white, mottled with delicate brown markings." (Pearse, 1915, pp. 541, 542.)

I examined and made notes on one of Pearse's specimens labeled "*Philoscia walkeri* type," in the U. S. National Museum. The specimen measures about 4 mm. long without the head, which is missing.

The body is rather elongate, the abdomen abruptly narrower, rather long and not much tapered. The body surface is smooth with a few scattered stiff hairs and is rather coarsely marked with light (unpigmented) spots and bars. The anterior parts of the segments are little pigmented, and they have a light rear border also.

Thoracic segments I to IV inclusive have the rear lateral angle rounded and not extended back; V, VI, and VII have it angular, contrary to Pearse's statement, and increasingly extended back.

The points of abdominal segments 3, 4, and 5 are small and appressed and barely noticeable in a dorsal view. Telson broadly triangular, the apex somewhat rounded.

LOCALITIES.—Santa Marta region, Colombia. "This species was fairly common under stones, grass, and logs, and in bromeliads at the top of San Lorenzo (8300 feet) on July 19 and 23. Two specimens were also taken in the forest below at an altitude of about 4500 feet." (Pearse, 1915, p. 542.) Cotypes in University of Michigan Museum and U. S. National Museum. (Pearse.)

***Philoscia demerarae* Van Name, 1925**

Figure 78

Philoscia demerarae VAN NAME, 1925, p. 496 (orig. descr.), Figs. 64-66.—
ARCANGELI, 1929, p. 138; 1932c, p. 3.

Body elongate-elliptical in outline, the abdomen over one-quarter of the length of body and head; cuticle rather soft and articulation of the segments loose.

"Surface of body fairly smooth, only a few setose hairs are present on most parts of the body and limbs, except on the antennae, where they are fairly numerous. Color pale purplish brown above with small light (unpigmented) spots on the head and a few larger oval, rounded, or somewhat irregular ones on the dorso-lateral regions of the back. The lower parts and limbs bear a little of the purplish pigment in some places.

"Head rounded behind and set well back into the thorax. Seen from above its front outline is sinuous or somewhat three-lobed; the lateral lobes, situated under the eyes, are rounded but extend downward much more than forward or laterally. The most forwardly prominent part of the forehead forms a not very definitely indicated line which,

when seen from in front, dips down in the median region in a V-shaped angle. Directly below the angle and between the minute first antennae there is an oval tubercle. The head is not narrowed below the level of the eyes, and the mouth parts form a large mass which projects obliquely downward and farther forward than the anterior margin of the forehead, so that its anterior part shows in a dorsal view of the body. Eyes well pigmented but with rather few ocelli, about ten being well formed. Second antennae quite long, reaching to the sixth thoracic

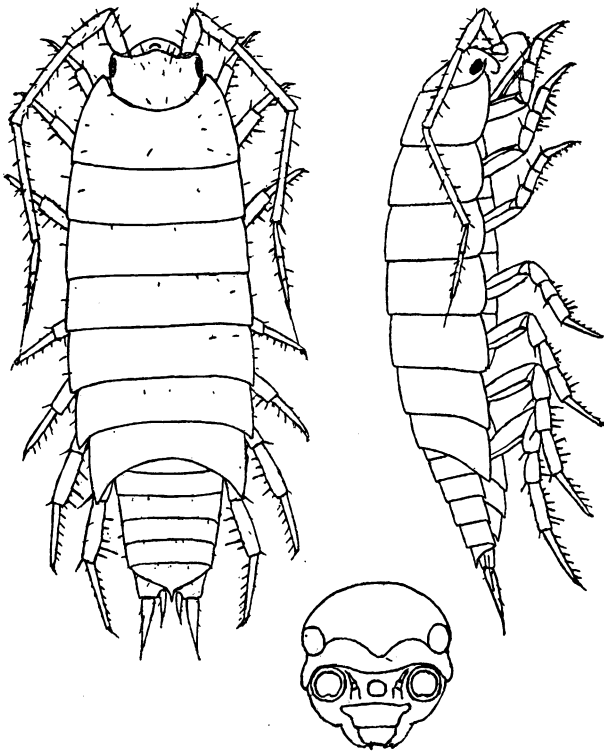


Fig. 78. *Philoscia demerarae* Van Name. Adapted from Van Name, 1925.

segment when strongly drawn back. The flagellum, exclusive of a rather long terminal bristle, is considerably shorter than the last segment of the peduncle. Its first article is the longest, the second somewhat the shortest (the terminal bristle not being included).

“First five thoracic segments with the posterior lateral angles rounded off, the fifth less so than the others, the sixth and seventh have

them sharp. Only fifth (to a slight extent), sixth, and seventh have this angle extended back. Legs long with fairly long and strong spines.

"Abdomen only moderately tapered. The posterior angles of segments three, four, and five are only extended into insignificantly small, appressed points which are hardly noticeable in a dorsal view. Telson wide and short, its sides slightly sinuously curved and its apex strongly acuminate. The basal segments of the uropoda, as well as the external branch of the same, have a furrow on the external aspect." (Van Name, 1925, p. 497.)

No sexual modification of the anterior legs of the male was observed.

Length of the largest specimen (a female, which is also the type) 4.5 mm. It has a well-developed and distended, though empty, marsupium.

LOCALITIES.—Type locality, Kartabo, British Guiana, one specimen collected by William Beebe by sifting in the jungle. This is in the American Museum of Natural History, New York (Cat. No. 5329), which also has over a dozen other specimens, some of them immature, including both sexes, collected at Kumakusa, British Guiana, by Mr. Herbert Lang in 1922 and 1923. The pigmentation of these specimens, especially the immature ones, is very light. Several specimens (not labeled) were also found among material loaned by the University of Michigan Museum. They were collected by Prof. A. S. Pearse at Du-noon, British Guiana.

This small species is easily recognized by the acuminate telson, the conspicuous median tubercle between the first antennae, and the rounding off of the posterior angles of four, and to a less extent also of the fifth; of the thoracic epimera.

The American Museum has several fragmentary specimens all lacking the head and most of the appendages, collected at Port of Spain, Trinidad, in 1910, which may possibly be of this species, but are too incomplete for satisfactory determination. None of them show the acuminate point of the telson, but this may be due to mutilation.

***Philoscia diminuta* Budde-Lund, 1893**

Philoscia diminuta BUDDE-LUND, 1893, p. 120.—DOLLFUS, 1893a, p. 345.

"Elongate ovata, convexiuscula, laevis, nitida, in marginibus sparse hirsuta.

"Antennae corpore dimidio aliquanto breviores, hirsutae; flagellum articulo quinto scapi satis brevius, articulus primus articulo secundo

subaequalis, articulo tertio sesqui brevior. Linea marginalis frontalis subrecta, vel medio levissime procurva; lobi frontales latiores, extrorsi, obliqui, subovales; epistoma linea vel carina transversa, in medio sinuata, infra inter antennulas tumidum.

“Trunci segmenta duo vel tria priora margine posteriore curvato, segmenta duo sequentia margine posteriore subrecto, segmenta duo posteriora medio incurvo. Cauda trunco abrupte angustior; epimera adpressa. Segmentum anale brevissimum, quadruplo latius quam longius, triangulum, apice obtuso.

“Color e brunneo fuscus, maculis crebris albidis praesertim in trunci segmentis, capite fusco praeter orem albidum, cauda subunicolore, fusca, maculis tribus parvis rotundis flavis in segmento anali; antennae articulis tribus prioribus albidis, duobus sequentibus cum flagello obscurioribus.

“Long. 3.5 mm. Lat. 1.5 mm.” (Budde-Lund, 1893.)

LOCALITIES.—Venezuela: La Moka (first mentioned locality) two specimens; Caracas, one specimen (Budde-Lund).

***Philoscia gatunensis* Van Name, 1926**

Figure 79

Philoscia gatunensis VAN NAME, 1926, p. 12 (orig. descr.), Figs. 21, 22.—ARCAN-
GELI, 1929, p. 138; 1930a, pp. 5, 20; 1932c, p. 3.

“This small and slender form may easily be distinguished from all the other similar American species with which I am familiar by the lateral lobes of the head that extend down below the eyes, these being of unusually large size, although they do not project forward or outward much and are not very prominent in a dorsal view of the head unless the latter is considerably tilted up. But in a side view they appear large and of squarish outline, with the lower anterior corner rounded off and the lower posterior corner a little produced.

“In addition to its very small size, it is characterized by its narrow, elongate body whose segments, being rather loosely articulated, permit of considerable additional elongation of the body when the intersegmental muscles are relaxed. The back is not greatly arched; the body surface is very smooth and even and practically free from pubescence, though the antennae and, to a less extent, the uropoda bear some short hairs; the color is the usual purplish brown above, with small light-colored markings on the head and dorso-lateral regions of the back; the legs and under parts are practically unpigmented.

“The head is fairly large and rounded, though not wide, and is

somewhat set back into the thorax. Its large but rather closely appressed lateral lobes have already been described; the median part of the forehead is slightly prominent. Eyes wide apart, rather small; ocelli few, apparently not over 10 or 12. Second antennae of moderate length and stoutness, reaching nearly or quite to the fourth thoracic segment when laid back. Flagellum considerably shorter than the last segment of the peduncle; its terminal article the longest and tipped with a rather short terminal bristle.

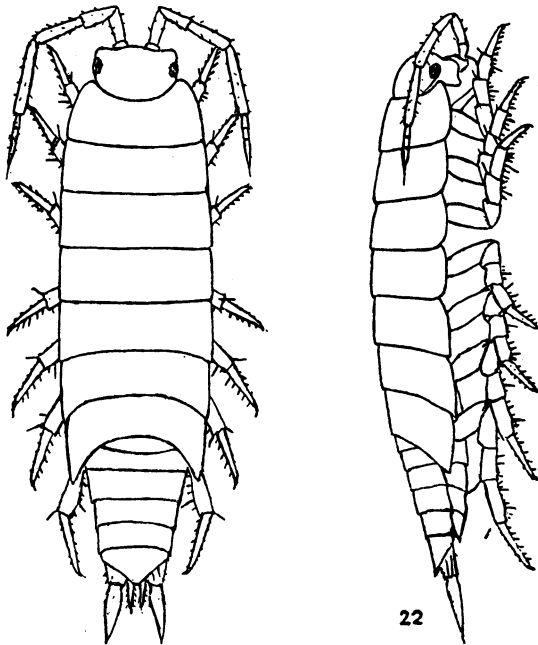


Fig. 79. *Philoscia gatunensis* Van Name. From Van Name, 1926.

“The first four thoracic segments have the posterior lateral corners rounded off and not produced backwards. The last three have the corresponding corners sharp and more or less produced backwards. All have the lateral ends cut off with a somewhat curved outline which, however, is more squarely truncate in the case of the last three or four segments than in the anterior ones. Legs moderately long for the size of the animal. No sexual differences in the legs were noted.

“Abdomen rather long and of smoothly tapering outline when seen from above. The posterior lateral corners of segments 3, 4, and a are

appressed and scarcely at all produced into points, and do not break the smooth, straight outline of the sides of the abdomen in a dorsal view of the same. Telson triangular, wider than long, but not greatly so; its apex fairly acute. Inner branches of uropoda rather narrow and laterally compressed, the outer ones slightly flattened, of sharply tapering outline as seen from above or below." (Van Name, 1926, pp. 12, 13.)

Length of largest specimen (a female with marsupium), 3.75 mm.

LOCALITIES.—Barro Colorado Island, Gatun Lake, Canal Zone. Collected by sifting dead leaves and mould in old-growth forest. Nine specimens, including type, in the American Museum of Natural History (Van Name). Apaican, Costa Rica, one specimen (Arcangeli).

***Philoscia paulensis* Moreira, 1927**

Figure 80

Philoscia paulensis MOREIRA, 1927, p. 194 (orig. descr.), Figs. 1-3.—SCHWENCK, 1927, p. ?, Figs. 2-5 (fide Moreira).—MOREIRA, 1932, p. 426 (descr.), Pl. II.

"Body elongate oval, in length a little more than in width; length 10 mm., width 4.5 mm.

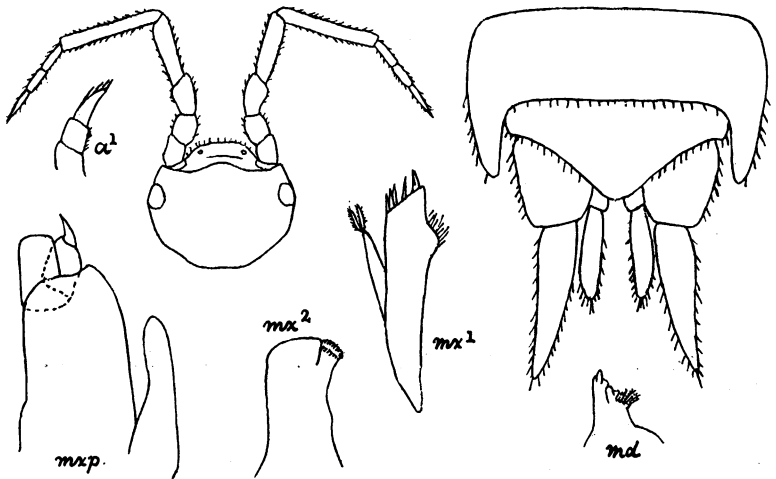


Fig. 80. *Philoscia paulensis* Moreira. Adapted from Moreira, 1927.

"The head is wider than long with the anterior margin sinuous, convex in the middle between the second pair of antennae and concave over their positions; the eyes are small, oval, and situated at the sides of the head; the antennae of the first pair are rudimentary, of three

segments, and very short, reaching hardly halfway along the second segment of the antennae of the second pair. The antennae of the second pair are long, reaching to the fourth thoracic segment; the first segment of these antennae is the shortest, the second a little longer, and the fourth a little larger than the third; the fourth has about double the length of the third, and the fifth is much longer than the fourth; the flagellum is composed of three subequal articles.

"The thoracic segments are equal, the first perhaps slightly the longest; their epimera not distinct. The abdomen is noticeably narrower than the thorax; its first two segments are covered by the last thoracic segment. The lateral parts of the segments are well developed and curved backward; the telson is broadly triangular with a rounded apex. The peduncle of the uropoda reaches to the extremity of the telson, the internal branch reaches a third of the length of the terminal branch of the uropod. All the legs are ambulatory.

"The color of this species is very dark chestnut; on each side of the thoracic segments two light lines extend, of which only the inner is very distinct, and the outer is broken up into spots which disappear on the posterior segments; there are closely placed short, irregular, longitudinal lines on each side of the dorsal part of the segments; leaving a poorly diffused light line along the back.

"Habitat: Found on the ground in a garden in São Paulo. The larger examples are 9 to 10 mm. long and 4.5 mm. wide.

"There is a color variation exhibited by many specimens of this species differing from the typical form in that the longitudinal lines are well defined, the space between them being lighter and the dorsal light line more evident." (Translation of original description.)

Type in the Instituto Biologico de Defesa Agricola, Rio de Janeiro. The fact that it was found in a garden in the city with *Porcellio laevis* and *P. scaber* and *Armadillidium vulgare* may assist in finding it again.

Philoscia briani Arcangeli, 1929

Figure 81

Philoscia briani ARCANGELI, 1929, p. 136 (orig. descr.), Fig. 3.—BOONE, 1934, pp. 567, 569 (new descr.).—ARCANGELI, 1932c, p. 3.

Body very elongate, abruptly narrowed at the abdomen, moderately convex, glossy, and bearing scattered, slender setae which are best developed on the abdomen. The outlines of the head are shown in the figures here reproduced. Eyes moderately large, composed of about twenty ocelli. Second antennae slender, setose, more than two-fifths

of the body length, with a flagellum exceeding the terminal joint of the peduncle. The three articles of the flagellum diminish slightly in length from the first to the third. The last article of the peduncle is longitudinally grooved.

Rear angle of the thoracic epimera nearly a right angle in segments I to IV, somewhat acute and produced backward in segments V to VII. The rear angles of abdominal segments 3 to 5 are acute, but very short and bent downward so that the lateral outline of the abdomen appears straight and uninterrupted when seen from above. The basal part of the telson continues the straight converging outline of the abdomen,

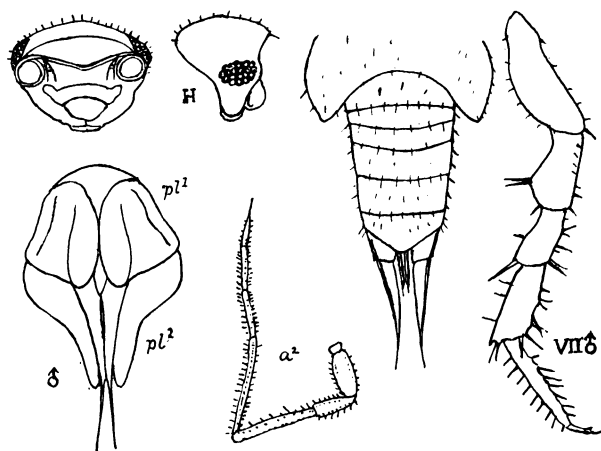


Fig. 81. *Philoscia briani* Arcangeli. H, head, right side. Adapted from Arcangeli, 1929.

the terminal part is triangular, with a slightly rounded apex and a slight median impression on its upper surface. Exopodites of the uropoda grooved on the outside. Endopodites about half the length of the exopodites.

The color is dark chestnut brown with yellowish markings on the dorso-lateral regions of the back and a median row of less distinct yellowish spots; on the abdomen there are additional lateral spots on each side, making three rows. The ends of the seventh thoracic epimera and the rear margins of the abdominal segments, also spots on the telson, and most of the under parts, are yellowish.

Dimensions.—Length, 7 mm.; width, 3 mm.

LOCALITIES.—Cuba. A total of fifteen adult (two of them males)

and some young specimens are recorded by Arcangeli. They were taken at Guayabal (first mentioned locality) and Soledad. Boone, 1933, records it from the two following additional Cuban localities: Sierra de Anafe, Prov. Piñar del Rio, and Cojimer.

***Philoscia baldonii* Arcangeli, 1930**

Figure 82

Philoscia baldonii ARCANGELI, 1930a, p. 20 (orig. descr.), Fig. 6.

A small species resembling *Philoscia (Ischioscia) variegata* in general form, though having the body surface somewhat scabrous and setose,

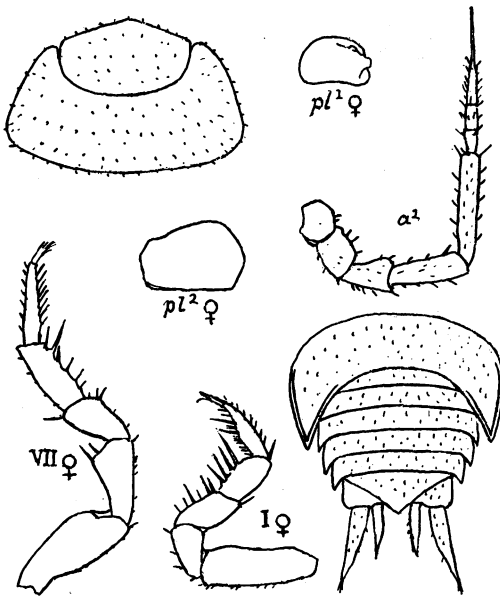


Fig. 82. *Philoscia baldonii* Arcangeli. Adapted from Arcangeli, 1930a.

and the eyes entirely wanting. The second antennae are a little less in length than the body, rather stout and setose. The rear lateral angle of the first thoracic segment is slightly obtuse and well rounded. The rear angle begins to become acute and extended backward in the fourth segment, becoming very acute in the seventh. The outlines of Arcangeli's figures here given show the form of the abdominal segments, telson, etc. The pleopoda have no tracheae in the external lamellae. No furrow on the outside of the external branch of the uropoda.

Color white, entirely without pigment.

Dimensions.—Length, 2.05 mm.; width, 1.21 mm.

Many other details may be found in the original description.

LOCALITY.—San José, Costa Rica. Two female specimens collected by Prof. F. Tristan, 1916.

***Philoscia langi*, new species**

Figures 83, 84

Body elliptical in a dorsal view, the front outline of the head evenly convex and the abdomen somewhat narrower than the rear end of the thorax. Back moder-

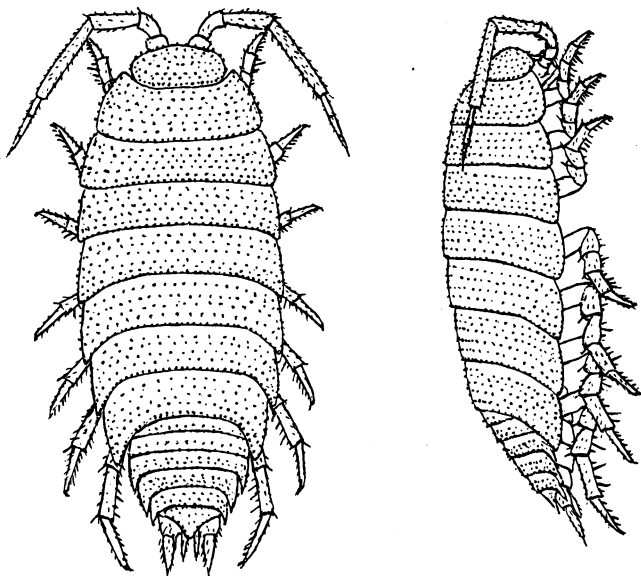


Fig. 83. *Philoscia langi*, new species.

ately convex; the surface rather smooth and even; the exposed parts of the segments little raised above the part that fits under the segment next in front. The whole dorsal surface is fairly thickly covered with more or less club-shaped setae which have a noticeable tendency to arrangement in transverse rows. Along the posterior margin of each segment there is a row of quite closely placed setae; the remainder of the exposed dorsal part in the thoracic segments is occupied by four or more rows of them somewhat less closely and regularly spaced; the abdominal segments have two or three rows, including that along the posterior margin. The antennae, uropoda and legs are covered with short rather stout setae, which, however, are usually not club-shaped like those on the back.

Head without lobes; the forehead rather high and the demarcation between

the forehead and epistome sinuous, dipping down a little in the middle, but not very conspicuously defined. No eyes could be distinguished. Antennae moderately long, reaching the anterior part of the fourth segment when well drawn back. The fifth joint of the peduncle exceeds the third and fourth taken together; the flagellum, exclusive of the rather short terminal spine, is nearly two-thirds the length of the fifth joint of the peduncle and has three distinct articles, the first the longest, and the terminal one the shortest.

First segment of the thorax considerably the longest. All except the first have the rear lateral angles extended backward to an increasing degree as the rear end of the body is approached. Only the first has the angle much rounded off, although their tips are not actually sharp except in the case of the last one or two. The legs are moderately long. A small sexual difference exists in the first pair of legs, the

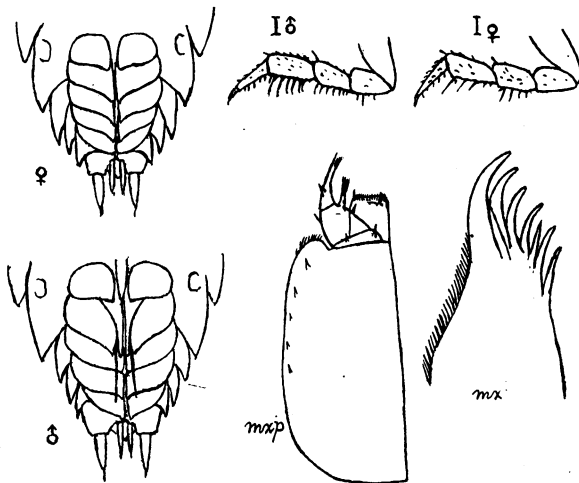


Fig. 84. *Philoscia langi*, new species.

carpus and merus having a slightly larger number of spines arranged in a more regular comb-like row on the inferior aspect of the limb in the male. These show a tendency to be slightly larger and curved, while in the female the spines are fewer, perfectly straight (as on all the other legs also in both sexes) and directed more distally.

The third, fourth, and fifth abdominal segments have the lateral parts extended into rather long, narrow, backwardly directed points. The telson is considerably broader than long, with a fairly acute tip and concave side outlines. The uropoda have the branches rather small, the outer tapering and somewhat terete, the inner shorter and compressed from side to side. The inner division of the second pleopoda in the male is produced into an unusually long spinous process reaching about as far as the end of the fifth segment.

The specimens are practically without pigment. Length of largest specimens (either sex) about 5 mm.

LOCALITY.—Kamakusa, British Guiana, about 35 specimens,

including the type (Cat. No. 6512) in the American Museum of Natural History. They were collected by Mr. Herbert Lang, for whom the species is named, in October, 1922, and January, 1923.

***Philoscia pearsei*, new species**

Figure 85

Philoscia spinosa PEARSE, 1917, p. 7, not Say, 1818, p. 429.

The specimens from British Guiana identified by Professor Pearse with Say's species from Georgia were kindly sent to me for examination by Professor E. P. Creaser of the University of Michigan Museum. I believe that their assignment to Say's very briefly and insufficiently described species is not warranted, as Say would hardly have described the hairs of this species as "small spinelike tubercles." Therefore, I am here treating them as distinct, naming the new species after Prof. Pearse.

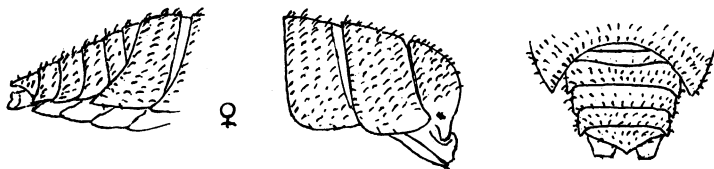


Fig. 85. *Philoscia pearsei*, new species.

P. pearsei bears so close a resemblance to *P. langi* described above that the distinguishing characters can be noticed only on considerable magnification, for the general form and outline of the body and of its more conspicuous parts are very nearly alike in both species. The most noticeable distinctions are shown in the illustrations of the head and abdomen here given. The dorsal surface and the antennae and uropoda are covered with short, bristly, often somewhat curved hairs which are only slightly bulbous at the free ends. They are very easily rubbed off and show a tendency to arrangement in transverse rows, as in *P. langi* (four or five rows on most of the thoracic segments; more on the first thoracic and only one or two on the abdominal segments).

Rudiments of the eyes in the form of small irregular spots of black pigment are present and below these the surface of the head is extended downward into rudimentary lobes closely appressed to the sockets of the antennae and not visible in a dorsal view of the head unless it is considerably tilted up. The demarcation between the forehead and epistome is rather indistinct. The posterior lateral angles of the abdominal segments three, four, and five are extended back into short, closely appressed points, not long and slender ones as in *P. langi*.

Careful comparison of the two species discloses other slight differences. In *P. pearsei* the legs, antennae, and uropoda are a little stouter and the rear lateral angles of thoracic segments II are rounded and not as much produced backward, a slight tendency to their backward extension being noticeable first in segment III, in which the angles are also somewhat rounded off. There is a sexual difference in the spines on the anterior legs, as in *P. langi*.

Except for the eye spots, the specimens are practically unpigmented.

Size apparently somewhat less than that of *P. langi*. Many of the specimens are less than 4 mm. long and the largest, a female, if complete, would probably not exceed 4.5 mm. in the length of the head and body.

LOCALITY.—Near Dunoon, British Guiana, in rotten wood, both in clay jungle and in the Labba Creek sand hills. Specimens, including type, in University of Michigan Museum. Cotypes in the American Museum of Natural History.

Philoscia spinosa Say, 1818

Philoscia spinosa SAY, 1818, p. 429 (orig. descr.).—DE KAY, 1844, p. 50.—BUDDÉ-LUND, 1879, p. 2; 1885, p. 223.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 305; 1901, p. 565; 1905, p. 608 (descr.).

Probably not *Philoscia spinosa* PEARSE, 1917. See remarks below.

“Brown, oblong-oval, with numerous spines above; feet armed with short setae beneath.

“Inhabits Georgia.

“Cabinet of the academy.

“Body brown, elongate-oval, armed with numerous spine-like tubercles; sixth and seventh segments produced on each side behind, acute, the latter attaining the base of the fifth succeeding joint; abdominal and caudal segments somewhat glabrous, terminal segment surpassing the first joint of the lateral styles; antennae rough and subspinose before, terminal joint glabrous, pale; feet beneath armed with short, distant setae.

“Length nearly one-fifth of an inch.

“Under stones, old wood, etc., in moist situations near Savannah, Georgia.” (Say, 1818, pp. 429, 430.)

Nothing is known about this species other than Say's brief description, and I think that the probabilities are so strongly against the identity of the form from British Guiana that Pearse assigns to this species, that I am treating his form as distinct under the name *Philoscia pearsei*.

THE HALOPHILOSCIA GROUP

Verhoeff (1908a, p. 340) separated certain Old World species inhabiting the sea coasts from the other *Philoscias* as the tribe Halophilosciini, containing the genera *Halophiloscia* and *Stenophiloscia* (see also Verhoeff, Arch. Biontol, II, pp. 128–133). Many years later Kesselyak (1930, Studia Zoologica, I, pp. 256–258, and Zool. Anziger, XCII, pp. 282–284, Figs. 1, 2) made the interesting discovery that *Halophiloscia*

and *Stenophiloscia* have the vasa deferentia separate for their entire length and leading into paired copulatory appendages instead of a single median one; an apparently primitive character unique in the Oniscoidea but occurring in aquatic isopods. There is also a peculiar muscular thickening of a part of the wall of the vasa deferentia. Kesselyak considers these characters to be of great taxonomic importance and establishes for these genera a separate subfamily, Halophilosciinae, of the Oniscidae, in spite of their resemblance to *Philoscia* in most characters.

It seems rather probable that the next following five species (*P. culebrae*, *culebroides*, *richardsonae*, *nomae*, and *bermudensis*) may belong in the Halophilosciinae instead of among the true *Philoscias*. This question can only be settled when there is available a sufficiency of fresh or well-preserved male specimens for the study of the distinctive structures. At present I do not venture to transfer them to that group.

***Philoscia culebrae* Moore, 1901**

Figures 86, 87

Philoscia culebrae MOORE, 1901, p. 176 (orig. descr.), Pl. XI, figs. 13-17.—RICHARDSON, 1905, p. 604 (descr.), Fig. 660.—BOONE, 1918, p. 602.—VAN NAME, 1924, pp. 194, 195.

Not *Philoscia culebrae* PEARSE, 1915, p. 534, Fig. B (see remarks below).

Body elliptical in a dorsal view moderately elongate, the abdomen rather narrow and tapering. Surface rather thickly dotted with short stiff scabrous hairs; on the antennae the hairs are longer and more conspicuous.

Head short, more than half the width of the first thoracic segment, into which it is set back rather deeply. Its front outline, seen from above, is gently convex with a very slightly projecting lobe under each eye. These lobes, extending downward and only slightly forward, are better visible in a lateral view of the head. In such a view they appear somewhat square; from above or from in front, more triangular.

A considerably arched line, less distinct in the median portion, marks the border of the face. Laterally, it becomes more prominent and bends down along the inner border of the eye. Antennae moderately short; the three articles of the flagellum do not differ very greatly in length, the second being a little the shortest. Eyes moderately large, well pigmented, with over a dozen ocelli, some not very well developed.

Lateral ends of the thoracic segments truncated in a gentle curve, especially in the anterior segments; the posterior corners of the first three conspicuously rounded off, those of the fourth scarcely at all; the fifth, sixth, and seventh are sharp or nearly so. Beginning just percep-

tibly with the fourth segment, the posterior lateral corners are produced backward to an increasing degree.

Legs rather long and strong; first, and to a less extent in the second, pair, there is a difference in the legs in the two sexes, the propodus and carpus being noticeably tumid and the whole legs stouter in the male.

The abdominal segments 3 to 5 inclusive have only small, sharp,

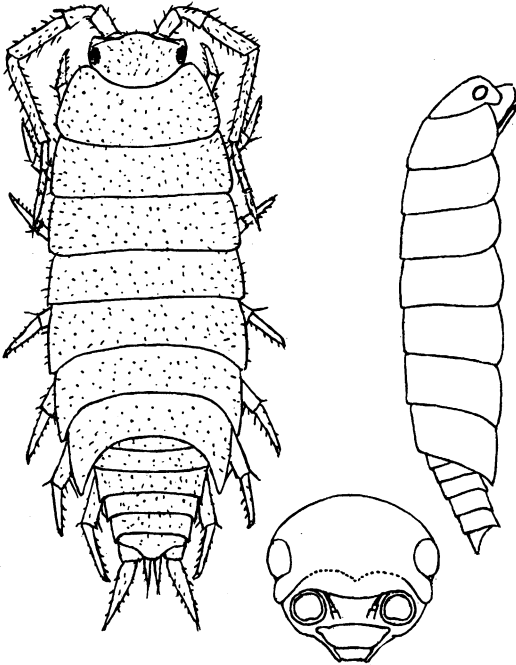


Fig. 86. *Philoscia culebrae* Moore. Specimen from Porto Rico.

posteriorly directed, appressed points. The telson is broad with sinusously concave side outlines and the median part rather broadly rounded behind. The external branches of the uropoda are rather long and gradually tapered; the inner branches comparatively short.

Color.—Pale yellowish brown to light brown above with pale edgings to the segments and numerous small pale yellowish markings as well as larger pale spots on the median line and on the epimera of the thoracic segments; under parts and legs pale yellowish.

Dimensions of type, according to Moore, 4.2 mm. by 1.6 mm.

This species may perhaps belong in the genus *Halophiloscia* Verhoeff.

DISTRIBUTION.—A littoral species found under drift and rubbish on the shores of salt and brackish water. Type locality, Culebra Island, east of Puerto Rico; types in the U. S. National Museum, which also has other specimens from Culebra (at Ensenada Honda), from Puerto Rico (beach at San Juan), and from Caballo Blanco Reef near Vieques Island. The American Museum of Natural History has two from Puerto Rico obtained from the U. S. National Museum, and one from Culebra Island, collected by Prof. W. M. Wheeler.

It is, however, either of much wider distribution, or is represented by very closely allied forms in other coastal regions, since two large, stout female specimens, in the American Museum, one of them 6 mm. long, received from Dr. James Zetek, who collected them at the St.

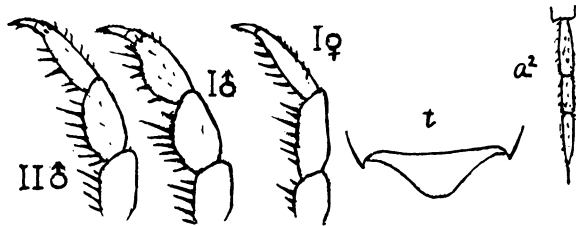


Fig. 87. *Philoscia culebrae* Moore. Specimens from Puerto Rico.

Andrews Islands, Colombia, agree well with those from Culebra in such details as can be studied without dismembering them, but are unpigmented except for thinly but evenly distributed blackish stellate pigment spots.

The American Museum of Natural History also has three specimens, likewise collected under drift and rubbish on the shores of salt or brackish water, two of them from Woods Hole, Massachusetts, and one from Flushing, Long Island, New York, which I refer to this species, although, considering the difference of locality, it would not be surprising if, with more abundant material, some characters might be found to justify separating the northern from the West Indian form. The specimen from Flushing is larger than any West Indian one that I have seen, measuring 6.3 mm. long.

Philoscia culebrae Pearse, 1915, has clearly nothing to do with the present species, as his figure of the telson and uropoda shows. It is,

moreover, a species of high altitude forests, while the present one seems to be confined to the vicinity of sea beaches. See remarks under *P. kartaboana*.

***Philoscia culebroides* Van Name, 1924**

Figure 88

Philoscia culebroides VAN NAME, 1924, p. 193 (orig. descr.), Figs. 11, 12.

Philoscia williamsi VAN NAME, 1924, p. 194 (descr.), Figs. 13-15.

A small and delicate species having the body only moderately wide; the abdomen is small, short, and tapering, though fairly wide at its base,

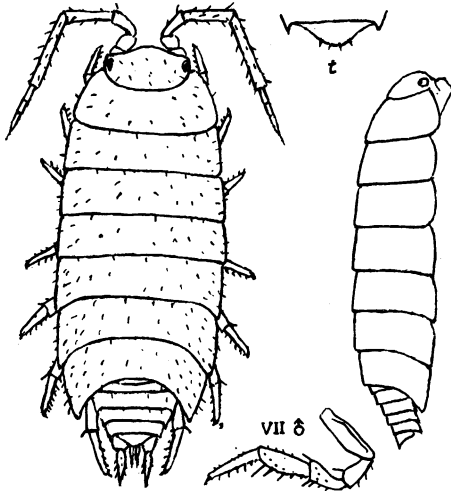


Fig. 88. *Philoscia culebroides* Van Name.

the integument bears scattered setae. Head moderately wide, not abruptly narrowed below the eyes, its front outline convex in the middle; rudimentary lateral lobes of rounded outline are present but are not at all prominent and are too slightly developed to show much except in a lateral view of the head. Eyes rather small and rounded, well pigmented, but the ocelli appear confluent and are not easily counted. Antennae setose; fairly long, exceeding half the body length; the flagellum slender; its terminal article, which bears a strong bristle, is longer than either of the others, which do not differ much in length. No conspicuous tubercle between the first antennae.

The first three thoracic segments have the rear lateral corner rounded, the others have it angular; the fourth very slightly, and the

following ones in an increasing degree have the angle produced backward. The legs are of moderate length, they are stout and have strong spines. The only male specimen is apparently not fully adult, but the carpus and propodus of leg I appear slightly tumid.

The third, fourth, and fifth abdominal segments have the rear lateral angles produced into small, short triangular points. The telson is wide and short, quite broadly rounded at the rear end and with concave, somewhat sinuous side outlines.

Coloration not conspicuous, rather light brown above with the usual light spots and hairs on the lateral regions of the back and additional, rather poorly defined light areas on the basal part of the thoracic epimera. Lower parts and limbs whitish with very little of the brown pigment.

Length of type (largest male), 2.3 mm.; of a female, with its marsupium greatly distended by a number of large larvae, a little over 3.5 mm. (This specimen was originally described as the type of *P. williamsi* Van Name, 1924.)

LOCALITY.—Tower Island, Galapagos, under blocks of lava. Four specimens (two of them very immature) including the type, in the American Museum of Natural History. They were collected by the Williams Galapagos Expedition under Mr. William Beebe, April 18, 1923.

The material available is not sufficient for a satisfactory study of this species, but a re-examination of the specimens I described as two species (*P. culebroides* and *P. williamsi*) in my article (1924) on the Isopoda of the Williams Galapagos Expedition, in the light of studies in the variation of other species of this group with age, sex, etc., leads me to the conclusion that those two species should be united. The name *culebroides* has page priority.

This species, like *P. culebrae*, may really belong in the genus *Halophiloscia* Verhoeff, not among the true *Philoscias*.

***Philoscia richardsonae* Holmes and Gay, 1909**

Figure 89

Philoscia richardsonae HOLMES AND GAY, 1909, p. 378 (orig. descr.), Fig. 6.—STAFFORD, 1912, p. 127 (descr.), Fig. 71; 1913, p. 170.

“Body oblong-oval, covered with short minute spinules. Head twice as wide as long; frontal margin arched; lateral angles subacute. First thoracic segment longer than the following ones, the last three segments produced backwards at the lateral angles. Antennae about one-half as long as the body, the last joint of the peduncle about as long as the third and fourth; flagellum triarticulate, nearly as long as the fifth

joint of the peduncle, the first and third joints subequal and a little longer than the second; last joint ending in a spine.

"Legs similar, increasing gradually in length from before backwards; and very spiny.

"Abdomen abruptly much narrower than the thorax, the lateral angles of the third, fourth, and fifth segments produced backwards;

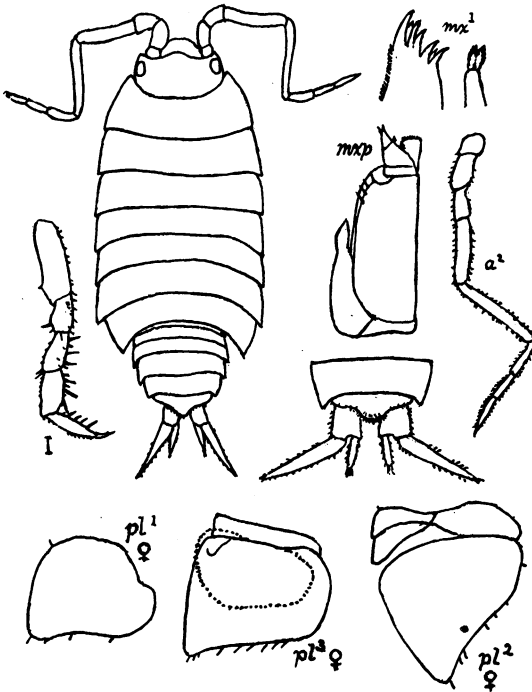


Fig. 89. *Philoscia richardsonae* Holmes and Gay, 1909. Adapted from Holmes and Gay, 1909 (large figure), and Stafford 1912 (details).

last segment over twice as broad as long, with the posterior margin concave on either side of the narrowly rounded tip. Basal joint of the uropods about as broad as long; outer ramus slender, acuminate, subconical, with the outer margin nearly straight and the inner one somewhat convex; inner ramus about one-third the length of the outer, subconical, with narrow blunt tip which is armed with one or more sharp spines; scattered short spines occur on both rami. Length, 5 mm."

LOCALITIES.—San Diego, California, "on moist swampy ground"

(Holmes and Gay, 1909, pp. 378, 379); under old sea weed on the edge of a salt marsh at Laguna Beach, California (Stafford).

This species may be a *Halophiloscia*, not a true *Philoscia*.

***Philoscia nomae* Van Name, 1924**

Figure 90

Philoscia nomae VAN NAME, 1924, p. 196 (orig. descr.), Figs. 16-18.

Based on a mutilated female specimen, lacking the head, uropoda, etc., collected with *Philoscia culebroides* above described, but differing from the specimens of that form in certain minor characters as follows:

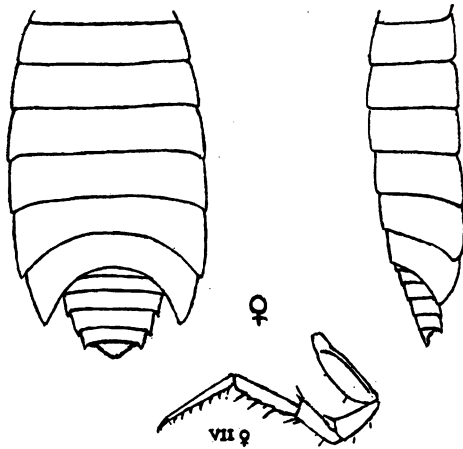


Fig. 90. *Philoscia nomae* Van Name. From Zoologica, V, p. 196.

Larger size (if entire, it would measure about 5 mm. long); wide body; the fourth thoracic segment with the rear angle almost a right angle and not appreciably extended back, and the fifth, sixth and seventh thoracic segments with the rear angles less sharp than in *P. culebroides*; the telson somewhat less broadly rounded. These differences might be individual or entirely deceptive, due to different conditions of contraction or distortion of the integument, but they are accompanied by another difference not so easily dismissed; the legs in the present specimen are decidedly longer and proportionately slenderer, though strong and indicating a species of active habits. Therefore I felt unwilling to assign the specimen to *P. culebroides*; neither have I been able to identify it with any other.

LOCALITY.—Tower Island, Galapagos. Collected by the Williams

Galapagos Expedition under Mr. William Beebe, under lava blocks, April 18, 1923.

Philoscia bermudensis Dahl, 1892

Figure 91

Halophiloscia bermudensis VERHOEFF, 1908a, p. 359.—BRIAN, 1929, p. 189.

Philoscia bermudensis DAHL, 1892, part I, p. 111, Pl. III, figs. 2, 4, 5, 7, 8, 10, 13.—VERRILL, 1902, p. 845, Figs. 235a-235d (name misprinted *bermudense* in caption of illustration).—RICHARDSON, 1905, p. 607, Fig. 664.—ARCANGELI, 1925, p. 52.

This species was not formally described by Dahl, but is well figured

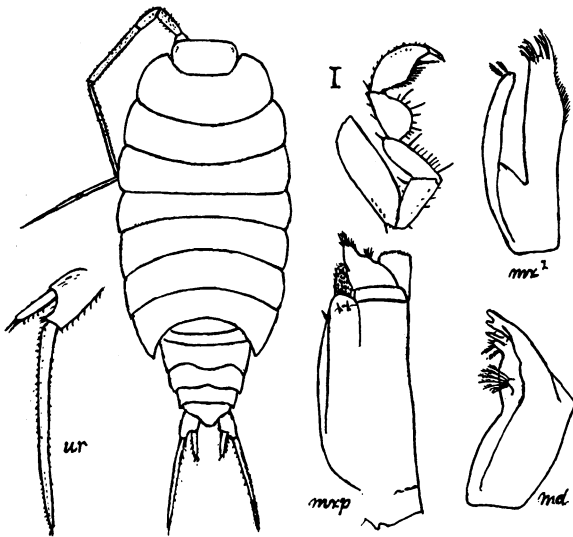


Fig. 91. *Philoscia bermudensis* Dahl. Adapted from Dahl, 1892.

and is compared with an Old World species, *P. couchii* Kinahan, from which it differs in having longer and more slender antennae and uropoda and eyes consisting of small spots of pigment with rudimentary ocelli, it being a cave dwelling species. In the expansion (probably only in the male) of the propodus and carpus of the anterior legs a relationship to *Ischioscia* is suggested.

Length, to tip of telson, about 9 mm.

LOCALITY.—Walsingham Cave, Bermuda (apparently not found by other collectors).

Dahl advances the utterly unjustified theory that this and other species of *Philoscia* evolved directly and independently from various

species of *Ligia*, a genus to which they are in no way really closely related. This manifestly incorrect theory is attacked by Verhoeff (1908*a*, p. 344, and 1908*b*, p. 521, and again in 1916, pp. 158-159).

Verhoeff assigned this species to his genus *Halophiloscia* on the strength of Dahl's figures. It appears to be an aberrant form requiring more investigation.

PHALLONISCUS BUDDE-LUND, 1908

This genus was established by Budde-Lund (1908*a*, p. 296) for two New Zealand species, *Oniscus punctatus* G. M. Thompson, 1879, being the first mentioned and therefore the type. He states that the genus includes two other undescribed species, the locality of which he does not mention, and *Philoscia anomala* Dollfus from Chile (see below). Budde-Lund gives no diagnosis but mentions the following characters: flagellum of antenna of three articles. Mandibles with one free brush-like tuft ("freien pinselformigen Anhang"). Mala of maxillipeds with spines on the tip. Inner division of first pair of pleopoda of male greatly developed and thickened at the end, even more than in *Alloniscus*. Wahrberg, 1922, p. 86 ff., discusses the genus, which he regards as intermediate between *Oniscus* and *Philoscia* but not particularly close to *Alloniscus*, and describes the New Zealand species in detail.

Both these authors appear to have based the details they give about the genus entirely on the New Zealand forms, and it is worthy of note that they omit mention of the modifications in the legs of the male which Dollfus makes one of the principal characters of his South American species.

Phalloniscus anomalus (Dollfus), 1890

Figure 92

Phalloniscus anomalus BUDDE-LUND, 1908*a*, p. 296.—WAHRBERG, 1922, p. 86.

Philoscia anomala DOLLFUS, 1890, p. 66 (orig. descr.), Pl. II, figs. 1-1*d*; 1893*a*, p. 343 (*Philoscia ammala*, misprint).—STEBBING, 1893, p. 431.

"Corps oval, peu convexe, couvert de granulations très fines; pleon en retrait peu sensible.

"Cephalon.—Lobes latéraux étroits allongés, s'infléchissant latéralement et dépassant le trou des antennes externes. Lobe médian à peine marqué. Epistome (sec. Budde-Lund) arrivant jusqu'au bord frontal. Yeux petits; environ 20 ocelles. Antennes externes dépassant la moitié de la longueur du corps; les deux premiers articles du fouet subégaux, le troisième aussi long que les deux premiers segments.

“Pereion.—Bord postérieur des deux premiers segments à peine sinueux de chaque côté; la sinuosité augment jusqu’au 7e segment. Sur chaque segment, une granulation perliforme à la naissance des épimeres et une autre plus marqué de part et d’autre de la ligne médiane. Pattes pereiales chez le mâle adulte (au moment de la copulation?) disposées ainsi; tarses de la première paire munis d’un processus longitudinal étroit; tarses de la troisième pairs très élargis; ceux de la quatrième paire encore plus développe et offrant l’aspect d’une palette presque circulaire, tandis que l’article onguiculé est extrêmement réduit.¹ Derrières paires normales.”

“Pleon.—A côtés bien développés, étalés, assez étroits, les trois

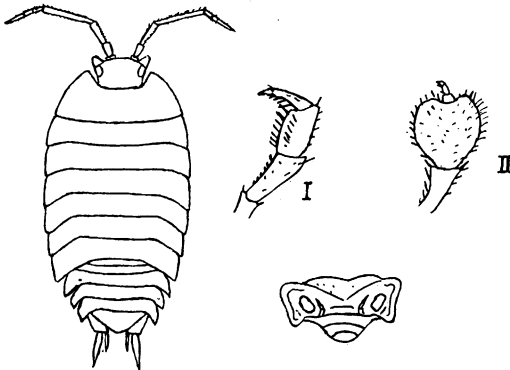


Fig. 92. *Phalloniscus anomalus* (Dollfus). Adapted from Dollfus, 1890.

premiers segments sont munis chacun de deux granulations perliformes.

“Telson.—Triangulaire, arrondi, un peu plus court que large. Telsopodes à article basilaire atteignant l’extrémité du telson. Appendice externe deux fois plus long et plus fort que l’appendice interne.

“Couleur.—Brun foncé ou rougeâtre avec des marbrures claires de chaque côté de la ligne médiane, et une tache claire plus nettement delimitée à la naissance des épimeres; pléon irrégulièrement taché de clair; pattes plus our moins teintées de brun.

“Dimensions.—Mâle adulte longueur 12 à 13 1/2, largeur 6 1/2 à 6 3/4.” (Dollfus, 1890, p. 66.)

LOCALITIES.—Valparaiso, Chile, three males and three females, November, 1875; Juan Fernandez Island, beach.

¹ “Cette disposition si remarquable des pattes ne se présente pas chez tous les mâles de la même espèce; il est donc probable qu’il s’agit là d’un développement temporaire qui coïncide sans doute avec le moment de la copulation. . . .”

PSEUDOPHILOSCIA BUDDE-LUND, 1904

This genus was established by Budde-Lund, 1904, p. 42, with the following characters:

"Flagellum antennarum 3-articulatum. Pleurae capitis discretæ, linea verticalis utrinque post oculos decurrens. Trunci segmentum primum post integrum. Pleopodum rami externes solum operculares, nullis tracheis instructi. Telsum breve, subtriangulum, epimera segmenti paenultimi superans. Uropodes longi, producti; exopoditum longum, hastatum, scapi apici insertum, scapo fere triple longius; endopoditum longum, compressum, exopodito nonnihil brevius.

"Corpus convexiusculum non in globum contractile.

"Trunci segmenta pronotum satis magnum, fere tertiam partem dorsi segmenti aequans, minus manifeste discretum habent."

Budde-Lund placed this genus in his subfamily Spherilloninae, a group no longer recognized, and did not regard it as a near ally of *Philoscia*. Verhoeff, 1926, p. 323, places it in the Oniscidae near *Philoscia*, which has been followed in the present work. The genus contains a number of species in various parts of the southern hemisphere. Stebbing in a footnote in Budde-Lund, 1912, p. 372, points out that *Pseudophiloscia* as a generic name may be a synonym of, and antedated by, *Paraphiloscia* Stebbing, 1900. While I admit such a possibility, the information now available does not seem to justify the rejection of Budde-Lund's genus, at least so far as the South American species is concerned.

Another South American form, *Philoscia angusta* (Dana), see below, never sufficiently described or figured, may also belong in this group.

***Pseudophiloscia inflexa* Budde-Lund, 1904**

Figure 93

Pseudophiloscia inflexa BUDDE-LUND, 1904, p. 43 (orig. descr.), Pl. VI, figs. 1-4; 1912, p. 372.

"Elongata, angusta, convexiuscula.

"Oculi mediocres, ocelli minimi, dense subconfluentes congregati, numero c. 18.

"Antennae dimidium corpus longitudine aequantes, graciles, hirsutae, scapi articuli ad apicem versus gradatim longiores; flagellum scapi articulo 5 paulo longius, articulus 1 flagelli articulis duobus sequentibus subaeque longis subaequalis, articulus 3 seta apicali longiore.

"Frons ab epistomati nisi in lateribus linea marginali non discreta;

epistoma per medium linea transversa, elevata, subrecta, vel in medio leviter procurva. Foramina antennarum magna, tubercula antennaria nulla fere. Clypeus subhorizontalis vel leviter fornicatus, labio magno.

“Truncus.—Segmenta omnia epimeris parvis tenuibus integris; margo posterior segmenti 4 utrinque levissime incurvus, segmenti 5–6–7 medio leviter incurvus. Linea marginalis anterior segmenti 1 collaris, integra ad angulos anticos segmenti ducta et cum linea marginali laterali conjuncta.

“Cauda.—Segmenta omnia subaequalia longiora; epimera segmenti 1–2, perparva sed conspicua, segmenti 3–4–5 parva. Telsum breviter triangulum duplo vel plus latius quam longius.

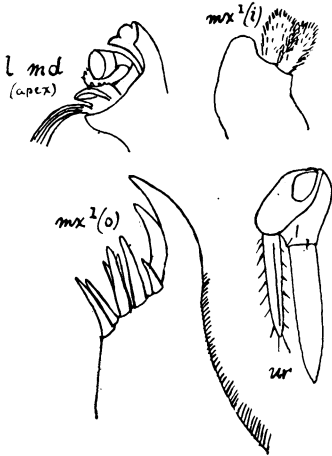


Fig. 93. *Pseudophiloscia inflexa* Budde-Lund. Adapted from Budde-Lund, 1904.

“Long. 9.5 mm. Lat. 3 mm.” (Budde-Lund, 1904, pp. 43–44.)

LOCALITY.—Corral, Chile. Type in Berlin Museum.

See remarks on genus *Paraphiloscia* Stebbing under genus *Pseudophiloscia*.

***Pseudophiloscia* (?) *angusta* (Dana), 1853**

Figure 94

Oniscus (?) *angustus* DANA, 1853, p. 731 (orig. descr.), Pl. XLVIII, figs. 3a–3d.—STUXBERG, 1875, p. 43.—STEBBING, 1900a, p. 649 (see below).

Philoscia angusta BUDDE-LUND, 1879, p. 1; 1885, p. 223.

“Body narrow, smooth. Head not embedded in following joint, but prominent, the antero-lateral processes absent, and front a little arcuate.

Abdomen abruptly a little narrower than thorax, sides straight and entire, the segments not being salient either side; last segment short, transverse, triangular.

"Length, four lines. The antennae and stylets are both wanting in our specimens, and the subgenus to which they belong, therefore, is undetermined. The habit of the body is somewhat like that of a *Styloniscus*; but the character of the maxillipeds shows that they are not related to that group. The fifth joint of the last pair of legs is very slender, and the short setae on the under side are not longer than the breadth of the joint; the fourth joint of the first pair bears below a few long, slender spines, longer than half the next joint; the fifth joint is very nearly naked.

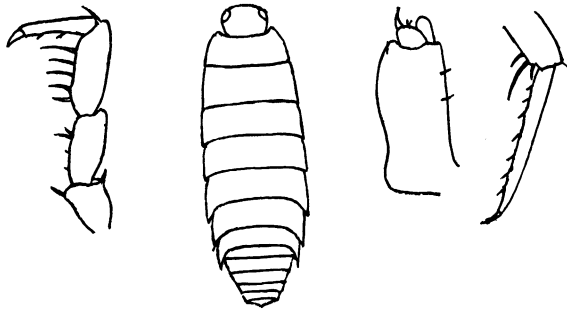


Fig. 94. *Pseudophiloscia(?) angusta* (Dana). Adapted from Dana, 1855.

"LOCALITY.—Near Nassau Bay, Tierra del Fuego." (Dana, 1852.)

Stebbing, 1900 (see above), notes a resemblance between this species as described by Dana and his genus *Paraphiloscia* from New Zealand, with which *Pseudophiloscia*, Budde-Lund, perhaps may have to be united (see that genus). It is on the basis of this statement that I have placed this species provisionally in *Pseudophiloscia*.

TROGLOPHILOSCIA BRIAN, 1929

Resembling *Philoscia* in the general form of the body, antennae, etc., but entirely without eyes, and having the setae of the body surface modified into scale-like structures. In the male the endopodites of the second pleopoda each bear a very long slender curved styloid process which reaches beyond the end of the telson.

The following is the type and only species.

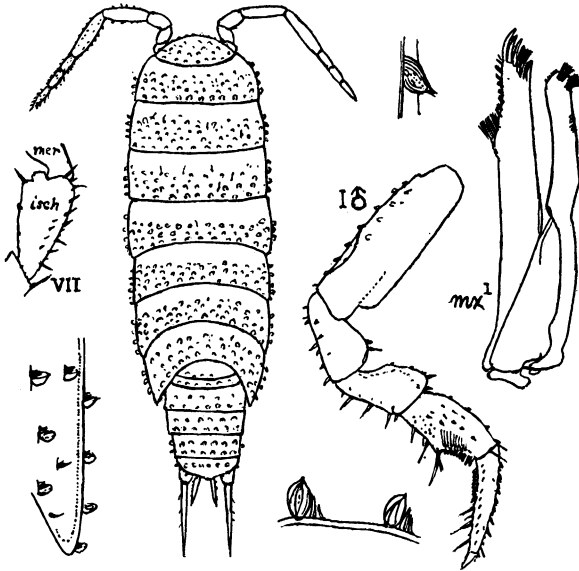


Fig. 95. *Troglophiloscia silvestrii* Brian. Adapted from Brian, 1929.

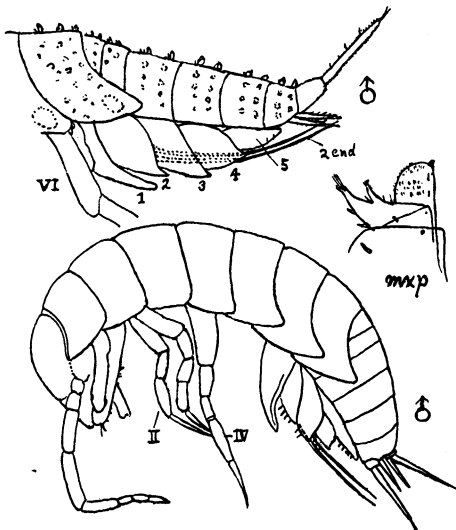


Fig. 96. *Troglophiloscia silvestrii* Brian. Adapted from Brian, 1929.

Troglophiloscia silvestrii Brian, 1929

Figures 95, 96

Troglophiloscia silvestrii BRIAN, 1929, p. 189 (orig. descr.), Pls. I-III.

Described and figured in great detail by Brian. The figures given here, adapted from those of that author, show its main characteristics. Head without a median lobe and only slightly developed lateral lobes. All the teeth on the outer division of the first maxilla are smooth. There is a short truncated projection on the distal end of the ischium of the seventh leg which, according to Brian, is a secondary sexual character.

The telson is short with a rounded and slightly sinuous rear border.

The scale-like structures into which the setae of the body surface are modified show some tendency to arrangement in transverse rows. They are flattened, somewhat curved, bending toward the anterior end of the body and are protected at the base by an imbricated adherent series of three small scales. Color uniform whitish.

Length, 4 to 4 1/2 mm.

LOCALITY.—Seven specimens were obtained by Prof. F. Silvestri in the Bellamar Cave, near Matanzas, Cuba, Oct. 17, 1928, all males, except one small immature female.

ONISCUS LINNAEUS, 1758

In its modern restricted sense this is a very small genus, comprising a few Old World species, one of which has become established in America. It is characterized by the broad body, with expanded epimera, the head with well-developed lateral lobes and an indistinct line between the forehead and epistome. The eyes are large; the antennae have a three-jointed flagellum. No tracheae in the external plates of the pleopoda. In older classifications, many other Oniscoidea having antennae with a three-jointed flagellum were included; or originally, almost any member of the Isopoda.

Oniscus asellus, Linnaeus, 1758

Figures 97, 98

Oniscus affinis SAY, 1818, p. 430.—WHITE, 1847, p. 98.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900a, p. 305; 1901, p. 563.

Oniscus asellus LINNAEUS, 1758, 'Syst. Nat.', 10th Ed., p. 637.—GOULD, 1841, p. 336.—DE KAY, 1844, p. 51, Pl. VI, fig. 12.—STEBBING, 1893, p. 430.—UNDERWOOD, 1886, p. 363 (erroneously placed under syns. of *Porcellio scaber*).—RICHARDSON, 1900a, p. 305; 1901, p. 562.—STOLLER, 1902, p. 213.—PAULMIER, 1905, p. 180, Fig. 52.—RICHARDSON, 1905, p. 600 (descr.), Fig. 657.—RATHBUN, 1905, p. 45, check list, p. 4.—FOWLER, 1912, p. 235 (descr.), Pl. LXXI.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 379, Fig. 605.—JOHANSEN, 1926b, p. 165.—WALKER, 1927,

p. 177.—KUNKEL, 1918, p. 238, Fig. 76.—ARCANGELI, 1926, p. 43.—BLAKE, 1929, p. 11, Fig. 1; 1931, p. 350.—PROCTER, 1933, p. 247.—BIRSTEIN, 1933, p. 473.—PRATT, 1935, p. 442, Fig. 610.

Oniscus murarius BUDE-LUND, 1879, p. 1; 1885, p. 202.

Oniscus vicarius STUXBERG, 1872, p. 3; 1875, p. 50.—UNDERWOOD, 1886, p. 361.

Porcellio limatus FITCH, 1855, p. 824 (descr.; the following color varieties also described, p. 825: *dorsalis*, *multiguttatus*, *marginatus*, *lateralis*, *limbalis*); 1856, p. 120.—UNDERWOOD, 1886, p. 362. Budde-Lund, however (1855, p. 124), makes *P. limatus* a doubtful syn. of *Porcellio spinicornis*.

“Body rather regularly oval, greatest width exceeding half the length, dorsal face but slightly convex, and, in adult specimens, nearly smooth, and glossy, in younger specimens of a duller appearance, being

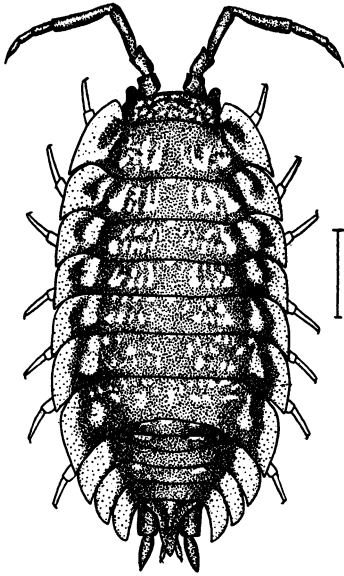


Fig. 97. *Oniscus asellus*
Linnaeus. After Paulmier, 1905.

rough owing to small tubercles occurring especially on the anterior part of the body. Cephalon to a great extent flanked by the side-plates of the 1st segment of mesosome, and fully twice as broad as it is long, frontal edge obtusely angular in the middle, lateral lobes rather prominent, narrow linguiform, dorsal face clothed with small rounded tubercles. Side-plates of mesosome greatly prominent, lamellar, subcontiguous, all terminating behind in an acute corner. Metasome about half the length of the mesosome and not much narrower, the 2 anterior seg-

ments very small and wholly embraced by the preceding segment, epimeral plates of the 3 succeeding segments narrowly produced and strongly recurved, the posterior pair extending almost as far as the last segment; the latter much longer than it is broad at the base, outer part narrow conic, convex above. Eyes oval and but slightly convex. Antennulae with the terminal joint about the length of the basal one, and conically tapered. Antennae long and slender exceeding half the length of the body, flagellum shorter than the last peduncular joint, and having the 1st and last articulations of about equal length, the middle one shorter. Legs rather slender, with the outer joints densely spinous inside. Uropoda with the outer ramus narrow lanceolate, and exceeding the basal part in length, inner ramus narrow linear, and ex-

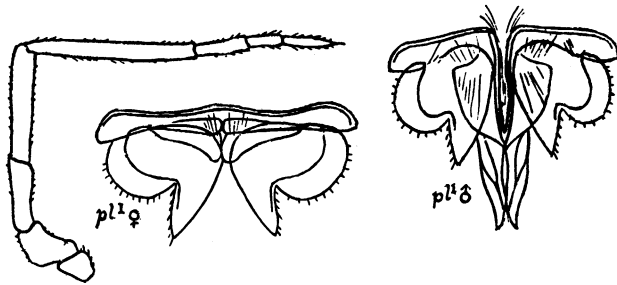


Fig. 98. *Oniscus asellus* Linnaeus. Details. Adapted from Sars, 1899.

tending to about the middle of the outer. Colour of dorsal face in adult specimens dark chocolate, with a regular row of whitish patches along each side of mesosome, at the base of the side-plates, and a few small, opaque white dots nearer the median line. Length of adult female reaching 16 mm." (Sars, 1899, pp. 171-172.)

DISTRIBUTION.—Doubtless introduced from Europe, where it is common and widely distributed. Found in gardens, hot-houses and elsewhere in the vicinity of human settlements. In America it is rather northerly in its distribution, and Richardson, 1905, gives no records south of New York or west of Illinois, but its range no doubt is wider. Hay, 1903, reports it from Cuba without more definite locality, from specimens collected by Dr. C. H. Eigenmann. I know of no other record from south of the United States.

Walker, 1927, gives a summary of the Canadian records which are from Newfoundland and points in the provinces of Ontario and Quebec,

and Blake, 1931, p. 350, a list of New England localities. A record from Greenland (by Sars, 1899) does not appear to have been confirmed since.

***Oniscus armatus* Nicolet, 1849**

Oniscus armatus NICOLET, 1849, p. 270 (orig. descr.).—STUXBERG, 1875, p. 43.—
BUDDE-LUND, 1879, p. 1; 1885, p. 206.

“*O. nigrescens*, flavescente marmoratus; corpore ovato; capite brevi, lobo intermedio frontis elongato, trianguliformi, recurvo; lobis externis nullis; segmento ultimo abdominis truncato.”

“Body oval, rather wide and glossy, head very short but wide and entirely set back into the concavity of the first thoracic segment, whose sides reach to the anterior level of the eyes; forehead vertical, or better described as directed downward, produced in the form of a widened triangle applied to the anterior surface of the head; no lateral lobes; thorax much wider than the abdomen, without unusual characters; abdomen short, with the first segment much longer than the next, which is insignificant, the last presents the form of a sub-rectangular triangle with the extremity truncated. But that which particularly characterizes this species is the arrangement of the stylets or last abdominal appendages; the external pair are stout, long, and acute and inserted so as to diverge laterally, and directed obliquely to the rear; the internal pair are slender, as long as the others, spiniform and acute, and diverge laterally and downward in such a way that in a side view of the animal the two pairs form an angle of about 45 degrees. Color dark blackish brown marbled with dark yellow; the legs and antennae are of the latter color. Length, 3 lines; width, 2 lines.” (Translated from original description.)

LOCALITY.—Chile.

This is a species of very doubtful position.

CALYCUONISCUS COLLINGE, 1915

This genus was established for a small species found in the Botanic Gardens at Georgetown, British Guiana, having “the cephalon and segments covered with peculiar cup-shaped or calyx-like organs.” I have not seen this animal, but it seems hard to believe that these cup-shaped structures represent anything but the glandular hairs found on the body of most land isopods modified into small vesicle-like structures, a change which occurs to a greater or less extent in other genera also, and that their cup-shaped appearance is due to their collapsing in the preserved specimens, so that the free end becomes invaginated into the basal part.

Collinge gave the following generic diagnosis.

"Body oblong-oval, flattened; metasome a little narrower than the mesosome, the cephalon and segments covered with peculiar cup-shaped or calyx-like organs, and the appendages marked with lattice-work and scale-like ornamentation. Cephalon with well marked median and lateral lobes, the former being prolonged forwards and slightly downwards; epistoma raised in the median line, at each side of which is a deep concavity. Antennae of medium length with 3-jointed flagellum, divisions subequal. Uropoda extending beyond telson, globose, basal plate with raised anterior margin; exopodite short and thick, outer border almost straight; endopodite same length as exopodite, both setaceous with terminal hair-like setae. Telson triangular with posterior margin bluntly rounded.

"Affinity doubtful." (Collinge, 1915, p. 509.)

Type *C. bodkini* (see below).

Attention may be called to the fact shown in Collinge's figure of the antenna, that although the flagellum has three articles, the joint between the last two is much less well marked than between the first and second, and is very likely only slightly movable, if at all, thus approaching a two-segmented condition.

***Calycuoniscus bodkini* Collinge, 1915**

Figure 99

Calycuoniscus bodkini COLLINGE, 1915, p. 509 (orig. descr.), Pl. L, figs. 1-12; 1917a, p. 29.

The following are characters in the original description additional to those named in the generic diagnosis:

"Eyes prominent, situated dorso-laterally almost above the cup-shaped lateral lobes of the cephalon. Antennulae 3-jointed. Antennae of medium length, the 5th joint being the longest; flagellum 3-jointed, with subequal divisions and terminal style. First maxillae, outer lobe terminating in four large curved spines and four small ones with bifid terminations. Thoracic appendages comparatively short, ornamentation strongly marked, densely covered with setae and spines, and terminating in a strong claw. Uropoda somewhat globose, basal plate with anteriorly raised margin, external antero-lateral margin produced inwards slightly; exopodite short and thick, outer border almost straight; endopodite same length as exopodite articulating beneath the anterior raised margin of the basal plate, both setaceous and with terminal hair-like setae.

“Color (in alcohol) horny brown with darker lateral portions or with dark median line.”

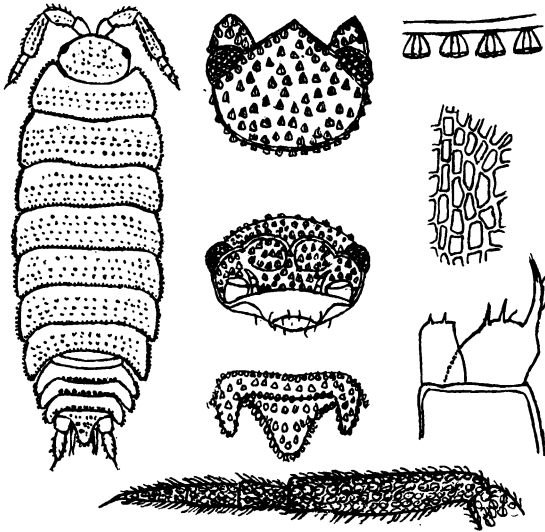


Fig. 99. *Calycuoniscus bodkini* Collinge. Adapted from Collinge, 1915.

Length, 2.8 mm.

LOCALITY.—Botanic Gardens, Georgetown, British Guiana, type locality, a number of specimens found beneath the bark of trees; Guacharo Cave, Trinidad, in material obtained from guacharo's nests, two specimens. Type in collection of W. E. Collinge.

***Calycuoniscus spinosus* Collinge, 1917**

Figure 100

Calycuoniscus spinosus COLLINGE, 1917a, p. 29 (orig. descr.), Figs. 1-3.

“Body oblong-oval, slightly convex dorsally; metasome narrower than the mesosome, the segments of both, and also the cephalon, covered with fairly long, bluntly ending spines, and a few cup-shaped organs. Cephalon convex above, cephalic lobes inconspicuous; epistome somewhat long. Eyes prominent, situated dorso-laterally. Antennulae 3-jointed. Antennae of medium length; flagellum 3-jointed, with subequal divisions and terminal style. First maxillae, outer lobe terminating in four large curved spines and four single-pointed smaller ones; inner lobe very short, with widely expanded distal portion on which are two

short, thick setose spines. Maxillipedes very similar to those in *C. bodkini*. The segments of the mesosome have their pleural plates much as in *C. bodkini*. Metasome narrower than in *C. bodkini*, pleural plates not produced backwards. Uropoda somewhat flattened with raised anterior margin on the basal plate; exopodite elongated and longer than the endopodite; both have three or four long terminal setae. Telson short and triangular.

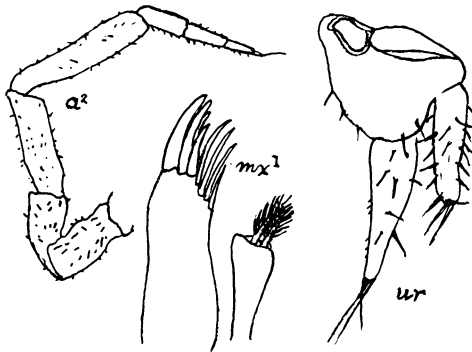


Fig. 100. *Calyconiscus spinosus* Collinge. Adapted from Collinge, 1917a.

“Length 3 mm. Colour orange-yellow.

“Habitat.—In the nests of the guacharo and mostly in the guano. Guacharo Cave, Trinidad, West Indies.

“This species differs from *C. bodkini* in possessing a smaller number of the peculiar chitinous cup-shaped organs on the segments of the body, and they are also more elongated; in the form of the cephalic lobes, which are exceedingly small; the longer epistome; the longer and narrower metasome, and the truncate ending of the pleural plates; and in the form of the uropoda and telson.” (Collinge, 1917a, pp. 29, 30.)

TRICHORHINA BUDDÉ-LUND, 1908

Established by Budde-Lund with *Bathytropa thermophila* Dollfus as the type, on the basis of specimens received from Dollfus, and including the four following species from South America (*papillosa*, *ambigua*, *quisquiliarum*, and *tomentosa*), which he had previously placed in *Alloniscus*, and one species from Madagascar as additional members. He also states (1908, p. 294) that two undescribed “tropical species” belong in it. The genus was defined as follows by Budde-Lund.

"Superficies setis minutissimis, clavatis dense obtecta.

"Oculi minuti; ocelli numero perparvo. Antennae breves; flagellum biarticulatum, articulo priore quam altero duplo aut triplo brevior. Frons ante vix marginata, in lateribus in processus obtusos minores producta, mandibularum lacinia interior penicillis 2 in mandibula dextra, penicillis 3 in mandibula sinistra; seta inferior biramosa; margo exterior mandibularum serie aculearum munitus. Maxillarum prioris pars lamina exterior dentibus 4 (dens 2. pertenuis) plus 4 (dentes 1. et 3. fissi, 2. et 4. integri); lamina interior spina nulla, post crinita, penicillis inaequalibus, superiore multo crassiore quam inferiore. Maxillipedum mala spina longa et aculeis 2 minutis posterioribus instructa.

"Trunci segmenti 1. linea collaris marginalis utrinque in ramum lateralem continuata. Segmentum 2. pronoto magno, intra angulos laterales desinente, nullo processu laterali; margo posterior leviter curvatus.

"Caudae pleopodum exopodita omnium parium nulla trachea instructa. Telson breve, triangulum. Uropodum scapus latere exteriori integro." (Budde-Lund, 1908a, p. 293.)

This group is a most difficult one and cannot be dealt with satisfactorily in the present state of our knowledge. The species apparently are numerous in tropical America, where many probably remain to be discovered, and few of the known ones have been described sufficiently or figured well enough, if indeed they have been figured at all.

The minute size of the animals, the prevailing absence of striking characters, and the small differences of form and details separating the species, their soft integument, which quickly shrinks and distorts both the whole body and its parts when alcoholic specimens are taken out for examination, and their extreme delicacy, which bears little handling without injury, all combine to make their study difficult. Their description, or even their illustration in a manner to make their future recognition certain without direct comparison of material, is usually a difficult matter, the more so because they are subject to considerable individual variation in many of their characters.

In consequence of this, many of the attempts to refer specimens to previously described forms have led to conclusions clouded by more or less doubt, and have added to the confusion.

Even the correct name for the genus is uncertain, for in the same year that *Trichorhina* was described by Budde-Lund, Verhoeff (1908, p. 173) also recognized that *B. thermophila* differed considerably from the other members of *Bathytropa* and established for it a genus *Bathytropina*,

though he gives no full diagnosis, noting only several superficial differences, as the absence of longitudinal ridges on the segments and that the telson is not truncated in Dollfus' species. It is possible that this name may have priority over *Trichorhina*. I have no information as to the exact dates of publication of the two articles, but that of Verhoeff probably appeared late in the year, as in a footnote in his article Verhoeff refers to a previous one he published "in 1908."

The members of this group have the body surface more or less thickly covered with short hairs or setae which are usually soft and somewhat bulbous at the tip, and in some species are so swollen as to become minute balloon-shaped appendages. They are of delicate structure and easily rubbed off, leaving the surface nearly or quite smooth.

In their wide depressed body, wide head, antennal flagellum with two articles and other characters some of them bear a strong superficial likeness to the Old World genus *Leptotrichus* and have been incorrectly placed in that genus. *Leptotrichus* is a close ally of *Porcellio* (in Budde-Lund's classification a subgenus of it) and has tracheae in the external plates of the anterior pleopoda. But so far as has been reported none of the members of *Trichorhina* have these tracheae, and their relationships appear to be rather with *Oniscus* and *Philoscia*. With the latter genus they are connected by some apparently intermediate species.

The species here included in *Trichorhina* differ considerably among themselves, and it is probable that when their characters are better known there will prove to be grounds for dividing the genus or removing some species which have been included by me. Budde-Lund (1912, p. 382), in fact did propose a new genus *Gedania* for some of them (see remarks under *Trichorhina papillosa*) but did not state on what characters he distinguished it.

***Trichorhina barbouri* Van Name, 1926**

Figure 101

Calycuoniscus barbouri VAN NAME, 1926, p. 5 (orig. descr.), Figs. 4, 5.—ARCANGELI, 1930a, p. 5.

Body surface unusually granular (under high magnification like fine sandpaper) when dry, but appearing smooth when wet. It bears numerous short, glandular hairs, which are present also on the antennae, uropoda, etc. These hairs are more or less thickened and enlarged at the end, or club-shaped; they show a tendency to arrangement in transverse rows. Though somewhat erect at its origin, each hair bends backward like a little hook.

Head moderately set back in the thorax, its front outline prominent in the middle with distinct but obtuse lateral lobes. In a side view these lobes appear large and somewhat square, though narrower toward the lower end, descending far below the eyes. Eyes of moderate size, somewhat bulging, and well pigmented, but with few ocelli. Second antennae quite short, not reaching far along the second thoracic segment when drawn back as far as possible. Flagellum with indications of three articles, but the joint between the second and third is indistinct and perhaps not moveable. The terminal article is tipped with short

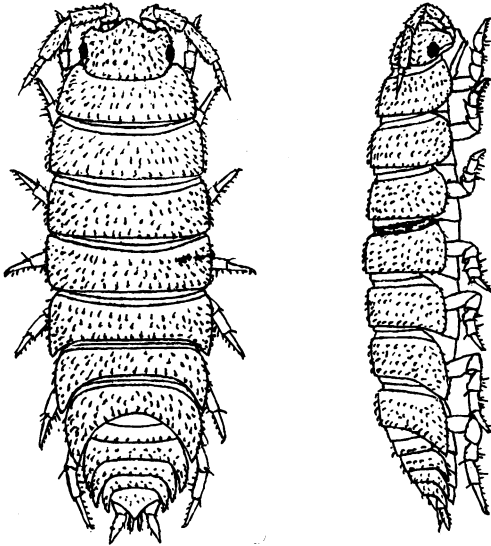


Fig. 101. *Trichorhina barbouri* (Van Name). From Van Name, 1926.

bristle. Upper border of epistome not prominent; it dips down in a V-shaped angle in the middle, each side of which is strongly arched.

The thoracic segments have the exposed part considerably elevated above the portion that slides under the segment next in front, and a distinct though shallow transverse groove separates these two parts of the segment.

Color purplish brown above, with small oval light markings on the dorso-lateral regions. Under parts and legs very little pigmented.

Length of only specimen (a female containing several embryos in the marsupium), 3 mm.

LOCALITY.—Barro Colorado Island, Gatun Lake, Panama Canal

Zone, taken by sifting leaves on the ground in old-growth forest, April 4, 1924. Type in the American Museum of Natural History.

The single minute specimen which I have had available is insufficient for a satisfactory study of this species. It seems to be in some respects intermediate between *Trichorhina* and *Calycuoniscus*, Collinge, in which I placed it in my original description. In the degree of modification of the setae it corresponds better with the former genus, to which I have transferred it in this work.

***Trichorhina thermophila* (Dollfus), 1896**

Figure 102

Bathytropa thermophila DOLLFUS, 1896a, p. 94 (orig. descr.), Fig. 2.—KRAEPELIN, 1901, p. 204.

Bathytropina thermophila VERHOEFF, 1908, p. 173.

Trichorhina thermophila BUDDE-LUND, 1908a, p. 294.

Trichorhina tomentosa BUDDE-LUND, 1912, p. 384 (in part; not the illustrations).

“Corps ovale allongé couvert de poils écailleux; céphalon à lobe médian largement arrondi, lobes latéraux petits; yeux très petits, antennes à fouet biarticulé, le premier article trois fois plus court que le second; premier segment du péreion à bord postérieur non sinueux;

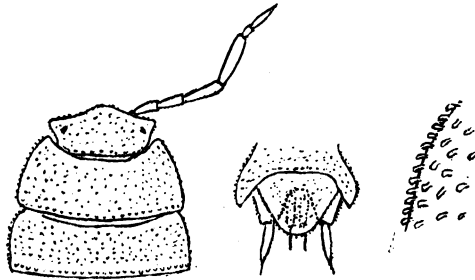


Fig. 102. *Trichorhina thermophila* (Dollfus). Adapted from Dollfus, 1896a.

pléotelson aussi long que large, à sommet arrondi; base des uropodes n'atteignant pas l'extrémité du pléotelson; exopodites dépassant sensiblement celui-ci; endopodites atteignant le sommet du pléotelson.

“Couleur.—Blanchâtre.

“Dimensions.—2 millimètres 1/4 sur 1 millimètre.” (Dollfus, 1896a, p. 94.)

TYPE LOCALITY.—“Serres du Jardin des Plantes, Paris” (Dollfus). Kraepelin, 1906, reports it from Hamburg, imported with orchids from

Nicaragua. Budde-Lund, 1912, p. 384, makes this species a synonym of *Trichorhina tomentosa*, described by himself (1893) from Las Trincheras, Venezuela, and gives several illustrations of its details, as well as a description, which are reproduced here under the heading of that species. Stebbing, who edited this paper after Budde-Lund's death, points out that the telson is described by Budde-Lund as two or more times wider than long and figured with markedly concave sides, which is not at all in correspondence with Dollfus' original description and figures. The conclusion seems inevitable that there has been some confusion of species, in spite of the fact that Budde-Lund, according to his statement, had original specimens received from Dollfus.

In view of this uncertainty, I cannot at present follow Budde-Lund in making this species a synonym of his *tomentosa*, and cannot tell to which species the following additional localities he gives apply: Port au Prince, Haiti; Kingston, Jamaica; Guayaquil and Naranjito, Guayas Province, Ecuador (specimens from all these in Hamburg Museum); "Purnio ob Magdalena" (Göttingen Museum); Kew Gardens, London.

Bathytropa thermophila Dollfus is the type of *Trichorhina* Budde-Lund, 1908a, p. 293, and *Bathytropina* Verhoeff, 1908, p. 173.

Trichorhina tomentosa Budde-Lund, 1893

Figure 103

Alloniscus tomentosus BUDDÉ-LUND, 1893, pp. 126 (orig. descr.), 127.—DOLLFUS, 1893a, p. 345.

Trichorhina tomentosa BUDDÉ-LUND, 1908a, p. 294; 1912, pp. 382, 384 (descr.), Pl. xxii, figs. 1-5.

"Superficies squamis vel setis clavatis minutissimis dense oblecta; margo posterior capitis et omnium segmentorum trunci caudaeque serie squamarum majorum setis minutis interpositis munitus.

"Oculi simplices, minuti, aegre pigmentati. Antennae breviores, dimidio corpore breviores; scapi articulus 4 paulo longior quam articulus 2; flagellum scapi articulo 5 longitudine aequale, articulo priore plus duplo brevior quam articulo altero. Frons linea marginali squamarum clavatarum subrecta, in medio levissime producta, ab epistomate discreta; processus frontales laterales parvi, rotundati. Epistoma supra cum fronte productum, linea transversa elevata in medio subrecta utrinque sinuate recurva, infra tuberculo rotundate tetragono inter antenulas munitum; clypeus magnus, porrectus.

"Trunci segmentum 1 margine posteriore curvato, segmenta 2, 3

marginē posteriore subrecto, segmenta 4–7 marginē posteriore in medio leviter incurvo; anguli postici laterales segmentorum 1–4 rotundate obtusi, segmentorum 5, 6 subrecti, segmenti 7 acutiores. Segmenta 2, 3, 4, stria suturali manifesta in femina.

“Caudae segmenta 3, 4, 5, epimeris majoribus, triangulis, latere exteriorē curvato. Telson breve, triangulum, duplo vel plus latius quam longius, epimera segmenti 5 paululum superans, lateribus subrectis apice obtuso.

“Unicolor, albida vel ex albido grisea.

“Long. 3–3.5 mm. Lat. 1.3–1.5 mm.” (Budde-Lund, 1912, p. 384.)

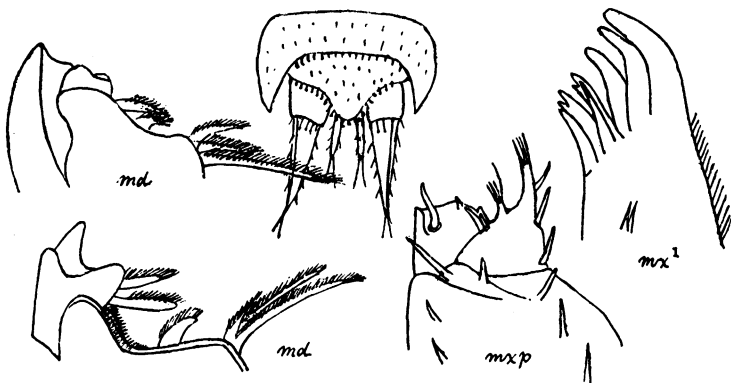


Fig. 103. *Trichorhina tomentosa* (Budde-Lund). Adapted from Budde-Lund, 1912.

LOCALITY OF TYPE.—Las Trincheras, Venezuela. Original description based on a single specimen. Budde-Lund, 1908a, gives several other localities in tropical America for this species, in which, however, he includes as a synonym *Trichorhina thermophila* (Dollfus), which may be a distinct species, and to which some or all of these other records may apply instead of to *tomentosa*. See remarks under *Trichorhina thermophila*.

Trichorhina quisquiliarum (Budde-Lund), 1893

Figure 104

Alloniscus quisquiliarum BUDDE-LUND, 1893, pp. 125 (orig. descr.), 127.—DOLLFUS, 1893a, p. 345.

Trichorhina quisquiliarum BUDDE-LUND, 1908a, p. 294; 1912, p. 384 (descr.), Pl. XXII, fig. 6.—COLLINGE, 1915, p. 510.

The description by Budde-Lund (1912) is as follows:

"Tota superficies densius setis clavatis oblecta; margo posterior omnium segmentorum serie papillarum minutissimarum ornatus.

"Oculi parvi; ocelli pauci, numero c. 6, quorum solum bini pigmentati. Antennae corporis dimidium longitudine subaequantes; scapi articuli tres priores inter se longitudine subaequales, articulus 4 sesqui longior quam articulus 3; flagelli articulus prior altero fere triplo brevior. Processus frontales laterales parvi, obliqui; epistoma convexum cum fronte paulum productum, infra inter antennulas linea transversa sinuata carinatum.

"Trunci segmenta duo priora margine posteriore curvato, segmentum 3 margine posteriore subtransverso.

"Caudae segmenta 3, 4, 5, epimeris brevioribus et latioribus. Telson breve triangulum, epimera segmenta 5 vix superans, plus duplo latius quam longius, lateribus late incurvis, apice acutiore.

"Unicolor, alba.

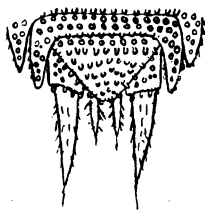


Fig. 104. *Trichorhina quisquiliarum* (Budde-Lund). Adapted from Budde-Lund, 1912.

"Long. 2.8–3 mm. Lat. 1.2–1.3 mm."

LOCALITIES.—Las Trincheras and La Moka, Venezuela, taken by sifting.

Stebbing, in a footnote to the article by Budde-Lund, 1912, p. 385, points out that the illustration that author gives is very far from agreeing with the statement in the description regarding the form of the telson.

Trichorhina simoni (Dollfus), 1893

Figure 105

Bathytropa (?) *simoni* ARCANGELI, 1921, p. 205.

Platyarthus simoni DOLLFUS, 1893a, p. 342 (orig. descr.), Pl. x, figs. 8a–8c.—COLLINGE, 1915, p. 510.

Trichorhina (?) *simoni* BUDE-LUND, 1912, p. 382.

"Corps étroit, couvert de stries longitudinales, et de petits poils, qui deviennent écailleux sur les côtés du cephalon et pénicilliaires sur le bord du pleotelson.

"Cephalon.—Lobe médian arrondi, lobes latéraux un peu sinueux.

Prosépistome garni de quelques poils longs, épars. Yeux nuls (ou non pigmentés?). Antennes dépassant le deuxième segment péreial. Fouet biarticulé, premier article trois fois plus court que le second.

“Perion.—Premier segment à bord postérieur presque droit.

“Pleon, Telson.—Parties latérales du pleon très étroites, pleopodes dépourvues de trachées. Pleotelson semi-circulaire, garni sur ses bords de pinceaux à poils caractéristiques. Uropodes à base entièrement cachée sous le pleotelson, exopodite lancéolé.

“Couleur.—Blanche, uniforme.



Fig. 105. *Trichorhina simoni* (Dollfus). Adapted from Dollfus, 1893a.

“Dimensions.— $3 \times 1 \frac{1}{4}$ mm.” (Dollfus, 1893, p. 342.)

LOCALITY.—Colonie Tovar, Venezuela, two female specimens (Dollfus). This place is at considerable altitude.

Trichorhina papillosa (Budde-Lund), 1893

Figure 106

Alloniscus papillosus BUDDE-LUND, 1893, p. 123 (orig. descr.), p. 127.—DOLLFUS, 1893a, p. 342 (see below), Pl. x, figs. 9a–9c, *pahillosus*.—RICHARDSON, 1912c, p. 31 (see below).

Gedania papillosa BUDDE-LUND, 1912, p. 382.

Trichorhina papillosa BUDDE-LUND, 1908a, p. 294.

“Oblonge ovalis, convexiusculus; tota superficies setis clavatis densius oblecta, praesertim in capite et in caudae segmentis ereberrimis; margo posterior omnium segmentorum serie papillarum minutissimarum ornatus.

“Antennae corporis dimidium longitudine subaequantes, scapi articuli tres priores subaequales, articulus quartus tertio satis longior; flagellum biarticulatum, articulus prior minutus, altero fere quadruplo brevior.

“Processus frontales laterales parvi vel mediocres, oblique rotundati epistoma convexum cum fronte leviter tumidum.

“Trunci segmenta tria priora margine posteriore curvato. Epimera

segmentorum 2-3-4 stria tenuissima, in segmento tertio manifestiore, in segmentis secundo et quarto subdeleta, a medio segmenti discreta.

"Caudae segmentum anale subrecte triangulum, lateribus ad apicem leviter incurvis, apice acuto. Segmenta 3-4-5 epimeris magis acuminatis, segmentum anale epimera segmenti praeanalisis paulum superans.

"Color flavus, capite et medio trunco fuscoirroratus, epimeris segmentorum trunci cum apicibus epimerorum caudalium subniger; antennarum basis pallida, articuli 4-5 cum flagello grisei.

"Long. 3.5 mm. Lat. 1.4 mm."

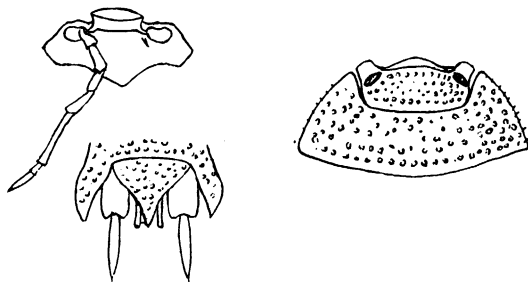


Fig. 106. *Trichorhina papillosa* (Budde-Lund). Adapted from Dollfus, 1893a.

LOCALITIES.—One specimen from Los Tejes, Venezuela (first-mentioned locality). Two specimens taken by sifting with other species of the genus in the vicinity of Caracas. Dollfus records it from La Guaira, Venezuela, and makes the following statement about it:

"Les exemplaires que j'ai vus sont un peu plus grands et plus larges que ceux qu'a examinés M. Budde-Lund. Ils atteignent $5 \times 2 \frac{1}{2}$ mill."

Dollfus gives three figures, the outlines of which are here reproduced. He remarks that the antenna is shown a little too long.

Richardson, 1914, reports this species from near Medellin, Colombia. The specimens from there are of about the same size as those of Budde-Lund, but are marked with reddish brown instead of black. Richardson expresses doubt as to the identity of Dollfus's specimens with Budde-Lund's species, apparently principally on account of their larger size. This does not seem to be a very convincing reason, as Budde-Lund's specimens may not have been fully grown. Indeed, the probability that the specimens from Medellin, which is far inland, and at an altitude of over 4800 feet, should be identical with those from the lowlands near the coast, would seem to be very much less.

Budde-Lund, 1908a, transferred this species to the new genus *Trichorhina*, which he established with *Bathytropa thermophila* as type. In his last paper (1912), which appeared after his death, he makes this species and *Trichorhina ambigua* (Budde-Lund), 1893, the representatives of a new genus, *Gedania*, regarding whose characters he gives no information whatever except that they are "different in the mouth parts" from *Trichorhina*. The present species, as the first mentioned, must be taken as the type of *Gedania*. This may be a sufficiently well distinguished group, but as no intimation of what its characters are has been given, and as neither of the two species assigned to it has been sufficiently described or figured, it seems best to postpone its recognition and leave the species in *Trichorhina* for the present. Budde-Lund informs us (1912) that *Gedania* has several representatives in South America not yet described.

***Trichorhina ambigua* (Budde-Lund), 1893**

Alloniscus ambiguus BUDE-LUND, 1893, pp. 124 (orig. descr.), 127.—DOLLFUS, 1893a, p. 345.

Gedania ambigua BUDE-LUND, 1912, pp. 382.

Trichorhina ambigua BUDE-LUND, 1908a, p. 294.

"Oblonge ovalis, convexiusculus; statura et habitu speciei praecedenti similis et affinis, tamen plurimis indicibus differt. Tota superficies sparsius setigera.

"Flagellum antennarum biarticulatum, articulus prior altero triplo brevior. Processus frontales laterales parvi, oblique rotundati; epistoma convexum cum fronte tumidum et subtriangule productum.

"Trunci segmentum primum margine posteriore curvato, segmenta 2-3-4 margine posteriore subtransverso, utrinque ad latera puncta impressa, levissime sinuata. Epimera segmentorum 2-3-4 stria tenuissima, maxime ad margine posteriorem manifestiore, a medio segmenti discreta.

"Caudae segmentum anale triangulum, lateribus subrectis, apice late rotundate subtruncato, supra ad longitudinem paulisper impressum. Segmenta 3-4-5 epimeris latioribus et brevioribus. Segmentum anale epimera segmenti praeanalalis multum superans.

"Color flavus vel brunneus, maculis fuscoviolaceis, praesertim in series quattuor longitudinales condensatis, capite et spimeris obscurior.

"Long. 3.2-3.4 mm. Lat. 1.2-1.3 mm."

LOCALITIES.—La Moka, Venezuela (first mentioned locality); also Caracas, Venezuela, with *T. papillosa* and *Alloniscus compar*.

This species was also included in the insufficiently characterized genus *Gedania* by Budde-Lund in his last work (see remarks under *Trichorhina papillosa*).

***Trichorhina marianii* Arcangeli, 1930**

Figure 107

Trichorhina marianii ARCANGELI, 1930a, p. 15 (orig. descr.), Fig. 4; 1931a, pp. 11, 18.

The following characters, gathered from Arcangeli's detailed description, supplement those clearly indicated in his figures here reproduced in outline.

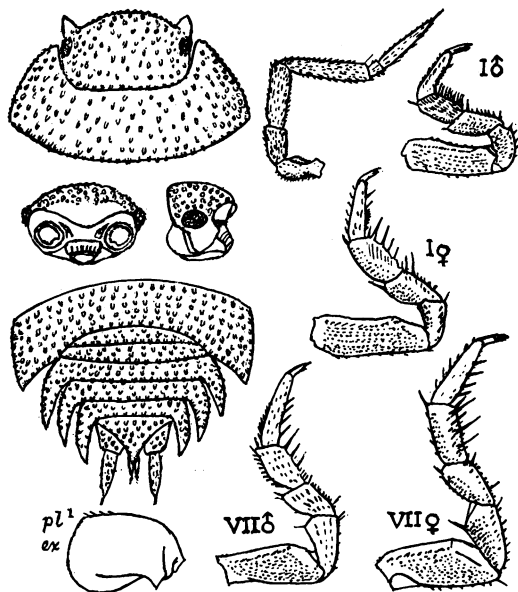


Fig. 107. *Trichorhina marianii* Arcangeli. Adapted from Arcangeli, 1930a.

Body oval, moderately convex, surface not granular but with very slight rugosities on the head and the dorso-lateral regions of the thorax, rather thickly covered with clavate setae smaller than those of *T. giannellii*.

The head has moderately developed downwardly and outwardly extending lateral lobes of somewhat triangular form, with the distal end quite sharply rounded (according to Arcangeli's figure also conspicuously projecting toward the front). Antennae setose, long enough

to be drawn back beyond the rear margin of segment II; their flagellum has the terminal one of the two articles more than three times as long as the proximal one.

The rear angles of the three anterior thoracic segments are rounded (more in segment II than in I, but less in segment III); slightly acute in IV and extended a little back in the following ones but not very sharp even in segment VII. The legs are fairly stout, those of the males differ little from those of the females, but have the merus and carpus a little shorter and stouter.

Telson with the dorsal surface slightly convex, the distal part scarcely perceptibly concaved.

Color.—Maroon brown dorsally with smoky whitish markings, the pigmentation extending with less intensity to the lower parts and appendages, except the pleopoda. Protopodite of uropoda lighter. Some individuals are paler colored.

Length, 4 mm.; width about 2 mm. Males smaller.

LOCALITIES.—Several places in Costa Rica: San Juan (first mentioned locality), Puente de las Mulas, and Faldas Vulcan Irazu.

***Trichorhina pittieri* (Pearse), 1921**

Figures 108, 109

Leptotrichus pittieri PEARSE, 1921, p. 460 (orig. descr.), Fig. 1.—VAN NAME, 1925, p. 486 (descr.), Figs. 37–42; 1926, p. 3.—ARCANGELI, 1929, pp. 134, 135.

Trichorhina pittieri ARCANGELI, 1930a, p. 15.

“Surface of body covered with peculiar processes; epimera and appendages with many small spines. Head with prominent lateral lobes,



108 *Trichorhina pittieri* (Pearse). Adapted from Pearse, 1921.

which are rather angular anteriorly; frontal margin making an obtuse angle. Eyes very small. Second antenna with fourth segment of peduncle longest; second segment of flagellum nearly thrice the length of first. Thoracic segment with lateral parts broadly expanded; the first a little longer than the others, which are subequal in length. First

two abdominal segments with lateral parts undeveloped. The third, fourth, and fifth are broadly expanded laterally and form a continuous line with the margin of the thoracic segments. Posterior segment with

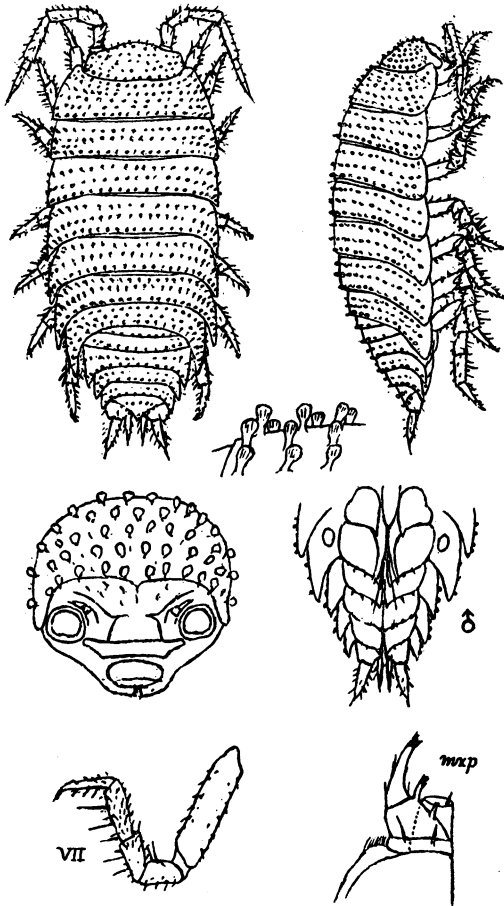


Fig. 109. *Trichorhina pitleri* (Pearse). Specimens from British Guiana in the American Museum of Natural History.

posterior lateral margins very slightly concave, rounded at apex; extending half its length beyond the preceding segment. Basal segment of uropod half the length of the exopod which is slender and conical; endopod linear and two-thirds as long as exopod.” (Pearse, 1921, p. 460.)

LOCALITY.—On shore of Lake Valencia, by paper mill at Maracay, Venezuela, July 23, 1918, under log. Type in University of Michigan Museum (Pearse).

In a previous paper (Van Name, 1925) the writer assigned to this species some specimens in the collection of the American Museum of Natural History collected by Mr. William Beebe at Kartabo, British Guiana, by sifting, and in dead wood. The same Museum has others of the same species collected at Kamakusa, British Guiana, by Mr. Herbert Lang. In most respects, these British Guiana specimens agree well with Pearse's description and figures, though the very small, somewhat angular lateral lobes of the head do not seem to deserve to be designated as "prominent," as they do not project beyond the general convex outline of the head unless the latter is considerably tilted up, and the eyes are so vestigial as to be better called wanting, a condition which Pearse's statement "very small" hardly seems to describe sufficiently. The additional figures given here and the following description are from these British Guiana specimens:

Body of rather delicate structure with the segments loosely articulated, so that the ratio of length to width, and the part of the individual segments left exposed varies considerably with the state of contraction of the muscles. (In the figure given, the segments are shown well drawn together, giving the body a rather wide ovate outline. When the muscles are relaxed, the width is less and the outline more oblong.)

Back moderately convex. All over the dorsal surface, the setae are modified into minute, soft, capitate or club-shaped structures arranged in more or less definite transverse rows. They are easily rubbed off and, when this takes place, the surface is quite smooth. On most of the segments there are three transverse rows of these structures, four on the first thoracic segment and still more on the head, but only one or two on the abdominal segments. On the wider parts of the body, there may be thirty or more in a row.

Head rather wide; in its usual, somewhat deflexed position, its anterior outline appears convex from above; when a little more upturned, it is convex with a more triangular outline, while if still more tilted up, the small, slightly projecting lateral lobes become noticeable above and slightly external to the bases of the second antennae. The latter are moderately short with a flagellum of two distinct articles, the first of which is less than one-third the length of the second, which bears a short terminal bristle. The antennae are conspicuously setose, as are also the uropoda. Eyes so vestigial as to be very hard to demonstrate.

All the thoracic segments except the first have the posterior angle extended backward to an increasing extent as the rear end of the body is approached; it is more or less rounded at the apex, save in the last three, and not very sharp in any of them. The abdominal segments 3, 4, and 5 have the lateral ends bent sharply back and acute, the telson is rather broadly triangular with very slightly concave or nearly straight sides. Uropoda small, the external branch tapering and somewhat terete, the inner branch shorter and flattened so as to appear very narrow in a dorsal view. The inner plate of the second pleopoda of the male is produced into a long, slender bristle.

Color yellowish or yellowish white (unpigmented).

Length, 3 to 4.2 mm., the variation being due in many cases more to the varied state of contraction of the muscles than to real difference in size.

***Trichorhina isthmica* (Van Name), 1926**

Figures 110, 111

Leptotrichus isthmicus VAN NAME, 1926, p. 3 (orig. descr.), Figs. 1-3.—ARCAN-
GELI, 1929, pp. 134, 135; 1930a, pp. 2, 15.

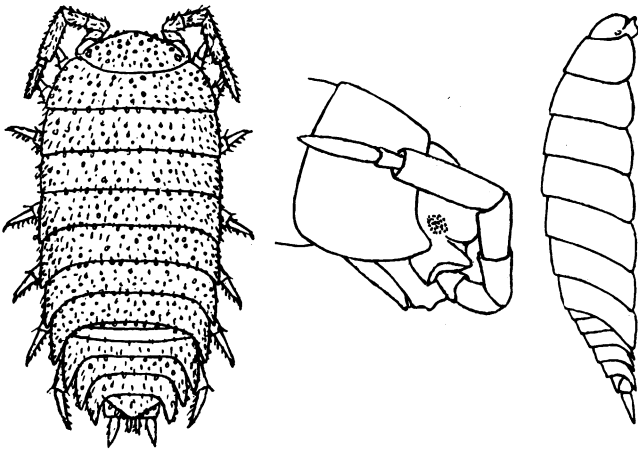


Fig. 110. *Trichorhina isthmica* (Van Name). From Van Name, 1926.

Body surface fairly even, but rather thickly provided with short, thick, glandular hairs, some of which are swollen toward the end, forming minute capitulate or club-shaped structures that are easily rubbed off. These are especially developed along the posterior margins of the segments, including the telson, but many are scattered over the dorsal

surface of the head and body. Scattered among them are many short hairs not so modified. There does not appear to be much tendency to arrangement of these structures in transverse rows, except along the posterior margins of the segments.

Head wide and short, its median portion obtusely prominent in a dorsal view. Below each eye a wide, broadly and obliquely truncated lobe extends obliquely outward, and sloping somewhat downward, forms with its concave lower surface a projecting arch over the base of the second antenna. Aside from these projecting lobes, the median part of the head is raised into a prominent median ridge in the region between the first antennae, due to a triangular tumid area extending downward from the lower margin of the forehead meeting a similar upwardly extending tumid area continuous with the clypeus.



Fig. 111. *Trichorhina isthmica* (Van Name).

The eyes are each composed of seven ocelli, fairly well formed but not much pigmented. The antennae are large and stout and, if strongly drawn back, would reach the third thoracic segment. Their flagellum has two articles, the first is hardly one-third the length of the terminal one.

Only the first two thoracic segments have the posterior lateral angle much rounded; it becomes gradually more acute and more extended back in the third and following segments. The abdominal segments 3, 4, and 5 have the epimera moderately long and acute and bent almost directly backward. The telson is widely triangular, straight sided, and slightly rounded at the extreme tip only.

Color yellowish white.

Length of only specimen (a male) 2.5 mm.

LOCALITY.—Barro Colorado Island, Canal Zone, under a log in old-growth forest. Type and only specimen in the American Museum of Natural History (Cat. No. 5336).

Trichorhina giannellii Arcangeli, 1929

Figure 112

Trichorhina giannellii ARCANGELI, 1929, p. 134 (orig. descr.), Fig. 2; 1930a, p. 14 (*T. giannellii*); 1931a, pp. 11, 18.—BOONE, 1934, pp. 567, 571, Fig. 2.

According to its describer, this species much resembles *T. pittieri* (Pearse), with which he suggests its possible identity, and also resembles, though less closely, *T. isthmicus* (Van Name). I am inclined to differ with him to the extent of believing it nearer to the latter species than to the former, that is, to the specimens from British Guiana which I suppose to represent Pearse's species.

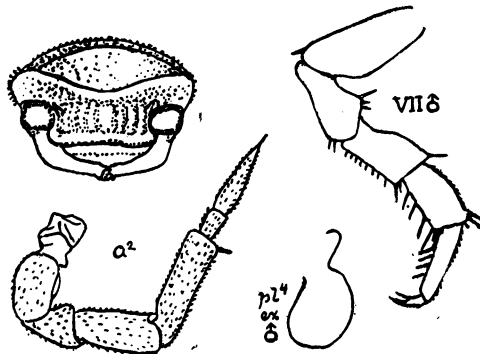


Fig. 112. *Trichorhina giannellii* Arcangeli. Adapted from Arcangeli, 1929.

I can find no trace of the longitudinal furrowing of the mesepistomal region, characteristic of *giannellii*, either in *isthmicus* or in the supposed *pittieri*; the latter has much less-developed lateral lobes and practically no eyes, while I have been unable to place my specimen of *isthmicus* in any position in which its head would present the outlines shown in Arcangeli's figure.

"The whole body is covered dorsally with small clavate setae easily rubbed off, especially conspicuous along the posterior margins of the segments.

"The frontal margin of the head is distinctly marked by a slender line, which forms in the middle an obtuse but definite angle. The lateral lobes, which join medially with the frontal margin in a broadly obtuse and rounded angle, are rather large, rounded, triangular in shape, and fail to reach to the level of the median point of that margin. The true frontal margin is, in fact, not that which is so termed above.

which is seen in a dorsal view of the animal, but is situated below and in advance of the latter, so as to appear shorter on looking at the head from below, appearing in the form of a widely divergent V, which passes into the lateral lobes at its extremities. Together with the false frontal margin, it limits a convex area of somewhat lozenge-shaped outline. Mesepistoma wide, with longitudinal ridges, of which the median one is widest." (Translated from Arcangeli, 1929, p. 134.)

The eyes are quite small and not always well or uniformly pigmented; they are composed of four or five extremely small ocelli. Antennae pubescent, capable of being drawn back beyond the rear margin of segment I. Their flagellum has the first of its two articles half the length of the second.

The rear angles of the thoracic segments I to III are rounded, the angles beginning to extend backward and to become acute in the fourth segment. Arcangeli mentions, but does not describe, sexual differences in the legs.

The telson is triangular, much wider than long, and with nearly straight sides; its surface slightly excavated at the apex and parallel to the sides; its obtuse angled point is at about the level of the ends of the basal segments of the uropoda.

Arcangeli (1929) remarks on the variability which his large series shows in the relative width and length of the body, the consistency of the integument, the length of the antennae and uropoda, the development of the frontal lobes, etc.

Color yellowish white; specimens from El Cobre, Cuba, with very light brown pigmentation.

Length, 3.6 mm.; width, 1.35 mm. The male is smaller.

DISTRIBUTION.—Cuba, many specimens from different localities (Guayabal; Santiago de las Vegas; Ruspoli; Guaró; Puerto Boniato, Santiago; El Cobre) reported by Arcangeli, 1929. In a subsequent paper (1930) he reports it also from the following points in Costa Rica: Puente de las Mulas; San José; Origenaco, Apaican; Fuldás Vulcan Irazú; San Juan. Boone, 1933, reports it from Cojimer, Cuba.

Trichorhina bequaerti, new species

Figures 113, 114

Body rather widely elliptical in a dorsal view, and considerably arched, the head wide and short and evenly convex in front, and the abdomen rather small, much set back into the thorax and conforming to the general curvature of the margin of the body in its outline. Body surface not tuberculated; the exposed part of each segment somewhat, though not abruptly, raised above the part that fits under the segment

next in front. Dorsal surface of body and head rather thickly covered with short hairs which become slightly longer on the epimeral regions. Many of these hairs are more or less enlarged at the end or are modified into minute club-shaped or even pear-shaped structures. Generally these are irregularly scattered among the less modified hairs, but along the posterior margin of each segment they form a regular, rather closely placed row.

Head without projecting lobes. Upper margin of epistome not prominent; it forms a sinuous line dipping down in the middle and below each eye. Forehead very high. Eyes small with few and apparently not very well-developed ocelli, but with considerable black pigment. Antennae short, pubescent, with a two-jointed flagellum, the first article hardly half as long as the second exclusive of the short terminal spine that is borne on the latter.

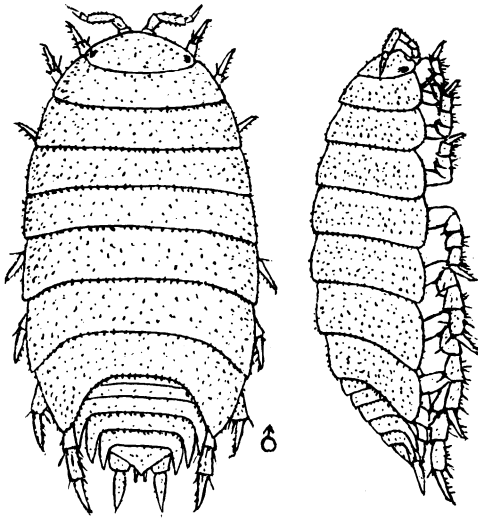


Fig. 113. *Trichorhina bequaerti*, new species.

Left mandible with the tip considerably produced and ending in three teeth, only two of which appear in the position in which it is here illustrated; its lacinia mobilis large and composed of two rounded lobes. The right mandible ends in a single toothlike process and its lacinia mobilis is represented by a lobe or projection ending in a large, slightly concave surface for the reception of the corresponding part of the other mandible when the jaws are closed. Only one "penicillus" (small brush-like process) distal to the large brush was observed on the inner aspect of each mandible; these parts, however, were examined in only one specimen. The outer division of the first maxilla has but six well-developed teeth (3 + 3, all simple, the first being very stout) with an additional slender accessory tooth at the base of the fourth tooth. The thoracic segments from the first to the sixth increase in length

more or less regularly. Their lateral ends are rounded-truncate, the posterior corners being rounded off in the case of the first three and more angular and increasingly produced backward in the posterior ones. The legs are fairly stout and well provided with spines. Sexual differences in them were not observed.

The abdominal segments three, four, and five have the epimeral ends tapering, pointed, and directed almost straight backward. Telson over twice as wide as long, triangular with concave sides. The backwardly extended angles of the first and second pleopoda in the male are rather short. No tracheae were found in their external

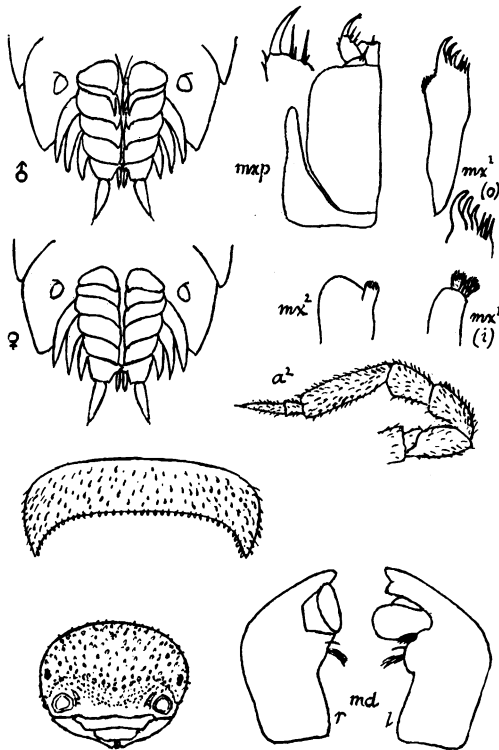


Fig. 114. *Trichorhina bequaerti*, new species.

plates. Uropoda rather short, the outer branches of the usual tapering form, the inner laterally compressed and much smaller than the outer.

Color pale yellowish (unpigmented), except for a slight amount of pale purplish-brown pigment distributed on the dorsal surface of the body and head, mainly in the median region and on the epimeral parts of the segments. The lateral and posterior borders of the segments and rounded or oval spots on the lateral parts of the back are entirely unpigmented, as are the lateral and terminal parts of the abdomen and the entire under parts and the legs. Even where the pigment is present it is very pale and thinly distributed. Length of the largest males and females, between 5 and 6 mm.

LOCALITY.—Cave of Aguas Gordas, Baños, Oriente Province, Cuba. Three specimens, including type (Cat. No. 6523), in the American Museum of Natural History, received from Dr. J. Bequaert, of the Harvard Medical School, for whom the species is named. Cotypes, three specimens, in Museum of Comparative Zoölogy, Cambridge, Massachusetts.

BISILVESTRIA ARCANGELI, 1929

A genus of doubtful relationship established by Arcangeli for the following peculiar species, which he places in the family Oniscidae.

***Bisilvestria marrassinii* Arcangeli, 1929**

Figure 115

Bisilvestria marrassinii ARCANGELI, 1929, p. 138 (orig. descr.), Fig. 4.

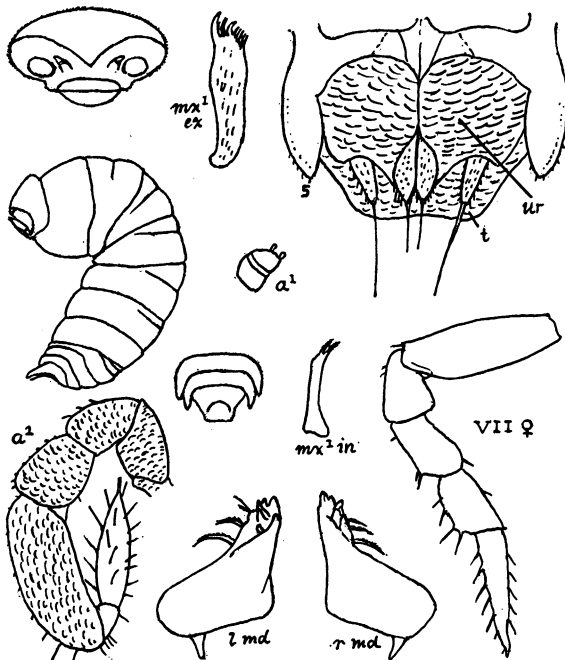


Fig. 115. *Bisilvestria marrassinii* Arcangeli. Adapted from Arcangeli, 1929.

According to the description of that author, who had only female specimens, the body is rather elongate with nearly vertical sides and is capable of rolling up into a ball. Surface covered with very small,

slightly capitate setae, curved toward the rear. They are especially developed on the margins of the segments. There are eight longitudinal ridges on the dorsal surface of each segment, four each side of the median line.

Head wide and short, entirely set back into the thorax; eyes wanting; antennae extremely short and stout with a flagellum of two articles, the first very short.

The external plates of the pleopoda are without tracheae.

The telson has the outline of a broadly truncated triangle, with slightly concave sides; its distal part bends out somewhat horizontally and its upper surface has a large spoon-like concavity bounded in front by a curved line. The telson is so large that it completely covers not only the basal segments, but the branches of the uropoda which are very short, so that these are visible only from below.

The body is unpigmented and somewhat translucent.

Length, 1.2 mm.; width, 0.45.

LOCALITY.—El Cobre, Cuba. Four females collected by Prof. Silvestri. Apparently an inhabitant of humus.

LYPROBIUS BUDDÉ-LUND, 1885

Budde-Lund, in the above work defined this group as follows, treating it as a subgenus of *Oniscus* and placing it next to *Alloniscus*. It was based on the two species here included and a third one from Algeria known only from a single imperfect specimen. The group is treated as a genus by Richardson, 1905, who also places it next to *Alloniscus*, though judging from the diagnosis and descriptions a position nearer to *Philoscia* might be better.

“Corpus minus convexum, vix contractile. Superficies plerumque setigera, vix granulata.

“Frons ante marginata, in lateribus lobata.

“Trunci annulus primus margine posteriore curvato, duo sequentes subtransversi, quattuor posteriores margine posteriore medio post magis magisque sinuato. Epimera sat magna, angulis posticis annulorum trium priorum rotundate obtusis, angulis annuli quarti subrectis, annulorum trium posteriorum acutioribus.

“Caudae annuli duo priores brevissimi, prior a trunci annulo septimo saepe occultus; annuli tres sequentes mediocres, epimeris magnis, extrorsis, acutis.

“Rami terminales exteriores pedum analium tertiusculi, conici, paulum deplanati, breviores; articulus basalis brevis et latus, latere exteriori sulcato.” (Budde-Lund, 1885, pp. 229, 230.)

Lyprobius pusillus Budde-Lund, 1885

Lyprobius pusillus BUDDÉ-LUND, 1879, p. 1 (*nomen nudum*); 1885, p. 230 (orig. descr.).—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7), IV, p. 333); 1900a, p. 305; 1905, p. 598.—JOHANSEN, 1926b, p. 165.

“Body oval, rather convex, smooth, punctate, very minutely setigerous, especially so posteriorly.

“Second pair of antennae a little shorter than half the length of the body; first article of the flagellum equal in length to the third, almost half as long as the second.

“Antero-lateral lobes small, rounded. Front, with the median marginal line entire, a little arched and produced.

“The terminal segment of the abdomen is triangulate in the middle, produced, and extends a little beyond the epimera of the fifth abdominal segment; terminal segment a little excavate above.

“Color uniformly brown, transparent on the margins, white.

“Length, 5 mm.; width, 2.5 mm.; height, 1.2 mm.” (Richardson, 1905, p. 598.)

LOCALITIES.—Type locality Sacramento, California (“specimen mutilatum . . . in Museo Schaufuss asservatur.” Budde-Lund, 1885).

According to Johansen (1926b, p. 165) there is a specimen in the U. S. National Museum collected at Unalaska, Aleutian Islands, by Dall in 1871, which was identified with the present species of Budde-Lund. The information given by Budde-Lund would seem, however, entirely insufficient for any certain recognition of the species.

Lyprobius modestus Budde-Lund, 1885

Lyprobius modestus BUDDÉ-LUND, 1885, p. 231 (orig. descr.); 1893, p. 127 (see note below); 1908a, p. 283 (see note below).

Budde-Lund's original description is as follows:

“Ovalis vel oblonge ovalis, convexiusculus, sparse et regulariter setigero squamatus.

“Antennae exteriores corpore dimidio paulo breviores; articulus primus flagelli quam articulus secundus sesqui brevior; articulus tertius brevissimus, vix conspicuus, decimam partem articuli vix superans.

“Lobi frontales laterales sat magni, rotundati, subsemicirculi, subdeclives; frons medio late triangulo producta, minus manifesto marginata.

“Trunci annuli tres priores margine posteriore curvato; annulus quartus subtransversus; annuli posteriores medio sinuato; epimera mediocria.

“Caudae annulus analis triangulus, brevis, epimera annuli prae-analis satis superans, lateribus leviter incurvis, apice subacuto, supra medio impressus.

“Color flavus crebro nigromaculatus vel potius nigro brunneus et flavomaculatus, ut praesertim tres series longitudinales macularum fingantur.

“Long. 4.5 mm. Lat. 2 mm. Alt. 1 mm.”

LOCALITY.—“Corientes,” South America (probably in Argentina). Several specimens collected by Will. Sorensen (Budde-Lund, 1885).

No other description or figures of this species appear to have been published. In a later work (1893) Budde-Lund mentions it again, stating that the tracheae in the pleopoda are even more rudimentary than in *Lyprobius cristatus* (= *Nagara cristata*) and that the relationship between these and certain Old World species which he names is not clear to him.

Budde-Lund apparently is referring to this last statement when he mentions (1908a, p. 283) that he has already removed *modestus* from *Lyprobius*, though he did not know where to place it. He offers no information on this point, and as I cannot solve the problem with the brief description that Budde-Lund has given I am leaving it in *Lyprobius*. This species apparently has nothing to do with *Porcellio modestus* Dollfus, from Salayer, Dutch East Indies, which Budde-Lund transferred to *Nagara*.

ALLONISCUS DANA, 1856

“Corpus convexiusculum, paulum vel vix contractile. Superficies punctis setigeris crebrata.

“Linea marginalis frontalis deleta, linea marginalis verticalis post oculos in pleuras capitis decurrens, producta. Frons in medio et in lateribus in tubercula producta; tubercula lateralia saepe instar cornus prominentia. Epistoma infra inter antennis tumosum, leviter carinatum.

“Trunci annuli priores margine posteriore curvata, rarius utrinque leviter sinuato. Epimera mediocria vel parva, processus lateralis nullus. Pedes valde spinosi.

“Cauda trunco haud abrupte angustior; annuli duo priores sequentibus breviores, epimeris deletis; annuli tres sequentes epimeris majoribus.

“Rami terminales exteriores pedum analium breves, subteretes, graciles, hirsuti, repandi; rami interiores breves, apice setosi; articulus basalis latus, magnus.” (Budde-Lund, 1885, p. 224.)

Budde-Lund (1908a, pp. 295-298) discusses this genus and gives further particulars about its characters, especially the following: that the maxilliped has the malar process without spines and covered with short hairs and the palp very short and stout, with the third article much shorter than the second. The external plates of the uropoda are more or less extensively provided with tracheae and in the females, but not in the males, distinct sutures often mark off some of the thoracic epimera. Mandibles with only one free brush-like appendage ("freien pinselformigen Anhang" of Budde-Lund).

More investigation will be needed to determine whether all the species here included will prove to conform to the genus as thus limited.

Alloniscus cornutus Budde-Lund, 1885

Figures 116, 117, 118

Alloniscus cornutus BUDDE-LUND, 1879, p. 1 (*nomen nudum*); 1885, p. 228 (orig. descr.).—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900a, p. 305; 1905, p. 595 (descr.).—BUDDE-LUND, 1908, p. 298, Pl. xv, figs. 43-47.

Alloniscus cornutus var. *lagunae* STAFFORD, 1913, p. 170 (descr.), Figs. 4, 5. Not *Alloniscus cornutus* KRAEPELIN, 1901 (= *Arhina porcellioides*).

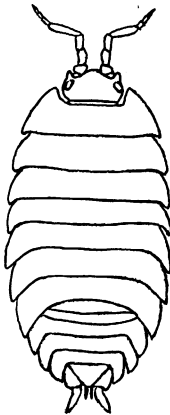


Fig. 116. *Alloniscus cornutus* Budde-Lund. Adapted from Stafford, 1913.

The following is Richardson's translation of the original description:

"Body short, oval, subconvex, obscurely but densely roughened and thickly punctate and setigerous. Second pair of antennae shorter than half the length of the body (7:17); flagellum shorter than the fifth article of the peduncle; the second article of the flagellum shortest, the first equal in length to the third.

“Antero-lateral processes large, narrow, prominent, subconical; front in the middle very much swollen.

“The first three segments of the thorax have the posterior margin on both sides slightly sinuated; all the following segments have the posterior margin in the middle rather sinuated posteriorly.

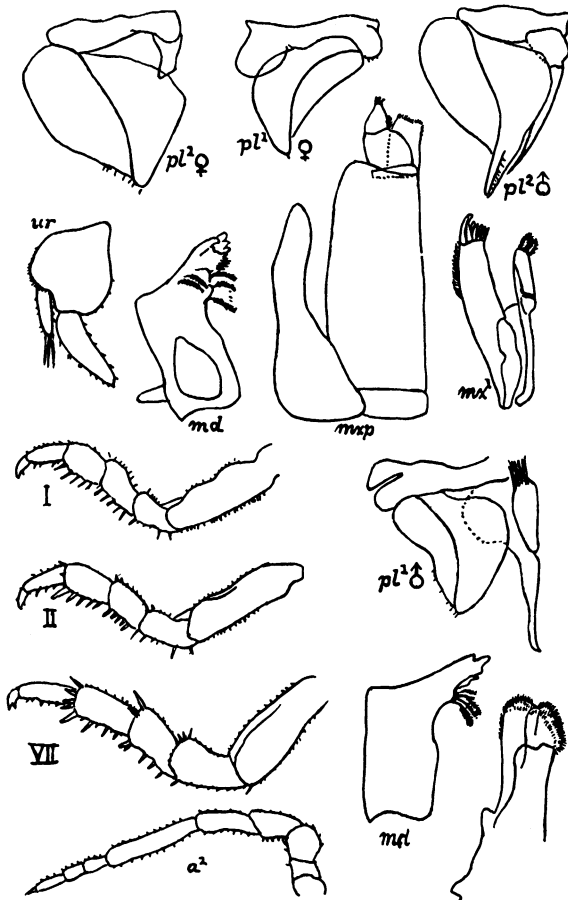


Fig. 117. *Alloniscus cornutus* Budde-Lund. Adapted from Stafford, 1913.

“The first two segments of the abdomen scarcely shorter than the other segments; the epimera of the third, fourth, and fifth segments strong, subtetragonal.

"The terminal abdominal segment is triangular, short, hardly twice as wide as long, rather convex above.

"The basal article of the uropoda is very wide, depressed; the outer branch is carinated, with the apex rounded; the inner branch is inserted at the inner angle of the basal article. Color grayish, pale on the sides. Length, 8.5 mm.; width, 5 mm.; height, 2 mm."

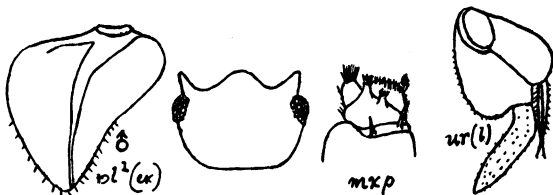


Fig. 118. *Alloniscus cornutus* Budde-Lund. Adapted from Budde-Lund, 1908a.

LOCALITY.—California, found with *A. perconvexus*. Two specimens, including the type, in the Copenhagen Museum (Budde-Lund). A variety (*lagunae*) was described from specimens obtained under old seaweed on the margin of a salt lagoon at Laguna Beach, California, by Stafford, 1913, but the supposed distinguishing characters of the variety are probably to be explained by the inadequate original description.

Alloniscus perconvexus Dana, 1856

Figures 119, 120

Alloniscus perconvexus DANA, 1856, p. 176 (orig. descr.).—STIMPSON, 1857, p. 506.—HARFORD, 1877, p. 54.—BUDDE-LUND, 1879, p. 1; 1885, p. 224.—UNDERWOOD, 1886, p. 360.—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900a, p. 305; 1905, p. 596 (descr.), Figs. 652-654.—BUDDE-LUND, 1908, p. 298, Pl. xv, figs. 48, 49.—STAFFORD, 1912, p. 124 (descr.), Fig. 69; 1913, p. 170.—ARCANGELI, 1932, p. 132.

Described by Dana as follows:

"Corpus valde convexum, subtilissime subgranulosum, fere laeve. Antennae externae subtiliter scabriculae, articulis tribus ultimis subaequis, articulo precedente non longioribus. Abdomen paulo transversum. Ramus terminalis styli caudalis basi brevior. Pedes infra spinulosi. Long. 6 1/2."

"Both the back and the legs in the specimens are brownish black. In some smaller specimens four to five lines long; the color is light brown, mottled with yellowish, and the legs are pale yellowish; the

form is a little more slender, and they may probably be a different species. The last three joints of the outer antennae are not so nearly equal."

Redescribed by Richardson, 1905, whose description is here quoted in part:

"Body ovate, very convex, not quite twice as long as broad, 9 mm.: 16 mm.

"Head twice as wide as long, 2 mm.: 4 mm., with the antero-lateral angles produced on either side into an acute process, "horn-like," situated just in front of the eye, and the front produced in the middle

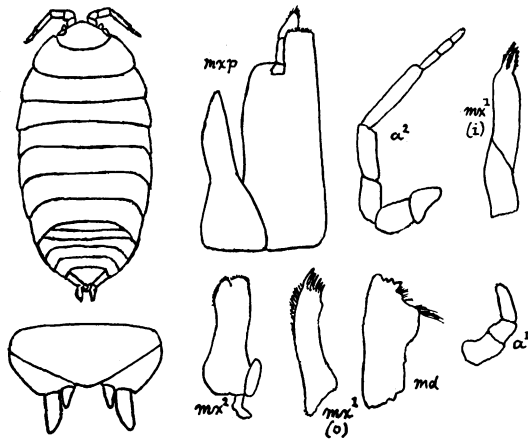


Fig. 119. *Alloniscus perconvexus* Dana. Adapted from Richardson, 1905.

in a large, widely rounded median lobe, extending as far as the lateral process. The eyes are small, oblong, composite, and situated in the antero-lateral angles of the head close to the lateral margins. The first pair of antennae are rudimentary and inconspicuous. They are composed of three small articles. The second pair of antennae have the basal article short; the second is about twice as long as the first; the third and fourth are subequal and each is a little longer than the second; the fifth is one and a half times as long as the fourth. The flagellum is composed of three subequal articles. The antennae are covered with small spines. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

"The first segment of the thorax is 2 mm. in length and is a little longer than any of the others, which are subequal and each is about

1 1/2 mm. long. The lateral margins of all the segments are straight and contiguous. On the first four segments the epimera are indicated by a distinct longitudinal suture, which on the first segment is confined to the posterior half of the segment, but in the three following segments extends the entire length of the segment. There are no suture lines on the last three segments. . . ." (Richardson, 1905, pp. 596, 597.)

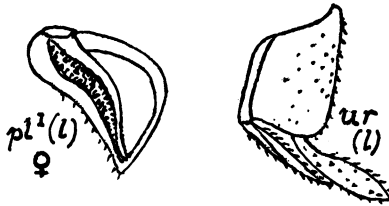


Fig. 120. *Alloniscus perconvexus* Dana. Adapted from Budde-Lund, 1908a.

LOCALITIES.—California (Dana, Budde-Lund); also Oregon. Richardson (1905) gives: Pacific Grove, Santa Barbara, and Monterey Bay in California, and Tillamook Head in Oregon; Stafford reports it from Laguna Beach, California, "Dug at mean tide mark from sandy shore." Budde-Lund says that the Copenhagen Museum has a few specimens. See also the remarks under *Ligidium gracile*.

***Alloniscus mirabilis* (Stuxberg), 1875**

Alloniscus mirabilis BUDDE-LUND, 1879, p. 1; 1885, p. 229.—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864, (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900a, p. 305; 1905, p. 594 (descr.).—PRATT, 1935, p. 442.

Rhinoryctes mirabilis STUXBERG, 1875, p. 51 (orig. descr.).—UNDERWOOD, 1886, p. 363.

The following is Richardson's translation of the original description:

"Body oval, twice as long as wide, convex, very densely granulated; epimera serrate on the margins. Second pair of antennae much shorter than the width of the body (85:100); the fifth article of the peduncle very long, not very much curved, equal in length to the three articulate flagellum; the articles of the flagellum equal to each other in length or the middle one sometimes smallest.

"Eyes prominent, subcircular, with numerous ocelli.

"The frontal median lobe large, produced, obtuse, extended upward, equal to a fourth part of the width of the head; lateral lobes produced, conical, anteriorly rounded, equal to the eyes in length.

"All the segments of the thorax with the posterior margin sinuated

in the middle. Epimera moderately large, with the anterior angles gradually more rounded posteriorly, serrate, the posterior angles roundly acuminate not very much directed backward.

"Abdomen subcircular, a little wider than long, all the segments equal in length, the epimera of the first and second segments vanishing, those of the third, fourth, and fifth segments large, directed backward, rounded on the exterior margin, serrate, almost straight on the inner margin. The last segment is triangular, twice as wide as long, with the posterior margins straight, roundly acuminate, rather convex above and sometimes furnished with a longitudinal furrow not at all deep. The uropoda have the basal article almost as wide as long, depressed, with the post-lateral margin very little elevated, circularly rounded, serrate, the outer branch a little flattened, subconical, with the exterior margin straight, the inner margin convex, extending not much beyond the inner branch in length, which extends very little beyond the last segment of the abdomen.

"Color of the dorsal surface reddish or dark gray, the frontal lobes, especially the middle one, and a longitudinal band on the thorax darker and covered with very numerous paler oblong spots."

LOCALITY.—California.

Alloniscus compar Budde-Lund, 1893

Alloniscus compar BUDDÉ-LUND, 1893, pp. 124 (orig. descr.), 127.—DOLLFUS, 1893a, p. 345.

"Oblonge ovalis ve subovalis, convexiusculus; tota superficies minutissime et densissime punctata, sparse minute setigera; margo posterior omnium trunci et caudae segmentorum, segmento anali excepto, serie papillarum minutissimarum ornatus.

"Antennae dimidium corporis longitudine aequantes; scapi articuli tres priores inter se aequales, articulus quartus duobus praecedentibus simul subaequalis; flagellum triarticulatum; articulus primus secundo paulisper longior, tertius longissimus, a secundo obscure discretus.

"Processus frontales laterales mediocres, oblique rotundati; epistoma convexum, cum fronte paulum productum.

"Trunci segmentum primum margine posteriore curvato, segmenta duo sequentia subtransversa. Stria suturalis epimerorum segmentorum 2-3-4 nulla.

"Caudae segmentum anale triangulum, lateribus late incurvis, apice subobtusio, supra in medio paulisper excavatum, epimeras segmenti prae-analis tantum paulum superans. Segmenta 3-4-5 epimeris brevioribus.

"Color flavus, maculis e brunneo violaceis crebris, maxime in series quattuor longitudinales condensatis.

"Long. 4-4.5(5) mm. Lat. 2-2.2 mm." (Budde-Lund, 1893, p. 124.)

LOCALITIES.—La Moka and vicinity of Caracas, Venezuela, found with *Trichorhina ambigua* and *T. papillosa*.

Alloniscus borellii Dollfus, 1897

Figure 121

Alloniscus borellii DOLLFUS, 1897c, p. 3 (orig. descr.), Figs. 3a-3e.

"Corps assez convexe, ovale, lisse, avec de petits poils sétacés surtout sur les bords.

"Cephalon.—Front arrondi et un peu proéminent; lobes latéraux

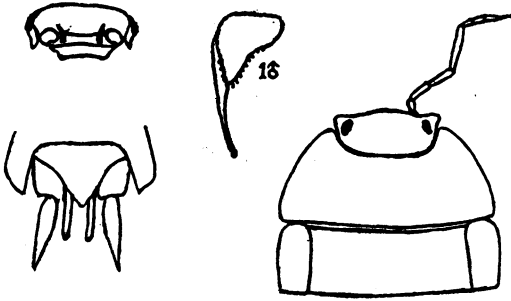


Fig. 121. *Alloniscus borellii* Dollfus. Adapted from Dollfus, 1897a.

infléchis de part et d'autres des yeux comme dans l'espèce précédente et dans la suivante (*A. argentinus*, *A. griseus*), et formant en avant un processus arrondi peu développé. Prosépistome muni d'un petit tubercle perliforme peu apparent; mesépistome bien développé. Yeux assez grands. Antennes à fouet tri-articulé, les deux premiers articles subgaux, et bien plus courts que le troisième.

"Pereion.—Premier segment à bord postérieur à peine sinueux de chaque côté; segments 2-4 munis d'un sillon coxal (chez la femelle seulement). Cinq derniers segments munis latéralement d'une petite granulation perliforme.

"Pleon, Telson.—Pleon en continuité avec le pereion. Pleotelson plus court que large, triangulaire à bords incurvés, à sommet subaigu. Uropodes à base n'atteignant pas l'extrémité du pleotelson; endopodite dépassant grandement le pleotelson, exopodite lancéolé, médiocre.

"Couleur.—Brun foncé, marbré et taché de clair: une tache

claire latérale plus accentuée bordée d'une ligne foncée: côtés plus clairs.

"Dimensions.—Long. 11 mm., larg. 5 mm."

LOCALITIES.—S. Lorenzo, Prov. Jujuy (first mentioned locality); vicinity of Salta; Estancia S. Felipe, Oran, both in Prov. of Salta in Argentina. Also Mission de Aguairenda and Caiza in the Chaco of Bolivia.

Alloniscus argentinus (Dollfus), 1894

Figure 122

Alloniscus argentinus DOLLFUS 1897a, p. 2 (descr.), Figs. 2a-2c.

Metoponorthus argentinus DOLLFUS, 1894, p. 3 (orig. descr.), 3 text figures.

"Corps ovale, assez convexe, lisse.

"Cephalon à bord frontal reporté sur la face inférieure ou il a refoulé l'épistome qui est très court. Yeux grands, environ 20 ocelles. Antennes?

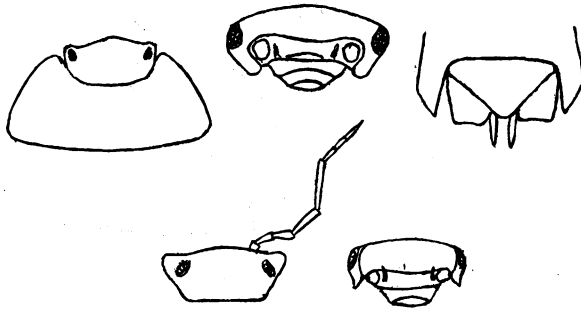


Fig. 122. *Alloniscus argentinus* (Dollfus). Adapted from Dollfus, 1894 (upper figures), and 1897a (lower figures).

"Pereion.—Premier segment à bord postérieur régulièrement courbé, sans la moindre sinuosité.

"Pleon, Telson.—Pleon en retrait peu sensible sur le pereion. Pleotelson triangulaire obtus, un peu incurvé sur les bords, plus large que long. Uropodes à base très développée, dépassant même un peu le sommet du pleotelson. Endopodites lancéolés étroits dépassant grandement le pleotelson. Exopodites?

"Couleur.—Gris-jaunâtre, avec des stries et marbrures brunes, une strie latérale plus foncée que les autres. Pattes tachées de brun.

"Dimensions.—11 × 5 mm." (Dollfus, 1894, p. 3.)

Having later received additional specimens retaining their antennae, Dollfus (1897a, p. 2) places the species in *Alloniscus* instead of *Metopo-*

northus, gives additional figures and makes the following addition to the description.

“Antennes à fouet tri-articulé, les deux premiers articles du fouet subégaux, le dernier un peu plus long. Front normal et n’empiétant pas sur l’épistome; il n’en est séparé que par un très mince rebord apical. Prosépistome plan et sans tubercle médian; mésépistome très développé comme dans les espèces suivantes. Segments 2 à 4 du pereion présentant, chez la femelle seulement, un sillon coxal.”

LOCALITIES.—Buenos Aires (first mentioned locality; no type locality named), Argentina: Río Apa, Paraguay (Dollfus, 1894). No localities given for additional specimens described in 1897.

Alloniscus griseus Dollfus, 1897

Figure 123

Alloniscus griseus DOLLFUS 1897a, p. 3 (orig. descr.), Figs. 4a-4e.

“Corps ovale, presque lisse, très-finement ponctué-setacé, surtout sur les côtés.

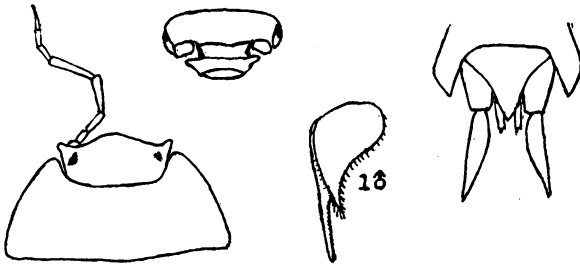


Fig. 123. *Alloniscus griseus* Dollfus. Adapted from Dollfus, 1897a.

“Cephalon.—Front proéminent et arrondi au milieu: lobes latéraux inflexis de part et d’autre des yeux, et formant antérieurement un processus triangulaire. Prosépistome plan: mésépistome bien développé. Yeux mediocres. Antennes à fouet tri-articulé; les deux premiers articles plus courts que le troisième.

“Pereion.—Premier segment à bord postérieur faiblement sinueux de chaque côté.

“Pleon, Telson.—En continuité avec le pereion; processus latéraux bien développés. Pleotelson aussi long que large, triangulaire à côtés incurvés, à sommet subaigu, avec une dépression médiane. Uropodes à base n’atteignant pas l’extrémité du pleotelson; endopodite dépassant à peine le pleotelson, exopodite lancéolé, assez grand.

“Couleur.—Gris uniforme.

“Dimensions.—Long. 13 mm., larg. 6 1/2 mm.”

LOCALITY.—Oran, Salta Province, Argentina. One male example (Dollfus).

Alloniscus species?

Alloniscus sp. RICHARDSON, 1913, p. 340.—PICADO, 1913, p. 337.

“One imperfect specimen was obtained at Patahaya (south of Cartago), Costa Rica. Collected by Mr. Picado.” (Richardson.)

Richardson states elsewhere in the article that the specimens among which the present one was included were found on epiphytic bromeliads and were mostly collected at an altitude of 2000 to 2500 meters. Picado's reference applies to the same specimen as Richardson's.

SYNUROPUS RICHARDSON, 1901

“Body oval, not contractile into a ball, with the segments laterally expanded, as in *Oniscus*.

“Head with lateral and frontal lobes. Second pair of antennae long, with flagellum composed of three articles.

“Abdomen not narrower than thorax; pleural lamellae large.

“Terminal segment of body much broader than long, widely rounded posteriorly, not conically produced as in *Oniscus*. Basal joint of the uropoda large, broadly expanded inside, not oblong as in *Oniscus*; inner branches close together, their internal lateral margins contiguous. Inner branch inserted but little or scarcely at all in advance of the outer branch, situated close to the inner post-lateral angle of the peduncle. Outer branch somewhat longer than the inner branch.” (Richardson, 1901, p. 563.)

The following is the type and only species. From the brief description and figures it would seem to be close to *Alloniscus*, if really separable from it.

Synuropus granulatus Richardson, 1901

Figure 124

Synuropus granulatus RICHARDSON, 1901, p. 563 (orig. descr.), Figs. 30, 31; 1905, p. 599 (descr.), Figs. 655, 656.

“Body oval, not able to be contracted into a ball, with the lateral parts of the segments expanded.

“Entire surface of body covered with small tubercles.

“Head deeply set in the first thoracic segment, the rounded anterior angulations of which reach the antero-lateral angles of the head. The

anterior margin of the head is produced in an obtusely pointed median lobe. The lateral lobes are very acute. The antennae are geniculate at the articulation of the fourth and fifth peduncular joints; the flagellum consists of three joints.

"The first thoracic segment is longest; the others are subequal. The abdomen is not narrower than the thorax. The first two segments have their lateral margins concealed. The three following have their lateral margins broadly expanded. The terminal segment is twice as broad as long, with the posterior margin broadly rounded. The basal joints of the uropoda are large, being partly covered by the terminal segment of the body. The outer branch is styliform and extends its entire length beyond the terminal abdominal segment. The inner

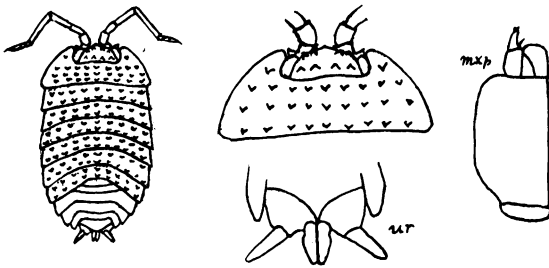


Fig. 124. *Synuropus granulatus* Richardson. Adapted from Richardson, 1901.

branches are situated close together in such a way that the inner lateral margins are contiguous throughout their length.

"The legs are ambulatory, similar, and subequal.

"Color brown, mottled with black." (Richardson, 1901, pp. 563, 564.)

LOCALITY.—El Yunque, Puerto Rico, at an altitude of 2800 feet. Type in U. S. National Museum.

ARHINA BUDE-LUND, 1904

"Flagellum antennarum 3-articulatum. Pleurae capitis linea verticali utrinque decurrente discretæ.

"Trunci segmentum primum post integrum. Pleopodum rami operculares omnium parium tracheis parvis instructi. Telsum breve triangulum, epimeris segmenti paenultimi paululum superans. Uropodes longiproducti; exopoditum longum sub-hastatum, apici scapi insertum, scapo multo plus duplo longius; endopoditum longum, scapo multo longius.

"Corpus leviter convexum aegre contractile. Oculi congregati, ocelli numerosi. Antennae mediocres, corpus dimidium subaequantis.

"Antennularum articulus 3. longius. Trunci segmenta pronotum satis magnum, tertiam partem dorsi segmenti aequans, et processum lateralem habens." (Budde-Lund, 1904, p. 44.)

A genus very closely related to *Alloniscus*, according to Jackson, 1928a, p. 582. Barnard, 1932, p. 232, considers it inseparable from that genus.

***Arhina porcellioides* Budde-Lund, 1904**

Figures 125, 126

Arhina porcellioides BUDDE-LUND, 1904, p. 45 (orig. descr.), Pl. VI, figs. 1-17.

Arhina porcelloides JACKSON, 1928a, p. 582, Fig. 12.

Alloniscus cornutus KRAEPELIN, 1901, p. 204.

Not *Alloniscus cornutus* BUDDE-LUND, 1885, from California.

Budde-Lund's (1904) description is as follows:

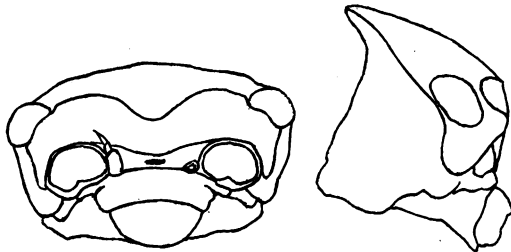


Fig. 125. *Arhina porcellioides* Budde-Lund. Adapted from Jackson, 1928a.

"Subovalis, convexiuscula, dense et minute granulata.

"Oculi majores: ocelli dense congregati, numero c. 20. Antennae dimidio corpore vix breviores (7:17); scapi articuli 1. et 2. breves, subglobosi, articulus 3. 2do vix longior et multo angustior, articulus 4. paulo longior quam 3. articulus 5. paululo brevior quam articuli 3. et 4. conjuncti; flagellum articulo 5. scapi longitudine subaequali, articuli inter se subaequales vel articulus 1. duobus sequentibus brevior. Frons ante linea obsoleta ab epistomata discreta in lateribus in tuberculositates producta, post lineam marginalem sulco leviori transverso impressa. Linea marginalis verticalis utrinque ad oculos producta, deinde in pleuras capitis decurrens. Epistoma angustius, convexiusculum, infra leviter transverse tumidum. Foramina antennarum magna, approximata; tubercula antennaria nulla. Clypeus fornicatus, lobis lateralibus nullis.

"Truncus segmenta omnia epimeris tenuibus integris; margo posterior segmenti 1. late curvatus, segmenti 2.-3.-4. leviter curvatus, subtransversus, utrinque vix conspicue incurvus; margo posterior segmenti 5.-6. leviter, 7. magis in medio incurvus; anguli posteriores segmenti 1.-2.-3. late rotundate obtusi, segmenti 4. subrecti, segmenti 5.-6. et maxime 7. acuti. Cauda: segmenta 1.-2. mediocria, segmenta 3.-4.-5. epimeris mediocribus; epimera segmenti 5. lata, angulo postico paulum extra verso valde divergentia. Telsonum breve, triangulum, lateribus incurvis, epimera segmenti 5. paululum superans. Uropodes: Scapus oblique tetragonus, paulo latior quam longior, latere exteriori

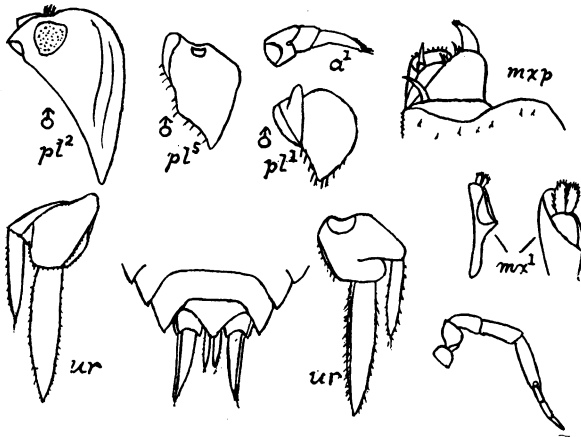


Fig. 126. *Arhina porcellioides* Budde-Lund. Adapted from Budde-Lund, 1904.

post excavato. Exopoditum longum, sub-hastatum; endopoditum longum, telsum satis superans.

"Subunicolor, grisea, in trunci segmentis utrinque macula rotunda pallidiore.

"Long. 7 mm. Lat. 4 mm."

DISTRIBUTION.—"Patria incerta, forsitan cosmopolita" (Budde-Lund). Found in warehouse at Copenhagen, perhaps imported from the East Indies, and in Hamburg Botanical Garden among plants from the West Indies.

Alloniscus cornutus Budde-Lund, with which (according to Budde-Lund, 1904, p. 46) this was incorrectly identified in Kraepelin's list, is a California species.

PORCELLIO LATREILLE, 1804

In the restricted sense employed in the present work, the members of this genus are of more or less depressed form with the lateral parts of the segments expanded, the head with median and lateral lobes well-developed, the eyes compound, the antennae with a flagellum of two articles only, and the abdomen not abruptly contracted. Branching tracheae, opening by a single orifice near the articulation of the plate are present in the external plates of the two or, rarely, three anterior pairs of pleopoda. See remarks under genus *Tracheoniscus*. There are a number of related groups sometimes treated as subgenera of *Porcellio*, sometimes as full genera; among these *Porcellionides* (see below) may be mentioned as very unsatisfactorily separated from *Porcellio* proper. The few true Porcellios found in America perhaps may have been accidentally introduced by man from Europe or North Africa, where the group has numerous representatives. Among them are two of the most abundant and familiar land isopods of the United States. Type of the genus, *P. scaber* Latreille.

Porcellio scaber Latreille, 1804

Figures 2, 3, 127A, 128

Philoscia tuberculata STIMPSON, 1856, p. 97.

Porcellio gemmulatus DANA, 1853, p. 725, Pl. XLVII, fig. 7.—STIMPSON, 1857, p. 506.—STUXBERG, 1875, p. 58.—UNDERWOOD, 1886, p. 362.

Porcellio montezumae SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 480 (descr.), Pl. v, fig. 41.—STUXBERG, 1875, p. 62.—BUDDE-LUND, 1879, p. 3; 1885, p. 130 (makes syn. of *scaber*).

Porcellio niger UNDERWOOD, 1886, p. 362.

Porcellio nigra SAY, 1818, p. 432.—GOULD, 1841, p. 337.—DE KAY, 1844, p. 52.

Porcellio scaber LATREILLE, 1804, 'Hist. Nat. des Crustacés et Insects,' VII, p. 45 (orig. descr.).—FITCH, 1855, p. 824; 1856, p. 121.—BUDDE-LUND, 1879, p. 3; 1885, p. 129 (descr.).—DOLLFUS, 1890, p. 66; 1896*d*, pp. 46, 48; 1897, p. 206.—MICHAELSEN, 1897, p. 128.—SARS, 1899, p. 176; Pl. LXXVII.—KRAEPELIN, 1901, p. 204.—RICHARDSON, 1901, p. 568; 1905, p. 621, Fig. 671.—RATHBUN, 1905, p. 45, check list, p. 4.—PAULMIER, 1905, p. 183, Fig. 56.—NORTON, 1909, p. 251.—THIELEMANN, 1910, p. 76.—FOWLER, 1912, p. 230 (descr.), Pl. LXIX.—RICHARDSON, 1912*c*, p. 29.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 380, Fig. 608.—ARCANGELI, 1914, p. 472.—VERHOEFF, 1917*a*, p. 221.—KUNKEL, 1918, p. 245 (descr.), Fig. 80.—WALLACE, 1919, p. 41.—WAHRBURG, 1922*a*, p. 286.—LONGNECKER, 1924, p. 197.—GANDARA, 1926, p. 285.—MOREIRA, 1927, p. 194.—JOHANSEN, 1929, p. 106.—BLAKE, 1930, p. 279; 1931, p. 352.—ARCANGELI, 1932, pp. 128, 129, Fig. 2.—MOREIRA, 1932, p. 430.—PROCTER, 1933, p. 248.—BIRSTEIN, 1933, p. 473.—PRATT, 1935, p. 441, Fig. 608.

The following may also be a synonym:

Porcellio cayennensis MIERS, 1877a, p. 667 (descr.), Pl. LXVIII, figs. 2-2b.—
 BUDDÉ-LUND, 1885, p. 131 (says perhaps a synonym of *scaber*).—VAN NAME, 1925, p.
 466.

NOTE.—*Oniscus asellus* apparently is erroneously entered among the syn-
 onyms of this species by Underwood, 1886, p. 363.

“Body oblong oval, about twice as long as it is broad, dorsal face
 slightly convex and very rough, owing to the presence of numerous
 rounded tubercles. Cephalon with the lateral lobes rather large and
 rounded; frontal lobe less prominent, obtusely triangular. Side-plates
 of mesosome of moderate size, with the posterior corners acutely pro-

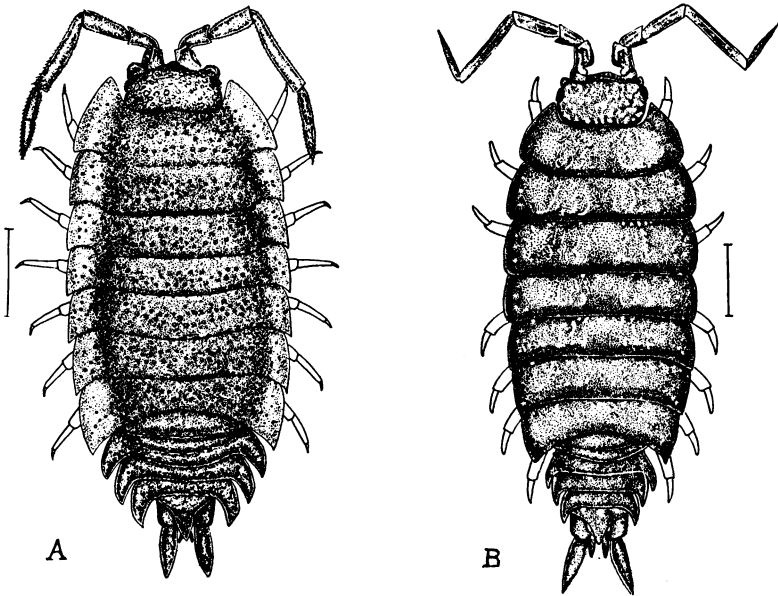


Fig. 127. A, *Porcellio scaber* Latreille. B, *Porcellionides pruinosus* (Brandt).
 After Paulmier, 1905.

duced. Metasome occupying about $1/4$ of the length of the body, epimeral plates of 3rd to 5th segments strongly recurved; last segment rather produced, terminating in an acute point slightly grooved dorsally. Antennae less slender, scarcely attaining half the length of the body, flagellum about as long as the last peduncular joint, and having its 2 articulations of nearly equal size. Last pair of legs differing but little in the two sexes. Opercular plates of only the two anterior pairs of

pleopoda with air-cavities. Uropoda with the outer ramus broadly lanceolate, and comparatively larger in male than in female. Colour of dorsal face generally a uniformly grayish black; sometimes, however, lighter, and variegated with irregular dark patches, more rarely black, with the side-plates light yellowish. Length of adult female 14 mm." (Sars, 1899, pp. 176-177.)

This is the most conspicuously tuberculated of the Porcellios common in the United States.

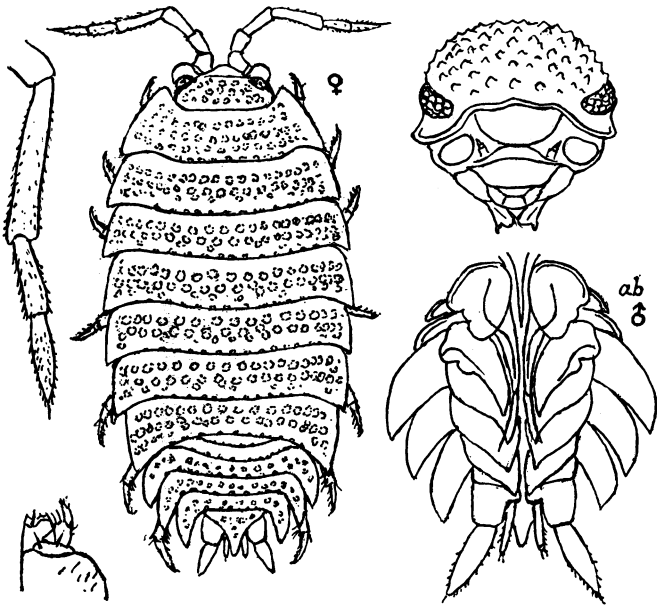


Fig. 128. *Porcellio scaber* Latreille. Adapted from Sars, 1899.

Two color varieties of this species were described by Brandt and Ratzeburg (*Medizinische Zoologie*, II, 1830-1834, p. 77), var. *marmoratus* "e testaceo flava vel e sordido flava vel uniformis vel maculis punctisque nigris conspersa," and var. *marginata* "nigra, pulcherrime flavo vel rufo limbata."

DISTRIBUTION.—A native of Europe that has followed human settlements throughout the greater part of the world, though apparently more at home in temperate than in hot regions, which, however, it has invaded to some extent. It is one of the commonest isopods in the northern half of the United States and is reported from eastern Mexico,

in low altitudes near Cordova, State of Vera Cruz, and in higher altitudes at "Tusitlan" (Tezuitlan, State of Puebla) by Saussure under the name *P. montezumae*, and if *P. cayennensis* Miers is a synonym, from Cayenne, Bogota, and other localities in Colombia in altitudes of 1800 to 2750 meters (examples of vars. *marmoratus* and *marginatus* also obtained at these localities); St. Croix, W. I.; Galapagos (Thielemann, 1922); Bermuda; Juan Fernandez (Dollfus, 1890; Arcangeli, 1914; Wahrburg, 1924); São Paulo, Brazil (Moreira, 1932). There are records from Greenland, Alaska, and various parts of Canada including Prince Edward Island (Johansen, 1929), all of which however are from either the eastern or the Pacific coastal regions or near the Great Lakes or St. Lawrence River.

***Porcellio scaber* variety *americanus* Arcangeli, 1932**

Arcangeli, 1932, p. 128, expresses the opinion that this species is endemic in the North American Pacific coast region and describes and figures (*loc. cit.*, Fig. 3) specimens from that region as a variety (var. *americanus*).

***Porcellio laevis* Latreille, 1804**

Figure 129

Porcellio aztecus SAUSSURE, 1857 (brief descr.), p. 307; 1858, p. 479 (descr.), Pl. v, fig. 38.—STUXBERG, 1875, p. 62.—MIERS, 1877a, p. 669.

Porcellio cinerascens BRANDT, 1833, p. 178 (descr.).—MILNE-EDWARDS, 1840, p. 170.—STUXBERG, 1875, p. 43.

Porcellio cotillae SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 478 (descr. name misprinted *cotillai*), Pl. v, fig. 37.

Porcellio cubensis SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 477 (descr.), Pl. v, fig. 35.—MIERS, 1877a, p. 668.

Porcellio dubius BRANDT, 1833, p. 178.—MILNE-EDWARDS, 1840, p. 170.—STUXBERG, 1875, p. 58.—UNDERWOOD, 1886, p. 362.

Porcellio laevis LATREILLE, 1804, 'Hist. Nat. des Crustacés et Insects,' VII, p. 46 (orig. descr.).—BUDDE-LUND, 1879, p. 3; 1885, p. 138 (descr.).—DOLLFUS, 1890, p. 66.—DAHL, 1892, p. 110.—DOLLFUS, 1893a, pp. 341, 344; 1894, p. 3; 1896d, p. 46; 1897, p. 207.—HANSEN, 1897, p. 124.—SARS, 1899, p. 181 (descr.), Pl. LXXIX, fig. 2.—KRAEPELIN, 1901, p. 204.—RICHARDSON, 1902, p. 301.—BUDDE-LUND, 1904, p. 120.—VERRILL, 1902, p. 844, Fig. 232a.—RICHARDSON, 1905, p. 614 (descr.), Fig. 666; 1912, Proc. U. S. Nat. Mus., XLII, p. 192.—FOWLER, 1912, p. 231 (descr.), Pl. LXX.—PRATT, 1916, p. 380.—POPENOE, 1917, p. 10, Fig. 7.—VERHOEFF, 1917a, p. 221.—PEARSE, 1917, p. 7.—WAHRBERG, 1922, p. 286.—VAN NAME, 1924, p. 185.—GANDARA, 1926, p. 285.—JOHANSEN, 1926, p. 166.—WALKER, 1927, p. 173.—MOREIRA, 1927, p. 194.—GIAMBIAGI, 1931, p. 420, Pls. IV, v.—BOONE, 1934, p. 569.—MOREIRA, 1932, p. 430.—PRATT, 1935, p. 441.

Porcellio mexicanus SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 479 (descr.), Pl. v, figs. 39, 40.—STUXBERG, 1875, p. 62.—MIERS, 1877a, p. 669 (makes syn. of *P. aztecus*).

Porcellio parvicornis RICHARDSON, 1902, p. 302 (descr.), Pl. XL, fig. 57.—VER-RILL, 1902, p. 844, Fig. 230.—RICHARDSON, 1905, p. 616 (descr.), Fig. 667.—VERHOEFF, 1907, p. 232 (says based on young *laevis*); 1917a, p. 221.—BOONE, 1921, p. 98.

Porcellio poeyi GUERIN, 1837, p. 132 (orig. descr.).—SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 477, Pl. v, fig. 34.

Porcellio sumichrasti SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 478, Pl. v, fig. 36.—MIERS, 1877a, p. 668.

The following are also probably to be regarded as synonyms:

Porcellio chilensis NICOLET, 1849, p. 272 (orig. descr.).—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*). (Not *P. chilensis* Dana, 1853.)

LOCALITY.—Chile.

Porcellio formosus STUXBERG, 1875, p. 57 (orig. descr.).—BUDDE-LUND, 1885, p. 141 (says perhaps not distinct from *P. laevis*).—UNDERWOOD, 1886, p. 362.—RICHARDSON, 1899, p. 862 (Ann. Mag. Nat. Hist., (7) IV, p. 329); 1900a, p. 304; 1905, p. 612 (descr.).—VERHOEFF, 1917a, p. 221.—PRATT, 1925, p. 441.

LOCALITIES.—San Pedro and San Francisco, California. See also under *Porcellionides virgatus*.

Porcellio gayi NICOLET, 1849, p. 272 (orig. descr.).—STUXBERG, 1875, p. 44.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*).

LOCALITY.—Chile.

Porcellio interruptus HELLER, 1861, p. 497 (orig. descr.); 1868, p. 136 (descr.), Pl. XII, fig. 6.—STUXBERG, 1875, p. 44.—MIERS, 1877, p. 669.—BUDDE-LUND, 1885, p. 140 (considers probably immature of *laevis*). (Not *P. interruptus* Koch, 1841.)

LOCALITY.—Chile.

Porcellio pulcher NICOLET, 1849, p. 271 (orig. descr.).—STUXBERG, 1875, p. 44.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*).

LOCALITY.—Chile, in damp places.

See also under syns. of *Cylisticus convervus*.

“Body oval, greatest width slightly exceeding half the length, dorsal face moderately convex and almost perfectly smooth. Cephalon with the lateral lobes well developed, rounded, frontal lobe obtusely triangular. Side-plates of mesosome subcontiguous, 1st pair considerably larger than the succeeding ones, which have the posterior corners but slightly produced. Metasome not nearly attaining 1/4 of the length of the body, epimeral plates of 3rd to 5th segments of moderate size and slightly recurved; last segment subtriangular, outer part acutely pro-

duced and slightly grooved above. Antennae very slender, equalling half the length of the body, flagellum not attaining the length of the last peduncular joint, and having the proximal articulation somewhat longer than the distal one. Last pair of legs differing but little in the two sexes. Opercular plates of only the 2 anterior pairs of pleopoda with air-cavities. Uropoda with the outer ramus in male nearly twice as long as in female. Colour of dorsal face leaden gray, the segments of mesosome having on each side of the median line an assemblage of lighter, wavy stripes; lower face and legs pale yellowish. Length of adult male reaching to 15 mm." (Sars, 1899, pp. 181, 182.)

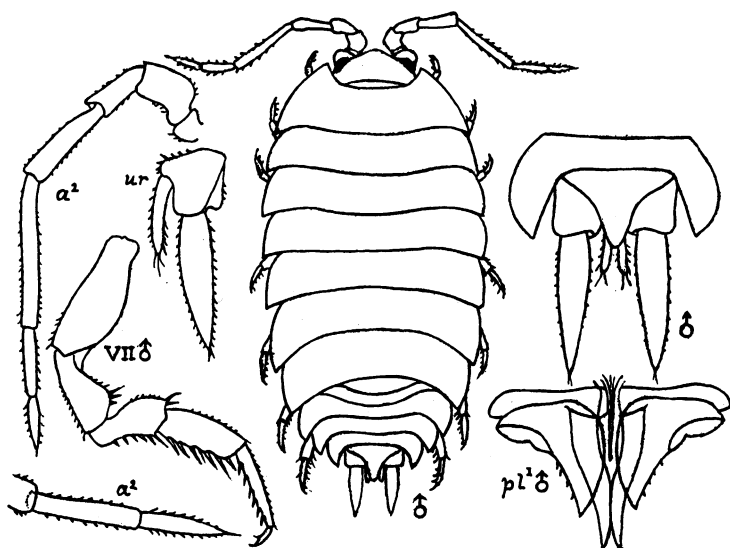


Fig. 129. *Porcellio laevis* Latreille. Adapted from Sars, 1899.

This is an Old World species that has followed human settlements throughout a large part of the world, especially in warm and warm-temperate regions, though also to a less extent in cooler latitudes. It is so widely distributed in South America, except the most southern part, Central America, Mexico, the West Indies and the southern and especially in the southwestern parts of the United States, north at least to northern-central California, southern Ohio, and the vicinity of New York City, that the mention of specific localities seems hardly needed here. It is found also at Bermuda, the Galapagos (Hansen, 1897), Juan Fernandez (Wahrberg, 1922), as well as at Hawaii. There are no

Canadian records that I know of. Richardson (1899, 1905) gives one from Unalaska, Aleutian IIs., which is so far north that a confirmation of the record would be desirable.

If not already established in America before the advent of white settlers, it must have been one of the first foreign species to become so, arriving with the early Spanish colonists.

***Porcellio spinicornis* Say, 1818**

Figure 130

Porcellio mixtus FITCH, 1855, p. 824 (descr.); 1856, p. 120.—UNDERWOOD, 1886, p. 362.

Porcellio pictus STUXBERG, 1875, p. 59.—BUDDE-LUND, 1879, p. 3; 1885, p. 123.—SARS, 1899, p. 177 (descr.), Pl. LXXVIII, fig. 1.—VERHOEFF, 1917a, p. 221.—BLAKE, 1931, p. 352.

Porcellio spinicornis SAY, 1818, p. 431 (orig. descr.).—DE KAY, 1844, p. 51.—STUXBERG, 1875, p. 55.—BUDDE-LUND, 1885, p. 124 (doubtfully distinguished from *pictus*).—STOLLER, 1902, p. 213.—RICHARDSON, 1905, p. 619, Fig. 669.—RATHBUN, 1905, p. 46, check list, p. 4.—FOWLER, 1912, p. 518.—KUNKEL, 1918, p. 243, Fig. 79.—JOHANSEN, 1926b, p. 166.—WALKER, 1927, p. 179.

See also *Porcellio limatus* Fitch, under syns. of *Oniscus asellus*.

“Body oblong oval, and considerably depressed, with the face rough owing to the presence of small elevated tubercles, less densely crowded than in *P. scaber*. Cephalon with the lateral lobes very large and slightly curved outwards, frontal lobe less prominent, and broadly rounded. Side-plates of mesosome well developed, with the posterior corners acuminate. Metasome scarcely attaining 1/4 of the length of the body, epimeral plates of 3rd and 5th segments prominent, recurved; last segment considerably produced, being almost as long as it is broad at the base, terminal part acute and slightly grooved above. Antennae rather slender, nearly half as long as the body, 2nd and 3rd joints of the peduncle carinated outside, the carina being in each of the joints produced at the end to a dentiform projection; flagellum not attaining the length of the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Last pair of legs in male more strongly built than in female, with the carpal joint considerably dilated. Opercular plates of the 2 anterior pairs of pleopoda with very distinct air-cavities. Uropoda with the outer ramus rather broad, and considerably larger in male than in female. Colour of dorsal face yellowish grey, variegated with dark brown patches, which are generally arranged in 5 longitudinal series on the mesosome; cephalon and middle part of metasome uniformly blackish. In fresh specimens, moreover, a double row of very conspicuous light yellow patches occurs along the middle of the

mesosome, caused by some opaque matter lying beneath the skin (renal excretions). Length of adult female reaching to 14 mm.

“Remarks.—The present species may be easily recognized by the comparatively greatly depressed body, the broadly rounded frontal lobe, the slender antennae, and the peculiar colouring of the dorsal face. In fresh specimens, the above-mentioned opaque patches along the dorsal face of the mesosome are very conspicuous, and may at once suffice for distinguishing this species from its allies. The extent of the dark

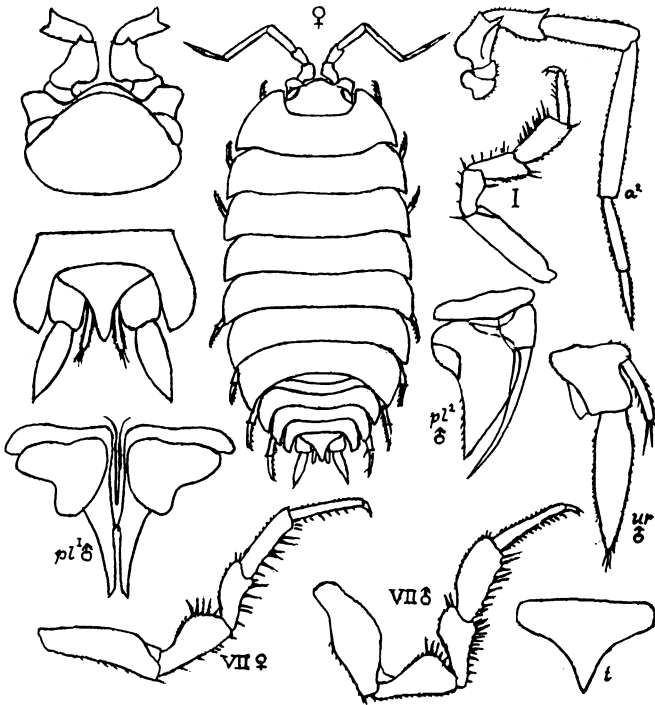


Fig. 130. *Porcellio spinicornis* Say. Adapted from Sars, 1899.

patches is, on the other hand, rather variable; but in all the specimens the cephalon and the middle part of the metasome exhibit a uniformly dark colour, and this has, indeed, given rise to the specific name, *melanocephalus*, proposed by Koch for this species.” (Sars, 1899, pp. 177, 178.)

DISTRIBUTION.—Common and widely distributed in northern and central Europe and established in northeastern North America, where

it has been recorded from New York State (Niagara and Schenectady), and Connecticut (Goshen and New Haven); Johansen, 1926, and Walker, 1927, give localities in southern Ontario and Quebec. The American Museum of Natural History has specimens from Saugerties, New York. "Found in the crevices of rocks and on shady limestone ridges" (Stoller).

Porcellio pubescens Dollfus, 1893

Figure 131

Porcellio pubescens DOLLFUS, 1893a, p. 341 (orig. descr.), Pl. x, figs. 7a-7c.

"Corps assez étroit, peu convexe, lisse et pubescent.

"Cephalon.—Lobe frontal médian largement triangulaire, lobes latéraux quadrangulaires, arrondis. Prosépistome très développé, muni d'un tubercule perliforme très net. Antennes atteignant la moitié du corps, premier article du fouet quatre fois plus court que le second.



Fig. 131. *Porcellio pubescens* Dollfus. Adapted from Dollfus, 1893a.

"Pleon.—Bord postérieur non sinueux.

"Pleon, Telson.—Parties latérales des somites du pleon assez divergents. Pleotelson aussi long que large, triangulaire, à côtés incurvés. Uropodes à base très développée, surtout du côté interne; endopodite implanté très en arrière et dépassant l'extrémité du pleotelson.

"Couleur.—D'un fauve clair, avec marbrures et taches brunes, formant trois bandes longitudinales, une médiane et deux latérales. Dans les exemplaires de la Colonie Tovar, la bande médiane est découpée et les côtés du pleon restent clairs.

"Dimensions.—8 × 3 1/2 mill." (Dollfus, 1893.)

LOCALITIES.—Petare, Venezuela, 5 female specimens; Colonie Tovar, Venezuela, 6 female specimens.

Porcellio granarus Nicolet, 1849

Porcellio granarus NICOLET, 1849, p. 273 (orig. descr.).—MIERS, 1877a, p. 669.—BUDE-LUND, 1879, p. 3; 1885, p. 149.

Porcellio granurus STUXBERG, 1875, p. 44.

"*P. fusco*; corpore elongato, granario; antennis exterioribus gracilibus, latis, lateralibus minimis; abdomine brevi, segmento ultimo trianguliformi."

"Body narrow, elongate and finely granulated, head scarcely set back into the concavity of the thorax, which is of little depth; forehead wide, almost straight and very abrupt, lateral lobes very small, not directed forward, lying against the sides of the head; antennae slender with the sixth article longer than the seventh; lateral plates of the body segments short, little rounded and almost squarely truncate; abdomen very short with the segments subequal; narrower than the thorax and terminating in a triangular point without exceeding the basal article of the last pair of appendages; legs without spines except for some hair-like ones. Color light brown with the lower side of the body and the legs pale yellow. Length, 5 lines; width, 2.5 lines." (Translated from original description.)

LOCALITY.—Chile, found with *P. gayi* (the latter a probable syn. of *P. laevis*).

***Porcellio liliputanus* Nicolet, 1849**

Porcellio liliputanus NICOLET, 1849, p. 273 (orig. descr.).—MIERS, 1877a, p. 669.—BUDDE-LUND, 1879, p. 3; 1885, p. 149.

Porcellio triliputanus STURXBERG, 1875, p. 44, (also *trilipatanus*)

"*P. fusco*; corpore ovato, convexo, tenuissime punctato; lobis lateralibus capitis minutissimis."

"Body oval, very convex and finely punctated, head wide, subglobose, with the forehead very much inclined and rounded at the top; lateral lobes very small and insignificant, and directed downward; sixth article of the antennae much shorter than the seventh; abdomen very short; the first five segments short and equal, terminated laterally by narrow prolonged plates, acute and directed backward; the last segment is large, triangular and longer than the basal article of the last pair of appendages. Color dark brown. Length, 2 lines; width, 1 line." (Translated from original description.)

LOCALITY.—Chile, in damp places.

SUBGENUS **PROPORCELLIO** VERHOEFF, 1917

A subdivision of *Porcellio* (see Verhoeff, 1917a, p. 214) comprising a few species of the Mediterranean region which approach *Porcellionides* in some respects.

Porcellio (Proporcellio) quadriseriatus Verhoeff, 1917

Figure 132

Porcellio (Proporcellio) quadriseriatus VERHOEFF, 1917, Jahresh. vat. nat. Ver. Wuerttemberg, LXXIII, p. 167 (orig. descr.).—GEISER, 1933, p. 29; 1934, p. 9.

See also remarks under synonymy of *Philoscia muscorum*.

The body is of somewhat elongate oval form and only moderately arched. The first three thoracic segments have the rear lateral angles rounded off to a successively diminishing extent; segment IV is the first one in which that angle is noticeably produced backward. The two or

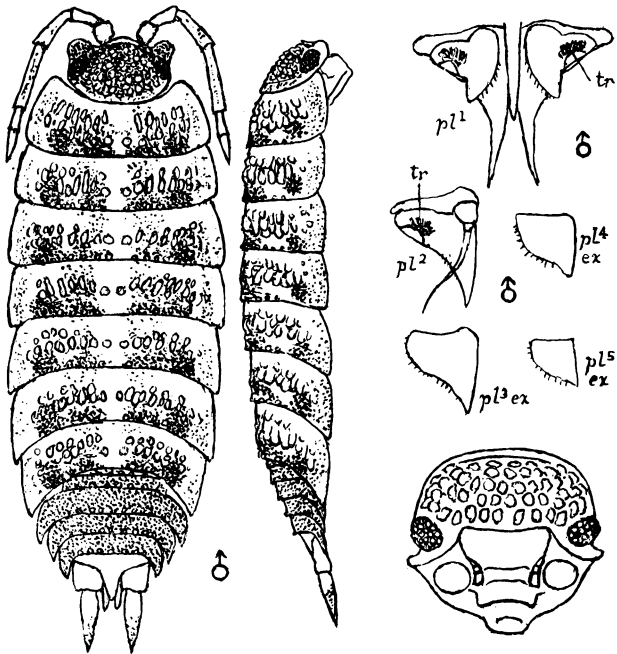


Fig. 132. *Porcellio (Proporcellio) quadriseriatus* Verhoeff.

three anterior segments, but especially segment I, have the lateral margin very slightly and narrowly rolled or turned outward. The general surface is somewhat tuberculate or rugose, in addition to which magnification shows the surface to be covered with minute rounded granules and scattered minute backwardly directed setae. The head is quite rough with numerous small, low rounded tubercles; these occur also on the thoracic segments, where, however, they become more or less confluent into low rugae; they are somewhat less numerous and conspicu-

ous on the posterior than on the more anterior segments, and are wanting on the abdomen. On both abdomen and thorax there are small, inconspicuous rounded tubercles in a row along the rear border of the segments. The telson is smooth but exhibits a slight median depression.

The front margin of the head exhibits prominent downwardly inclined lateral lobes which are rounded in front; between them the outline is that of a very wide obtuse triangle. The upper margin of the epistome is distinct and upturned, below it the epistome is smoothly convex.

The eyes are prominent with about eighteen well-formed ocelli, the antennae fairly long, with their segments of four-angled, slightly furrowed cross section, and with the two articles of the flagellum usually not far from equal in length or the proximal article more or less noticeably shorter, especially in young individuals.

There are sexual differences in the first three pairs of legs, those of the male having brush-like areas of slender spines on the carpus and merus; the males also have the external branches of the uropoda, and to some extent the basal segments also, longer than in the females.

The coloration of these specimens is striking. The head is dark purplish brown with numerous small light spots, the abdomen, except the telson, is also almost uniformly dark. The telson and the uropoda (except the tips of the external branches) are light, in most specimens practically entirely unpigmented, contrasting conspicuously with the dark abdominal segments. The thoracic segments each have a fairly large conspicuous dark spot on the rear basal part of each epimeron and a transversely extended dark area on the rear part of each segment on each side of the median line. The other parts of these segments are mainly light (unpigmented) or slightly clouded or marbled with the purplish brown, so that the thorax also appears light in contrast with the dark head and abdomen. Legs and under parts practically unpigmented.

Length, 6 to 7 mm.

LOCALITY.—Dallas, Texas, collected in large numbers, May 15 to June 1, 1932, in the greenhouse of the Southern Methodist University in traps with potato as bait, in company with *Porcellionides pruinosus* and *Porcellio laevis*, by Prof. S. W. Geiser. Some of these specimens, donated by Prof. Geiser, are in the American Museum of Natural History.

This is a species of the Old World not previously reported from America. Specimens of it were kindly identified for me by Prof. Ar-

cangeli of Turin, Italy. The type locality of the species is near Jaffa, Palestine, but Prof. Arcangeli states in his letter that he considers several other forms described from Greece, Sicily, and southern France as synonyms or varieties of it, so that the country from which it was imported is uncertain.

GENUS OR SUBGENUS **PORCELLIONIDES** MIERS, 1877

(Syn. *Metoponorthus*, Budde-Lund, 1885)

Typical species of this group differ considerably in appearance from typical members of *Porcellio* in having a narrower, usually somewhat less depressed body, the frontal and lateral lobes of the head much less developed, the thoracic epimera less expanded and the abdomen smaller and more abruptly contracted, yet, as pointed out by Verhoeff (1907a, p. 241; 1917a, p. 215), there are no characters of real importance separating the two groups, which, moreover, are connected by many intermediate species. However, this group has been generally accorded generic rank, and until further study can be made of the many insufficiently known American species of this section of the family, the adoption of any innovation in their classification would be premature, and probably would result in more inconvenience than advantage. An additional reason for caution in this matter is that some of the species may prove to belong in *Tracheoniscus* (see below) rather than in *Porcellio*.

Porcellionides pruinosus (Brandt), 1833

Figures 127B, 133, 134A

Metoponorthus pruinosus BUDDE-LUND, 1879, p. 4; 1885, p. 169 (descr.).—DOLLFUS, 1893a, pp. 342, 344 (*Mesoponorthus* and *Metoponorthus*).—BUDDE-LUND, 1893, p. 118.—STEBBING, 1893, p. 429.—DOLLFUS, 1894, p. 3; 1896b, p. 2; 1897a, p. 2; 1897, p. 209 (*Metoponosthus*).—SARS, 1899, p. 184 (descr.), Pl. LXXX, fig. 2.—RICHARDSON, 1901, p. 569.—KRAEPELIN, 1901, p. 204.—STOLLER, 1902, p. 213 (*Metoponorthus*).—VERRILL, 1902, p. 845.—RICHARDSON, 1902, p. 302; 1905, p. 627, Fig. 674.—PAULMIER, 1905, p. 183, Fig. 57.—RICHARDSON, 1910a, p. 95.—FOWLER, 1912, p. 517.—PRATT, 1916, p. 380, Fig. 609.—PEARSE, 1917, p. 7; 1921, p. 460.—KUNKEL, 1918, p. 247 (descr.), Fig. 82.—LONGNECKER, 1924, p. 198.—WALKER, 1927, p. 177.—GIAMBIAGI, 1931, p. 422, Pl. VI.—VERHOEFF, 1933, p. 106.

Metoponorthus schwencki MOREIRA, 1927, p. 145, Figs. 4-6.—SCHWENCK, 1927, p. ?, Figs. 7, 8, 10.—MOREIRA, 1932, p. 430 (*schwencki*, *schwenski*), Pl. III.

Porcellio immaculatus FITCH, 1855, p. 824; 1856, p. 120.—UNDERWOOD, 1886, p. 362.

Porcellio maculicornis STUXBERG, 1875, p. 55.—UNDERWOOD, 1886, p. 362.

Porcellio pruinosus BRANDT, 1833, p. 19 (orig. descr.).

Porcellio (*Porcellionides*) *pruinosus* ARCANGELI, 1930a, p. 3.

Porcellio (*Porcellionides*) *flavo-vittata* MIERS, 1877a, p. 669 (descr.), Pl. LXVIII, figs. 4-4b. See Budde-Lund, 1885, p. 171 (*P. flavo-vittatus*).

Porcellionides pruinosus RICHARDSON, 1912, p. 192.—PICADO, 1913, p. 337.—RICHARDSON, 1912c, p. 30 (*Procellionides*) COLLINGE, 1915, p. 509.—VAN NAME, 1924, p. 197, Fig. 19; 1925, p. 465; 1926, p. 2.—BLAKE, 1931, p. 353.

The following form is also perhaps a synonym:

Porcellio (*Porcellionides*) *jelskii* MIERS, 1877a, p. 668 (descr.), Pl. LXIII, figs. 3-36.

Porcellionides jelskii BUDDE-LUND, 1885, p. 170 (doubtful syn. of *pruinus*).—VAN NAME, 1925, p. 465 (doubtful syn. of *pruinus*).

See also *Porcellionides bermudezi* Boone, 1934, and *P. chilensis* (Dana), 1853.

“Body oblong, more than twice as long as it is broad, dorsal face but slightly convex and nearly smooth, though, on a closer examination,

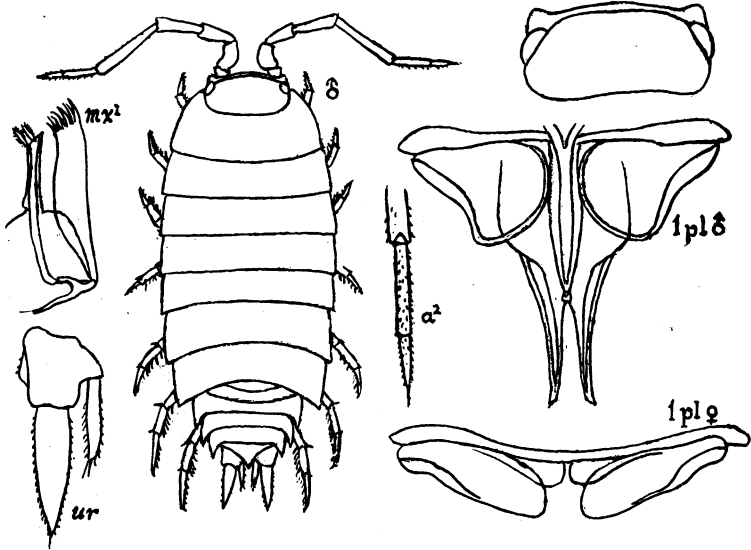


Fig. 133. *Porcellionides pruinosus* (Brandt). Adapted from Sars, 1899.

exhibiting a very fine granulation. Cephalon transversely quadrangular, almost twice as broad as it is long, lateral lobes extremely small, frontal margin straight. Side-plates of the 4 anterior segments of mesosome scarcely at all projecting, those of the 3 posterior segments somewhat larger, with the posterior corners obtusely acuminate. Metasome not attaining 1/4 of the length of the body, and much narrower than the mesosome, epimeral plates of the 2 anterior segments concealed, those of 3rd to 5th segments comparatively small, recurved; last segment nearly twice as broad at the base as it is long, subtriangular, tip pointed. An-

tennulae with the last joint scarcely longer than the middle one. Antennae very slender and elongated, exceeding half the length of the body, flagellum somewhat shorter than the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Legs very slender, minutely spinulose inside, propodal joint narrow, sub-linear. Opercular plates of only the 2 anterior pairs of pleopoda provided with air-cavities, and of somewhat different shape in the two sexes. Uropoda with the outer ramus nearly twice as long as the basal part, inner ramus extending scarcely to the middle of the outer. Colour of dorsal face light reddish brown, the segments of mesosome being bordered behind with darker brown, and having on each side of the median line a group of lighter dots or stripes; antennae banded with white. Length of adult female 9 mm." (Sars, 1899, pp. 184, 185.)

The statements in the above description of Sars, in my opinion, should have some qualification, as the thoracic segments exhibit quite noticeable, though very small, slightly elevated tubercles arranged in more or less distinct transverse rows, one of them along the rear edge of each segment.

The unusual length of the first article of the antennal flagellum compared to the terminal one affords great help in recognizing this species. See Figure 134A.

DISTRIBUTION.—A species of European origin that is now found about human settlements in most parts of the world, in warm as well as temperate climates. Widely distributed in settled places in South America (except perhaps in the extreme south), Central America, Mexico, and the West Indies. It occurs at Bermuda and the Galapagos Islands. The American Museum collection contains specimens from the St. Andrews Islands, Colombia, and from localities on the following West Indian Islands: New Providence, Andros, Turk's, Puerto Rico, Culebra, Mona, Desecheo, Jamaica, Cuba, and Dominica. It has also been recorded from St. Croix and St. Thomas. Richardson, 1912c, reports it from localities in Colombia from 1547 to 1820 meters in altitude; and Stebbing, 1893, from Equador at the great altitude of 13,300 feet.

In North America it ranges clear across the United States to the Pacific coast, but Walker, 1927, states that there is only one Canadian record (Lake Simcoe, Ontario).

Porcellionides sexfasciatus (Koch), 1847

Figure 134B

Metoponorthus sexfasciatus BUDDÉ-LUND, 1885, p. 167 (descr., no American

locality given).—DOLLFUS, 1890, p. 4.—DAHL, 1892, p. 110.—RICHARDSON, 1902, p. 302.—VERRILL, 1902, p. 844.—RICHARDSON, 1905, p. 629 (descr.).

Porcellio sexfasciatus KOCH, 1847, p. 208 (orig. descr.), Pl. VIII, fig. 99.—ARCANGELI, 1932b, p. 229.

Porcellionides sexfasciatus ARCANGELI, 1925, p. 42; 1930, p. 88.

Best distinguished from *pruinus* by the antennae, which are proportionately very slightly shorter and have the two articles of the flagellum nearly equal, the proximal one being just perceptibly longer, and by the color markings. In this species the markings of the dorsal surface form somewhat interrupted, but often conspicuous, light and dark longitudinal stripes, while the general color in *pruinus* is very uniform. The present species, if the few specimens at hand give sufficient indication, is somewhat smoother than *pruinus*, and each thoracic

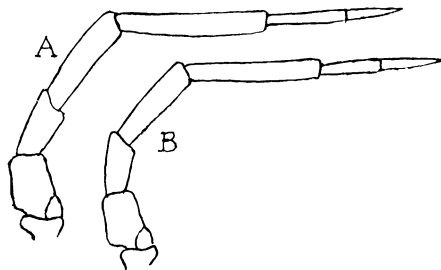


Fig. 134. A, antenna of *Porcellionides pruinus* (Brandt); B, *Porcellionides sexfasciatus* (Koch).

epimeron bears, posterior to its center, a low and small, but nevertheless fairly noticeable, tubercle. Budde-Lund, 1885, mentions a small difference in the number of penicilli on the inner mala of the mandible: three to four in *sexfasciatus*; four to five (on the left mandible) six in *pruinus*. I was unable to notice much, if any, difference in the telson of the two species.

DISTRIBUTION.—This species, native of countries north and south of the Mediterranean, is included here because it has become established in Bermuda. Three specimens from there were reported by Dollfus, 1890, and the Yale University collection contains numerous specimens collected at Walshingham, Bermuda, by Professor Verrill in 1898 and 1901.

Porcellionides virgatus (Budde-Lund), 1885

Figure 135

Metoponorthus virgatus BUDE-LUND, 1879, p. 4 (*nomen nudum*); 1885, p. 182

(orig. descr.).—RICHARDSON, 1900, p. 303; 1901, p. 569; 1905, p. 630 (descr.).—VERHOEFF, 1916, p. 124.

Porcellio (Proporcellio) formosus ARCANGELI, 1932, p. 130, Fig. 4. (not Stuxberg, 1875).

See also *P. mulaiki*, p. 522.

“Body oblong oval, convex, smooth or obscurely and finely granulated and tuberculated.

“Inner face of the right mandible furnished with four plumose processes, of the left mandible with five.

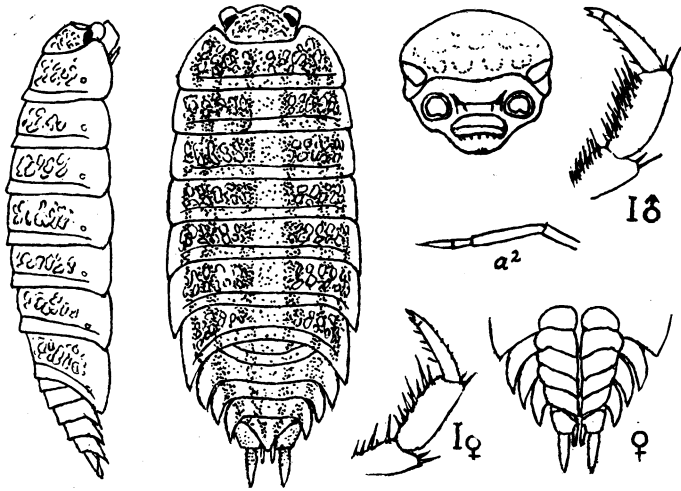


Fig. 135. *Porcellionides virgatus* (Budde-Lund).

“Second pair of antennae equal to half the length of the body; the first article of the flagellum is shorter than the second.

“Antero-lateral lobes of the head small, rounded; median lobe very small, widely rounded; epistome slightly convex, smooth. The terminal abdominal segment is short, triangular, with the sides straight; it is flat above, scarcely excavated.

“Color grayish black; there are white tubercles in the middle of the thorax and white spots arranged in three longitudinal lines.

“The epimera of the thorax are furnished with a shining tubercle distant from the margin. The legs are spotted with black, thickest on the coxae.

“Length, 9–10 mm.; width, 4.5–5 mm.; height, 2–2.2 mm.” (Richardson, 1905, p. 630, trans. from Budde-Lund, 1885.)

Eyes with between 25 and 30 ocelli. Upper border of epistome distinct and not very prominent, curving down a little in the middle when seen from in front. There is a transverse row of four large but low and indistinct tubercles on the forehead just above it.

The body surface is fairly smooth and even, but exhibits small smooth granules, not very close together, under moderate magnification. In addition, there are faintly noticeable rugae on the lateral regions of the back. Rear angles of first two thoracic segments more or less rounded and forming about a right angle. Those of the third also somewhat rounded and just perceptibly produced back. Those of the others are acute or nearly so, and are more and more produced backward in successive segments. The abdomen is rather small and short, but does not appear abruptly narrower than the thorax, for the abdominal epimera 3, 4, and 5, though acute and curved back in usual manner, are sufficiently long to approximately continue the general elliptical outline of the body. The telson is fairly acute at the apex; its dorsal surface is slightly concave in the middle. The external branches of the uropoda are tapering, acute, and fairly long in the male, but noticeably shorter in the female, and as in many species of this group, there is a sexual difference in the three anterior legs, the males having a brush-like area of slender spines on the carpus and merus, the females a few stout spines only. Tracheae of the pleopoda of the *Porcellio* type are present in the exopodites of the first two pairs only.

The coloration is handsome and conspicuous, the dark gray pigmented areas contrasting strongly with the yellow unpigmented parts, the darker markings being so disposed as to give the back a longitudinally striped appearance as shown in the figure. The external branches of the uropoda are light colored toward the ends, and large light areas on the epimera of the thorax give the body a broad light border. A small light spot surrounds the tubercle alluded to in Budde-Lund's description, which lies in the dark part of the epimera.

Length of the larger Florida specimens over 8 mm.

DISTRIBUTION.—“Ad Aureliam Novam cl. Kröyer nonnulla exampla cepit; etiam e Florida exampla a cl. Leuckart, capta in Mus. Uljanini asservantur.” (Budde-Lund, 1885.) “Aurelia Nova” is New Orleans.

The specimens described and figured here and referred to this species are in the American Museum of Natural History and were collected in Florida by Dr. F. E. Lutz in November, 1911, nine at Fort Myers in a grassy field near the river west of the town, and one at Newberry, in second growth pine and palmetto scrub, under rubbish on sandy ground.

Arcangeli, 1932, records and gives some good figures of what is evidently this same species from specimens collected by Prof. Silvestri at Baton Rouge, Louisiana (hence near the type locality), and Uvalde in southern Texas, though he calls it *Porcellio formosus* Stuxberg and refers it to the Old World subgenus *Proporcellio*. Stuxberg's species was described from California and is probably a synonym of *P. laevis*. It does not seem probable that this species occurs in California.

***Porcellionides habanensis*, new species**

Figure 136

Body rather elongate oblong in a dorsal view, the abdomen abruptly narrower. Body surface rather smooth, irregularly rugose to a very slight extent (noticeable

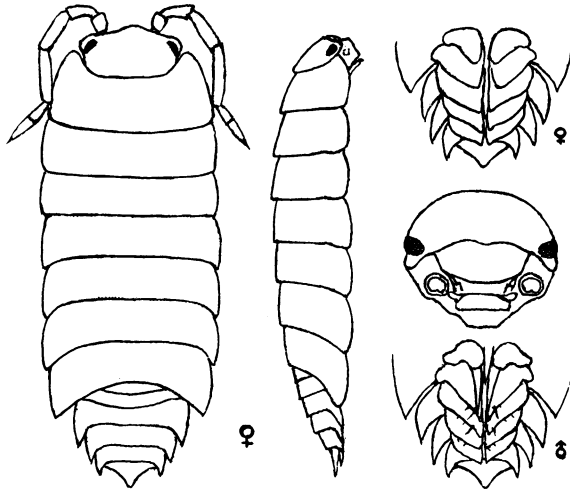


Fig. 136. *Porcellionides habanensis*, new species.

only when the surface is dry) on the dorso-lateral regions of the thorax. The body surface is quite thickly and evenly dotted with minute and extremely short stiff setae, directed backward and so short that they cannot be said to cause a condition of pubescence, but merely to give the surface a scabrous roughness.

The head is well set back into the thorax, and rather wide, its front outline somewhat tumid or prominent in the middle, and with a pair of small, widely separated, obliquely downward and outwardly directed lateral lobes under the eyes. The eyes are widely separated, rather small, oval and bulging, with more than twenty small ocelli. The upper border of the epistome is distinctly marked, but closely appressed in the median region. It is sinuously curved and dips down in the middle. First antennae with the basal joint wide. Second antennae are present in only one of the specimens, an immature male, and are of moderate length and rather stout, reaching

to a point on the third segment when well drawn back. The flagellum is stout; the terminal article exceeds the basal article a little in length, and bears a short, stout spine at the tip.

All the thoracic segments have the lateral ends truncated in a curved outline. In the case of the first three, the rear outline is a little sinuous in the lateral regions and the rear corner is well rounded off. The last four have this corner angular and produced backward to an increasing extent in successive segments. In the female the epimera of segments II to V, inclusive, show evidences of a suture at the base. In abdominal segments three, four, and five the lateral parts are rather wide, moderately produced, curved backward, and acute. The telson is rather wide and short, triangular with slightly concave sides, and rounded off at the extreme tip. Its upper surface is quite smooth and even.

The legs are missing in the two larger specimens. In the immature male, they are fairly long and stout but with rather weakly developed spines. The carpus and merus of the first pair of legs are much wider, stouter, and more flattened than in any succeeding pair. There are a few stout spines on the external margins of the outer lamellae of the pleopoda in the male. Only the basal joints of the uropoda are present in these specimens.

Color yellowish, almost unpigmented, there being only a little very pale brownish pigment on the dorsal regions. In consequence, the small black eyes are very conspicuous.

Length of largest specimen (a female), 6.3 mm.

LOCALITY.—University Hill, Havana, Cuba. One female (type, Cat. No. 6524) and two males collected by Dr. F. E. Lutz, Nov. 18, 1911, with specimens of *Porcellio laevis*; all are in the American Museum of Natural History.

Only very insufficient material of this species is available and better specimens will be required for a satisfactory description. Only one of the males, an immature individual 4 mm. long, is approximately complete. The type lacks the legs, antennae and uropoda, the large male is incomplete, lacking the head and fore part of the body. The circumstances under which it was found suggest that it may be an accidentally introduced Old World form, but I have not found any such species to which I can assign it. I may add that although the pleopoda were not removed for especial study, it appears to be a true *Porcellionides*, not *Tracheoniscus*.

***Porcellionides saussurei* (Dollfus), 1896**

Figure 137

Metoponorthus saussurei DOLLFUS, 1896d, p. 48 (orig. descr.), Fig. 2.—RICHARDSON, 1905, p. 626, Fig. 673.

The original description as translated by Richardson, 1905, is as follows:

"Body oval, elongated, feebly and irregularly granulated; each segment of the abdomen has a posterior depression and the first segments are furnished on each side with a little pearl-like granulation.

"Head(?), Thorax.—The first segment has the posterior margin almost straight and not sinuated. Abdomen a little narrower; the lateral processes of the third to the fifth abdominal segments are well developed and a little divergent. Terminal segment triangular, with the sides incurved and obtuse at the apex. Uropoda with the basal segment reaching the apex of the terminal abdominal segment; inner and outer branches very much elongated, the former being linear, the latter

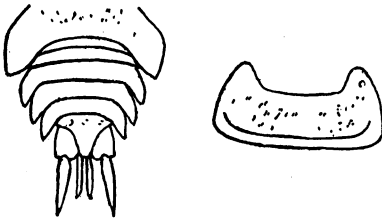


Fig. 137. *Porcellionides saussurei* (Dollfus). Adapted from Dollfus, 1896d.

lanceolate. Color, brownish with light wavy spots; there are three little light spots at the base of the terminal segment. Dimensions.—Length, 10 mm.(?). Width, 3 1/2 mm.

"LOCALITY.—Cordova, Mexico."

Porcellionides chilensis (Dana), 1853

Figure 138

Metoponorthus chilensis BUDDÉ-LUND, 1879, p. 5; 1885, p. 191.

Porcellio chilensis DANA, 1852-1853, p. 727 (orig. descr.), Pl. XLVII, figs. 9a-9d.—MIERS, 1877a, p. 668.

Not *Porcellio chilensis* Nicolet, 1849 (which is probably *P. laevis*).

"Very faintly granulate. Head much transverse, not imbedded in following segment, antero-lateral processes minute, rectangular, front sparingly arcuate. Antennae very minutely hirsute, flagellum slightly shorter than preceding joint, its first joint nearly twice as long as the second. Five anterior articulations of thorax nearly straight transverse. Abdomen short, not longer than broad, third, fourth, and fifth segments laterally salient and acute, last triangular, subacute, sides excavate, breadth at base a little greater than its length. Caudal stylets as long as abdomen, the base hardly reaching to apex of abdomen, shorter branch exsert, a little stout, subulate, having three setae at apex, outer branch stout, acuminate, more than three times as long as the other.

“Length, six to eight lines. There is a resemblance in this species to the *fuegiensis*; yet it is much larger and lighter-coloured. The shorter branch of the stylets is not slender linear, as in the *fuegiensis*, and has three setae at apex; the front is much less projecting. The

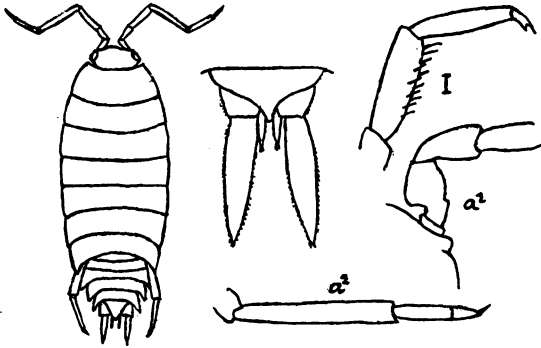


Fig. 138. *Porcellionides chilensis* (Dana). Adapted from Dana, 1855.

granules of the surface are quite small, and there is some pubescence.” (Dana, 1852–1853, p. 727.)

LOCALITY.—Valparaiso, Chile.

Possibly a synonym of *P. pruinus*.

Porcellionides advena (Stuxberg), 1872

Figures 139, 140

Porcellio advena STUXBERG, 1872, p. 4 (orig. descr.), Pl. x; 1875, p. 43.—BUDDELUND, 1879, p. 5; 1885, p. 191 (says perhaps a *Metoponorthus*).

In view of the careful illustrations given by Stuxberg, it does not seem necessary to quote in full his lengthy description. The concluding paragraphs of it, which deal with features not shown in the figures, are as follows:

“Sculptura: Series tuberculorum septimi trunci segmenti arcuata, sexti subarcuata, quinti, quarti, tertii, secundi recta, margini anteriori appropinquans. Primum trunci segmentum ad marginem posteriorem serie tuberculorum confluentium majorum, ante quam 2–3 aliae sparsorum minusque conspicuorum. Margo omnium trunci segmentorum aequae ac capitis posterior saepissime laevis, interdum tuberculis fere inconspicuis, longo intervallo distantibus. Omnia caudae segmenta, ultimo excepto, margine postico tuberculis minimis, in medio creberri-

mis, praedito. Cutis, ut plerumque in Oniscoidis, aculeis perbreuibus, trigonis, subseriatim dispositis.

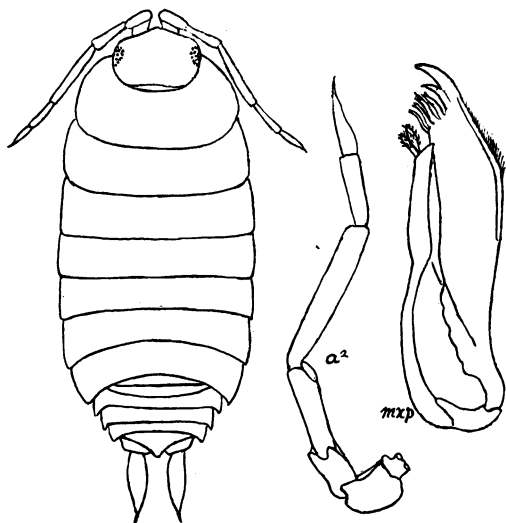


Fig. 139. *Porcellionides advena* (Stuxberg). Adapted from Stuxberg, 1875.

“Color dorsi rufo-griseus, maculis nullis, epimeris haud multo pallidioribus.

“Longitudo 5.5 mm.; latitudo 2.5 mm. Longitudo antennarum exteriorum 3.5 mm.” (Stuxberg, 1872, pp. 4, 5.)

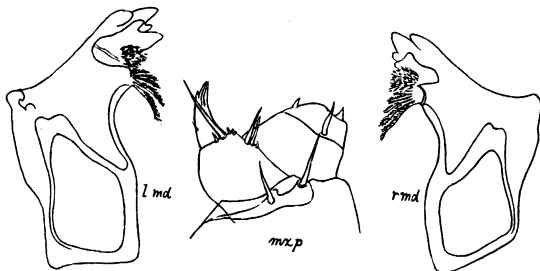


Fig. 140. *Porcellionides advena* (Stuxberg). Adapted from Stuxberg, 1875.

LOCALITY.—Brazil (apparently, from Stuxberg’s statement, with some possibility of doubt): “Ex Brasilia (Caldas) duo tantum specimina, in collectione plantarum a Dmno. S. Henschen reportata fortuito inventa, vidimus.”

Porcellionides fuegiensis (Dana), 1853

Figure 141

Metoponorthus fuegiensis BUDE-LUND, 1879, p. 5; 1885, p. 191.*Porcellio fuegiensis* DANA, 1853, pp. 726 (orig. descr.), 728, Pl. XLVII, figs. 8a-8d.—STUXBERG, 1875, p. 43.

“Abdomen abruptly a little narrower than thorax. Head anteriorly with an abrupt vertical surface and acute edge above, antero-lateral process very small and subrectangular, front salient, nearly straight transverse. Segments of thorax in part rugato-granulate; segments of abdomen very finely granulate, third, fourth, and fifth laterally expanded and salient, last triangular, somewhat transverse, and above concave, hardly projecting beyond base of stylets; inner branch of stylets long salient, and short hirsute; outer branch half as long as abdomen.

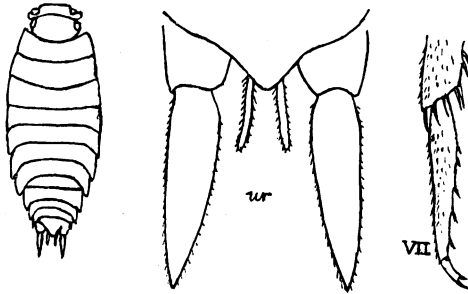


Fig. 141. *Porcellionides fuegiensis* (Dana). Adapted from Dana, 1855.

“Length of body, four lines. The projection of the inner branches of the stylets is a striking character, since they are in sight from above nearly their whole length, and extend one-third of the distance to the apex of the longer stylets. The antennae of the specimens were mutilated, and we are, therefore, in some doubt as to the number of joints of the flagellum. The granules of the surface are hardly granules, they appearing partly like wrinkles though raised, ranging longitudinally across the segments of the thorax near their middle.” (Dana, 1853, p. 726.)

LOCALITY.—Near Nassau Bay, Tierra del Fuego.

Included in *Porcellio* with doubt by Dana, owing to the mutilation of the antennae.

Porcellionides brunneus (Brandt), 1853

Metoponorthus brunneus BUDDÉ-LUND, 1879, p. 4; 1885, p. 171 (new descr.).

Porcellio brunneus BRANDT, 1833, p. 180 (orig. descr.).—MILNE-EDWARDS, III, 1840, p. 172 (descr.).—STUXBERG, 1875, p. 43.

Porcellionides brunneus VAN NAME, 1925, p. 465.

“Oblonge ovalis, paulisper convexus, tenuiter praesertim antice granulatus, minutissime squamatus.

“Antennae exteriores corpore dimidio longiores; 3-4 carinati, articuli 2-3 ad apicem acute dentati. Lobi frontales laterales parvi; linea marginalis frontalis medio curvata. Epistoma linea transversa medio acutius sinuata.

“Cauda a trunci annulo septimo maximam partem complecta; annulus analis brevis, triangulus, lateribus profundius incurvis, supra planus, basi levissime trifoveolato.

“Color e rufo brunneus, uniformis.

“Long. 10 mm. Lat. 4.75 mm.” (Budde-Lund, 1885, pp. 171-182.)

LOCALITY.—“Demerary” (Brandt). Type in Berlin Museum (Budde-Lund).

Porcellionides minutissimus (Boone), 1918

Figure 142

Philoscia minutissima BOONE, 1918, p. 601 (orig. descr.), Pl. xcii, fig. 2; 1934, pp. 573, 574.

Through the kindness of Dr. Waldo L. Schmitt of the U. S. National Museum, I have had the opportunity of examining two cotypes of this species, both of them females. The body is rather flattened, ovate in a dorsal view, and much more broadly rounded in front than behind. Its surface is very slightly rugose or roughened with a minute irregular, slightly scabrous tuberculation noticeable only on considerable magnification. At its front end the abdomen is but little narrower than the thorax, not greatly breaking the oval outline of the body, and is rather short and rapidly tapered. The head is fairly wide, its front outline (seen from above) gently convex, with small downwardly and forwardly extending, sharply rounded, almost angular, lateral lobes below the eyes. These lobes project forward sufficiently to be noticeable in a dorsal view. The frontal line is sinuously arched, prominent laterally and very distinct even in the middle; below it the face is abruptly vertically flattened. The supra-antennal line is less well defined but discernible. It dips down in a V-shaped angle in the middle. The antennae would

reach well along the third segment if fully drawn back. They have a long, stout flagellum of two subequal articles. The eyes are rather small with not over ten well-developed ocelli, and are somewhat irregularly pigmented.

The thoracic segments I to III have the rear lateral angle well rounded; in segment IV it forms a slightly rounded off right angle, and in the succeeding ones it is increasingly acute.

The abdominal epimera 3 to 5 are short, moderately wide, and backwardly curved. The telson is triangular with quite strongly concave side outlines. The basal joints of the uropoda reach about to the tip of the telson, the external branches are rather short, stout, and sharply tapered; the slender inner branches are also tapered and flattened from side to side and less than two-thirds as long as the outer.

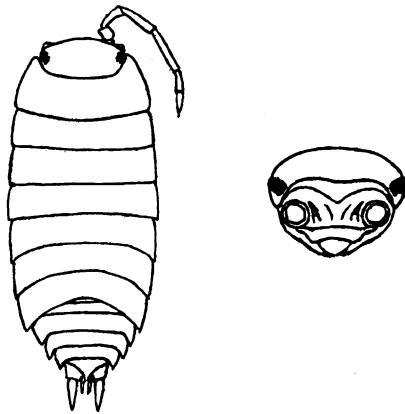


Fig. 142. *Porcellionides minutissimus* (Boone). From cotype in the U. S. National Museum.

The color is light brownish, with little evident pigmentation, as would be expected in a cave species. Miss Boone mentions irregular fuscous patches and a median yellow stripe in the type. The length of one of the cotypes would equal that given for the type by Miss Boone (4 mm.).

LOCALITY.—The type and six other specimens, all in the U. S. National Museum, were secured on bat guano in Hunt's Cave, New Providence, Bahamas.

Porcellionides bermudezi Boone, 1934

Figure 143

Porcellionides bermudezi BOONE, 1934, p. 512 (orig. descr.), Fig. 3.

The figures of this species accompanying the original description do not satisfactorily bring out its close resemblance to *Porcellionides pruinosus* (Brandt).

Dr. C. H. Blake, after examining the type and only specimen, a female only 2.5 mm. long, found at Rincon de Genuelo, Cuba, and now

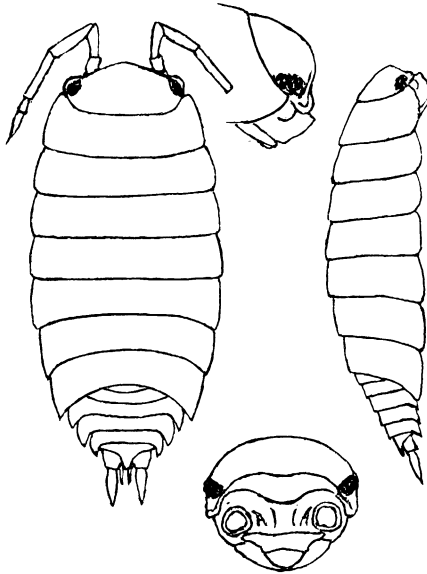


Fig. 143. *Porcellionides bermudezi* Boone.

in the American Museum of Natural History (Cat. No. 6602), expressed the view that it is a young *pruinosus*, and I am very strongly inclined to agree with this opinion. I consider the chief obstacle to definitely placing it among the synonyms of *pruinosus*, to be the lack, at the time of writing, of specimens of *pruinosus* in a correspondingly early stage of growth to permit of an exact comparison.

LEPTOTRICHUS BUDE-LUND, 1885

“Body rather convex, scarcely contractile, generally setigerous.

“Second pair of antennae short, the first four articles of the peduncle

subequal in length; flagellum composed of two articles, of which the first is much shorter than the second.

“Front of head without a margin, produced in the middle with the epistome bulbous; antero-lateral processes obtuse. Vertical marginal line posteriorly wanting. Eyes small.

“Lateral parts of thoracic segments not expanded.

“Terminal segment of abdomen generally triangular; epimera of the third, fourth, and fifth segments moderately large.

“First and second pairs of pleopoda furnished with tracheae” (Richardson, 1905, p. 624.)

Leptotrichus granulatus Richardson, 1902

Figure 144

Leptotrichus granulatus RICHARDSON, 1902, p. 303 (orig. descr.), Pl. XL, fig. 58.—VERRILL, 1902, p. 844, Fig. 231.—RICHARDSON, 1905, p. 624, Fig. 672.—PEARSE, 1915, p. 543.—BOONE, 1918, p. 603.—ARCANGELI, 1930a, p. 3.

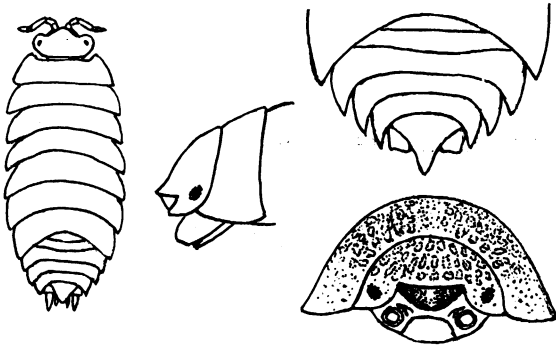


Fig. 144. *Leptotrichus granulatus* Richardson. Left-hand figure adapted from Richardson, 1902. Others from specimen in Yale University Museum.

“Body roughly and minutely granulated. Color light reddish or yellowish brown, with markings of dark brown in patches on each segment, forming four longitudinal rows, the two median rows not extending anteriorly beyond the third segment of the thorax in one specimen, and in the other being almost obsolete.

“The head is produced in front in a prominent, rounded, median lobe, and at the sides in large rounded lateral lobes. The eyes are small, but distinct, and are placed at the base of the lateral lobes. The external antennae are very short, not reaching the anterior angle of the first thoracic segment. The fourth joint of the peduncle is not longer than

the third; the flagellum is composed of two joints, the first of which is about half the length of the second.

"The thoracic segments are subequal in length, the lateral parts broadly expanded.

"The first two abdominal segments have the lateral parts undeveloped. The third, fourth, and fifth segments are broadly expanded laterally, the outer margins forming a continuous and unbroken line with the margins of the thoracic segments, the terminal segment of the abdomen extends but a distance of half its length beyond the epimera of the preceding segment; its surface is smooth, the basal joint of the uropoda attains half the length of the last segment. The outer branch extends half its length beyond this." (Richardson, 1902, p. 303.)

Length of type, 4.15 mm.

I have had the opportunity of examining one of Richardson's Bermuda examples of this species at the Yale University Museum, but the specimen was found to be so brittle, and its legs set in such positions, as not to permit of a satisfactory study without demolishing it. However, its general character suggests probable relationship to the true *Leptotrichus* of the Old World or some allied genus of the *Porcellio* group, rather than to *Trichorhina*, to which most of the supposed American species of *Leptotrichus* really belong.

The following notes were made from this specimen, to supplement Richardson's statements:

Body fairly broad, rather highly arched and more compactly articulated than would be inferred from Richardson's figure.

Dorsal surface with thickly scattered small, low, irregular tubercles, best developed on the head and anterior part of the body; the surface also bears very short, scabrous setae conspicuous when the body is dry.

The large, lateral lobes of the head are greatly extended downward as well as forward; between them, the line of demarcation between the forehead and epistome is prominently convex in a dorsal view, but nearly horizontal and little curved in a front view; the upper part of the epistome is very convex and deeply pigmented. The eyes are oval and contain at least fifteen ocelli.

All the thoracic segments, even the first to a slight degree, have the rear lateral angle extended back to an increasing extent toward the rear of the body; the thoracic epimera are large and descend obliquely.

LOCALITIES.—Type locality, Castle Harbor, Bermuda, "in dead coral." Two specimens, including type, in Yale University Museum

(Richardson, 1902). Pearce, 1915, p. 543, reports it from Santa Marta, Colombia, as follows:

"Thirty specimens of this interesting isopod were collected . . . under some bricks in the patio of our house in Santa Marta; in a log in an ant's nest and under leaves in the forest at Fundacion; under the bark of a rough tree near La Rosa. It has previously been reported only from the Bermudas, where it was found in dead coral."

He does not, however, give any statements or figures in support of his course in assigning his specimens to Richardson's species, and a comparison of material from the two localities would be very desirable.

Leptotrichus vedadoensis Boone, 1918

Figure 145

Leptotrichus vedadoensis BOONE, 1918, p. 603 (orig. descr.), Pl. xcii, fig. 3.

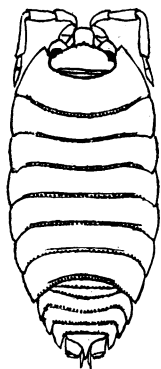


Fig. 145. *Porcellio vedadoensis* Boone. Adapted from Boone, 1918.

"Body elongate-ovate, subconvex, twice as long as wide, 6 mm., 3 mm., densely granulated. Head produced in front in a conspicuous median lobe which is squarish with the anterior margin rounded and is tilted upward and outward; the lateral lobes are large and divergent and broadly rounded. The eyes are moderately large, oval, complex, and situated at the base of the lateral lobes. The second antennae have the first four articles of the peduncle subequal; the fifth is much longer, about 1 mm.; the flagellum is biarticulate, the first article being about two-thirds as long as the second and terminating in a minute hooklike point; the flagellum is about as long as the fifth joint; the second antennae extend to the anterior margin of the second thoracic segment.

"Thorax.—The first segment is slightly longer than the others, about 1 mm., with its lateral margins expanded and surrounding the

head, the second to seventh segments, inclusive, are similar, subequal, with their lateral parts moderately expanded and the post-lateral angles gradually acutely produced. The legs are similar, subequal and have the inner margin ornamented with brushlike tufts of spines.

"Abdomen.—The first and second segments are compressed and have the lateral parts concealed by the seventh thoracic segment; the third, fourth, and fifth segments are broadly expanded, forming a continuous curve with the margin of the thoracic segments; the sixth segment is abruptly narrow, triangulate, with the posterior margins recurved. The peduncle of the uropod is broad, about two-thirds as long as the terminal segment; the inner branch is minute, placed at the inner distal angle of the peduncle; the outer branch is broken off.

"The posterior margins of the head, thorax, and first five abdominal segments are heavily carinated. The entire dorsal surface is densely granulated, has scattered minute pigment spots, and is finely setiferous." (Boone, 1918, p. 603.)

LOCALITY.—La Puntilla, Vedado, near Havana, Cuba. Type and two other specimens in the U. S. National Museum (Boone).

This species does not appear to belong in *Leptotrichus*, but I have left it here provisionally through uncertainty where to place it.

NAGARA BUDE-LUND, 1908

Established by Budde-Lund, 1908a, p. 284, as a subgenus of *Porcellio*, with *Porcellio* (or *Lyprobius*) *cristatus* Dollfus, 1889, as type, though he treats it practically as a genus. He gives the following diagnosis:

"Superficies granulata et squamata. Oculi mediocres; ocelli numero ca. 20. Antennae breviores; flagellum biarticulatum, articulus prior altero multo brevior. Frons in lateribus lobata, in medio carina vel crista transversa, saepe abbreviata instructa. Mandibularum lacinia interior penicillis duobus in mandibula dextra, penicillis tribus in mandibula sinistra. Margo exterior mandibularum serie spinarum munitus. Maxillarum prioris paris lamina exterior dentibus 10 (4 + 6; dentes 1. 3. 4. 6. ad apicem fissi, 2. 5. integri, acuti); lamina interior spina posteriore brevi penicillis ambobus longis, aequalibus. Maxillipedum mala spina longiore et aculeis 3, posterioribus quam anteriore multo majoribus; margo superior articuli 2 di (labialis) hirsutus.

"Trunci segmentum 1. linea collari cum linea laterali manifestiore conjuncta; margo posterior curvatus. Segmentum 2. pronoto mediocri, processu laterali nullo. In epimeris segmentorum 2. 3. 4. in femina linea suturalis adest. Unguiculi pedum appendice simplici.

“Caudae pleopodum exopodita omnium parium tracheis instructa, hae priorum parium saepe parvae. Telsum breve, triangulum. Uropodium scapus latere exteriori breviter triangulo exciso. Exopoditum et endopoditum mediocria.”

Nagara cristata (Dollfus), 1889

Figure 146

Leptotrichus emarginatus PEARSE, 1917, p. 5 (descr.), Fig. 3.—VAN NAME, 1925, p. 466.

Lyprobius cristatus BUDDE-LUND, 1893, p. 127 (notes on characters).—DOLLFUS, 1893a, p. 345.—VAN NAME, 1925, p. 466.

Nagara cristata BUDDE-LUND, 1908a, pp. 281 (*cristatus*), 284 (made type of new subgenus of *Porcellio*, *Nagara*; redescribed), Pl. xiv, figs. 27-39; 1912, p. 381.—VERHOEFF, 1926, pp. 317, 318.—ARCANGELI, 1930a, pp. 3, 11, Fig. 3.

Porcellio cristatus DOLLFUS, 1889, p. 91 (orig. descr.), Pl. v, figs. 2a-2d.

Porcellio (Nagara) cristatus WAHRBERG, 1922, p. 178, Fig. 57.—ARCANGELI, 1927, pp. 245, 250.

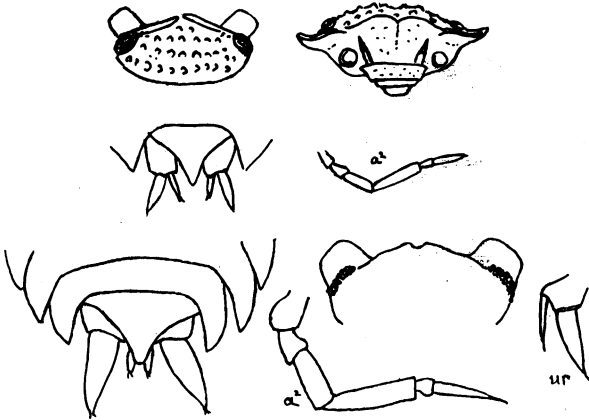


Fig. 146. *Nagara cristata* (Dollfus). Upper figures adapted from Dollfus, 1889. Lower figures from Pearse, 1917 (*Leptotrichus emarginatus*).

The following description is quoted from Budde-Lund, 1908a:

“Superficies granulata, maxime ante fortius, et minute squamata.

“Antennae tertiam corporis partem longitudine aequantes; flagelli articulus prior altero fere triplo brevior. Caput lobis lateralibus magnis, rotundate tetragonis; frons media carina vel crista transversa, paulum obliqua, in medio abrupta; epistoma convexiusculum.

“Trunci segmenta 1.-2 margine postico curvato; segmentum 3, margine postico subrecto.

“Caudae segmenta 1.–2 brevia; segmenta 3. 4. 5. epimeris majoribus, distantibus, triangulis, acutis. Telsum epimera segmenti 5. paulum superans, triangulum, lateribus profundius incurvis, apice acutiore.

“Color flavus, in capite obscure brunneus; in trunci medio et lateri bus series macularum fuscaram per longitudine ductae; cauda fusca; telsum pallidum; antennarum articuli duo priores et uropodes pallidi.

“Long. 5.5–6 (7 sec. Dollf.) mm. Lat. 2.3–2.7 mm.”

I quote also from Pearse's description, as I have been able to observe the color markings that he describes in the case of specimens from Dominica, West Indies, also. The four longitudinal brown stripes he mentions comprise one on each side along the basal region of the epimera and a very wide median stripe which is nearly divided into two by a series of large median spots on each segment of the thorax. It may be added to his notes that the basal part of the antennae (first two or three segments) is light-colored, and that in the Dominica specimens at least, the light ground color (unpigmented part of the color pattern) is decidedly yellowish.

“Color.—Head brown with small white markings; thorax white, with four irregular longitudinal brown stripes; abdomen with second and third segments white with brown band at middle of posterior margin; third, fourth and fifth segments brown with small white spot at antero-median margin, last segment white with darker tip; ventral surface and paired appendages white, except the antennae and the tips of the outer rami of the uropoda, which are brown.” (Pearse, 1917, pp. 5, 6.)

DISTRIBUTION.—Type locality Surinam (Dollfus, 1889, only locality mentioned). Type probably in Leyden Museum. Budde-Lund, 1893, records it from Caracas, Venezuela, and in 1909 from Colon, Canal Zone, and Puerto Limon, Costa Rica, as well as from Camerun and East Indian localities, stating that it is widely distributed in tropical countries, though not common, and that he had seen only females. Likewise he mentions (1909, p. 285) that it has been found at Hamburg, brought in on palms from Brazil. Additional localities given by Budde-Lund, 1912, are Madagascar and Mahé, Seychelles, at 1600 feet altitude. Arcangeli (1930) reports it from San José and Puente de las Mulas, Costa Rica.

Having examined Pearse's specimens of his “*Leptotrichus emarginatus*” from Dunoon, British Guiana, I agree with Arcangeli's (1930) opinion that it is a synonym. “Taken under the bark of dead wood. Other specimens were collected from the axils of leaves from three to

ten feet above the ground . . . also in dry sand on Hubudibu Creek." (Pearse.)

The American Museum of Natural History has ten specimens from Laudat, Dominica, West Indies, all of them females.

Verhoeff, 1926, p. 317, expresses doubts whether all these records really refer to the same species, but in the present state of our knowledge it seems more probable that this is a species of Old World origin that has acquired a wide distribution through human agency as in the case of a number of other isopods. Lack of exact correspondence in the figures of different authors is probably explainable by the parts being drawn from a slightly different point of view, or to difficulties of observation due to the small size of the animal.

CYLISTICUS SCHNITZLER, 1853

Related to *Porcellio* and especially to *Tracheoniscus*, and, like the latter genus, having the opercular plates of all the pairs of pleopoda with tracheae which are provided with separate openings along a part of the margin of the plate, but it is readily distinguished by its much more convex body and its power of rolling up into a ball. Throughout the greater part of the United States, this and *Armadillidium vulgare* are the only common species, if not absolutely the only species, having this faculty well developed.

Cylisticus convexus (De Geer), 1778

Figures 147A, 148

Cylisticus convexus PAULMIER, 1905, p. 181, Fig. 54.—PEARSE, 1914, p. 4.

Cylisticus convexus BUDDE-LUND, 1885, p. 77.—SARS, 1899, p. 186 (descr.), Pl. LXXXI.—RICHARDSON, 1900a, p. 303; 1901, p. 565.—STOLLER, 1902, p. 213.—RICHARDSON, 1905, p. 609 (descr.), Fig. 665.—NORTON, 1909, p. 251.—FOWLER, 1912, p. 519.—HUNTSMAN, 1913, p. 274.—SHELFORD, 1913, pp. 239, 253.—PRATT, 1916, p. 379, Fig. 607.—KUNKEL, 1918, p. 241 (descr.), Fig. 78.—WALLACE, 1919, p. 40.—LONGNECKER, 1924, p. 198.—ARCANGELI, 1926, p. 38.—JOHANSEN, 1926b, p. 166.—WALKER, 1927, p. 179.—BLAKE, 1931, p. 351.—ARCANGELI, 1931, p. 126.—PROCTER, 1933, p. 248.—PRATT, 1935, p. 441, Fig. 609.

Oniscus convexus DE GEER, 1778, 'Mém. des Insectes,' VII, p. 553 (orig. descr.), Pl. xxxv, fig. 11.

Porcellio convexus STUXBERG, 1875, p. 60.—UNDERWOOD, 1886, p. 362.—RATHBUN, 1905, p. 46, check list, p. 4. Probable synonyms:

Porcellio glaber FITCH, 1855, p. 823 (descr.; color var. *confluentus* also described); 1856, p. 119.—BUDDE-LUND, 1885, p. 78.—UNDERWOOD, 1886, p. 362.

Porcellio laevis GOULD, 1841, p. 337.—DE KAY, 1844, p. 52 (not Latreille, 1804).

"Body oblong oval, more than twice as long as it is broad, side-contours nearly parallel, dorsal face strongly vaulted and perfectly

smooth. Cephalon short, transverse, almost 3 times as broad as it is long, lateral lobes rather large, obliquely truncated at the tip, median lobe forming a very small, but distinct acute projection. Side-plates of 1st segment of mesosome very large, partly flanking the cephalon, and acutely produced behind; the succeeding pairs with the posterior corner less acute. Metasome not attaining half the length of the mesosome,

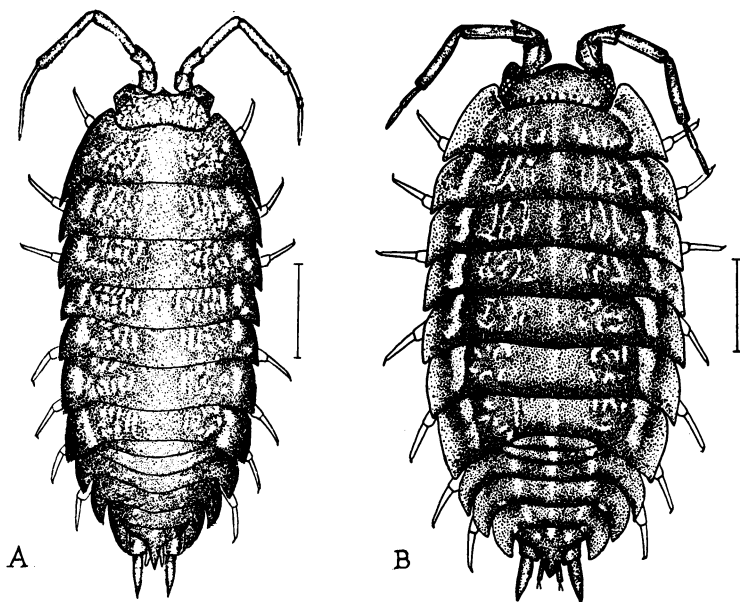


Fig. 147. A, *Cylisticus convexus* (De Geer). B, *Tracheoniscus rathkei* (Brandt). After Paulmier, 1905.

epimeral plates of the first 2 segments concealed, those of the 3 succeeding segments large, recurved, their lateral margins being continuous with the sides of the mesosome; last segment about as long as it is broad at the base, its terminal part conically pointed, and extending as far as the basal part of the uropoda. Eyes rather large and convex. Antennulae with the last joint about as long as the basal one, and conically pointed. Antennae very slender, considerably exceeding half the length of the body, flagellum a little shorter than the last peduncular joint, and having its 2 articulations subequal in length. Legs moderately slender, and of same structure in the 2 sexes. Inner rami of 1st pair of pleopoda in male with the terminal parts divergent. Uropoda rather large, with the

basal part oblong quadrangular, and distinctly keeled along the lower side, outer ramus narrow laceolate, in male considerably exceeding the basal part in length; inner ramus very narrow, linear, and issuing far in front, thus but slightly projecting beyond the basal part. Colour of dorsal face dark iron gray, with a regular row of light patches along each side of the mesosome, and in each segment a group of less conspicuous flexuous stripes on either side of the median line; uropoda generally ferruginous. Length attaining 12 mm." (Sars, 1899, p. 186.)

DISTRIBUTION.—Widely distributed in Europe and the eastern part of North America, where it may be indigenous, as it occurs in woods and other places more or less remote from human habitations, as well as about the latter. It is rather northern in its distribution. Las Vegas Springs, New Mexico, is by far the most southern as well as the most western of numerous localities given by Richardson, 1905.

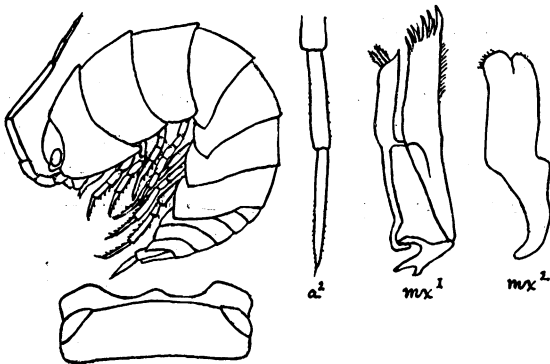


Fig. 148. *Cylisticus convexus* (De Geer). Adapted from Sars, 1899.

Longnecker, 1924, reports it from several places in Iowa and Pearse, 1914, from Moleen Canyon, Nevada. Walker, 1927, says it is the commonest of the larger land isopods in southeastern Canada next to *Tracheoniscus rathkei*, and records it from localities in New Brunswick and in southern Ontario and Quebec, and Arcangeli, 1932, from Frontenac and St. Paul, Minnesota. The American Museum has a specimen labeled "St. Johns, Labrador." Probably Newfoundland was meant.

SUBGENUS OR GENUS *TRACHELIPUS* BUDDE-LUND, 1909

(See genus *Tracheoniscus* Verhoeff)

TRACHEONISCUS VERHOEFF, 1917

This genus was split off from Porcellio by Verhoeff, 1917a, p. 199,

with *Porcellio rathkei* Brandt as the type, on the ground of its having the external plates of all the five pairs of pleopoda instead of only two or three provided with tracheae. Moreover, these tracheae are little branched and open by a row of small pores along a part of the external margin of the plate instead of by a single large orifice near the articulation of the plate, as in *Porcellio* proper.

Budde-Lund, 1908a, p. 281, had already proposed a subgenus of *Porcellio* with *P. rathkei* as type, to which he gave the name *Trachelipus*, but as he gave no diagnosis or reasons for this separation of the group, I am using Verhoeff's name. The group contains other species in the Old World, and in spite of the practically complete superficial resemblance to the true *Porcellios*, it seems to be deserving of recognition as a genus. Perhaps other American species assigned to *Porcellio* or *Porcellionides* in this work may prove to belong here when their respiratory apparatus is studied.

Tracheoniscus rathkei (Brandt), 1833

Figures 147B, 149

Porcellio rathkei BRANDT, 1833 (orig. descr.).—BUDE-LUND, 1879, p. 2; 1885, p. 85 (descr.).—RICHARDSON, 1900a, p. 304; 1901, p. 567.—STOLLER, 1902, p. 212.—RICHARDSON, 1905, p. 617 (descr.), Fig. 668.—RATHBUN, 1905, p. 45, check list, p. 4.—PAULMIER, 1905, p. 182, Fig. 55.—NORTON, 1909, p. 251.—SHELFORD, 1913, pp. 220, etc.—PEARSE, 1911, p. 108.—FOWLER, 1912, p. 518.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 379.—VERHOEFF, 1917a, p. 221.—KUNKEL, 1918, p. 246, (descr.), Fig. 81.—WALLACE, 1919, p. 41.—LONGNECKER, 1923, p. 198.—ARCANGELI, 1926, p. 22.—JOHANSEN, 1926b, p. 166.—WALKER, 1927, p. 177.—JOHANSEN, 1929, p. 106.

Porcellio trilineatus STUXBERG, 1875, p. 59.—UNDERWOOD, 1886, p. 363.

Porcellio vittatus FITCH, 1855, p. 824; 1856, p. 120.—UNDERWOOD, 1886, p. 363.

Trachelipus rathkei BLAKE, 1931, p. 353.—PROCTER, 1933, p. 248.

Tracheoniscus rathkii ARCANGELI, 1932, p. 132.

"Body oval, somewhat broader in female than in male, dorsal face rather convex and slightly tuberculated. Cephalon with the lateral lobes well developed, rounded, frontal lobe short, obtusely triangular. Side-plates of mesosome of moderate size, subcontinuous, with the posterior corners obtusely acuminate. Metasome scarcely attaining 1/4 of the length of the body, epimeral plates of 3rd to 5th segments well developed, recurved; last segment subtriangular, outer part acutely produced and plane above. Antennae rather slender, nearly attaining half the length of the body, flagellum about the length of the last peduncular joint, and having its proximal joint somewhat shorter than the distal one. Last pair of legs in male stronger than in female, with the

carpal joint remarkably dilated near the base. Opercular plates of all the pleopoda with air cavities. Uropoda with the outer ramus broadly lanceolate, inner extending considerably beyond the last caudal segment. Colour of dorsal face somewhat variable, being in female, as a rule, lighter than in male, with irregular dark patches intermingled with some of a ferruginous hue, and more generally exhibiting a row of more or less distinct whitish patches on each side of the mesosome, at the base of the side-plates. Colour of male specimens generally dark slaty grey, with 3 longitudinal rows of whitish patches on the mesosome, the one median,

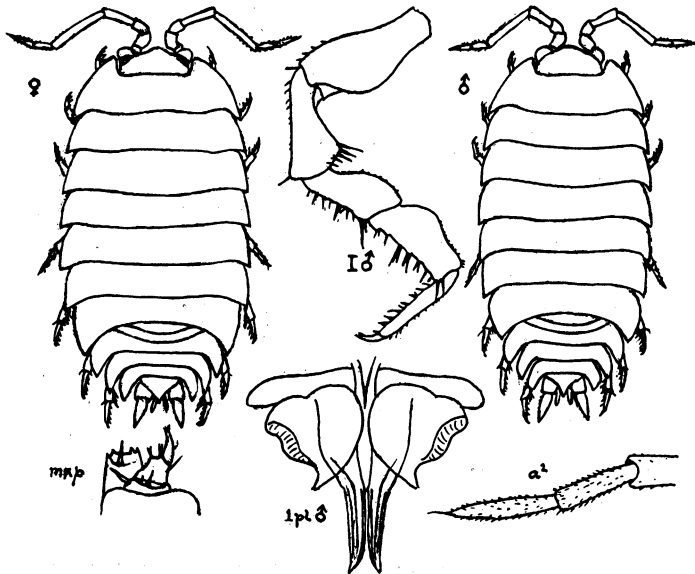


Fig. 149. *Tracheoniscus rathkei* (Brandt). Adapted from Sars, 1899.

the 2 other sublateral, and between these rows on each segment an assemblage of light, wavy stripes. Length of adult female 12 mm." (Sars, 1899, p. 180.)

The dilation of the carpus of the seventh legs above referred to is a quite prominent keel-like or fin-like expansion of very obtusely triangular outline, borne on the dorsal border of the carpus for a considerable part of its length. Its margins are smooth without teeth or spines.

LOCALITIES.—This well-known species, found about human habitations in both the Old and New Worlds (though doubtless originating in

the former), is widely distributed in the Eastern United States. The only American record of it from south of the United States appears to be one from Cuatotolapam, State of Vera Cruz, Mexico (Pearse, 1911). These specimens were identified (with some doubt) by Richardson, who stated that they differ somewhat in markings from those from the United States. The other most southern localities given by Richardson, 1905, are St. Mary's, Georgia, and Victoria, in southern Texas. Longnecker, 1924, reports it from various places in Iowa, but the records indicate that it is mainly confined to the eastern part of the continent. Though it is the commonest land isopod in southeastern Canada (in settled districts at least), it does not extend far north (see Walker, 1927; Johansen, 1929, p. 106).

RHYSOTUS BUDDE-LUND, 1885

Figure 150

This group is distinguished by the bulbous expansion of the epistome (more strictly speaking, that part of it formed by the frontal lamina) which is well marked off from the rest of the head, and by the very wide short maxillipeds, which have the palp and molar portions also very wide and proportionately short.

Its species are almost unique among land isopods in being hermaphroditic, the individuals being males when young and later developing functional ovaries and marsupial plates, though retaining the male type of pleopoda. This peculiar combination of male and female characters was observed and recorded in *R. laxus* by the present writer (1924, p. 200) though its explanation was not discovered. The matter has been investigated since by Jackson (1928, pp. 527-537) who discovered that it was a true case of hermaphroditism. The only other recorded case among land isopods, according to Jackson's statement, is that of *Philoscia elongata* (see Arcangeli, 1925, Mon. Zool. Ital., XXXVI, pp. 105-122). Budde-Lund (1908a, pp. 298-302) makes this the type and only genus of a subfamily Rhyscotinae of the Oniscidae, and classifies its species into two sections, to which, however, he gives no names. He includes in *Rhyscotus*, as a synonym, *Hypergnathus* Richardson, 1905.

Of the species found in the region covered by this article, *R. parallelus*, *R. ortonedae*, *R. cubensis*, *R. ciferrii*, and *R. laxus* belong to Budde-Lund's first section of the genus, characterized by a triangular, practically straight-sided telson, the tips of the legs with short claws and a small vesicular pad,¹ and the inner branch of the uropoda equaling

¹ Arcangeli, 1930b, p. 38, expresses doubt regarding the vesicular nature of this structure.

the basal segment in length. The second section, containing *R. sphaerocephalus*, *R. nasutus*, *R. turgifrons*, *R. albidemaculatus*, *R. jacksoni*, and *R. texensis*, has the telson short-triangular with concave sides, the legs tipped with a long, simple claw, and the inner branch of the uropoda shorter than the basal segment. Within each section, the species are much alike and are so minute and so soft-bodied that the small differences in the shape of the parts existing between species are hard to determine

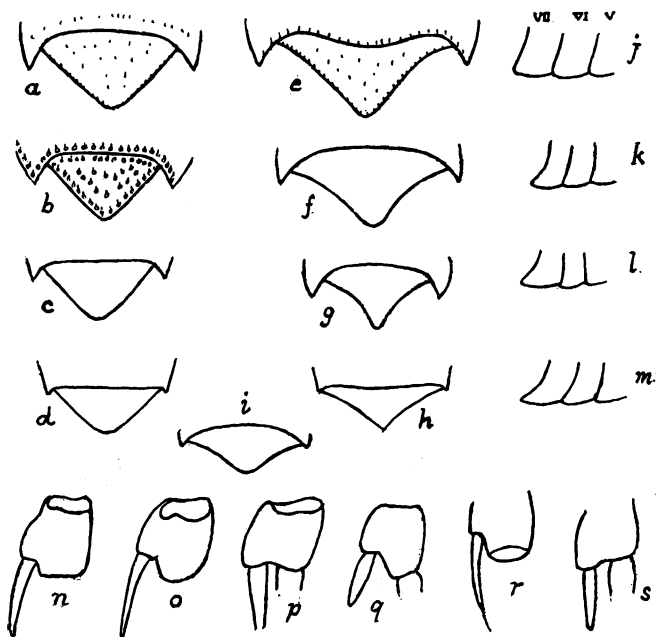


Fig. 150. Comparison of species of *Rhyscotus*. Outlines taken from the figures of various authors.

Outline of telson: a, *R. ortonedae*; b, *R. parallelus*; c, *R. laxus*; d, *R. ciferrii*; e, *R. sphaerocephalus*; f, *R. nasutus*; g, *R. albidemaculatus*; h, *R. jacksoni*; i, *R. texensis*. Outlines of last three thoracic segments: j, *R. ortonedae*; k, *R. sphaerocephalus*; l, *R. nasutus*; m, *R. laxus*. Basal segment and inner branch of uropod: n, *R. sphaerocephalus*; o, *R. nasutus*; p, *R. ortonedae*; q, *R. texensis*; r, *R. jacksoni*; s, *R. laxus*.

and still harder to describe and illustrate. However, there appear to be well-marked differences in the form of the uropoda in some of the species.

***Rhyscotus parallelus* Budde-Lund, 1893**

Figures 150B, 151

Rhyscotus parallelus BUDDE-LUND, 1893, p. 119 (orig. descr.).—DOLLFUS,

1893a, p. 342, Pl. IX, figs. 6-6d.—BUDE-LUND, 1908a, p. 299, Pl. xvii, figs. 9-10.—VAN NAME, 1924, p. 200.—JACKSON, 1928, p. 529.—ARCANGELI, 1930b, pp. 31, 38.

The following statements are taken from the original description: "Elongatus, angustus, convexiusculus, sparse et minutissime setiger. Antennae tertia corporis parte vix longiores; flagellum scapi articulo quinto subaequalis, articulus prior altero duplo brevior. Oculi minores, ocelli pauci, circiter 6-8. Frons ante delete marginata; epistoma valde bulbosum, frontem satis superans, sulco paulum profundo subrecto a fronte discretum.

"Trunci segmenti primi margo posterior curvatus, segmentorum 2-3-4 subrectus, segmenti quinti utrinque leviter sinuatus, segmentorum 6-7 in medio leviter incurvus. Epimera caudae segmentorum

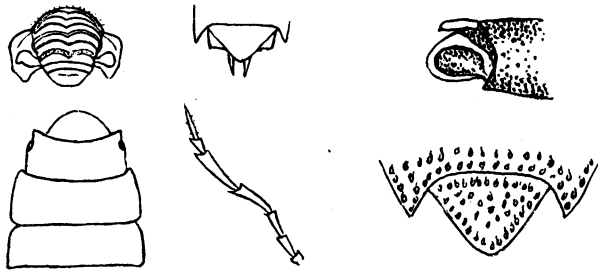


Fig. 151. *Rhyscotus parallelus* Budde-Lund. Adapted from Dollfus, 1893, except two right-hand figures, adapted from Budde-Lund, 1908a (upper figure tip of a leg).

3-4-5 brevissima, epimera segmenti quinti tamen praecedentibus paulo majora; segmentum anale breve, late rotundate triangulum, semicirculo brevi haud dissimile, supra convexum, basi media puncta profunde impressa.

"Long. 4-4.5 mm. Lat. 0.9-1.3 mm."

DISTRIBUTION.—Vicinity of Caracas, Venezuela (Budde-Lund, Dollfus; obtained by beating bushes, according to Budde-Lund). Specimens in the Copenhagen Museum (Budde-Lund); these probably include the type.

***Rhyscotus ortonedae* Budde-Lund, 1908**

Figures 150a, 150j, 150p, 152

Rhyscotus ortonedae BUDE-LUND, 1908a, p. 299 (orig. descr.), Pl. xvii, figs. 11-31.—VAN NAME, 1924, p. 200.—JACKSON, 1928, p. 528-537, Figs. 1-6 (anat.); 1928a, p. 586, Fig. 15.—ARCANGELI, 1930b, pp. 31, 38, 32 (misprinted *orthonedae*).—BARNARD, 1932, p. 289.

The original description is here quoted in full:

"Antennae longae, fere duas corporis partes aequantes; scapi articulus 2. paulo longior quam articulus 3., fere duplo brevior quam articulus 4., articulus 5. multo longior quam articulus 4.; paulo longior quam flagellum; flagelli articuli subaequalis, vel articulus prior altero sublongior.

"Epistoma valde bulbosum productum, fere semiglobosum, frontem superans; frons ab epistomate sulco profundo, subrecto, in medio levissime recurvo discreta.

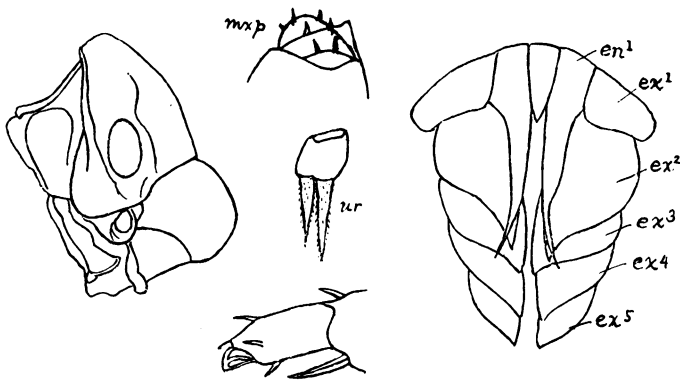


Fig. 152. *Rhyscotus ortonedae* Budde-Lund. Large figures after Jackson, 1928a and 1928. Small figures after Budde-Lund, 1908a (lower figure tip of a leg).

"Trunci segmenta 1. 2. margine postico leviter curvato, angulis posticis late rotundatis, obtusis; segmentum 3. margine postico subrecto; segmentum 4. margine postico in medio leviter incurvo; segmenta 3. 4. angulis posticis late rotundatis, obtusis; segmenta 5. 6. 7. margine postico in medio fortius incurvo, angulis posticis in segmentis 5. 6. rotundate subrectis, in segmento 7. acutioribus.

"Color griseus, ad latera pallidior; caput caudaque obscuriora; scapus uropodorum pallidus.

"Long. 5.5 mm. Lat. 2 mm."

DISTRIBUTION.—Near Naranjito, Guayas Province, Ecuador (Budde-Lund), and Samoan Islands (Jackson).

***Rhyscotus cubensis* Budde-Lund, 1908**

Rhyscotus cubensis BUDDE-LUND, 1908a, p. 300 (orig. descr.).—VAN NAME, 1924, p. 201.—ARCANGELI, 1930b, pp. 31, 38.

Known only from one incomplete specimen which Budde-Lund describes as follows:

"Superficies sparse et minutissime setigera. Oculi parvi, ocelli pauci. Antennae . . . Epistoma satis globose productum, latius quam longius, a fronte sulco transverso, recto discretum. Trunci segmentum 1. margine valde curvato; segmentum 2. margine posteriore leviter curvato; segmenta 3. 4. margine posteriore in medio leviter incurvo, sub transverso; anguli posteriores segmentorum 1.-4. rotundati. Telsum? Uropodes? Color fuscus ad latera dilutior.

"Locality.—Cuba."

Budde-Lund places this species in the first of his above-mentioned sections of the genus on account of the legs being tipped with a short claw and pad. See also remarks under *R. ciferrii*.

***Rhyscotus ciferrii ciferrii* Arcangeli, 1930**

Figures 150d, 153

Rhyscotus ciferrii ARCANGELI, 1930b, p. 35 (orig. descr.), Fig. 2.

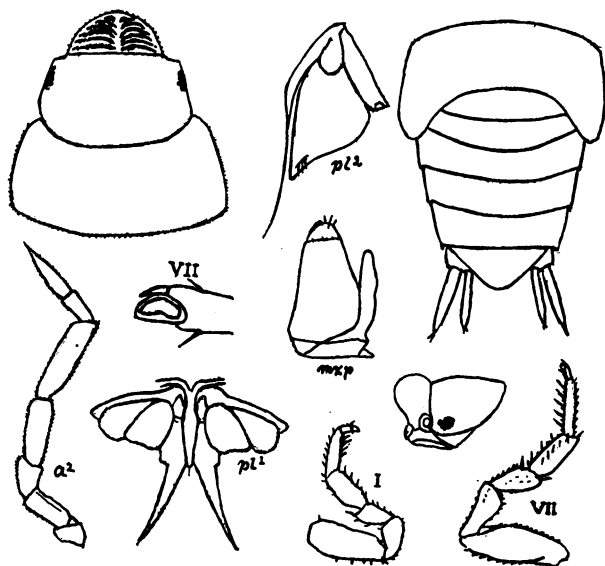


Fig. 153. *Rhyscotus ciferrii* Arcangeli. Adapted from Arcangeli, 1930b.

Body very elongate (length three and one-half times the width) with almost parallel sides, slightly rough with scattered small setae similar to those of the genus *Trichorhina*, which are easily rubbed off.

Frontal margin of head nearly straight; the bulbous expansion of the epistome extends forward for a distance of more than half the length of the head proper, from which it is marked off by a distinct sulcus. It exhibits eight yellowish transverse stripes alternating with brown ones, and bears characteristic clavate setae. Eyes rather small, not prominent, located in a slight depression and composed of ten ocelli. Antennae rather stout, pilose, when drawn back they extend little beyond the rear of the second segment. Rear angle of first four thoracic segments rounded (especially in segment I). In the remaining thoracic segments it is also rounded off to some extent, and only in the case of segment VII is it very much extended back. The lateral ends of segments II to VII are nearly straight.

Abdominal segments 3 to 5 have small, sharp, appressed, backwardly directed rear angles which scarcely break the continuous side outlines of the abdomen, though they are larger than in *R. jacksoni*. Telson triangular, more than twice as wide as long, with very slightly convex lateral margins; a somewhat rounded apex and a slight but wide median dorsal depression on the distal part. Uropoda very small.

Color deep chestnut-brown with yellowish spots on the thorax and larger yellowish areas at the junction of the epimera with their segments which may extend on the epimera to their rear angles.

Length about 5 mm.; width less than 1.4 mm.

LOCALITY.—Los Hermanos Islands near Santo Domingo, West Indies. Twenty-six examples collected by Dr. R. Ciferri.

Arcangeli remarks that this species may be identical with the insufficiently described *R. cubensis* Budde-Lund. Although it evidently belongs to the group that, according to Budde-Lund, possesses small vesicular pads under the terminal claws of the legs. Arcangeli (p. 38) expresses disbelief in the view that the small pad-like structure is really a vesicle, at least in the case of this species.

Rhyscotus laxus Van Name, 1924

Figures 150c, 150m, 150s, 154

Rhyscotus laxus VAN NAME, 1924, p. 198 (orig. descr.), Figs. 20-22.—JACKSON, 1928, p. 527.—ARCANGELI, 1930b, p. 32.

“Body long and narrow, and moreover so loosely articulated that considerable motion of the segments in a longitudinal direction is possible, while the soft integument permits of a varying degree of lateral spread of the free lateral ends of the segments. The illustration here given shows the segments quite closely approximated, so that, seen

from above, the outline is that of a narrow ellipse. Many of the preserved specimens are more relaxed and longitudinally extended, so that they exhibit a more parallel-sided outline.

“Body surface evenly, but not very thickly, covered with short hairs or setae, visible only on considerable magnification. The antennae, uropoda, and legs are also more or less setose. Along the free borders of the segments the setae are a little longer and stouter and form a regular row closer together than on the general surface of the body.

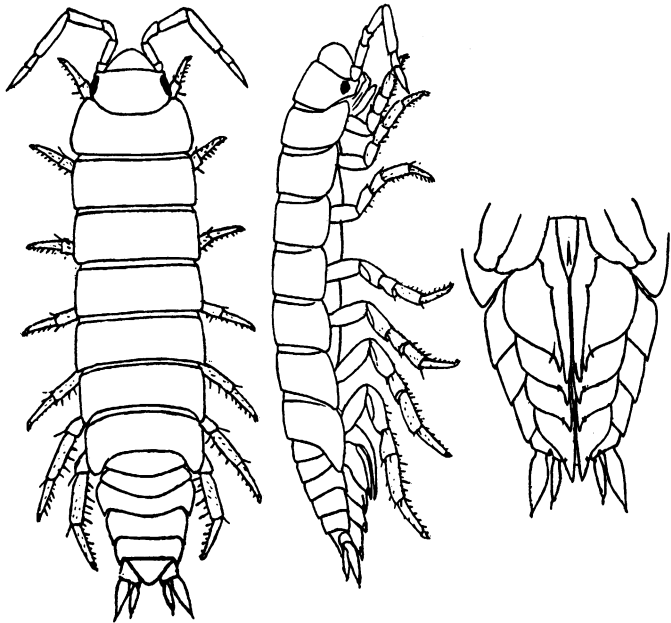


Fig. 154. *Rhyscotus laxus* Van Name. Adapted from Van Name, 1924.

“A nearly straight transverse furrow marks off the epistome from the main or posterior part of the head. The latter is produced downward and a little forward into an obtuse lobe on each side below the eyes, which have few, apparently usually about ten, well-developed ocelli. The epistome forms a large, rounded projecting bulbous expansion of the anterior median part of the head between the sockets of the second antennae. It is covered like the rest of the body and head with scattered, short setae and shows on careful examination a number of very faint transverse furrows on its anterior aspect, but these are so shallow and

poorly marked as to easily escape notice altogether." (Quoted from original description, where additional details are given.)

Both branches of the uropoda are short, the endopod laterally compressed and the exopod stout, furrowed on the external aspect and provided with a short terminal bristle. The basal joint is peculiar in being obliquely truncated so that the endopod is inserted farther back than the exopod.

Length of largest specimens 4.25–5 mm., depending on the state of contraction of the muscles.

DISTRIBUTION.—Tower and South Seymour Islands, Galapagos, found under blocks of lava and among dead leaves. Type (in the American Museum of Natural History) from Tower Island.

In the shape of the telson and in many characters of the head, this species evidently much resembles *R. parallelus* from Venezuela, but if we may judge by the figures of Dollfus here reproduced in outline, the transverse furrows on the epistome are much less conspicuous and the antero-lateral lobes of the head less acute in this species.

***Rhyscotus sphaerocephalus* Budde-Lund, 1893**

Figures 150e, 150k, 150n

Rhyscotus sphaerocephalus BUDDE-LUND, 1893, p. 120 (orig. descr.).—DOLLFUS, 1893a, p. 344.—BUDDE-LUND, 1908a, p. 301, Pl. xvii, figs. 34–36.—ARCANGELI, 1930b, p. 31.

The following statements are taken from the original description:

"Oblongus vel elongatus, post paulum angustatus, convexiusculus, sparse et minutissime setiger. Antennae ut in *Rh. parallelo*; flagelli articulus prior altero duplo vel fere triplo brevior. Oculi majores, ocelli plures. Frons ante vix marginata; epistoma late bulbosum, frontem non superans, sulco vel linea impressa in medio paulum recurva, in lateribus subrecta a fronte discretum.

"Trunci segmentorum margo posterior ut in *Rh. parallelo*. Caudae segmenta duo priora segmentis sequentibus non breviora; epimera segmentorum 3–4–5 brevissima, segmentum anale perbreve, triplo vel magis latius quam longius, triangulum, lateribus late incurvis, apice obtuso. . .

"Long. 4.5–4.7 mm. Lat. 1.4–1.5 mm."

DISTRIBUTION.—Caracas, Venezuela, under bark and in earth.

***Rhyscotus nasutus* Budde-Lund, 1908**

Figures 150f, 150l, 150o

Rhyscotus nasutus BUDDE-LUND, 1908a, p. 301 (orig. descr.), Pl. xvii, figs. 37–40.—ARCANGELI, 1930a, p. 5; 1930b, p. 31.

The original description is here quoted in full:

"Sublaevis, minutissime et sparsissime setigerus.

"Oculi magni; ocelli numero ca. 20.

"Antennae breviores; scapi articulus 2. paulo longior quam articulus 3.; articulus 4. multo longior quam articulus 2.; articulus 5. nonnihil longior quam articulus 4.; flagellum articulo 5. scapi longitudine aequale, articulus prior altero multo brevior.

"Trunci segmenta 1.-5. angulis posticis rotundatis, obtusis; segmentum 5. angulis rotundate subrectis, segmentum 6. angulis rotundate acutioribus, segmentum 7. angulis acutis.

"Telsum plus duplo latius quam longius, lateribus leviter incurvis, apice late rotundato.

"Long. 4.5 mm. Lat. 1.8 mm."

LOCALITY.—Near Realejo, Nicaragua. One specimen, "living among sheathing leaf bases of *Epiphytia tillandsiae*."

Rhyscotus turgifrons Budde-Lund, 1885

Rhyscotus turgifrons BUDDE-LUND, 1885, p. 192 (descr.).—STEBBING, 1893, p. 429.—RICHARDSON, 1901, p. 569; 1905, p. 631 (descr. after Budde-Lund).—BUDDE-LUND, 1908a, p. 302.—ARCANGELI, 1930b, p. 30.

Stenomacrus turgifrons BUDDE-LUND, 1879, p. 5 (*nomen nudum*).

Known only from the brief description of Budde-Lund here quoted in full:

"Oblongus, post attenuatus, convexiusculus, minute et dense punctatus, sparse crinitus. Mala interior mandibularum penicillis binis? Antennae exteriores corpore dimido longiores, flagelli articulus prior altero fere duplo brevior. Caudae annulus analis brevis, lateribus leviter incurvis, apice obtuso, supra sulcatus. Pedes anales longiusculi; articulus basalis annulo anali sublongior; ramus exterior terminalis conicus; ramus interior tenuis, paululum curvatus, apice setaceo.

"Color e nigro brunneus, in epimeris dilutior; venter e fusco griseus; pedes fusci.

"Long. 5 mm. Lat. 2 mm. Alt. 1.3 mm.

"PATRIA.—Specimen descriptum, mutilatum, a cl. Prof. A. S. Oersted ex insula "St. Jean" Indiae occidentalis allatum, in Museo Hau-niense asservatur." (Budde-Lund, 1885, p. 192.)

Rhyscotus albidemaculatus Budde-Lund, 1908

Figure 150g

Rhyscotus albidemaculatus BUDDE-LUND, 1908a, p. 302 (orig. descr.), Pl. xvii, fig. 46.—ARCANGELI, 1930b, p. 31.

Previously mentioned in print as "an obscure isopod, Brazilian" in 17th Ann. Rept. Univ. Mus. Oxford, 1904, p. 43.

The original description is here quoted in full:

"Superficies minutissime setigera-squamata.

"Oculi majores; ocelli numero ca. 16. Flagellum antennarum articulo priore quam altero vix vel paululo brevior. Epistoma valde globosum, sulco minus profundo subrecto a fronte discretum.

"Trunci segmenta 1. 2. 3. margine postico valde curvato, angulis posticis late rotundatis, obtusis; segmenta 4. 5. margine postico subrecto, angulis posticis subrectis; segmenta 6. 7. margine postico in medio late incurvo, angulis posticis acutioribus. Pedes?

"Telsum breve, triangulum, lateribus fortiter incurvis, apice acutiore. Uropodes?

"Color e nigro fuscus, epimeris macula albida oblonge-rotundata, prope angulos posteriores pictus.

"Long. 7.5 mm. Lat. 3 mm."

LOCALITY.—Rio Janeiro. One specimen received by Budde-Lund, from the Oxford Museum, for determination.

***Rhyscotus jacksoni* Arcangeli, 1930**

Figures 150*h*, 150*r*, 155

Rhyscotus jacksoni ARCANGELI, 1930*b*, p. 32 (orig. descr.), Fig. 1.

This species, which is described at some length by Arcangeli, has the body smooth and glossy above and rather wide as compared with other known species of the group.

The head is about twice as wide as long, not taking into account the bulbous epistome, that projects forward of the frontal line (which is slightly sinuous) for a distance little more than half the length of the head proper. Seen from one side, the outline of the bulbous part continues the curve of the upper surface of the head. It is marked with nine yellowish, more or less curved stripes alternating with brown ones. The eyes are large and prominent, with sixteen ocelli; the antennae are two-fifths the length of the body.

The thoracic segments I and II are not extended back and have the rear angles "obtuse." In segments III and IV, the angles are about a right angle and there is slight concavity of the posterior margins of the segment; in the last three segments the angles become acute and increasingly extended back.

The rear angles of the abdominal segments 3 to 5 are small, appressed, and barely visible in a dorsal view, so that the lateral abdominal

outlines are smoothly continuous, the telson is triangular, more than twice as wide as long, its apex angular (about a right angle) and its sides slightly concave. There is a median dorsal sulcus on its distal half.

Coloration of the dorsal surface well marked, the yellowish (unpigmented) and brown pigmented areas forming on the thorax a somewhat noticeable longitudinally banded pattern, described in detail by Arcangeli.

Length about 4.5 mm.; width a little less than 2 mm.

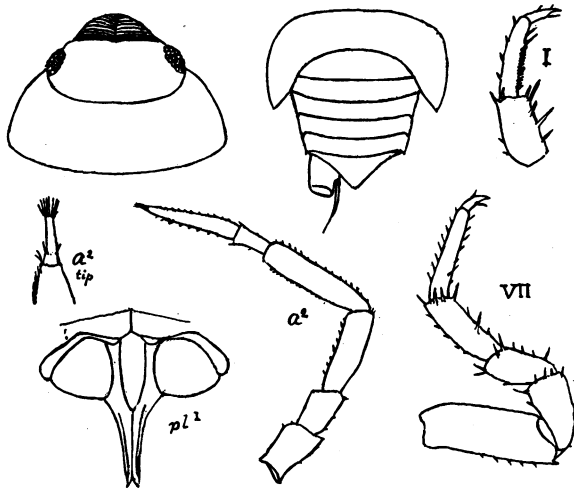


Fig. 155. *Rhyscotus jacksoni* Arcangeli. Adapted from Arcangeli, 1930b.

LOCALITY.—Los Hermanos Islands near Santo Domingo, West Indies. One imperfect specimen collected by Dr. R. Ciferri.

***Rhyscotus texensis* (Richardson), 1905**

Figures 150i, 150g, 156

Hypergnathus texensis RICHARDSON, 1905, p. 632 (orig. descr.), Figs. 675–677.

Rhyscotus texensis BUDDE-LUND, 1908a, p. 302.—ARCANGELI, 1930b, p. 31.

“Body oblong-ovate, more than twice as long as wide, 2 1/2 mm. 6 mm. Surface perfectly smooth.

“Head a little wider than long, 1 mm.:1 1/2 mm., with the front not margined, straight, continuous between the eyes with the epistome, which is strongly arched, and gives the appearance of a median lobe. There are no lateral lobes. The lateral angles are rounded. The eyes

are small, round, composite, and situated at the sides of the head close to the lateral margins. The first pair of antennae are small and inconspicuous. The second pair have the first three articles short and subequal; the fourth is about one and a half times longer than the third; the fifth is twice as long as the third. The flagellum is composed of two unequal articles, the second one being three times as long as the first.

"The seven segments of the thorax are about equal in length; the first one has the antero-lateral angles slightly produced forward and rounded; the last three have the post-lateral angles posteriorly produced, becoming gradually more acutely produced. The epimera are united with the segments.

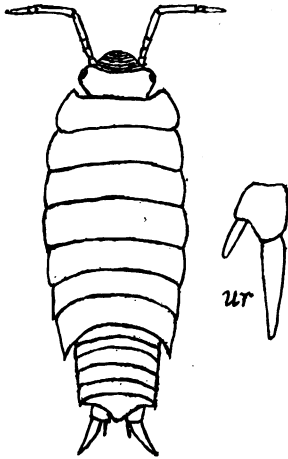


Fig. 156. *Rhyscotus texensis* (Richardson). Adapted from Richardson, 1905.

"The color is a light yellow, with irregular markings of brown on the posterior margins of the segments and on the lateral parts. The head is thickly covered with brown markings, which on the produced portion are arranged in definite transverse lines, but on the remaining surface are arranged irregularly around small, rounded, yellow areas. The abdomen is very closely covered with the brown as is also the posterior half of the outer uropod." (Richardson, 1905, pp. 632, 633.)

LOCALITY.—Texas. The types, collected by H. S. Barber, are in the United States National Museum.

This species was made the type of a new genus, *Hypergnathus*, by Richardson, 1905, p. 631. Budde-Lund, 1908, regards it, quite correctly, I believe, as not distinguishable from *Rhyscotus*.

Armadillidiidae

A family whose members much resemble the Cubaridae in appearance because of their highly arched body and faculty of rolling up into a ball, but are at once distinguishable by the uropoda, which have the external branch broad and lamellar, hinged to the end of the basal joint, and forming part of the external contour of the rear end of the body. Usually the upper part of the epistome forms a prominent vertical triangular shield. But two pairs of pleopoda have tracheae in the external plates. The Armadillidiidae are chiefly confined to the Old World. The few species that have reached America apparently have done so through human agency. (This family name must not be confused with Armadillidae, syn. of Cubaridae.)

ARMADILLIDIUM BRANDT, 1830

"Body oblong or elliptical in form, very convex, and capable of being rolled up into a perfect ball. Cephalon with the front distinctly marginate, lateral lobes rounded, and sharply defined at the base. Epistome vertical, forming above a triangular shield, advancing more or less beyond the frontal edge. Side-plates of 1st segment of mesosome large, securiform, not incised behind. Metasome semicircular, with the edges continuous throughout; last segment lamellar, quadrangular or triangular in form, not extending beyond the limits of the epimeral plates of the penultimate segment. Eyes distinct, lateral. Antennulae with the terminal joint but little produced. Antennae, as a rule, not attaining half the length of the body, penultimate peduncular joint scarcely longer than the 2nd; flagellum biarticulate. Opercular plates of only the first 2 pairs of pleopoda with air-cavities. Uropoda very short, with the basal part broad, lamellar, outer ramus spatulate, inner narrow, cylindric." (Sars, 1899, p. 188.)

The following familiar species is the type.

Armadillidium vulgare (Latreille), 1804

Figures 157, 158, 159

Armadillidium cinereum ARCANGELI, 1932, p. 126.

Armadillidium pilulare STUXBERG, 1875, p. 63.—UNDERWOOD, 1886, p. 360.

Armadillidium vulgare BUDDE-LUND, 1885, p. 66.—DOLLFUS, 1890, p. 66.—DAHL, 1892, p. 110.—DOLLFUS, 1894, p. 3; 1896c, p. 530; 1896e, p. 357; 1897, p. 206; 1897a, p. 2.—MICHAELSEN, 1897, p. 124.—SARS, 1899, p. 189 (descr.), Pl. LXXXII.—KRAEPELIN, 1901, p. 204.—RICHARDSON, 1902, p. 304.—VERRILL, 1902, p. 845, Fig. 232b.—RICHARDSON, 1905, p. 666 (descr.), Fig. 706 (after Sars).—RATHBUN, 1905, p. 46, check list, p. 4.—PAULMIER, 1905, p. 184, Fig. 58.—FOWLER, 1912, p. 226 (descr.), Pls. LXVII, LXVIII.—PRATT, 1916, p. 380, Fig. 610.—POPENOE, 1917,

p. 10, Figs. 5, 6.—KUNKEL, 1918, p. 251 (descr.), Fig. 84.—WAHRBERG, 1922*a*, p. 286.—LONGNECKER, 1924, p. 197.—VAN NAME, 1925, p. 467.—JOHANSEN, 1926*b*, p. 166.—GANDARA, 1926, p. 291.—COCKERELL, 1927, p. 232.—WALKER, 1927, p. 179.—MOREIRA, 1927, p. 194.—BLAKE, 1930, p. 279; 1931*a*, p. 354.—GIAMBIAGI, 1931, p. 417, Pls. I-III.—MOREIRA, 1932, p. 432.—PRATT, 1935, p. 443, Fig. 614.

Armadillo pitularis SAY, 1818, p. 432.—GOULD, 1841, p. 336.—DE KAY, 1844, p. 52.

Armadillo vulgaris LATREILLE, 1804, 'Hist. Crust.', p. 48 (orig. descr.).—MIERS, 1877*a*, p. 665.

Uropodias bermudensis RICHARDSON, 1902, p. 304 (descr.), Pl. XL, figs. 59, 60.—VERRILL, 1902, p. 844.—RICHARDSON, 1905, p. 670 (descr.), Figs. 709 (see also VERHOEFF, 1907, pp. 462, 463).

"Body oblong oval, more than twice as long as it is broad, side-contours sub-parallel, dorsal face strongly vaulted and perfectly smooth. Cephalon, seen dorsally, broadly quadrangular, transversely truncated

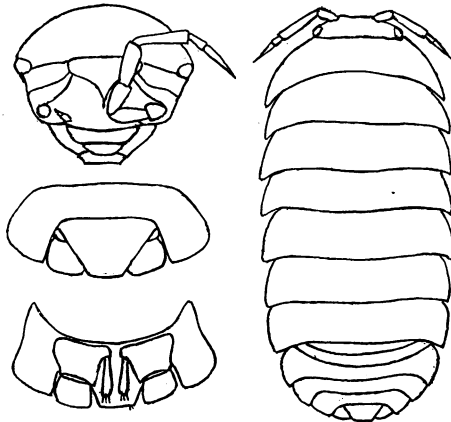


Fig. 157. *Armadillidium vulgare* Latreille. After Sars, 1899.

in front, lateral lobes comparatively small, rounded. Side-plates of 1st segment of mesosome with the posterior corner acute. Metasome broad, semicircular, scarcely occupying more than $1/5$ of the length of the body; last segment much shorter than it is broad at the base and slightly tapering distally, tip transversely truncated. Antennae very short, scarcely exceeding in length $1/4$ of the body, flagellum about the length of the last peduncular joint, and having its 1st articulation somewhat shorter than the 2nd. Last pair of legs with the ischial joint rather large, equalling in length the succeeding part of the leg. Copulative appendages of 1st pair of pleopoda in male with tips slightly divergent;

opercular plate of 2nd pair rather produced, but scarcely curved outwards at the tip. Uropoda with the outer ramus much shorter than the basal part, and very broad, its edge being continuous with the last seg-

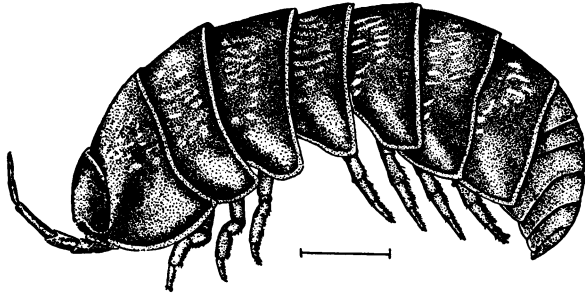


Fig. 158. *Armadillidium vulgare* Latreille. After Paulmier, 1905.

ment. Colour of dorsal face somewhat variable, sometimes uniformly dark grey or nearly black, sometimes variegated with lighter patches generally arranged on the mesosome in 3 longitudinal rows, one median and 2 lateral; between them, moreover, on each segment is a group of more or less distinct flexuous stripes. Length attaining 14 mm." (Sars, 1899, p. 189.)

DISTRIBUTION.—Of Old World origin, but now found throughout much of the world inhabited by civilized man. Localities in the area

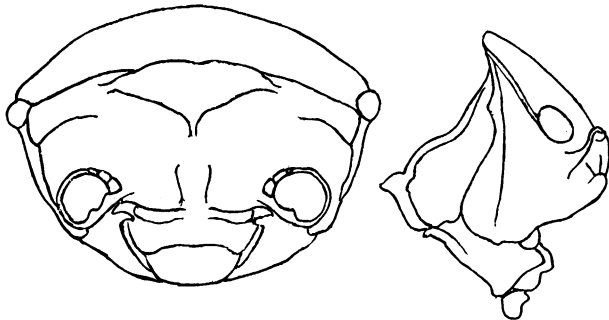


Fig. 159. *Armadillidium vulgare* Latreille. Adapted from Jackson, 1928.

covered by this work include Mexico City, Cayenne, São Paulo, Montevideo, Buenos Aires, Bermuda, Juan Fernandez. In the United States it occurs at least as far west as Colorado (Cockerell, 1927); it reaches

southern Canada, but occurs there chiefly in greenhouses (Walker, 1927); Blake (1931) reports it only as far north as Salem in Massachusetts.

It is most numerous in the vicinity of human habitations, in gardens, greenhouses, etc., and is one of the few terrestrial isopods whose habits and numbers are such as to render it occasionally troublesome by damaging cultivated plants. It is one of the species in which the faculty and habit of rolling up into a ball is most highly developed, and is the one to which the popular name, "pill bug," is most often applied, though of course that name is given indiscriminately to all those that roll up.

Verhoeff, 1907, has pointed out that the genus *Uropodias* Richardson, 1902, p. 304, is based on a larval form, apparently of *Armadillidium*. After examining larvae of *A. vulgare*, which is reported from Bermuda, the type locality of *Uropodias bermudensis* (only species of the genus), I feel little hesitation in placing *U. bermudensis* among the synonyms of *Armadillidium vulgare*.

***Armadillidium nasatum* Budde-Lund, 1885**

Figure 160

Armadillidium nasatum BUDDE-LUND, 1879, p. 6 (*nomen nudum*); 1885, p. 51 (descr.).—BLAKE, 1929, p. 11, Figs. 3, 4; 1931a, p. 354.

Armadillidium quadrifrons STOLLER, 1902, p. 211 (descr.), Fig. 2.—RICHARDSON, 1905, p. 668 (descr.), Figs. 707, 708.—ROSS, 1914, p. 24.—LONGNECKER, 1924, p. 198.—WALKER, 1927, p. 179.

"Oblonge ovale, convexiusculum, sublaeve, nitidum, raro et obsolete, maxime ad latera granulatum; medius truncus tuberculis laevibus et subdeletis; superficies tota densissime et minute punctata.

"Mala interior mandibularum penicillis 7-8.

"Antennae exteriores dimidiam corporis partem longitudine complentes; flagelli articuli subaequales, vel prior longior.

"Epistome e carina media supra in laminam subquadrangulam, marginem frontalem multo superantem, ascendens. Lamina margine superiore vix inciso, marginibus lateralibus utrinque sub lineam frontalem marginalem continuatis; frons post laminam excavatam fove praedita. . . .

"Color griseus, uniformis, vel saepe maculis pallidis, maxime in exemplis junioribus, in lineas tres vel quinque longitudinales pulchre marmoratus.

"Long. 10-13 mm. Lat. 4.5-6 mm. Alt. 2.3-2.7 mm." (Budde-Lund, 1885, p. 51-52.)

The large, squarish, forwardly extending lobe into which the epistome is produced distinguishes this species from *A. vulgare*.

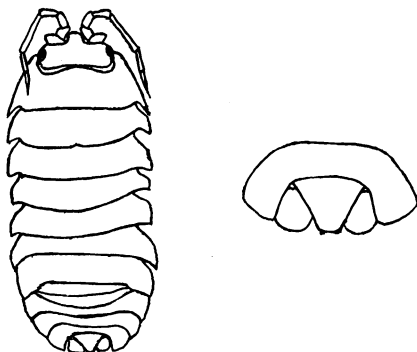


Fig. 160. *Armadillidium nasatum* Budde-Lund. After Blake, 1928, and Richardson, 1905.

DISTRIBUTION.—A native of southern Europe; type locality near Rome, Italy. In America apparently confined to hothouses and warmed buildings, where however it may occur in abundance. Reported from Schenectady, N. Y. (Stoller); Cambridge, Mass., and Middletown, Conn. (Blake); London, Ontario (Ross); Mt. Pleasant, Iowa (Longnecker). The American Museum of Natural History has a specimen found in a storage warehouse in New York City.

ELUMA BUDDE-LUND, 1885

This genus is separated from *Armadillidium* by the following characters:

“The cephalic lobes are more feebly developed and the epistome is keeled in the middle line, and has a sloping dorsal portion, and auricula-shaped prominences above and lateral to the antennal sockets; the eyes are small and simple; the pleural plate of the first mesomatic segment exhibits a notch on the posterior angle formed by the protrusion of the coxopodite; finally the uropoda extend beyond the telson.” (Collinge, 1922, p. 104.)

Type: *E. purpurascens* Budde-Lund, a European species which is regarded as identical with the following species of Miers:

Eluma caelata (Miers), 1877

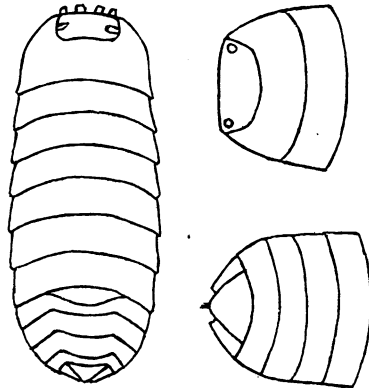
Figures 161, 162

Armadillidium caelatum MIERS, 1877a, p. 665 (orig. descr.), Pl. LXVII, figs. 3-3b.—BUDDE-LUND, 1879, p. 6.—STEBBING, 1893, p. 434.

Eluma purpurascens BUDDÉ-LUND, 1879, p. 6 (*nomen nudum*); 1885 (descr.), p. 48 (mentions, p. 49, *A. caelatum* Miers, as probably not distinct from this).—DE BORRE, 1886, p. cvii.—DOLLFUS, 1896e, p. 357.

Eluma caelatum COLLINGE, 1922 (new descr.), p. 104, Pl. VIII, figs. 1–12.—VAN NAME, 1925, p. 467.—ARCANGELI, 1930, p. 83.

Fig. 161. *Eluma caelata*.
Enlarged from Miers' (1877)
small figures.



Miers' description, which is not a satisfactory one, is here quoted. His figures are small and show very little.

"Convex, very finely and closely punctuated and pubescent. Head transverse-oblong, closely encased in the first segment of the body,

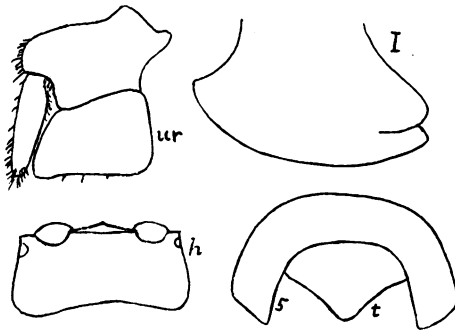


Fig. 162. *Eluma caelata*. Adapted from Collinge, 1922. From specimens from Ireland.

with the anterior margin reflexed, more prominent in the centre, and slightly sinuated toward the antero-lateral angles, which are not prominent. Eyes minute, placed close to the antero-lateral angles. First segment of the body somewhat larger on the sides than the rest, with

the postero-lateral angles acute, the posterior margin slightly excavate; following segments with the posterior margins nearly straight. Segments of the tail short; third to fifth bent backward on the sides; terminal segment broader than long, triangular. Terminal joints of the uropoda transverse when viewed from above. External antennae with the last two joints (flagellum) together about as long as, but more slender than, the preceding joint, the penultimate much shorter than the terminal joint. Colour generally dark brown. Length about 4 lines; breadth 2 lines.

“Hab.—Cayenne.”

DISTRIBUTION.—Cayenne, French Guiana, type locality (Miers). Budde-Lund, 1885, also reports having seen specimens from Cayenne. It is, however, according to the opinions of Budde-Lund, 1885, and of Collinge, 1922, identical with *Eluma purpurascens* Budde-Lund, 1885, an Old World form occurring in the Canaries, Azores, Madeira, western Algeria, Spain, Portugal, parts of France and Ireland.

Except for Budde-Lund's apparent acceptance of the Cayenne record, we might be inclined to suspect that the locality was an error and question whether this is an American species at all, or to doubt the identity of the Old World and American forms, especially as Miers' description is so brief and his small and crude figures (here reproduced in outline much enlarged) are so inadequate. Arcangeli, 1930, expresses disbelief in the identity of *caelata* and *purpurascens*, and in the occurrence of the latter in America.

Cubaridae (Syn. Armadillidae)

The Cubaridae are generally characterized by a highly arched body adapted for rolling up, and by having well-developed epimera so shaped as to form a close fit with the parts with which they come in contact when rolled. In the more highly specialized forms, such as *Cubaris* and its allies, there are, on the lower aspects of the anterior segments, epimeral or coxopodite ridges or processes to lock together and support more firmly the segments when the body is in the rolled position. The tight fit of their segments and the effective adaptation of the pleopoda for breathing dry air permits of such effective conservation of moisture that many species can maintain themselves in the semi-desert areas of the tropical and warm-temperate zones.

The head is short from front to rear, well set back into the thorax and with its somites so well consolidated that their limits are often difficult to determine; in most genera the antennae have the articles of

the flagellum reduced to two, while the uropoda have a large broad basal segment which performs a share in inclosing the body when rolled, but the internal, and especially the external branches, are greatly reduced or vestigial. All of these are evidences of specialization and advanced phylogenetic development, and in the adaption of the pleopoda for respiration purposes advanced development is also shown, all five pair of pleopoda having, in the typical genera of the family, systems of tracheae in the external plates. These open in each plate by an aperture in a pocket-like furrow near its external margin, the development of the tracheae being so extensive that the respiratory function of the inner plates of the pleopoda becomes more or less secondary in this group.

In the present work the majority of the American genera characterized by a highly arched body and well-developed power of rolling up have been placed in this family, but especially with the present incomplete knowledge of the characters of some of the genera it is difficult to know where to draw the line between the Oniscidae and the present family. In the case of some of the less specialized genera, as *Scleropactes* and *Sphaeroniscus*, there is much to be said in favor of placing them in the Oniscidae rather than here. See also remarks under the genus *Cirroniscus*.

The Old World genus *Eubelum* and its only known American ally *Ethelum*, often regarded as a separate family (Eubelidae), are also included here in the present work.

SCLEROPACTES BUDDE-LUND, 1885

“Flagellum antennarum 3-articulatum. Pleurae capitis concreatæ; linea marginalis verticalis ad oculos producta.

“Trunci segmentum primum post intergrum.

“Pleopodum rami operculares nullis tracheis. Telson breve rotundate triangulum, epimeris segmenti paenultimi multo brevius. Uropodes breviores vel mediocres. Exopoditum mediocre teretiusculum, scapi lateri interiori insertum, scapo non longius, endopoditum longum, scapo longius.

“Corpus valde convexum in globum contractile.

“Oculi congregati, ocelli sat numerosi. Lamina exterior maxillae prioris parvis dentibus septem integris munita. Antennae, corporis dimidium aequantes vel paulum superantes, scapi articuli ad apicem versus sensim longitudine crescentes, articulus 4. gracilior quam 2. sed fere duplo longior. Epistoma convexum lineam marginalem frontalem continuam formans, post lineam marginalem sulco transversa a fronte discretum.

“Trunci segmenta pronotum magnum dimidio dorso segmenti aequale vel longius habent.” (Budde-Lund, 1904, p. 46.)

Type of the genus *S. concinnus* Budde-Lund, 1885 (see below).

The members of this genus are superficially much like *Sphaeroniscus* Gerstaecker, both in general appearance and in the structure of the uropoda, but may be at once distinguished by the groove or sulcus between the forehead and the upper border of the epistoma. This groove curves upward on the forehead along the inner border of each eye. No coxopodite sulcus ridge or process is present, and the rear angle of the first thoracic segment is not cleft. See remarks under the family Cuba-ridae.

***Scleropactes concinnus* Budde-Lund, 1885**

Figure 163

Scleropactes concinnus BUDDÉ-LUND, 1885, p. 240 (orig. descr.); 1904, p. 47, Pl. VII, figs. 1-10.—VAN NAME, 1926, p. 9.

The original description is as follows:

“Oblonge ovalis, valde convexus, nitidus, laevis, vix punctatus vel granulatus.

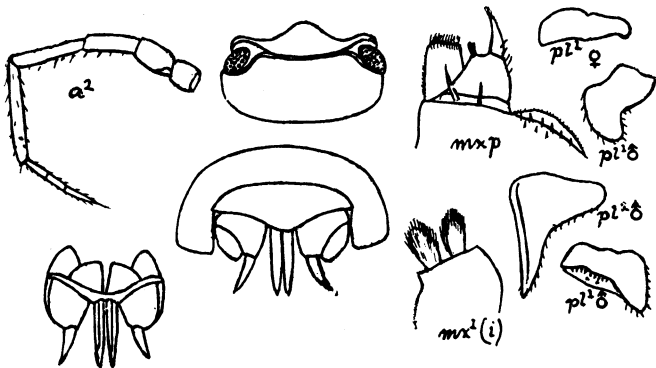


Fig. 163. *Scleropactes concinnus* Budde-Lund. Adapted from Budde-Lund, 1904.

“Antennae exteriores hirsutae, corpore dimidio vix breviores; flagellum scapi articulo quinto vix brevius; flagelli articuli ad apicem sensim longiores; articulus ultimus seta apicali longa instructus. Epistoma medio convexum, ad longitudinem sinuate subbicarinatum; linea marginalis frontem non superans, ad latera subbifurcata; sulcus frontalis profundus, utrinque post oculos retroductus.

"Trunci annuli priores margine posteriore subtransverso vel utrinque levissime sinuato; annuli posteriores margine posterior medio leviter sinuato; epimera parva, angulis posticis omnium annulorum obtusis, rotundatis, processu laterali nullo.

"Caudae annuli duo priores breves; annuli tres sequentes mediocres, epimeris latis tetragonis. Annulus analis triangulus, triplo latior quam longior, epimeris annuli praeanalisis paulisper brevior, apice obtuso supra planus vel in apice paulisper impressus. Articulus basalis pedum analium magnus, anulum analem superans, latere exteriori alato, margine carinato, apice acute producto, margine interiori plano, tetragono. Ramus terminalis exterior teres, brevis, stiliformis; ramus interior substiliformis, longus, apicem rami exterioris aequans.

"Color griseus, maculis albidis in lineam longitudinalem in utroque latere digestis, in medio trunco caudaque crebro albedo irroratus; pedes albi; antennae griseae, flagello et dimidio articuli quinti scapi albidae.

"Long. 11-13 mm. Lat. 4.5-5 mm. Alt. 2.75-3 mm."

LOCALITY.—Tambillo, Ecuador (on the west slope of the Andes west by south of Quito, not in Peru, as first stated by Budde-Lund). Several specimens in Warsaw Museum (Budde-Lund).

Scleropactes incicus Budde-Lund, 1885

Scleropactes incicus BUDDE-LUND, 1885, p. 241 (orig. descr.); 1904, p. 47.

Described by Budde-Lund as differing from *S. concinnus* in the following respects:

"Superficies minutissime praesertim in medio trunco granulata. Epistomatis linea marginalis frontem paulisper superans, utrinque sublobate producta. Caudae annulus analis epimeris annuli praeanalisis minus convergentibus paulum brevior. Long. c. 6 mm."

LOCALITY.—Peru. Described from a single imperfect specimen.

Scleropactes zeteki Van Name, 1926

Figures 164, 165

Scleropactes zeteki VAN NAME, 1926, p. 6 (orig. descr.), Figs. 6-13.—ARCANGELI, 1930a, p. 2.

See also remarks following the description below.

The following statements are taken from the original description:

"Body surface covered with minute slightly elevated tubercles arranged in indistinct transverse rows; on the dorso-lateral regions of the thorax the tubercles are larger and often more or less confluent. In

many cases the tubercle bears a short, stiff setose hair on its summit. These hairs are also scattered elsewhere. . . .

“Front outline of head transverse and slightly sinuous when seen from above, with well-marked lateral angles. The upper border of the epistome is somewhat unevenly arched when seen from in front and is upturned to form a projecting border to the front of the head, producing

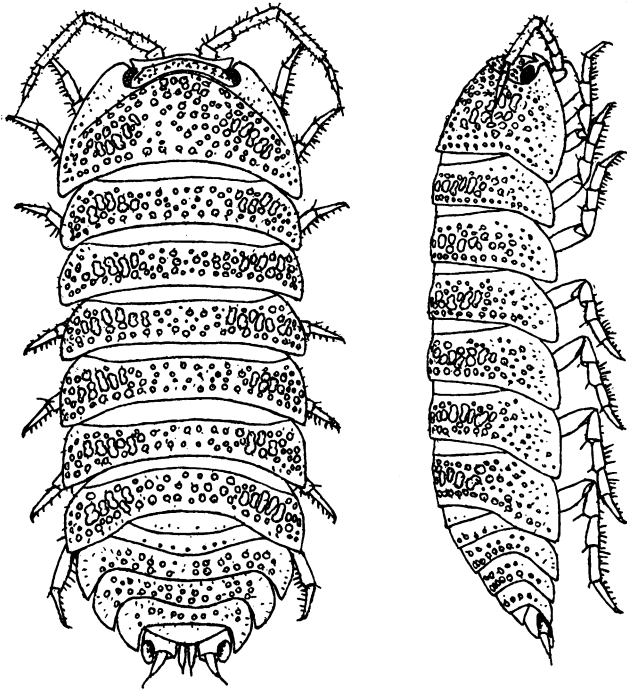


Fig. 164. *Scleropactes zeteki* Van Name. From Van Name, 1926.

a very deep, narrow furrow between itself and the base of the forehead. This furrow, however, does not extend the whole width of the front but curves upward on the forehead along the inner border of each eye.

“Eyes oval, oblique of medium size with fairly numerous ocelli. Their surface is very convex and prominent. Second antennae short (not reaching the third segment when drawn back) and weak, somewhat hairy and provided with a flagellum of three articles, the first being rather short and the articulation between the last two being rather indistinct and probably not movable. The last article is tipped with a rather short bristle. . . .

"Legs rather weak and slender with fairly long sharp and slender spines. . . .

"Telson having the form of an exceedingly wide, short triangle much rounded at the tip. Basal joints of uropoda wide and extending much beyond the telson; their dorsal surface has a large, sharply defined excavation on the posterior lateral part; the outer branch is short, curved, and tapering and arises from a conspicuous excavation

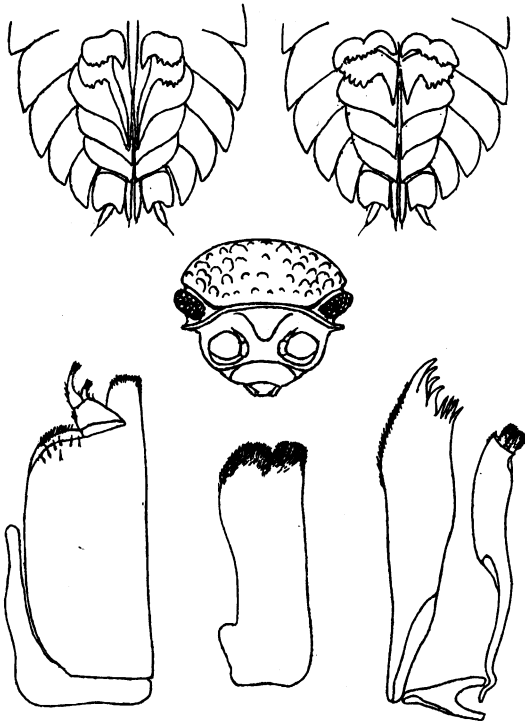


Fig. 165. *Scleropactes zeteki* Van Name. From Van Name, 1926.

in the thick terminal margin of the basal joint; the inner branch arises far forward on the ventral aspect of that joint close to the median line. It is straight and long and projects nearly half its length beyond the end of the telson, lying alongside its fellow of the opposite side in the gap between the somewhat widely separated basal joints. . . .

"Color.—Dull slaty gray with the usual small yellowish markings and larger yellowish spots on the segments at the junction of the epimeral

with the main parts of the segments, and in the median region of the back. The epimera are also lighter colored, giving the appearance of a broad light border around the body. The legs and lower parts are yellowish (unpigmented). The terminal half of the fifth joint of the antennae is abruptly light colored.

"Length of the largest individuals (females) about 15 mm."

LOCALITY.—Barro Colorado Island, Gatun Lake, Canal Zone, common under logs and dead leaves in the forest. Type in the American Museum of Natural History (Cat. No. 5348).

Allee, 1926, pp. 448, 453, 456, reports a "*Sphaeroniscus* sp." from Barro Colorado Island and from the monkey cap palm forest near Fort Sherman, Canal Zone, which very likely may be this species. It is possible that the specimen of *Sphaeroniscus* from Darien, "in too poor condition to be described," reported by Dollfus, 1896b, p. 2 (Van Name, 1926, p. 3), may also belong here instead of in *Sphaeroniscus*.

Scleropactes tatei, new species

Figures 166, 167

Body highly arched and compactly articulated; the epimeral ends of the segments extend down almost vertically, so that in a dorsal view the body is of rather narrow elliptical outline. It narrows also considerably toward the front and rear ends.

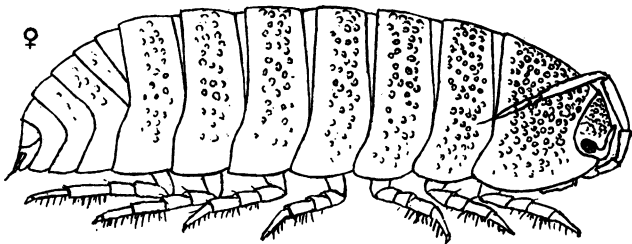


Fig. 166. *Scleropactes tatei*, new species.

Dorsal surface of body in general smooth and even, though on considerable magnification it is seen to be covered with very low smooth pustule-like tubercles which are best developed on the head and anterior half of the thorax. Toward the rear end of the body they become less well defined, almost disappearing on the abdomen.

Front outline of head sinuous and nearly transverse when seen from above. Upper border of epistome arched when seen from in front. It forms a strongly up-turned border to the head between the eyes but is not appressed to the forehead, from which it is separated by a very deep but narrow groove. Near the eyes this groove turns upward on the forehead and curves along the inner border of each eye,

becoming gradually narrower and finally closing altogether. The parts of the head bearing the eyes are separated from the forehead by this groove but they are not separated from the epistome by any conspicuous line of demarcation. Antennae rather slender and moderately long. Their flagellum is shorter than the last joint of the peduncle. It is tipped with a bristle and has three articles of which the last is somewhat the longest. Eyes rather small, ocelli about fifteen.

Lateral border of first thoracic segment not bent or curved outward, though under considerable magnification an extremely narrowed bead or thickened margin is visible. It bears no groove or sulcus, and no coxopodite process is present on any segment.

Telson very broad and short. Its exterior surface has a shallow median depression near the tip. The external rear angle of the basal segment of the uropoda is rounded off and there is a large shallow longitudinal groove-like depression external

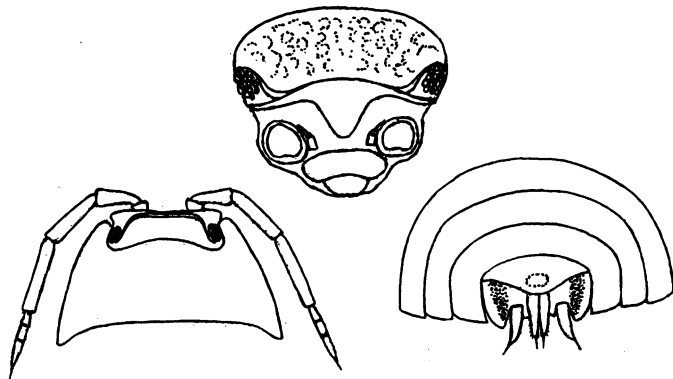


Fig. 167. *Scleropactes tatei*, new species.

to the origin of the outer branch, which is inserted in a deep notch in the posterior margin, and is stouter than the inner branch, though not so long, and of tapering somewhat curved form. Both branches bear conspicuous terminal bristles.

Color.—Brownish or brownish gray above with yellowish markings; legs and under parts yellowish.

Length of type (a female) about 8 mm.

LOCALITY.—The type (Cat. No. 6516) and another considerably smaller female specimen, which are in the American Museum of Natural History, were collected on Takinon Mountain, Naupon, Ecuador, at an altitude of 13,000 feet, by Mr. George H. Tate, for whom the species is named.

***Scleropactes tristani* Arcangeli, 1930**

Figure 168

Scleropactes tristani ARCANGELI, 1930a, p. 8 (orig. descr.), Fig. 2; 1931a, pp. 11, 16.

Body rather elongate oval, very convex, especially in the fore part, but not capable of completely rolling up; translucent, without granulations, and covered with very fine short setae not very thickly distributed.

Head entirely set back in the thorax; two and one-half times as wide as long; its rear margin slightly but distinctly concave in the middle and its front margin presenting a broadly curved outline with a slight inward curvature of the median region, due to a reflexion of the apex of the shield formed by the epistome, which is similar to that of *S. estherae*. Eyes entirely wanting. The antennae are short, not reaching the rear of segment II when drawn back.

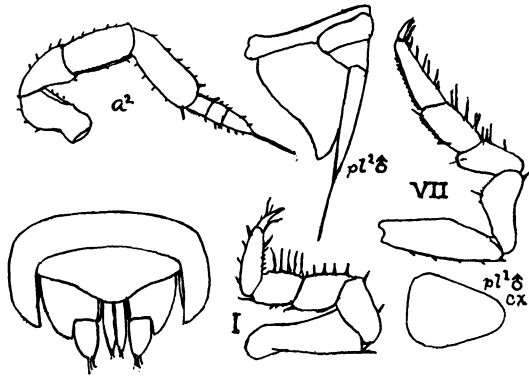


Fig. 168. *Scleropactes tristani* Arcangeli. Adapted from Arcangeli, 1930a.

The abdominal segments 3 to 5 have the epimera directed backward and fairly wide, but not as acute as in *S. estherae*. The telson is wide and short with a rounded apex and concave sides. It is much shorter than the basal segments of the uropoda and the tip of the fifth abdominal segments. The exposed part of the basal segments of the uropoda has the external border convex and ending in a prominent tooth or point external to the insertion of the exopodite which is conical and directed straight backward. The endopodites are narrow but long, inserted close together and reach nearly as far as the tips of the exopodites. Both branches are tipped with a tuft of short setae. No tracheae in the external plates of the pleopoda. Additional details are given in Arcangeli's description.

Color whitish; unpigmented.

Length, 3.5 mm.; width about 2 mm.

DISTRIBUTION.—Costa Rica. Many specimens collected at various

points; Puente de las Mulas (first mentioned locality), San José, San Juan, Apaican, etc. (Arcangeli).

***Scleropactes estherae* Arcangeli, 1930**

Figure 169

Scleropactes estherae ARCANGELI, 1930a, p. 6 (orig. descr.), Fig. 1.

Body elongate oval, very convex, especially in the anterior part; slightly rugose above, capable of rolling up almost completely, and bearing a few short subtriangular setae, especially on the fore part.

Head almost entirely set back in the thorax, two and one-half times as wide as long; its frontal outline, seen from above, sinuously convex. The lateral lobes are small and rectangular. Eyes relatively large, prominent, with ten large ocelli. The upper median part of the

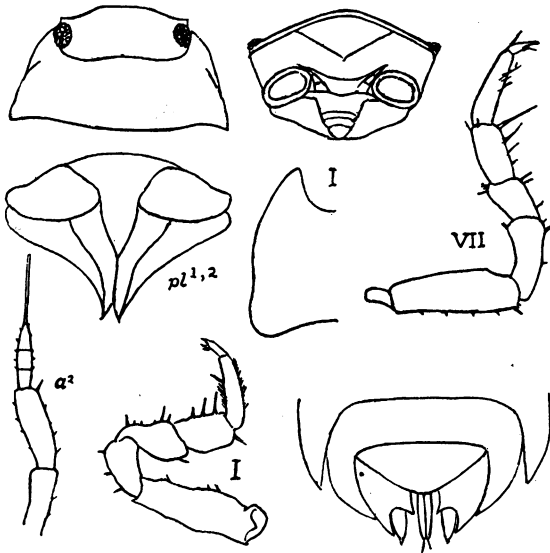


Fig. 169. *Scleropactes estherae* Arcangeli. Adapted from Arcangeli, 1930a.

epistome forms a large transverse diamond-shaped slightly raised shield between which and the small lateral lobes there are deep depressions. Second antennae quite short, not reaching the rear of the second segment when drawn back. The terminal article of the flagellum is a little the longest, the middle one a little the shortest of the three. The terminal one bears a long bristle. The first thoracic segment has nearly vertically descending sides, and a slight V-shaped depression on the median anterior part.

The third to fifth abdominal segments have long, acute epimera which are curved straight backward in segments 3 and 4 but are somewhat convergent in segment 5. The uropoda have the basal segment large, longer than wide and a little curved toward the median line so that the outer margin is convex, the inner concave. The fairly large conical exopodite occupies a deep semicircular notch in the inner distal part of the margin of the basal segment and extends beyond its end. The endopodites are quite long and slender, close together, and reach as far as the ends of the exopodites. Telson short, widely triangular, rounded at the apex.

Color.—Grayish chestnut above with whitish markings; the pigment is present to a considerable extent on the lower parts and legs also.

Length, 5 mm.; width about 2.5 mm.

LOCALITY.—La Palina, Costa Rica, one male specimen.

***Scleropactes cavifrons* Jackson, 1928**

Figure 170

Scleropactes sp. JACKSON, 1928a, p. 586 (*S. cavifrons* on p. 588, see below), Fig. 16.

Jackson describes and figures the head of a *Scleropactes* to which he does not himself formally attach a specific name. He says that the

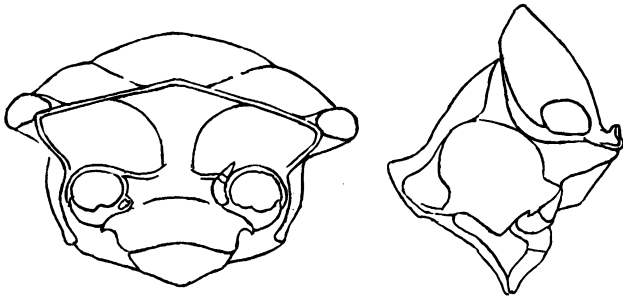


Fig. 170. *Scleropactes cavifrons* Jackson. Adapted from Jackson, 1928a.

specimen was in the British Museum among Budde-Lund's material and was labeled *S. cavifrons*, but that no description of it seemed to have been published.

From his figure (here reproduced in outline) and the few statements he makes, the species is apparently close to *S. estherae* Arcangeli. He gives no locality, but presumably it is American.

It would seem that the publication of his descriptive statements and figure in connection with Budde-Lund's proposed name must be regarded as giving validity to the latter.

SPHERARMADILLO RICHARDSON, 1907

Quite close to *Sphaeroniscus* Gerstaecker, 1854, in most characters, but apparently sufficiently distinguished by the absence of eyes and by having the coxopodite ridge developed along much of the length of the under side of the margin of the first thoracic segment. Flagellum of antennae with three articles.

Spherarmadillo schwarzi Richardson, 1907

Figure 171

Spherarmadillo schwarzi RICHARDSON, 1907, p. 448 (orig. descr.), Figs. a-g.

The following statements from the description are given to supplement the figures reproduced from Richardson's article.

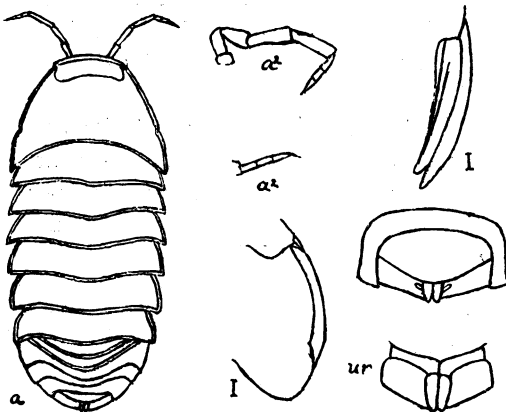


Fig. 171. *Spherarmadillo schwarzi* Richardson. Adapted from Richardson, 1907.

Head with the front straight and margined. The epistome has a slight shield-like convexity. There is no trace of eyes. The flagellum of the second antennae is composed of three articles, the middle one of which is slightly shorter than either of the others, which are subequal.

The lateral parts of the first segment are slightly produced backward in rounded lobes. Epimera or coxopodites are present on the underside and extend in the form of a wide band along the entire lateral margin almost to the posterior margin and are cleft posteriorly by a rather deep fissure. The form and position of the coxopodites give a thickened

appearance to the lateral margin. Epimera are not present on any of the following thoracic segments.

Color yellow with numerous arborescent markings of dark brown.

Length, 50 mm.; width, 22 mm. (See remarks below.)

LOCALITY.—Livingston, Guatemala. Type and only specimen in U. S. National Museum (Richardson).

The dimensions given in the description are extraordinary, and are evidently incorrect. The figure *a* (the only one from which the size can be well determined) given in the explanation as enlarged three times indicates that the length of the specimen was 18.6 mm., quite a large size.

SPHAERONISCUS GERSTAECKER, 1854

This genus was given a brief Latin diagnosis (here repeated) by Gerstaecker (1854, p. 314), followed by a more lengthy characterization in German which is here translated in part:

“Antennae externae 9 articulatae, seta terminali instructae. Annuli thoracici anteriores lateribus valde attenuati, apice rotundati. Annuli abdominis duo anteriores ceteris non breviores; ultimus subtriangularis. Pedes spurii ultimi paris articulo terminali externo minuto, postico; interno elongato.”

“The head is short and wide with the anterior border much turned up; the eyes relatively small, oval and placed near the rear angles. Flagellum of outer antennae of three articles which become successively thinner; the last is tipped with a long bristle. Mouth parts not different from those of *Cubaris* Brandt.

“The thorax, which is adapted for rolling up, is of structure similar to that in *Cubaris*, but exhibits certain differences. The first segment has a widely set off and more upturned border; on the under side this border, which is formed by the union of the upper and lower plates, is not sharply defined but widely flattened, so that it forms a flat surface set off at right angles. However, this surface does not fully reach the rear angle, but ends somewhat farther forward than the actual lateral border does, forming in doing so a blunt, posteriorly projecting tooth, so that in rolling up the second segment can fit under the first.

“The last pair of appendages consist of a large four-sided basal joint which completely fills in the space between the last two segments and two branches. Of these the outer is very small, oval, visible from above, and inserted, not in the middle of the inner border as in *Cubaris*, but in a notch in the inner rear corner; the inner branch is very long, laterally compressed, with a sharp upper and lower margin, and reaches to the hind edge of the basal segment.

"Type of the genus: *S. flavomaculatus* Gerstaecker."

Neither Gerstaecker's long description nor his figures give us a fully satisfactory idea of this genus. It is possible that as here used it is being taken in too comprehensive a sense and may require division.

***Sphaeroniscus flavomaculatus* Gerstaecker, 1854**

Figure 172

Sphaeroniscus flavomaculatus GERSTAECKER, 1854, p. 315 (orig. descr.), Pl. II, figs. 2-2c.—STUXBERG, 1875, p. 44; BUDDE-LUND, 1879, p. 7; 1885, p. 45.—STEBBING, 1893, p. 434.—RICHARDSON, 1912c, p. 31.

Gerstaecker describes this species as follows:

"Long., 7 lin.

"Oblongo-ovalis, convexus, laevis, nitidus, fuscus, capite processibusque annulorum lateribus pallidioribus, seriebus duabus macularum dorsalium, marginibus annulorum posticis, lineaque media pallide flavis."

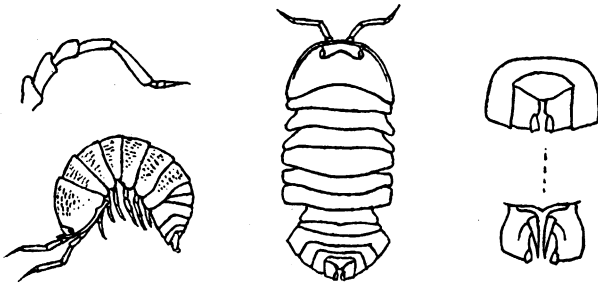


Fig. 172. *Sphaeroniscus flavomaculatus* Gerstaecker. Adapted from Gerstaecker, 1859.

"The body is elongate oval semicircularly arched, smooth and shining. The outer antennae do not reach to the rear border of the first segment when drawn back; they are light brown, the flagellum whitish. The head is nearly four times as wide as long, with a vertically bent up, straight front border, and a deeply concave rear border; the rear corners are rounded, the surface somewhat uneven, gray-brown, irregularly spotted with white. The first thoracic segment is rather wider than the rest of the body, twice as long as the other segments, with the lateral border widely turned out and up toward the anterior end. The anterior corners fit the sides of the head exactly and are rounded like the rear corners.

"The succeeding thoracic segments are of equal length in the median line, the lateral ends of the first three are narrowed with a rounded

tip, those of the former somewhat wider, yet rounded, those of the last two nearly rectangular. Of the abdominal segments the two first are a trifle wider than the next three, the lateral processes of the latter are somewhat widened rectangularly and toward the outside. The last segment is short, triangular, with rounded tip and concave sides; with a transverse impression halfway toward the end.

“Ground color of upper parts blackish brown; epimera somewhat lighter with two longitudinal rows of large oblong spots; the median line and the rear border of the individual segments are pale yellow. The underside and legs are whitish.” (Translated from original description.)

LOCALITIES.—New Granada (Gerstaecker); between Boca del Monte and Tanbo, Colombia, 1800 meters (Richardson).

Sphaeroniscus frontalis Richardson, 1912

Sphaeroniscus frontalis RICHARDSON, 1912c, p. 31.

Richardson's statement regarding this form is as follows:

“This species is very close to *Sphaeroniscus flavomaculatus* Gerstaecker, but differs in not having the epistome produced to a great distance beyond the frontal margin of the head; in having the first segment of the thorax with the lateral margin not rolled back so much and not so wide as in *S. flavomaculatus*, and in not having the lateral margins of the segments lighter in color.”

Color.—Orange-brown or dark gray, yellow markings.

LOCALITIES.—Near Viota, Colombia, 1200 and 1800 meters.

Sphaeroniscus portoricensis Richardson, 1901

Figure 173

Sphaeroniscus portoricensis RICHARDSON, 1901, p. 573 (orig. descr.), Fig 34; 1905, p. 662 (orig. descr. repeated), Figs. 703, 704; 1907, p. 449.—PEARSE, 1917, p. 3.—VAN NAME, 1925, p. 466.

Richardson's description in full is as follows:

“Body oblong, very convex, contractile into a ball. Surface perfectly smooth. Head set in first thoracic segment; front straight; epistoma forming a triangular shield. Eyes very small. Antennae with flagellum composed of three joints.

“First thoracic segment twice as long as head and longer than any of the other segments. Coxopodites not distinct from segment.

“First two abdominal segments with the lateral parts concealed, the three following ones continuing the outline of the body. The termi-

nal segment is twice as broad as long, very short, widely rounded posteriorly. The basal joints of the uropoda are square, extending the greater part of their length beyond the terminal segment. The external branch is inserted at the inner post-lateral angle of the basal joint and extends downward. The internal branch extends much beyond the last abdominal segment, is longer than the basal joint of the uropoda, and reaches the tip of the external branch.

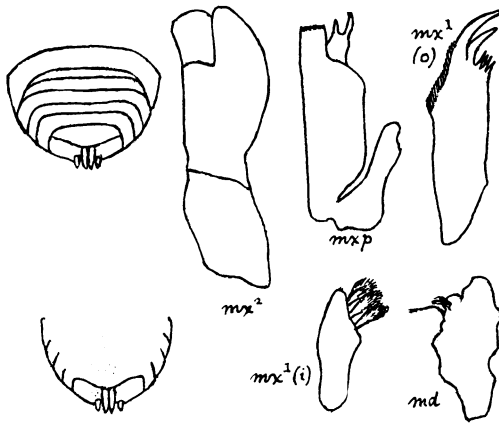


Fig. 173. *Sphaeroniscus portoricensis* Richardson. Adapted from Richardson, 1905.

“Color.—Reddish brown with markings of yellow.”

LOCALITIES.—“Four specimens were taken by Dr. C. W. Richmond at El Yunque, Puerto Rico, at an altitude of 2800 feet.” Type in U. S. National Museum (Richardson).

“Forty-three specimens were taken from bromeliads on the summits of sand hills on July 30, and twenty-one from an abandoned termite’s nest on a mourie, August 20, near Dunoon, British Guiana” (Pearse). Prof. Pearse does not give any description or figures, nor state that he made any direct comparison of specimens from the two regions.

***Sphaeroniscus guianensis*, new species**

Figures 174, 175, 176A

Body as seen from above very broad, considerably arched, broadly rounded in front and rounded in the arc of a smaller circle behind. Lateral ends of the segments considerably developed; in the abdominal region, especially, they increase the apparent width of the body by inclining obliquely outward. In the thoracic region they are more nearly vertical except in the anterior part of the first segment, where the

border is flared or curved outward conspicuously. Body surface smooth and even, not pubescent; exposed parts of segments not much raised above part overlapped by the segment next in front.

Head very small and short, its front outline convex when seen from above; there is a small slightly projecting lobe under each eye. Head so deeply set back into the thorax that it projects little beyond the general curve of the front of the body.

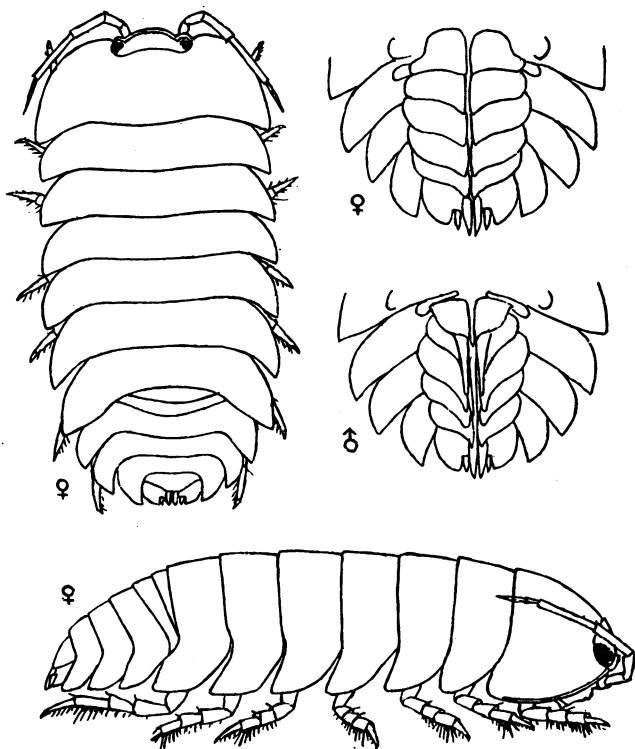


Fig. 174. *Sphaeroniscus guianensis*, new species.

The upper border of the epistome is prominent and upturned but not appressed to the forehead, so that a furrow is formed between it and the median anterior surface of the head. Seen from in front the upper border of the epistome describes a curve gently convex downward between the eyes and forms a distinct, sharply defined, upwardly directed angle near the inner lower corner of each eye. Eyes rather large, with about twenty-five ocelli arranged in four oblique rows. Second antennae of only moderate length and stoutness; the flagellum more than half as long as the last joint of the peduncle and very slender, with three articles, the terminal one somewhat the longest.

First segment of the thorax with the lateral borders curved or flared outward, but to a diminishing extent toward the rear angles, which are somewhat produced backward and slightly rounded off at the extreme tip. Its inferior margin is curved and bordered by a very narrow bead or thickened edge, so slight that it is noticeable only under magnification. No sulcus on its inferior aspect; no coxopodite developed on any segment. The second and third segments also have the extreme tip of the rear

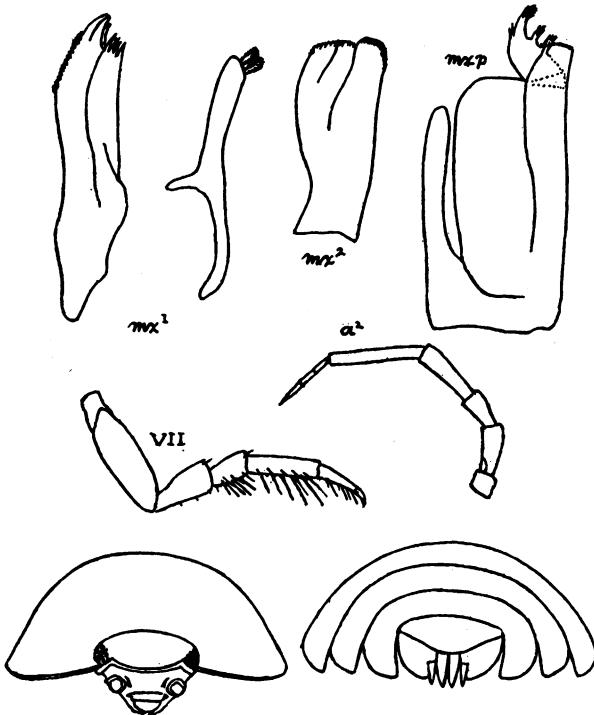


Fig. 175. *Sphaeroniscus guianensis*, new species.

lateral angle rounded off narrowly. The second to seventh (inclusive) segments of the thorax as well as the third, fourth, and fifth of the abdomen have the lateral ends considerably extended, their anterior corners being rounded off and the posterior ones sharp, except as above noted, and extended backward to an increasing degree as the posterior end of the body is approached. The seventh thoracic segment is an exception, being less extended back than the sixth.

Telson very broad and short, its shape approaching that of an inverted triangle blunted at the apex. The position and form of the uropoda and their branches are such that together they fill in most of the space behind the telson and between the epimeral ends of the fifth abdominal segment; the external rear angles of the broad

basal segments of the uropoda, however, are much rounded off. Their branches, which are of elongated tapering form, extend a trifle beyond the end of the basal segments.

Upper parts marbled or irregularly mottled with brown or dark grayish brown pigmented areas and pale yellowish unpigmented areas; under moderate magnification the pigmented parts are seen to be not continuous but composed of more or less separated dark spots of small size.

The largest specimen, a female, would probably measure 13 to 14 mm. long if it could be straightened out.

LOCALITIES.—Tumatumati, British Guiana, August, 1912, 1 large female (type). Kaieteur, British Guiana, August 11, 1911, Dr. F. E. Lutz, coll., 1 male, 1 female, and one incomplete specimen. Laudat, Dominica, W. I., August 6, 1911, Dr. F. E. Lutz, coll., 1 female and one mutilated specimen; Tacoba, British Guiana, Oct. 10, 1922, 1 specimen, Mr. Herbert Lang, coll. All in the American Museum of Natural History (type, Cat. No. 6527).

Sphaeroniscus tukeitanus, new species

Figures 176B, 176C

This is so close an ally of *S. guianensis* that a full description would be largely a repetition of what has been said regarding that species, but it can be distinguished at once by the fact that although the thoracic segments have their lateral ends

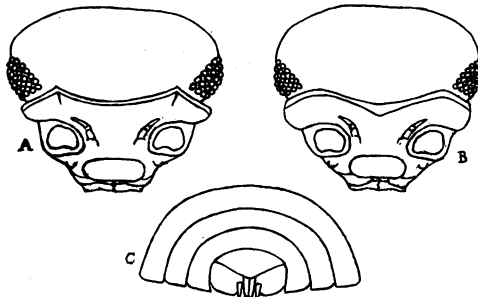


Fig. 176. A, *Sphaeroniscus guianensis*, new species, front of head. B, C, *Sphaeroniscus tukeitanus*, new species, front of head and rear end of body.

rounded off as in *S. guianensis*, the third, fourth, and fifth abdominal segments and the basal segment of the uropoda have the ends broadly truncated, filling out the even curvature of the outline of the rear end of the body. There is also an easily recognizable difference in the upper border of the epistome which does not present a sharply defined angle near the inside border of the eye, but only a slight upward curve.

Other minor differences are that the forehead is a little higher, the eyes smaller though with about the same number of ocelli, the body apparently a little more highly arched, and the lateral ends of the segments more developed, so that the apparent size of the body is greater in proportion to its actual bulk.

Color slaty gray above with a narrow yellowish edging to each segment and small irregular bars and rounded spots of yellowish on the lateral regions of the back. Under parts and legs yellowish.

Length of largest specimen (a female) about 16 mm.

LOCALITIES.—Tukeit, British Guiana, July 16, 1911, Dr. F. E. Lutz, coll., 1 female (type), 1 male. Kaieteur, British Guiana, August 4, 1911, Dr. F. E. Lutz, coll., 1 female. Specimens all in the American Museum of Natural History (type, Cat. No. 3542).

***Sphaeroniscus colombiensis* Pearse, 1915**

Figure 177

Sphaeroniscus colombiensis (misprint for *Sphaeroniscus c.* PEARSE, 1915, p. 548).

Sphaeroniscus colombiensis PEARSE, 1915, p. 547 (orig. descr.), Fig. 8.

Described by Pearse as follows:

“Body oblong, very convex, contractile into a ball; length 16 mm., width 5.8 mm. Dorsal surface marked with very minute pearly granules

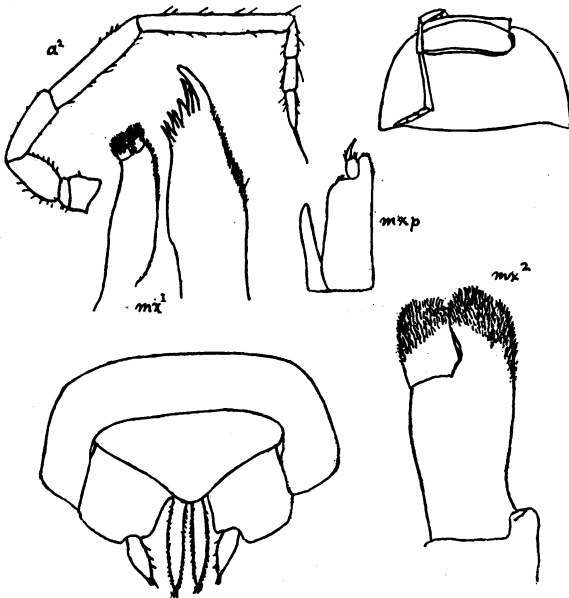


Fig. 177. *Sphaeroniscus columbiensis* Pearse. Adapted from Pearse, 1915.

arranged in irregular anastomosing lines. Head set in first thoracic segment; front nearly straight; epistoma rhomboidal. Eyes small. Flagellum of second antenna 3-segmented. Inner lobe of first maxilli-

ped armed with two plumose processes. First thoracic segment twice as long as head and longer than any other segment. Coxopodites not distinct. First abdominal segment with lateral parts concealed; the second without epimera but not concealed; the epimera of the next three segments continuing the general contour of the lateral margin. Telson broadly triangular, twice as broad as long, obtuse, slightly concave on postero-lateral margins. Basal segments of uropoda large, square, with a notch at the median distal angle for the exopodite which extends downward. The internal ramus of the uropoda slender, reaching about as far as outer ramus, longer than basal segment.

"Color brown, with paired lateral areas which contain irregular yellowish white lines.

"Length, 16 mm.; width, 5.8 mm."

LOCALITY.—Under leaves and logs in forest south of Cincinnati Coffee Plantation, Sierra Nevada de Santa Marta, Colombia, 4800 feet elevation, July 12, 1913. Type in University of Michigan Museum; paratype in U. S. National Museum (Pearse).

Sphaeroniscus peruvianus (Budde-Lund), 1885

Scleropactes peruvianus BUDDE-LUND, 1885, p. 241 (orig. descr.).

Sphaeroniscus(?) *peruvianus* BUDDE-LUND, 1904, p. 47.

Described by Budde-Lund as differing from *Scleropactes concinnus* in the following characters:

"Superficies minutissime granulata.

"Epistomatis linea marginalis frontem satis superans, integra.

"Trunci annuli priores margine posteriore utrinque magis sinuato.

"Caudae annulus analis epimeris annuli praeanalisis valde convergentibus multo brevior.

"Long. c. 7 mm."

LOCALITY.—Peru.

Described from an imperfect specimen (Budde-Lund, 1885). In his later work (1904), the same author states that this is not a *Scleropactes* but has "affinity to the genus *Sphaeroniscus*." It may have been his intention not to include this species and *S. senex*, to which his remark also applies, in *Sphaeroniscus* itself, but to establish an allied genus to receive them, but as he did not do this I am leaving them in *Sphaeroniscus*.

Sphaeroniscus senex (Budde-Lund), 1893

Scleropactes senex BUDDE-LUND, 1893, p. 128 (orig. descr.).—DOLLFUS, 1893a, p. 345.

Sphaeroniscus(?) *senex* BUDDE-LUND, 1904, p. 47.

Described by Budde-Lund as follows:

"Oblong ovalis, valde convexus, delete tuberculatus, nitidissimus.

"Antennae corpore dimidio breviores, hirsutae; flagellum scapi articulo quinto satis brevius; flagelli articuli ad apicem longitudine paulisper crescentes; articulus tertius seta apicali quam ipso articulo paulo brevior.

"Oculi magni, ocelli magni, numerosi, circiter triginta.

"Epistoma medio convexiusculum, margine superiore frontem superante, in medio transverse fronti adpresso et cum hoc concreto, utrinque libero, cavas duas frontales formante.

"Trunci segmenta tria priora margine posteriore utrinque leviter sinuato, segmentum quartum margine posteriore subtransverso, segmenta 5-6-7 medio sinuato; segmentum secundum margine exteriori paulisper incurvo; epimera hujus segmenti tertia parte anteriore articulari in lateribus a parte posteriore segmenti incisura discreta, epimera segmenti quarti perparva, subtriangula; anguli posteriores segmentorum 2-3 rotundati, segmenti quinti rotundate, sexti et septimi subacute recti.

"Caudae segmenta mediocria, epimeris segmentorum 3-4-5 latis, oblique tetragonis; segmentum anale breve, triangulum, duplo latius quam longius, epimeris segmenti praeanalisis subparallelis, apicibus leviter convergentibus multo brevius, apice obtuso supra planum.

"Long. 12-13 mm."

LOCALITY.—Merida, Venezuela.

The statement of Budde-Lund regarding the genus of *S. peruvianus* applies to this species also, and therefore I have also included it in *Sphaeroniscus*. See remarks under *peruvianus*.

***Sphaeroniscus granulatus* Dollfus, 1893**

Figure 178

Sphaeroniscus granulatus (misprint for *Sphaeroniscus g.* DOLLFUS, 1893a, p. 341).

Sphaeroniscus granulatus DOLLFUS, 1893a, p. 341 (orig. descr.), 344, 1 text fig.—

RICHARDSON, 1912c, p. 31.

Dollfus' description in full is as follows:

"Corps convexe, entièrement couvert de petites granulations.

"Cephalon.—Prosépistome présentant une dépression médiane; bord antérieur dépassant à peine le front et formant une ligne sinueuse. Antennes courtes, à fouet tri-articulé, le premier article plus fort et aussi long que les deux derniers réunis. Yeux moyens, formés d'environ 10 ocelles.

"Pereion.—Duplicature inférieure (coxopodite) du premier segment presque nulle.

"Pleon, Telson.—Cinquième somite du pleon à parties pleurales fortement dirigées en arrière et même un peu convergentes postérieurement. Pleotelson très court, triangulaire, à sommet obtus. Uropodes à base très grande, dépassant le pleotelson et les parties pleurales du pleon, se terminant du côté externe par un processus dentiforme; endopodites dépassant grandement le pleotelson; exopodites apicaux, courts, mais plus développés que dans le genre *Armadillo*.

"Couleur.—D'un gris brun, taché de clair.

"Dimensions.— $6 \times 2 \frac{3}{4}$ mill."



Fig. 178. *Sphaeroniscus granulatus* Dollfus. Adapted from Dollfus, 1893a.

LOCALITIES.—Colonie Tovar, Venezuela, a place at considerable altitude, type and only specimen (Dollfus). Richardson reports two specimens 5 mm. long from Puerto de los Pobres, on the Cauca River, Colombia, without description, except to remark that the inner branch of the uropoda does not quite reach the outer branch.

***Sphaeroniscus gaigei* Pearse, 1915**

Figure 179

Sphaeroniscus gaigei PEARSE, 1915, p. 546 (orig. descr.), Fig. 7.

Described by Pearse as follows:

"Body oblong, convex, contour rounded posteriorly; contractile into a somewhat flattened ball; length 4.4 mm. width 1.8 mm. Head set in first thoracic segment; front sinuous, with a slight concavity on either side; lateral angles prominent. Eyes small, with 14 facets. Second antenna robust, with 3-segmented flagellum; covered with many minute setae; ultimate segment nearly as long as the two preceding together, terminal seta very long. First maxilla with two plumose processes.

"First segment of thorax not twice as long as head, with two transverse rows of large tubercles; longer than the other segments, each of which has a row of tubercles along its posterior margin. Coxopodites

not distinct. First two abdominal segments without epimera; epimera of succeeding segments continuing contour of body. Terminal segment nearly twice as broad as long, slightly concave on postero-lateral margins; tip rounded. Uropoda with basal segments square but deeply notched on posterior border near median angle; external rami longer than basal segment, inner rami extending to middle of outer.

"Color reddish brown with irregular bilaterally symmetrical markings of yellowish white."

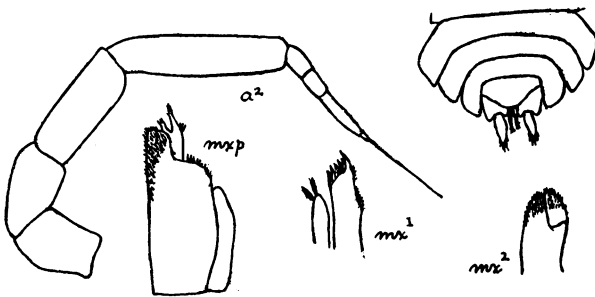


Fig. 179. *Sphaeroniscus gaigei* Pearse. Adapted from Pearse, 1915.

LOCALITY.—Collected in highest timber on San Lorenzo, Sierra Nevada de Santa Marta, Colombia, 7800 feet elevation, under leaves in ground, July 23, 1913. Type in Univ. of Michigan Museum. Paratype in U. S. National Museum (Pearse).

Sphaeroniscus species

Dollfus, 1893*a*, p. 351, mentions a specimen of a new species of this genus in his possession, collected at Loja, Ecuador, but does not name or describe it.

Sphaeroniscus species

Dollfus, 1896*b*, No. 228, p. 2, reports a specimen of *Sphaeroniscus* from Darien, "in too poor condition to be described" (listed also in Van Name, 1926, p. 3).

See also remarks under *Scleropactes zeteki*.

Sphaeroniscus species

Jackson, 1928*a*, p. 588, mentions a few facts about the structure of the head in this genus, basing them on a specimen in the British Museum among Budde-Lund's material, which he said was labeled "*S. intrusus* B.-L.," but of which no description had been published.

He gives no figure and mentions no locality for it, and the name *intrusus* does not seem to me to require recognition as a valid one.

CIRCONISCUS PEARSE, 1917

In this genus the general form of the body is much as in *Cubaris*. The most characteristic feature of the genus is seen in the lateral regions of the first thoracic segment. Throughout most of its length the lateral margin has a narrow outwardly projecting border, but this ends rather abruptly short of the rear angle, its termination being marked by a distinct notch in the lower margin, posterior to which is a rounded lobe, without projecting border, that forms the rear angle of the segment, and likewise constitutes the outer lamella of a narrow cleft for the reception of the anterior edge of the second segment when the body is rolled up. The antennal flagellum consists of two articles. The telson is broadly triangulate and ends short of the general outline of the rear end. The large flat basal segments of the uropoda fill in the spaces each side of it; their inner branches extend posteriorly a little beyond the end of the telson; the short, stout outer branches are inserted in the inner distal angles of the basal segments. Type: *C. gaigei* Pearse. *Paracubaris* Collinge, 1918, is a synonym.

Arcangeli, 1931, states that in *C. bezzii* the tracheae are confined chiefly to the first, second, and third pleopoda, and this I can confirm from an examination of a specimen of *C. gaigei*. I was not, however, able to assure myself from the material I examined that he was justified in stating that the tracheal system in this genus is of the *Tracheoniscus* type, as I was unable to trace the air tubes (which are radially arranged as in his figures) all the way to the margin of the plate, or to find there the pores by which they would open were the structure actually as in *Tracheoniscus*. The question should be further investigated, as, if Arcangeli is correct, the true relationships of *Circoniscus* may be rather with *Tracheoniscus* (through such genera as *Cylisticus*) rather than with *Cubaris*.

***Circoniscus gaigei* Pearse, 1917**

Figures 180, 181

Circoniscus gaigei PEARSE, 1917, p. 4 (orig. descr.), Fig. 2.—VAN NAME, 1925, p. 488 (new descr.), Figs. 43-51.—ARCANGELI, 1927a, pp. 135-137; 1931, p. 118.

The following statements are taken from Van Name, 1925, pp. 489, 490:

"Body surface very smooth and even. No tuberculation, the surface is very thickly dotted with minute, scabrous punctae bearing very

short minute hairs or setae. On the antennae, legs, etc., there is a coarser and more conspicuous pubescence. Legs rather weak and slender, with rather weak but moderately numerous spines.

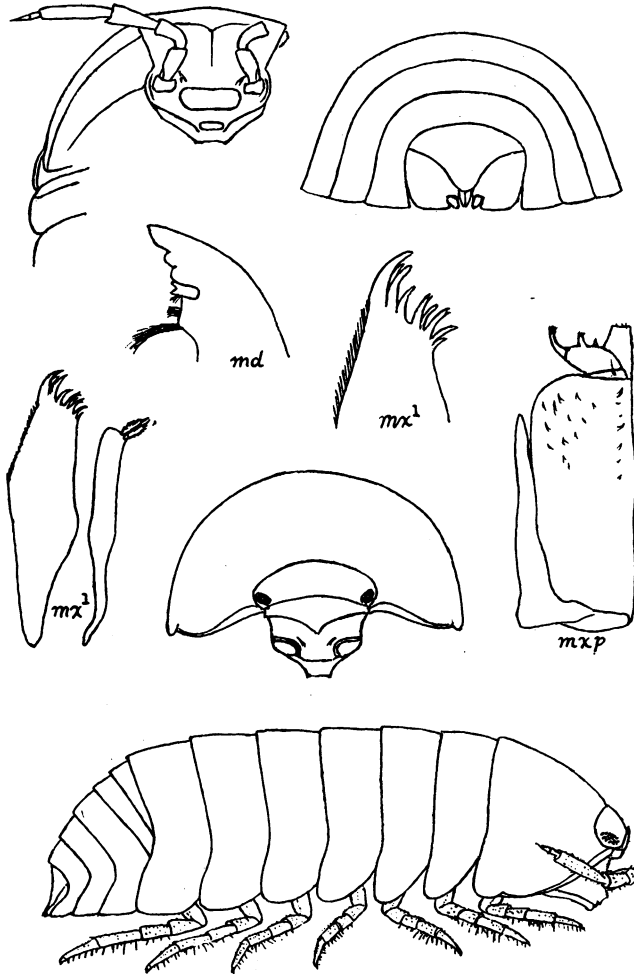


Fig. 180. *Circoniscus gaigei* Pearse. From Van Name, 1925, Zoologica, VI, p. 489.

“Head rather narrow, forehead low, upper edge of the epistome arched, forming a projecting upturned border distinct all the way across the head. First antennae minute, composed of three segments, the sec-

and the shortest, the terminal one much more slender than the others. Second antennae short and small, conspicuously and stiffly pubescent, the flagellum of two very small short articles which together are less than one-third the length of the last segment of the peduncle and of much smaller diameter than the latter. The terminal article bears a rather large moveable terminal bristle. The mouth parts form a very prominently projecting mass. Mandible with a row of four small tufts of hairs ('penicili') on the inner aspect distal to the large brush-like tuft. Eyes rather small, ocelli fairly numerous, apparently at least twenty-five in the largest specimens, but not well defined or well pigmented.

"First segment of the thorax rather large and wide, the anterior part of the lateral border narrowly rolled outward to form a rather thin projecting border. This diminishes toward the rear and disappears

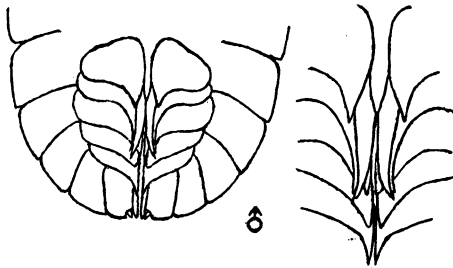


Fig. 181. *Circoniscus gagei* Pearse. Male. Ventral view of abdomen.

a little way from the rear corner where the rear part of the lateral face of the segment extends down vertically into a small semicircular lobe that forms the posterior lateral corner of the segment. In a ventral view it can be seen that this lobe forms the outer and longer side of a very small V-shaped notch for the reception of the second segment when the body is tightly rolled up. The inner side of the notch is very short and much thicker. The border of the segment is not sulcated. The inner side of the second segment has the anterior edge thickened but no process."

See also remarks on the tracheae of the pleopoda under the genus *Circoniscus*.

Color (in alcohol) varying from rather dark grayish brown to pale brown with numerous very small, somewhat irregular, yellow markings on the forehead and lateral parts of the back and yellow borders on the segments. Under parts and limbs yellow.

Length of largest specimens (males) nearly 20 mm.

LOCALITIES.—Dunoon, British Guiana (type locality), from rotten logs, aerial rootlets, loose bark of trees, and dry sand (Pearse); Kartabo, British Guiana, from dead wood (Van Name). Cotypes in Museum of University of Michigan (Pearse). Specimens from Kartabo, in the American Museum of Natural History, are the basis of the description and figures here reproduced.

***Circoniscus hamatus*, new species**

Figure 182

A much smaller species than *C. gaigei*, if we may judge by the material available, but so like it that without a close examination it might be taken for the young of that species.

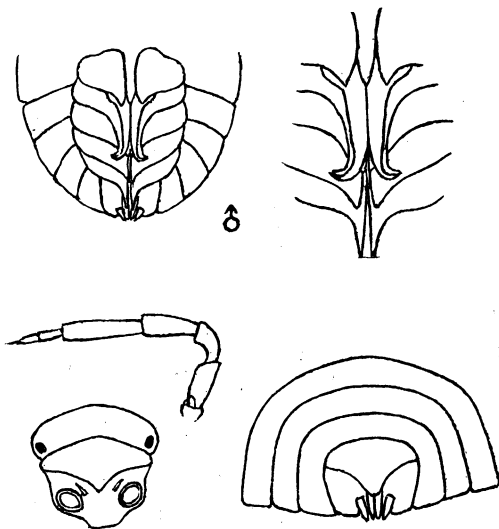


Fig. 182. *Circoniscus hamatus*, new species.

As in that species, the integument is very hard and smooth and the articulation firm and compact. The body is, however, proportionately a little narrower and the ends of the abdominal segments are scarcely at all bent or flared outward. The lateral border of the first thoracic segment is also less rolled outward.

Upper border of epistome less evenly curved, its outline being more that of a very obtuse triangle. Second antennae larger (both longer and stouter), with a proportionately longer flagellum, the latter, exclusive of its terminal spine, being about half the length of the fifth segment of the peduncle.

The backwardly extended processes of the inner and outer divisions of the second pleopoda of the male are larger and stouter, and instead of being only slightly

curved outward at the tips are so strongly bent as to be properly termed hooked. The exposed part of the uropoda is narrower and the outer branch is narrower and longer and is inserted about at the level of the tip of the telson, instead of at a point noticeably beyond the latter.

The color pattern is similar to that of *C. gaigei* but the markings are more conspicuous owing to the blackish slate ground color of the upper parts.

The largest specimens, could they be straightened out, would hardly measure 10 mm. in length.

LOCALITY.—Kamakusa, British Guiana. Eight specimens, including both sexes, obtained by Mr. Herbert Lang, October 25, 1922, are in the American Museum of Natural History. They include the type (a male, Cat. No. 6521).

***Circoniscus spinosus* (Collinge), 1918**

Figure 183

Circoniscus spinosus VAN NAME, 1925, pp. 466, 491.

Paracubaris spinosus COLLINGE, 1917, p. 62 (orig. descr.), Pl. VI.—ARCANGELI, 1927a, pp. 136, 137; 1931, p. 118.

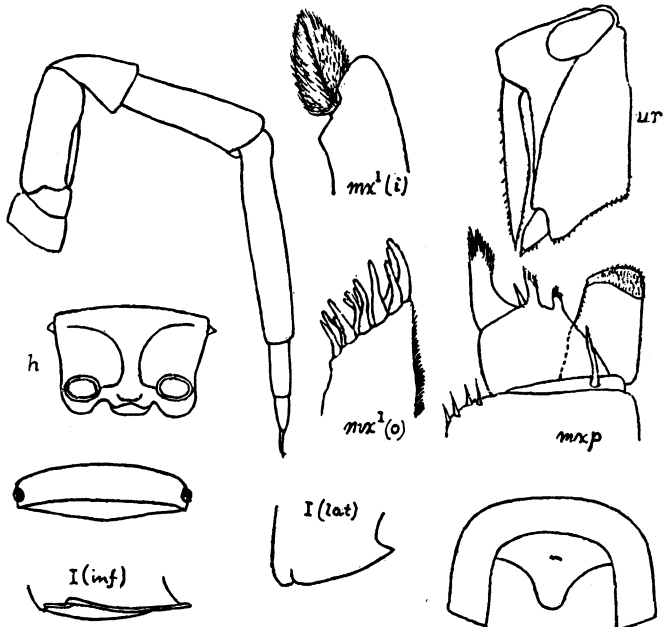


Fig. 183. *Circoniscus spinosus* (Collinge). Adapted from Collinge, 1918.

The following statements are taken from Collinge's description:

"Body oblong-oval, segments strongly convex, dorsal surface covered with short, blunt spines, finely granulose. Cephalon short and wide, with well marked anterior and posterior margins; cephalic lobes absent; epistome dorsally sloping from the anterior margin of the cephalon, keeled in the median line, concave laterally. Eyes compound, situated dorso-laterally. . . .

"The segments of the mesosome are strongly convex, pleural plates all slightly excavate, those of the 2nd to 5th segments terminally bluntly pointed, remainder truncate, posterior angles undeveloped. The first segment has a slight fold on the outer margin, which ventrally appears as a thickening. Thoracic appendages normal, enlarging slightly posteriorly. Uropoda extending beyond the telson; basal plate thick and flattened, with a slightly raised diagonal crest, exopodite short and broad, articulating with posterior inner border and extending beyond basal plate a little, endopodite long, both spinous and with small terminal styles. Telson triangular, terminally bluntly pointed, proximally wider than the length.

"Length, 20.5 mm.

"Color (in alcohol) greenish brown with lateral areas on the mesosome of brown and white mottling."

LOCALITY.—Mazakuvi River, British Guiana, in decaying wood. Two specimens taken by G. E. Bodkin, May, 1916.

The suggestion of Arcangeli, 1927, that this species is identical with *Circoniscus gaigei* Pearse, cannot easily be satisfactorily reconciled with the statement of Collinge that the back is "covered with short blunt spines" in the present species. *C. gaigei* is a very smooth species, its minute scattered setae being visible only on magnification.

Circoniscus bezzii Arcangeli, 1931

Figure 184

Circoniscus bezzii ARCANGELI, 1931, p. 115 (orig. descr.), Pl. II.

I find it very difficult, either from Arcangeli's description or figures, to find any well-marked characters distinguishing this species from *C. gaigei* described above, except that the second segment is said to have a coxopodite process in the form of a "rounded tooth" on the inner aspect of the epimera, and the third segment to have one still more reduced. Such a statement could hardly be made of my specimens of *gaigei*, the margin is merely thickened and folded over. I find also that the posterior

margin of all the thoracic segments show at least a little backward flexion in *gaigei*, as is shown in the side view of the body of that species, while it is said to be straight in the segments to and including number IV in *bezzii*.

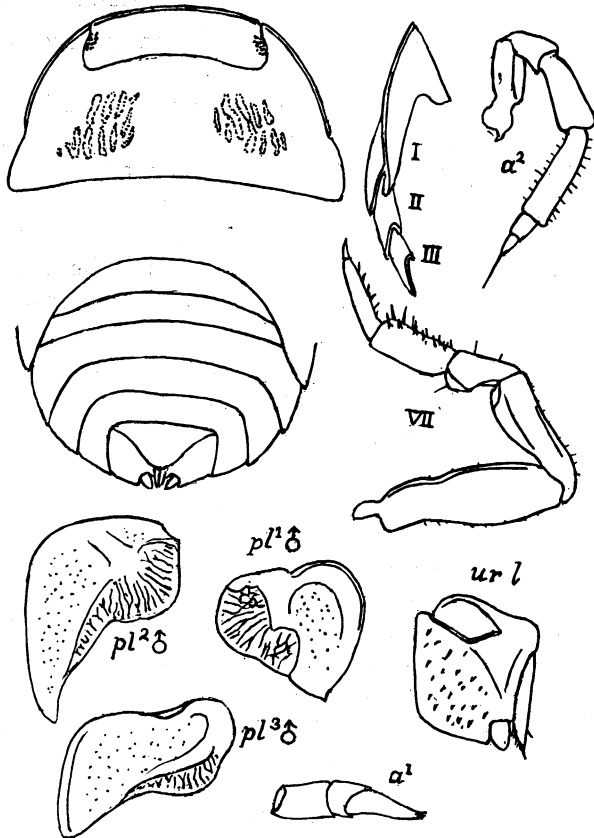


Fig. 184. *Circoniscus bezzii* Arcangeli. Adapted from Arcangeli, 1931.

Length, 11 mm.; width, 5.5 mm.

LOCALITY.—“Carandasinho, Brazil,” a place I have not located on the map. Two males and two females collected by Dr. M. Borelli.

See remarks on the respiratory apparatus of the species under the genus *Circoniscus*.

COXOPODIAS RICHARDSON, 1910

Coxopodias was established as a genus by Richardson, 1910a, p. 93, for a new species from Costa Rica related to *Cubaris*, characterized by

having distinct coxopodite ridges or processes on the under side of the first, second, and third thoracic segments, in having the outer branch of the uropoda (which is minute) inserted on the dorsal surface of the basal segment about in the middle of the exposed part, the antennal flagellum two-jointed, and the telson pointed at the end. *Minca* Pearse, 1915, is a synonym.

Arcangeli, 1927 and 1930, states that there do not seem to be any characters of generic importance separating *Coxopodias* from *Synarmadillo* Dollfus, 1892, an African genus. It is, however, distinguished by the central insertion of the outer branch of the uropoda above noted, and possibly by other characters, so that for the present I am retaining it as a genus.

Coxopodias tristani Richardson, 1910

Figure 185

Coxopodias tristani RICHARDSON, 1910a, p. 94 (orig. descr.), Figs. 1-4.—PICADO 1913, p. 337.—ARCANGELI, 1927a, p. 138; 1930a, pp. 2, 11.

The following statements are taken from Richardson's description:

"Head wider than long, the eyes small, composite, situated close to the lateral margin: anterior margin straight, the antero-lateral angles

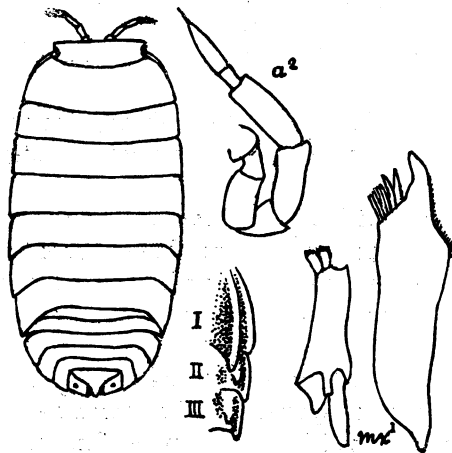


Fig. 185. *Coxopodias tristani* Richardson. Adapted from Richardson, 1910a.

acute; front not margined. Flagellum of second antennae composed of two articles, the first of which is about half as long as the second.

"Body ovate, very convex; surface smooth. Epimeron or coxo-

podite of first thoracic segment extends the entire length of the lateral margin, separated from the segment by a longitudinal furrow; it is cleft posteriorly. There is also a slight furrow on the dorsal side of the segment, close to the lateral margin. The second and third segments of the thorax are also furnished on the underside with small but conspicuous coxopodites in the form of tooth-like processes.

"Sixth or terminal segment of the abdomen triangular with the apex produced in an acute process. Basal article of the uropoda obliquely triangular, occupying all the space between the sixth abdominal segment and the lateral parts of the fifth segment. Inner branch of the uropoda extends to the tip of the inner postero-lateral angle of the basal angle; outer branch minute, situated about the middle of the dorsal surface of the basal article.

"Color reddish brown, with a lateral band of light wavy lines on either side of the body. Dimensions not given."

LOCALITIES.—Costa Rica. Type from road between Juan Vinas and Reventazon; other specimens from Turrialba. Type in U. S. National Museum (Richardson). San José (Arcangeli).

This species is listed by Picado as occurring both in bromeliads and on the ground.

Coxopodias ruthveni (Pearse), 1915

Figure 186

Minca ruthveni PEARSE, 1915, p. 546 (orig. descr.), Fig. 6.—ARCANGELI, 1927a, p. 138.

The following details are from Pearse's description:

"Body finely tuberculate, pubescent toward posterior end; length 16 mm., width 7.4 mm.

"Eyes small oval, with about 12 facets.

"Coxopodites distinct on the first three segments; on the first in the form of a long carina extending the whole length of the segment, but diverging more posteriorly; on the second and third as small triangular processes.

"Color.—Chocolate brown with median spots and lateral yellowish white markings; often the epimera on the thorax have white spots."

DISTRIBUTION.—Santa Marta, Colombia (Cincinnati Coffee Plantation at 4500 feet altitude, abundant under logs; type locality). Type in University of Michigan Museum.

Arcangeli, 1927, p. 139, points out that *Minca* Pearse, 1915, is not distinguishable from *Coxopodias* Richardson, 1910.

See remarks under that genus.

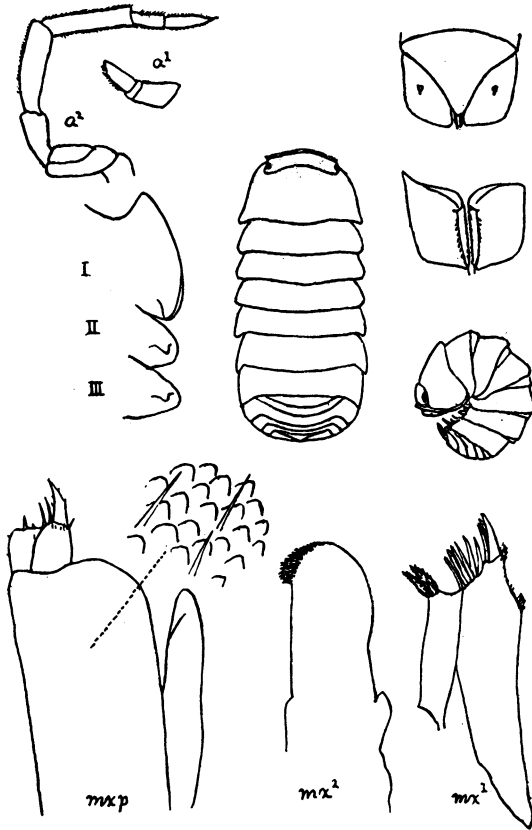


Fig. 186. *Coxopodias ruthveni* (Pearse). Adapted from Pearse, 1915.

HAPLARMADILLO DOLLFUS, 1896

This was established by Dollfus, 1896, p. 399, as a genus to contain the following species only, described as new in the same article. That author states that it is nearly related to the Old World genus *Synarmadillo* Dollfus, 1892, but differs in the monocellated eyes and single-jointed antennal flagellum.

Haplarmadillo monocellatus Dollfus, 1896

Figure 187

Haplarmadillo monocellatus DOLLFUS, 1896, p. 400 (orig. descr.), Figs. 13a-13d.—RICHARDSON, 1910, p. 573; 1905, p. 665 (orig. descr. quoted), Fig. 705.—OMER-COOPER, 1926, p. 352.—ARCANGELI, 1927a, p. 133.

The original description is as follows:

"Body convex, smooth, and covered with minute, setose hair.

"Cephalon.—Prosepistoma with a shield-like convexity. Eyes monocellate, hardly perceivable. Antennae very hairy; flagellum single-jointed with a long stiff hair at its distal end.

"Pereion.—First segment with a very blunt anteromedian tubercle; hind edge nearly straight; sides feebly raised forward; coxopodite distinct on the posterior half of the edge. Second segment with no distinct coxopodite.

"Pleon, Telson.—Pleotelson widely triangular, much wider than long. Uropoda with a square basis; longer than the pleotelson; endopodite as long as the basis; exopodite minute, placed at the internal distal angle of the basis.

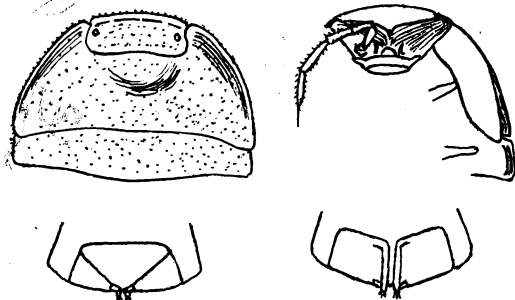


Fig. 187. *Haplarmadillo monocellatus* Dollfus. Adapted from Dollfus, 1896.

"Color.—Dark gray; variegated with lighter lineolae and irregular stripes.

"Dimensions.—9 by 4 mm."

LOCALITY.—"St. Vincent, Richmond valley under rotting leaves, 1100 feet, January 18 (one example)." Type in British Museum (Dollfus).

GLOBARMADILLO RICHARDSON, 1910

A genus established by Richardson (1910, p. 495) for the new species *G. armatus* whose description is quoted below. Among the characters given are:

"Thorax with no epimera distinctly separated from the segments either above or below.

"Abdomen with the terminal segment triangular ending posteriorly in an acute point.

“Uropoda with the basal article or peduncle wider than long, situated somewhat obliquely; the inner branch is inserted at the inner post-lateral angle of the basal article; the outer branch is short, hidden in a dorsal view, and does not reach the tip of the terminal abdominal segment.”

Globarmadillo armatus Richardson, 1910

Figure 188

Globarmadillo armatus RICHARDSON, 1910, p. 495 (orig. descr.) 1 text fig.—ARCANGELI, 1927a, p. 134.

The following statements are taken from the original description:

“Head broader than long, with the front slightly excavate and the lateral angles acutely produced. Flagellum (of antennae) consists of

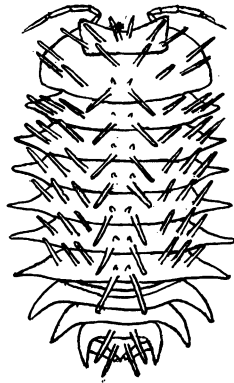


Fig. 188. *Globarmadillo armatus* Richardson. Adapted from Richardson, 1910.

two articles the first of which is minute, the second long and tapering and furnished with a long spine at the tip. The lateral parts of the first segment (of the thorax) are produced anteriorly and posteriorly into a broad plate on either side. The lateral parts of all six (following) segments are produced into long narrow spine-like processes. Epimera are not distinct on any of the segments either on the dorsal or ventral side.

“Lateral parts of the third, fourth and fifth (abdominal) segments are produced in long, narrow tapering processes.

“The two specimens are very small and so completely rolled up that only a diagrammatic drawing could be made.”

LOCALITY.—Trece Aguas, Guatemala. Two specimens, including type, in U. S. National Museum (Richardson).

PERISCYPHIS GERSTAECKER, 1873

Closely related to *Cubaris*, but distinguishable by the narrower, more or less tapering telson, often pointed at the end and not constricted at the middle; the absence of a sulcus on the inferior aspect of the border of the first thoracic segment, and of a cleft at its rear angle. This segment, however, has the margin with an abruptly thickened border on the outer side, at least on the anterior part, which becomes narrower and disappears toward the rear end of the segment (see Omer-Cooper, 1926, p. 355).

Periscyphis species

Kraepelin, 1901, p. 204, reports a specimen of this genus brought to Hamburg, Germany, on orchids from San Francisco, Brazil. The genus was determined by Budde-Lund, according to Kraepelin, but Budde-Lund, 1908a, p. 278, states that the known species of the genus are all from Africa. The American origin of the specimen must be considered extremely doubtful.

PSEUDARMADILLO SAUSSURE, 1857

This genus was established by Saussure on the basis of a single specimen which he named *P. carinulatus* and which was of uncertain locality: "Mexico or Cuba." Probably Cuba was correct, for while numerous specimens of the genus have since been collected in Cuba, the Isle of Pines, and the Bahamas, none, so far as I am aware, has been found in Mexico. Five species of the genus have been described, which differ mainly in the tuberculation or spination of the dorsal surface, a character which seems to be subject to a great deal of individual variation.

So far as the more fundamental characters are concerned, a single description will suffice for all of them. In general form the body resembles that of *Cubaris* and is capable of being rolled up into a ball, but the front outline of the head (formed by the upper border of the epistome) presents, when seen from above, three broad lobes, a median and a lateral on each side. In a front view, the outline of the epistome is straight and horizontal in the middle, rising a little on each side and dipping down again under the eyes, which are small, with very few ocelli and often imperfectly pigmented. Antennae short and stout with a flagellum of two joints, the first very short.

The lateral margin of thoracic segment I and the epimera of abdominal segments 3, 4, 5, as well as the terminal end of the telson are bent or flared outward.

Segment I of the thorax has a coxopodite ridge on each side throughout the whole length of the under side of the segment. It is separated from the margin by a broad, deep sulcus ending behind, as in *Cubaris*, in a cleft, the inner side of which is formed by a small plate-like continuation of the coxopodite ridge which is often somewhat notched or emarginate at the end, though I have never seen a case that could without exaggeration be called "bifurcate," as Richardson describes it. Whether this small character is really of diagnostic importance I do not know. Segment II has a large, acute, posteriorly directed coxopodite process. Segment III merely has the anterior edge folded, but beginning with the fifth, the following segments have a small but more or less distinct tooth-like process.

The dorsal surface of the abdomen has a steep roof-like slope which often is accentuated by a row of large median tubercles.

Segments 4 and 5, and to a less extent 3, bear inwardly extending plates arising from the ventral or inner surface of the epimera. The edges of the outer plates of the corresponding abdominal pleopoda fit closely against the free ends of these plates and against ridges on the upper ventral ends of the basal joints of the uropoda in such a way as to quite effectively close in and protect from drying the respiratory (inner) plates of the pleopoda.

The telson differs from that of *Cubaris* in being of somewhat triangular form, truncate at the narrow rear end. The basal joints of the uropoda fill in the spaces on each side of it, and have the very small, short external branch inserted in a notch in the inner rear angle, visible both in a dorsal and in a ventral view, while the internal branches are inserted close together as in *Cubaris* and are visible only from below, not quite reaching the end of the telson. They differ from those of *Cubaris* in being narrow at the inserted end and becoming wide and truncated at the distal end, which bears numerous very short setae.

The dorsal surface of the body bears numerous small tubercles arranged in more or less distinct transverse rows, a row near the rear edge of each thoracic segment being especially regular. In addition, there are certain larger tubercles, some of which may become long spines or processes in some species. There is a transverse row of four large ones near the upper (posterior) border of the head, a longitudinal row, not always conspicuous, on the side of the thorax about halfway from the median line to the lateral ends of the segments, a pair in the rear border of segment VII, and a median row on abdominal segments 3 (perhaps not always), 4, 5, and on the proximal part of the telson. Below the

median tubercle on the telson is a pair of smaller ones with a median depression between them.

***Pseudarmadillo carinulatus* Saussure, 1857**

Figures 189, 190

Pseudarmadillo carinulatus SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 483 (redescribed), Pl. v, figs. 43, 43a.—STUXBERG, 1875, pp. 46, 63.—BUDE-LUND, 1879, p. 7; 1885, p. 41 (new description: type examined).—STEBBING, 1893, p. 434.—DOLLFUS, 1896d, XXI, p. 46.—RICHARDSON, 1901, p. 572; 1902a, p. 511; 1905, p. 657 (Saussure's description quoted and translated), p. 659, Fig. 702 (after Saussure).—BOONE, 1934, p. 574 (new descr.), Fig. 4.

The following details are taken from the generic diagnosis and description of the species in Budde-Lund, 1885.

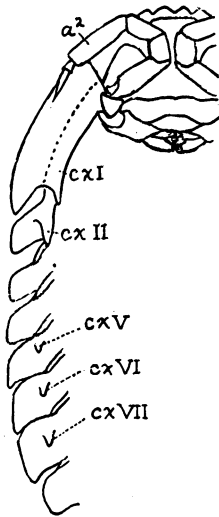


Fig. 189. *Pseudarmadillo carinulatus* Saussure, 1857. From specimens from Guantánamo, Cuba.

“Oblonge ovalis, convexus, granulatus vel tuberculatus; caput post crista tuberculorum maxime quattuor majorum; trunci annulus septimus medio duobus tuberculis et caudae annuli 4–5–6 medio tuberculis singulis, omnibus majoribus ornatus.

“Epistoma margine superiore marginem frontalem satis superante; incisuris duabus margo trilobatus videtur.

“Clypeus brevis, perpendicularis, margine superiore submarginato, non lobatus. Oculi congregati, parvi: ocelli circiter 6, non pigmentati, subdistantes. Trunci annulis primus margine laterali crasso, sulcato,

post parum profunde fisso; parte exteriori altecincta, revoluta tenui; parte inferiore brevior. Trunci annuli duo priores epimeris post fissis.

“Caudae annulis analis trapezoideus, subtrigonus, lateribus ad apicem subsinuatis, apice truncato, supra valde convexus.

“Color albidus uniformis.

“Long. 10 mm.”



Fig. 190. *Pseudarmadillo carinulatus* Saussure. Adapted from Saussure, 1857.

LOCALITIES.—Type locality doubtful, reported as from “Mexico or Cuba.” It was probably from Cuba (see remarks under the genus). Boone, 1934, reports it from Guaso, near Guantanamo, Cuba. Her specimens do not have the end of the coxopodite ridge of segment I emarginate, but narrow and rounded.

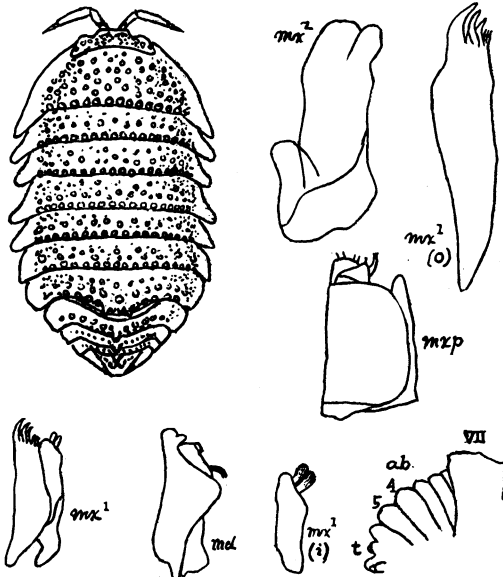


Fig. 191. *Pseudarmadillo dollfusi* Richardson. Adapted from Richardson, 1905.

The illustrations of Saussure are crude and in some respects misleading. The illustration of *P. dollfusi* (see above), which is perhaps not distinct from the present species, gives a better idea of the latter.

***Pseudarmadillo dollfusi* Richardson, 1905**

Figure 191

Pseudarmadillo dollfusi RICHARDSON, 1905, p. 657 (orig. descr.), Figs. 700, 701a-g.—BOONE, 1934, p. 575.

This is perhaps a synonym of *P. carinulatus*. So far as I am aware, the chief character distinguishing it is that it has the inner lamella of the coxopodite notch of segment I emarginate ("bifurcate," according to Richardson), instead of rounded at the tip.

LOCALITY.—Three specimens were obtained at Mangrove Cay, Andros Island, Bahamas. Types in the Museum of Comparative Zoology, Cambridge, Mass. (Richardson). The American Museum of Natural History has nine specimens from Andros Island (several of them from Mangrove Cay, the type locality).

***Pseudarmadillo welchi* Boone, 1934**

Figure 192

Pseudarmadillo welchi BOONE, 1934, p. 577 (orig. descr.), Figs. 5, 8d, 8e, 8f.

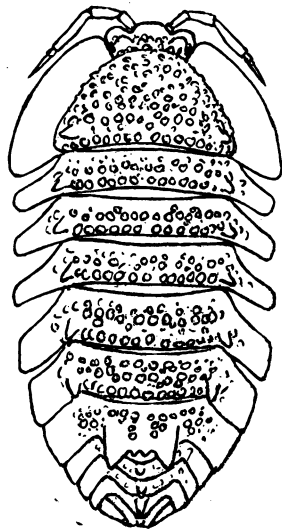


Fig. 192. *Pseudarmadillo welchi* Boone.

This is a form intermediate between *P. carinulatus* and *P. gillianus* (see below) and requires no description here as it apparently differs

from the latter form only in having conical or more or less pyramidal tubercles in place of the long spines of *gillianus*. Of these tubercles the two on the rear border of segment VII are the largest and project considerably beyond the rear border of the segment; between them there may be one or two minute tubercles or none at all. The tubercles replacing the lateral spines on the first six segments vary much in size in different individuals and some individuals are not very conspicuously enlarged.

In the widely flaring lateral borders and ends of the body segments which bend outward much more than in the specimens of *P. carinulatus* and its doubtfully distinct ally *dollfusi* which I have seen; in its size (ranging up to 11 or 12 mm. in length); and in its mottled coloration of brown and whitish irregularly variegated (especially on the epimeral parts) with large whitish areas of different extent and arrangement in different individuals, *gillianus* and *welchi* are alike, and I must consider the validity of the latter species as requiring more confirmation.

DISTRIBUTION.—Miss Boone reports *P. welchi* from a number of localities in Cuba from Camaguey to Piñar del Rio Provinces inclusive. The American Museum of Natural History contains the type (Cat. No. 6623) from Marti, Camaguey Province, and a number of other specimens. Variations in the development of the tuberculation are considerable, but do not seem to be correlated with size, age or locality.

Pseudarmadillo gillianus Richardson, 1902

Figure 193

Pseudarmadillo gillianus RICHARDSON, 1902b, p. 509 (orig. descr.), Figs. 1-4; 1905, p. 655 (descr.), Figs. 696-699 (original figures reproduced).—BOONE, 1934, pp. 577, 580, Fig. 6.

In this species, the row of large tubercles on each side of the thorax becomes a row of large spines, and the pair of tubercles on the rear border of thoracic segment VII, also the median tubercle on abdominal segment 5, are developed into long, tapering spines. The inner lamella of the notch in segment I is "bifurcate." Other differences which, from the figures, might be assumed to exist between this species and *dollfusi* (which perhaps = *carinulatus*) are probably due to the relaxed condition of the intersegmental muscles in the specimen from which the figure of *gillianus* was drawn, and from the fact that the head is more upturned.

LOCALITY.—Nueva Gerona, Isle of Pines, Cuba. Type in U. S. National Museum (Richardson). Boone, 1934, reports it from several localities in Cuba from Camaguey to Piñar del Rio Provinces inclusive.

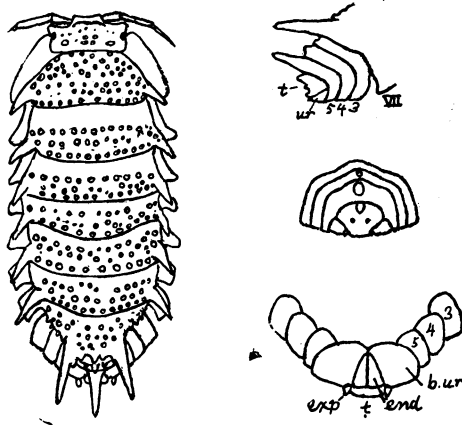


Fig. 193. *Pseudarmadillo gillianus* Richardson. Adapted from Richardson, 1902b.

***Pseudarmadillo buscki* Boone, 1924**

Figure 194

Pseudarmadillo buscki BOONE, 1934, p. 582 (orig. descr.), Fig. 7.

This remarkable species, though a typical *Pseudarmadillo* in all its fundamental structures and details, and conforming to the description given above under that genus, has perhaps the most extraordinary development of spines of any isopod.

In general form the body conforms to that of *P. gillianus*, but the small tubercles present on the dorsal surface of that species are practically wanting, the surface being merely granular. The large lateral spines present in *gillianus* have in *buscki* an even greater development, being larger and longer, and more or less flattened from side to side, the rear margin having a tendency to be slightly dentate. The head bears a pair of large, upwardly extending, flattened, leaf-like diverging processes. The spines borne by *gillianus* on the seventh thoracic segment are here represented by a pair of large acute leaf-like appendages joined at the base but diverging and extending nearly horizontally backward over the abdomen. They have the margins somewhat dentate and, on the lower aspect, a midrib bearing a row of tubercles. On the thoracic segments there is a transverse row of a few acute tubercles or small erect spines close to the rear margin; of these the pair each side of the median line are the largest of them, except that on segment VI there is a single median spine instead of a pair. Abdominal segments 4 and 5 and the

telson bear a median triangular erect plate, that on the telson being the largest.

The antennae resemble those of the other species of the genus. The eyes are small and composed of few ocelli. The coxopodite ridge of segment I is similar to that of *carinulatus* and ends in a small process whose tip is not expanded or emarginate. Segment 2 has a tooth-like coxopodite process.

Color yellowish white, with little trace of darker pigmentation.

Length of type (a female) about 10.2 mm.

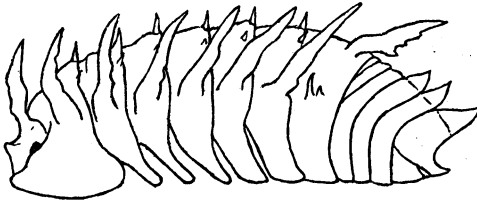


Fig. 194. *Pseudarmadillo buscki* Boone.

LOCALITY.—The type above described and a much smaller fragmentary specimen were obtained at Caenito, Cuba. Type in the American Museum of Natural History (Cat. No. 6615). We may surmise that with more material available, considerable individual variation in the development of the dorsal spines and processes would be found to occur.

DELATORREIA BOONE, 1934

This genus is characterized by the remarkable projection of the rear margin of the seventh thoracic segment which is broadly extended out in a roof-like manner over, but not in contact with, the abdomen. At its rear end this extension is curved downward and rendered slightly two-lobed as seen in a dorsal view by a median notch or emargination.

In other respects, including the coxopodite sulcus along the whole length of the margin of the first thoracic segment on the underside, and in the tooth-like coxopodite process of the second segment and the characters of the abdominal segments, telson, uropoda, etc., the genus does not appear to differ from *Pseudarmadillo*.

Delatorreia hoplites Boone, 1934

Figure 195

Delatorreia hoplites BOONE, 1934, p. 586 (orig. descr.), Figs. 8a, 8b, 8c, 9.

The characters given under the genus sufficiently differentiate this species from other known forms. The upper surface of the head and the back are covered with small tubercles which, on the back, form, on most of the segments, two or more distinct, transverse rows.

Eyes with few (seven, according to Miss Boone) well-developed ocelli. Antennae with a flagellum of two articles, the first very short. Abdominal segments 4 and 5, the telson with a median oblong tubercle.

The type specimen exhibits hardly any pigmentation.

Length of type (a female) about 10 mm.

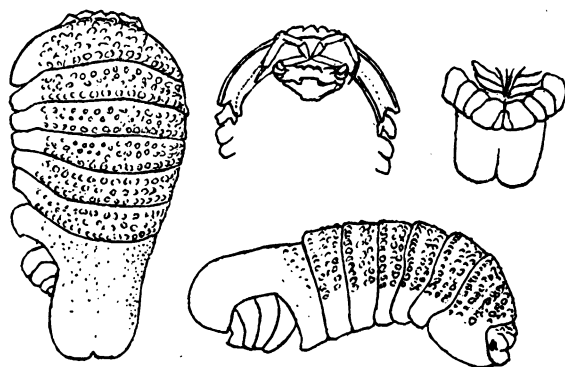


Fig. 195. *Delatorreia hoplites* Boone.

LOCALITIES.—The type (Cat. No. 6607 in the American Museum of Natural History) and a smaller specimen, were obtained at Finca de Soma, Sierra de Cubitas, Camaguey, Cuba. Miss Boone records a larger example (size not stated) from the Sierra de Najaza, Camaguey Province, Cuba.

CUBARIS BRANDT, 1833

(= *Armadillo* auct. plur.)

Budde-Lund's (1885) diagnosis of this genus, as translated by Richardson, 1905, is as follows:

"First pair of antennae very small, inconspicuous, composed of three articles. Second pair of antennae short, generally not longer than one-third the length of the body; flagellum composed of two articles.

"Eyes composite, small or moderately large. Clypeus very short, with the anterior margin entire, lobate at the sides. Epistome flat,

forming a continuously straight frontal marginal line. The vertical marginal line reaches the frontal line.

"First thoracic segment with the epimera posteriorly cleft, often also the second; rarely entire. Terminal abdominal segment tetragonal, wider at the base than at the apex, more or less contracted in the middle.

"Outer branch of all the pleopoda furnished with tracheae. Uropoda short, not extending beyond the terminal abdominal segment. Basal article or peduncle large, wide, entire, tetragonal, obliquely produced; outer branch very small, rather slender, inserted at the middle of the inner lateral margin of the basal article; inner branch small, rather slender or rather compressed."

The members of this genus are among the most perfectly adapted of all isopods for rolling the body up into the form of a ball for protection. They can readily be distinguished from the other American genera having this character, by their telson and uropoda. The telson is widely truncated at the rear end, forming a considerable part of the outline of the body; it is also wide at the superior or basal end, but usually more or less constricted in width in the middle portion. The broad, flattened basal segments of the uropoda fill in the space between the sides of the distal part of the telson and the fifth abdominal segment, also taking part in forming the posterior outline of the body. The inner branches of the uropoda are small and short, inserted well toward the basal ends, and visible only in a ventral view of the body. The external branches are mere rudiments, often very minute, inserted on the inner (median) margin of the basal segment, or sometimes on its external (dorsal) aspect near that margin.

On the first segment, in the American species, there is usually a sulcus or groove on the inferior aspect of the margin which separates off an internal ridge (the coxopodite ridge) that runs parallel to and inside of the actual margin for a part, or sometimes for the whole, length of the latter.¹ The second segment commonly has a small coxopodite process.

With a few exceptions, possibly all accidental importations through human agency, the American species of *Cubaris* may be placed in a single subgenus which includes also a number of African species, for

¹ The reader should bear in mind that the sulcus here referred to is on the inferior or ventral aspect of the lateral border of the first segment, usually extending forward from a more or less well-developed notch or cleft at the posterior lateral angle. It must not be confounded with another groove on the margin of the segment, formed by the abrupt upturning of the margin, present in some species.

resemblance between certain American and African species is very striking, although they are not identical.¹

Budde-Lund adopted the name *Diploexochus* Brandt for this subgenus and has been followed by a few other writers, notably Arcangeli and Barnard, the latter having given the group generic rank (1932).² But as none of these numerous American and African species have the peculiarities of the epimera on which Brandt's *Diploexochus* was based, it seems better to restrict his name to his type species *echinatus* and to consider the others as a different group. Verhoeff has recently (1928, p. 113) proposed the name *Venezillo* for it, with *Cubaris clausa* (Budde-Lund) as the type. Although he gives no diagnosis and does not discuss the limits of the group, which is evidently a very large one, *C. clausa* is a typical example of it and the name *Venezillo* appears to be available for use.

Pending a more complete study of the numerous species of *Cubaris* and for greater convenience in dealing with the American members of it in the present work, I have arranged them in five groups based on the development of the sulcus and coxopodite ridge on the first thoracic segment, as this is the most convenient single character for the purpose. Of these five groups, I, II, and probably III, including the great majority of the American species, belong in the subgenus *Venezillo*, with the possible exception of a few species.

The species of *Cubaris* have comparatively weak limbs and rather poor powers of locomotion. The result is that most of the species are very local in their distribution, unless they happen to have been more widely disseminated by some external factor, such as accidental introduction on plants brought for cultivation. Specimens from widely separated places, or from different islands (unless they are situated quite close together) will usually prove to be of different species.

Table of American Species of *Cubaris*

GROUP I.—Coxopodite sulcus on lower side of margin of first thoracic segment narrow or moderately narrow and distinct on the whole or nearly the whole length of the margin. Members of subgenus *Venezillo*.

¹ This similarity extends in a conspicuous manner to the arrangement of the tubercles with which the dorsal surface of some of the species are ornamented, and to other seemingly superficial characters. As an example of this, compare the American species *C. phylax* and *C. mineri*, here described and figured, with such African species as *C. jomposiensis* (Collinge), 1920, and *C. regulus* Van Name, 1920. I am inclined to attribute this largely to convergence, or more probably an inherited tendency derived from some ancestral form, to develop a certain pattern of tuberculation, rather than as evidence of recent immigration of African species to South America.

² Barnard, 1932, employs the genus *Cubaris* in a very restricted sense with *C. murina* as the type, corresponding to the subgenus *Cubaris* (of the genus *Armadillo*) employed by Budde-Lund, 1909.

a.—Upper surface practically smooth, or with only weakly developed rugae on the lateral regions of the back:

<i>watsoni</i>	Jamaica
<i>colomboi</i>	Cuba
<i>zigzag</i>	St. Vincent
<i>boliviana</i>	Bolivia
<i>booneae</i>	Jamaica
<i>hendersoni</i>	Haiti
<i>aguayoi</i>	Cuba
<i>congenera</i>	Brazil
<i>venusta</i>	Venezuela and Trinidad
<i>silvarum</i>	St. Vincent
<i>sanchezi</i>	Cuba

b.—Upper surface moderately rugose or tuberculated, especially on the lateral regions of the back:

<i>clausa</i>	Venezuela
<i>walkeri</i>	Mexico
<i>multipunctata</i>	Venezuela
<i>rubropunctata</i>	Venezuela
<i>pumila</i>	Venezuela
<i>viticola</i>	Grenada

c.—Upper surface with large tubercles:

<i>scaberrima</i>	Venezuela
<i>perlata</i>	St. Vincent or Grenada
<i>phylax</i>	Santo Domingo

GROUP II.—Coxopodite sulcus on lower side of first thoracic segment reduced in length and developed only on about one-half (or less) of the length of the margin (in *C. ramsdeni* and *wheeleri* almost entirely suppressed). Members of subgenus *Venezillo*.

a.—Upper surface practically smooth or with only weakly developed rugae on the lateral regions of the back:

<i>moneaguensis</i>	Jamaica
<i>oaxacana</i>	Mexico
<i>granadensis</i>	Granada, Venezuela, Colombia, Cuba
<i>nigrorufa</i>	Venezuela

<i>similis</i>	South America(?)
<i>pisum</i>	Florida
<i>gigas</i>	Nicaragua, Colombia
<i>dumorum</i>	Mustique Island
<i>dugesi</i>	Mexico
<i>beebei</i>	Galapagos

b.—Upper surface more or less conspicuously rugose or tuberculated:

<i>truncorum</i>	Venezuela
<i>vincentis</i>	St. Vincent (also Colombia?)
<i>culebrae</i>	Culebra
<i>jamaicensis</i>	Jamaica
<i>verrucosa</i>	Ecuador
<i>galapagoensis</i>	Galapagos
<i>tuberosa</i>	Haiti

c.—Coxopodite sulcus and ridge reduced to a small cleft or a minute notch at rear lateral angle of segment:

<i>ramsdeni</i>	Cuba
<i>wheeleri</i>	Culebra

GROUP III.—Coxopodite ridge distinct on posterior half or lower side of first thoracic segment but considerably removed from the lateral margin. Upper surface of body strongly tuberculated or spiny. (These are somewhat doubtful members of the subgenus *Venezillo*.)

<i>brevispinis</i>	Colombia
<i>mineri</i>	British Guiana
<i>longispinis</i>	Panama

GROUP IV.—Coxopodite ridge and sulcus of the first thoracic segment almost suppressed, the ridge represented only by a slight prominence or jog in the outline of the ventral aspect of the segment, far removed from the lateral margin. (Subgenus *Cubaris*, see Barnard, 1932, pp. 376, 377.)

<i>murina</i>	widely distributed
<i>cinerea</i>	Brazil
<i>brunnea</i>	British Guiana
<i>flavobrunnea</i>	Darien
<i>cinchonae</i>	Jamaica

GROUP V.—No coxopodite ridge or sulcus. These two species were doubtfully assigned by Budde-Lund (1904) to a group to which he later (1909) gave the name *Bethalus*, and which with these exceptions included only Old World species.

<i>tenuipunctata</i>	Mustique Island
<i>depressa</i>	St. Vincent

Doubtful species, insufficiently described to place in one of the above groups:

<i>affinis</i>	California
<i>californica</i>	California
<i>cacahuamilpensis</i>	Mexico
<i>granaria</i>	Chile

GROUP I

Coxopodite sulcus and ridge of thoracic segment I narrow or moderately narrow, and distinct on the whole length, or by far the greater part of the whole length of the lateral margin of the segment. *C. viticola*, though included here on account of the length of the coxopodite ridge, is peculiar in the distant removal of that ridge from the margin and in the elongate, scarcely constricted telson, and might be regarded as constituting a group by itself.

a.—Upper surface practically smooth, or with only weakly developed rugae on the dorso-lateral regions.

***Cubaris watsoni*, new species**

Figures 196, 197

Body highly arched, broadly rounded in front and especially behind, where the ends of the abdominal segments extend obliquely outward, increasing the width.

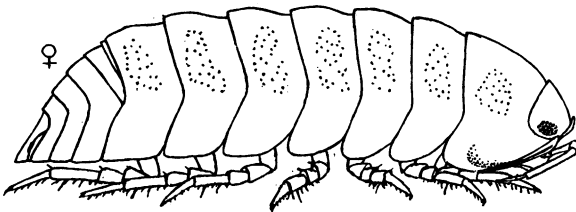


Fig. 196. *Cubaris watsoni*, new species.

Body surface smooth except for minute close granulation visible on magnification, and slight unevenness in the lateral regions of the back, a vestige of the tuberculation

present in many related species. Exposed part of the thoracic segments slightly but not abruptly elevated above the part fitting under the segment next in front. Legs moderately long but slender and with weak spines.

Front outline of head gently curved when seen from above. Upper border of epistome arched and forming a narrow, thin projecting border which is strongly up-turned but not closely appressed to the forehead. Eyes rather small, with about seventeen ocelli; antennae small and slender, the terminal article of the flagellum nearly twice as long as the proximal one.

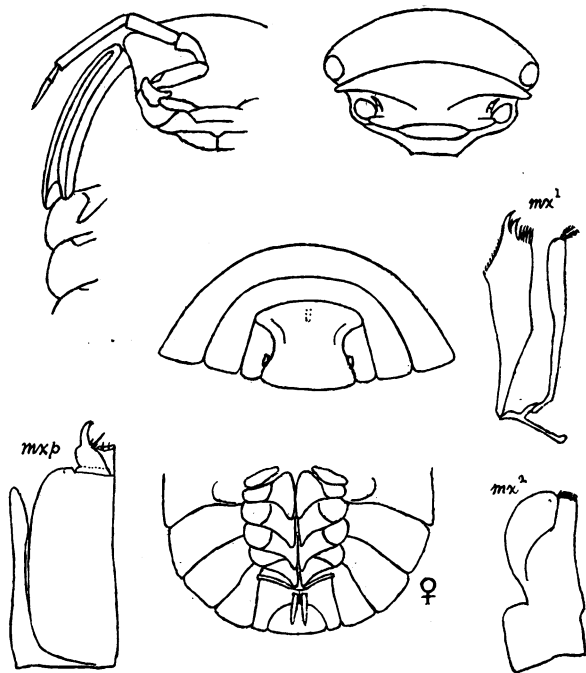


Fig. 197. *Cubaris watsoni*, new species.

First segment of the thorax with the lateral border quite abruptly but not very widely turned outward and very slightly upward it becomes narrower and merges with the side of the segment a considerable distance in front of the rear angle of the segment. The inferior aspect of the border has a rather narrow sulcus of U-shaped cross section on its whole length, but this is very shallow on the anterior half; on the posterior half it is also shallow and becomes gradually deeper and slightly wider and ends in a notch or cleft, whose inner side is shorter than the outer, which forms the rear angle of the segment. The second segment bears a narrow rather acute coxopodite process; none is developed on the third or succeeding segments. Telson not greatly wider than long; the wide upper part is short, and the rear end, which is cut

off in the arc of a very large circle, is over four-fifths the width of the upper part. The exposed part of the basal joint of the uropoda is long and narrow and bears the slightly elongated outer branch in a notch about the middle of the inner border of the exposed portion. The inner branches are narrow and fail by a considerable distance to reach the end of the telson.

Color of the alcoholic specimens are mostly yellowish, or whitish, only a little blackish pigment being present on the upper parts, thinly and unevenly distributed, chiefly on the median and epimeral parts of the segments and near their posterior borders, giving the back a cross-barred appearance.

Length of largest specimen about 15 mm.

LOCALITIES.—Mandeville, Jamaica. Three female specimens (including the type, Cat. No. 6514) in the American Museum of Natural History collected by Mr. F. E. Watson, for whom the species is named, at an altitude of about 2350 feet, and several from Port Antonio, Jamaica. There is also a small and poorly preserved specimen in the same museum from Chinchona, Jamaica, that appears to be of this species.

Cubaris colomboi Arcangeli, 1929

Figure 198

Cubaris colomboi ARCANGELI, 1929, p. 132, Fig. 1.

The main characters of this species, which is described in detail by Arcangeli, are shown by the figures here reproduced. It has a highly

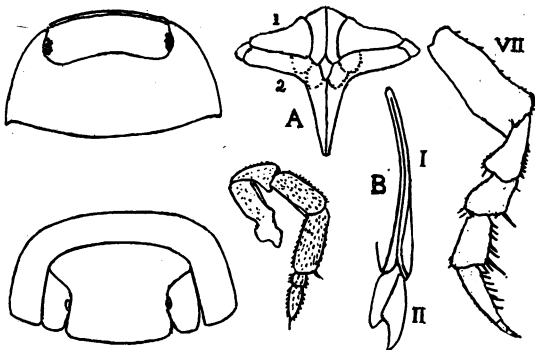


Fig. 198. *Cubaris colomboi* Arcangeli. Adapted from Arcangeli, 1929. A, first and second pleopoda of male seen from below; B, lower aspect of margin of first and second thoracic segments.

arched body with nearly vertically descending sides and practically smooth surface, except for a minute squamation. Eyes rather large, with twelve ocelli.

First thoracic segment with a narrow raised margin extending nearly to the rear angle and a very narrow shallow coxopodite sulcus throughout its length ending in a notch at the rear, which divides the margin into two lobes of which the "superior" is described as more widely rounded, the "inferior" as more acute. The second segment has a somewhat acute coxopodite process.

In the male the legs of the seventh pair bear a setose, truncated lobe at the inner distal angle of the basipodite, and above this on the rostral side, a subacute tooth.

Inner branches of uropoda reaching halfway along the under surface of the telson; their terminal bristles reaching or exceeding the rear margin of the telson.

Color.—Gray above, with yellowish markings. Ends of the epimera, the uropoda, base of the telson, and most of under parts yellowish.

Length, 6 mm.; width, about 3 mm.

LOCALITY.—Santiago de Las Vegas, Cuba. 13 specimens collected by Professor Silvestri in 1928.

Arcangeli assigns this species "provisionally" to Budde-Lund's subgenus *Diploexochus*.

Cubaris zigzag (Dollfus), 1896

Figure 199

Armadillo zigzag DOLLFUS, 1896, p. 394 (orig. descr.), Figs. 7a-7d.—BUDDE-LUND, 1904, p. 107.

Cubaris zigzag RICHARDSON, 1901, p. 572; 1905, p. 649 (orig. descr. quoted), Fig. 692 (after Dollfus).

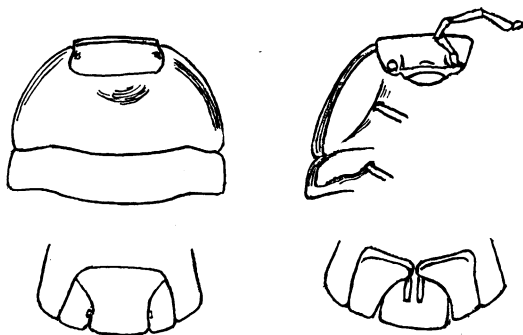


Fig. 199. *Cubaris zigzag* (Dollfus). Adapted from Dollfus, 1896.

The following is Dollfus' description:

"Body convex, smooth.

"Cephalon.—Prosepistoma plain, fore edge nearly straight. Eyes small; about twelve ocelli. Antennae short; first segment with a slightly perceptible antero-median tubercle, edges hardly raised, coxopodite distinct on the entire length of the edge (underside), not divergent. Coxopodite of the second segment narrowly quadrangular.

"Pleon, Telson.—Pleotelson as wide as long; sides feebly curved; apex with rounded angles, half as wide as the basis.

"Uropoda.—Basis oblique, endopodite reaching to one-half the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis (upperside).

"Color.—Yellowish, with a double median and crinkled lateral lines of dark brown; uropoda pale.

"Dimensions.—4 by 1.75 mm."

LOCALITY.—"St. Vincent, forest, damp ground under rubbish, 1000 feet, one example." Type in British Museum (Dollfus).

Cubaris boliviana (Dollfus), 1897

Figure 200

Armadillo bolivianus DOLLFUS, 1897a, p. 1 (orig. descr.), Figs. 1–1d.

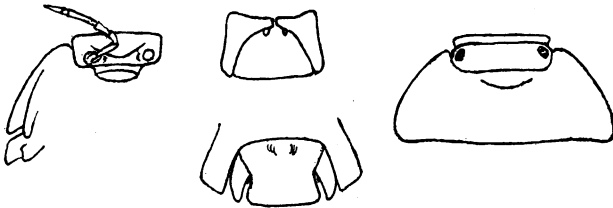


Fig. 200. *Cubaris boliviana* (Dollfus). Adapted from Dollfus, 1897a. NOTE.—The figure does not agree with the description in respect to the length of the coxopodite ridge of segment I.

No other information than that given in the above reference is available about this species:

"Corps assez convexe, presque lisse, finement ponctué.

"Cephalon.—Prosépistome dépassant sensiblement le front, convexe sans depression médiane. Yeux moyens. Antennes courtes, fouet à premier article trois fois plus court que le second.

"Pereion.—Premier segment à duplication coxale bien marquée, le coxopodite est divergent postérieurement et se distingue sur toute la longueur du bord du segment par un sillon qui va en s'atténuant antérieurement; deuxième segment à coxopodite court et très-divergent.

“Pleon, Telson.—Le pleotelson est à peu près aussi long que large, les côtes sont incurvés et le bord postérieur presque aussi large que la base; il est convexe, muni près de la base de deux petits mamelons carenés. Uropodes à base étroitement allongée; exopodite très-petit, visible seulement sur la face dorsale; endopodite minuscule.

“Couleur.—Gris, linéolé de blanchâtre, côtés blanchâtres.

“Dimension.—Long. 8 millimètres, larg. 3 1/2 millimètres.”

LOCALITIES.—“Mission de S. Francisco, Haut Pilcomayo (Bolivie).
—Mission de Aguirenda, Chaco Bolivien.—Caiza, Chaco Bolivien.”

Cubaris booneae, new species

Figure 201

Closely related to *C. silvarum* (Dollfus), 1896, but readily distinguished from it by having the front outline of the head as seen from above gently convex instead of nearly straight; the ocelli fewer; the constricted part of the telson nearer to the base than to the end; and the sulcus on the inferior edge of the border of the first segment longer, wider, and of comparatively uniform width throughout its length except near the rear end.

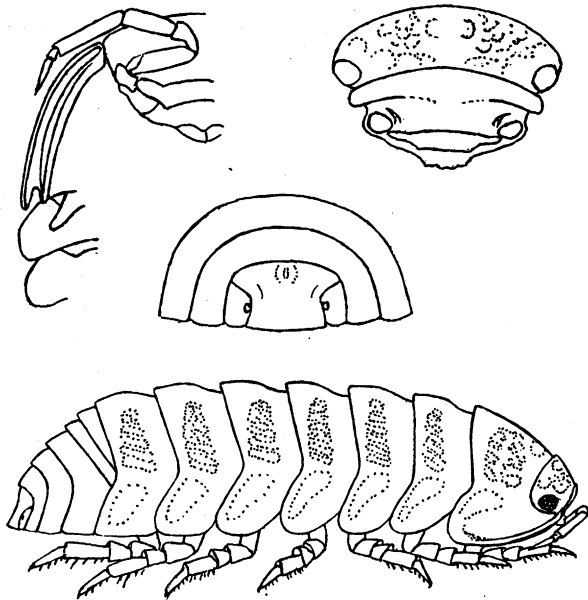


Fig. 201. *Cubaris booneae*, new species.

Body surface rather smooth except for minute setose granulation visible only on magnification, and slightly raised confluent tuberculations on the lateral parts of the back and on the head.

Front of head gently convex with a narrow, rather strongly upturned border, which is slightly wider toward the lateral ends. Ocelli about sixteen.

First segment of thorax with the lateral border rather narrow and abruptly turned outward at about a right angle, though not separated off by an actual furrow on the upper surface; below there is a fairly wide sulcus the whole length of the lateral margin of the segment. This has a shallow, inverted U-shaped cross-section and ends in a cleft with very slightly divergent sides (the inner slightly the shorter) at the rear end. The projecting lateral border diminishes and merges into the lateral face of the segment before the rear angle (which is rounded off) is reached. Second segment with a short, obliquely directed tooth-like coxopodite process; the third segment merely has a thickening of the anterior border with a slight prominence, but no actual process. Legs of moderate length, not very stout.

Telson considerably wider than long, its narrowest part rather nearer the base than the end, which is somewhat less than three-fourths as wide as the base. The inner branches of the uropoda are short, reaching hardly two-thirds of the distance to the end of the telson; the external branches are minute and scale-like and borne in a minute depression on the external (dorsal) surface of the basal segment close to, and somewhat indenting, the inner margin of the basal segment, which has on the middle line of the dorsal surface near the basal edge a small oval pit or impression, the lateral edges of which may be slightly raised.

Color grayish brown with the usual small, light-colored markings on the lateral regions of the back and less well-defined light spots on the median region and on the epimera of each thoracic segment. Largest specimen (a female) would measure about 10 mm. long if straightened out.

LOCALITIES.—Type locality, Palm Beach, Montego Bay, Jamaica. Six specimens (4 females, 2 males) in the American Museum of Natural History, collected by Mr. J. A. Grossbeck, March 11, 1911. Largest female (Cat. No. 6520) is the type. There is also a specimen from Moneague, Jamaica.

Named for Miss Lee Boone, describer of many American isopods.

***Cubaris hendersoni* Boone, 1934**

Figure 202

Cubaris hendersoni BOONE, 1934, p. 595 (orig. descr.), Fig. 13.

Through the kindness of the authorities of the U. S. National Museum, I had the opportunity of examining one of the three original specimens of this species.

The body is highly arched, elliptical in a dorsal view and rather narrowly rounded off at the ends, especially behind. The epimera are not flared or bent outward. Body surface very smooth, even on the dorsal lateral regions, but minutely scabrous-punctate under high magnification.

The rear (always exposed) part of each thoracic segment is convex

and raised somewhat above the flat part that slides under the segment next in front, but is not marked off from the latter by any abrupt shoulder.

Eyes rather small, about 18 ocelli are present but only about 10 of them are pigmented. Upper border of epistome turned up and appressed to the forehead, though actually separated from it by a deep but narrow groove. This border is convex (almost obtuse angled in the middle) when seen from in front. Antennae missing in this specimen.

The first thoracic segment has the lateral border much thickened but not bent or flared outward. The thickened border is separated from the main part of the segment by a deep cleft-like groove extending in horizontally and reaching from close to the front end to near the rear

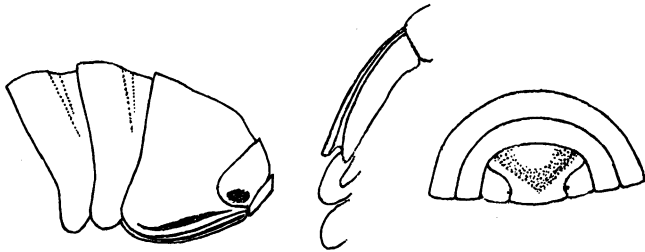


Fig. 202. *Cubaris hendersoni* Boone.

end of the border. This groove is widest and deepest in the middle part of its length. The rear angle of the segment forms a trifle less than a right angle and is somewhat rounded off, and (when seen from below) is cleft into a small notch from which a narrow, sharply defined coxopodite sulcus of quite even width extends forward the whole length of the lateral margin of the segment, but the sulcus lies rather on the outer-ventral than directly on the ventral aspect of the thickened margin of the segment, so that it is visible throughout its length in either a direct ventral or direct lateral view of the segment. The two sides of the notch at the rear angle do not appear to differ greatly in size or form, the inner being a little more extended and straighter than the outer, but the tightly rolled-up condition of the specimen prevented a satisfactory examination of this character or of the coxopodite process of the second segment, which appears to be rather small, or of the legs.

Thoracic segments II, III, and IV have the epimera much rounded off, the remaining three are successively more squarely truncated. The

abdominal segment and the telson and uropoda are squarely truncated at the ends so as to give the rear part of the body an even, continuous outline.

The telson is small and very short and quite wide, having the end a little more than half as wide as the base, and a very moderate constriction in the middle part; its dorsal surface has a large, somewhat tumid area on the median dorsal part, bounded by a very slight V-shaped depression. The exposed parts of the basal joints of the uropoda are very wide and short and fill in the spaces each side of the rear part of the telson very completely. The inner branches are fairly large and stout and outwardly curved and reach over halfway along the exposed part of the underside of the telson, the outer are represented by minute, scarcely discernible rudiments inserted close to the inner margin of the basal joint.

LOCALITY.—Tomazeau, Haiti, collected by Bartsch and Henderson, 1917. Three specimens, including the type, in the U. S. National Museum.

Cubaris aguayoi Boone, 1934

Figure 203

Cubaris aguayoi BOONE, 1934, p. 593 (orig. descr.), Fig. 12.

This is a species having the body quite broadly rounded before and behind when seen from above. The abdominal epimera slope outward

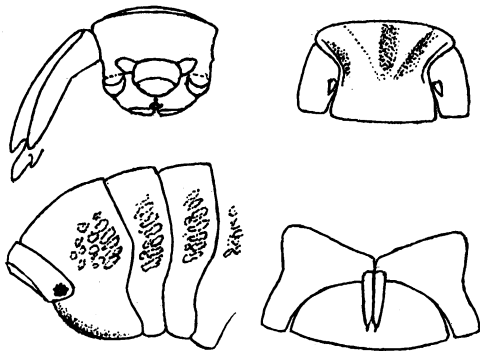


Fig. 203. *Cubaris aguayoi* Boone.

to a much greater extent than those of the thorax, which are nearly vertical. Body surface fairly even, granular on magnification, with groups of very low confluent tubercles on the dorso-lateral regions.

Front outline of head very gently curved with a very narrow, up-turned, almost appressed border which widens only at the lateral corners. Eyes fairly large and convex, with a dozen or more well-developed ocelli. Antennae missing.

The first thoracic segment is characteristic in the moderately wide, outwardly and a little upwardly rolled, lateral border which extends almost its whole length, forming a shallow trough of U-shaped cross section, deepest toward the front end but widest about the middle of the length of the segment. On the lower surface of the margin there is a narrow but well-marked coxopodite sulcus extending the whole length of the segment, widening very gradually and ending in a narrow cleft whose sides are nearly equal in length (the outer slightly longer) and which are not flared or bent apart. The coxopodite process of the second segment is small, flattened, tooth-like, and not very acute. The proportions of the telson and exposed parts of the uropoda are shown in the accompanying figures. The rear or dorsal surface of the telson presents a rather large median raised triangular area (the apex pointing downward) which is divided into two by a distinct, rather narrow median furrow. Between the sides of the raised triangle and the somewhat thickened and raised lateral borders of the telson there are wide shallow depressions.

The type specimen (alcoholic) is yellowish and exhibits little sign of pigment.

Length of type about 11 mm.

LOCALITY.—The type (Cat. No. 6606 in the American Museum of Natural History) and a paratype are from Camoa, Cuba.

Cubaris congenera (Budde-Lund), 1904

Armadillo congener BUDDE-LUND, 1904, p. 108 (orig. descr.).

The description in full is as follows:

“Oblonge ovalis, convexus, minutissime et densissime squamatus.

“Oculi mediocres; ocelli numero c. 18.

“Antennae breviores, tertiam corporis partem longitudine vix explentes; scapi articuli 2. et 4. aequales; flagelli articulus prior altero triplo vel quadruplo brevior.

“Epistoma margine superiore frontem paululum superante, linea marginalis verticalis utrinque ante oculos ad marginem epistomatis continue producta; area lateralis infraocularis nulla fere. Clypeus brevis, subperpendicularis, lobis lateralibus brevibus rotundatis.

“Trunci segmentum 1. epimeris crassis, margine laterali per totam

longitudinem sulco angustiore sed profundo instructo; post subaequaliter fisso; lacinia interior angustior sed paululo longior quam lacinia exterior; margo posterior segmenti utrinque vix conspicue incurvus. Segmentum 2. epimeris profunde fissis; lacinia interior subovalis; paulum retroducta, multo brevior et angustior quam lacinia exterior; pronotum decima parte dorsi vix longius. Trunci segmentorum 5.-6.-7. epimera duplicatura inferiore leviori sublunari. Caudae segmenta 3.-4.-5. epimeris longioribus, subrectangulis, processu inferiore inflexo nullo; epimera segmenti 5. subconvergentia. Pleopis primo paris in femina area operculari mediocri instructus.

"Telson paulo latius quam longius, in medio satis coarctatum.

"Uropodum scapus vix longior quam latior; expositum minutissimum, fere punctiforme, lateri interiori scapi procul ab apice insertum, brevissime ovale.

"Color brunneus, flavomaculatus.

"Long. 4-5 mm. Lat. 2.5 mm."

LOCALITY.—"Rio Nabilecche in the interior of Brazil." Type in the Genoa Museum (Budde-Lund).

***Cubaris venusta* (Budde-Lund), 1893**

Figure 204

Armadillo venustus BUDDE-LUND, 1893, pp. 114 (orig. descr.), 118.—DOLLFUS, 1893a, pp. 340, 344, Pl. IX, figs. 3a-3e.—BUDDE-LUND, 1904, p. 104, Pl. IX, figs. 30, 31.—ARCANGELI, 1932, p. 124; 1929, p. 93.

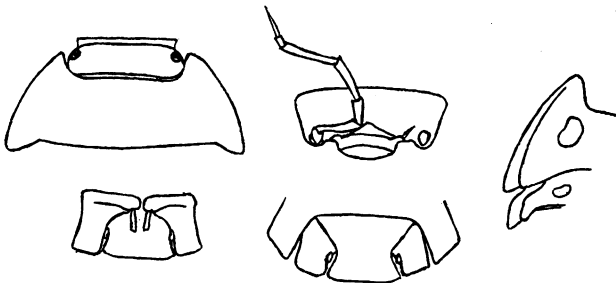


Fig. 204. *Cubaris venusta* (Budde-Lund). Adapted from Dollfus, 1893a.

The following statements are taken from Budde-Lund's original description:

"Trunci tuberculositates ordinariae parvae, subdeletae; tota superficies minutissime reticulate transverse striata. Antennae cor-

pore dimidio vix breviores; flagelli articulus prior altero circiter triplo brevior. Oculi mediocres; ocelli circiter 20, ocelli seriei interioris minores. . . . Epistoma margine superiore frontem paulisper, maxime in lateribus superante, leviter curvato, angulis late rotundatis.

"Trunci segmentum primum epimeris crassioribus, ante paulum revolutis, margine laterali ad longitudinem manifesto, ante angustius sulcato, post aequaliter fisso; segmentum secundum epimeris bipartitis, pars interior exteriore multo angustior et paulo brevior, oblique retroducta, ad apicem paulum angustata.

"Color albidus vel pallide flavus, maculis, praesertim in capite et in cauda et in lateribus trunci creberrimis, fuscis. Pedes et antennarum basis albida, articulus quintus et plerumque articulus quartus et etiam tertius obscuriores, subnigri.

"Long. 7-7.5 mm. Lat. 3.5 mm."

DISTRIBUTION.—Recorded from several localities in Venezuela: from La Moka, Las Adjuntas, and St. Esteban by Budde-Lund, 1893, and from La Guaira and Caracas by Dollfus, also from Port of Spain, Trinidad, by Budde-Lund, 1904 (specimen in the Gottingen Museum).

Budde-Lund, 1904, accepts Dollfus' record and figures as referring to this species without any comment or expression of uncertainty.

Cubaris silvarum (Dollfus), 1896

Figure 205

Armadillo silvarum DOLLFUS, 1896, p. 393 (orig. descr.), Figs. 6a-6d.—BUDDE-LUND, 1904, p. 107.

Cubaris silvarum RICHARDSON, 1901, p. 571; 1905, p. 643 (orig. descr. quoted), Fig. 685 (after Dollfus); 1912, p. 194.—VAN NAME, 1924, p. 205.—BOONE, 1934, p. 593.

The following is the original description:

"Body convex, slightly tuberculated on the pereion.

"Cephalon.—Prosepistoma plain. Eyes large; about 20 ocelli.

"Pereion.—First segment with a blunt, hardly perceptible antero-median tubercle; lateral edge forming a narrow raised border; coxopodite distinct on the entire length of the edge, and divergent on the half hind part, coxopodite of the second segment forming a tooth-like, divergent processus.

"Pleon, Telson.—Pleotelson wider than long, with a small double longitudinal ridge near the basis; sides curved near the apex; apex one-fourth narrower than the basis.

"Uropoda.—Endopodite extending to one-half the length of the

pleotelson; exopodite minute, placed near the middle of the internal edge of the basis.

"Color.—Dark gray or brown, with three longitudinal light lines, and a wide spot on the sides of each segment; antennae and uropoda pale.

"Dimensions.—16 by 7 mm."

DISTRIBUTION.—St. Vincent, W. I., "pretty common under rubbish, forest below 2000 feet. Forest, dry hillside near Chateaubelais (lee-ward), under stones 1000 feet; Cumberland Valley, damp ground, 1000 feet." Type in the British Museum (Dollfus).

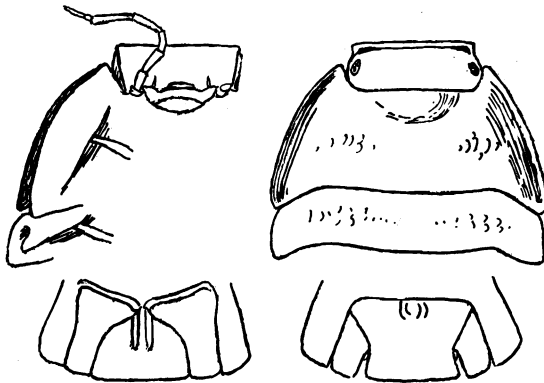


Fig. 205. *Cubaris silvarum* (Dollfus). Adapted from Dollfus, 1896.

The American Museum of Natural History has two specimens from Holmes Cay, Berry Island, Bahamas, received in exchange from the U. S. National Museum labeled "*Cubaris gigas?*" which are of this species or one very closely allied to it. They correspond well with Dollfus' description and figures, though the front margin of the head is a little curved and the telson, while of about the same general proportions as in his figure, has the upper or anterior border more curved and the constricted point slightly above the middle instead of a little below it.

***Cubaris sanchezi* Boone, 1934**

Figure 206

Cubaris sanchezi BOONE, 1934, p. 592 (orig. descr.), Fig. 11c.

This species, briefly described from a single specimen and illustrated only by a photograph of the ventral aspect, seems to be extremely close

to *C. silvarum*, Dollfus. The surface is smooth, except for minute granulation and patches of "unequal, coarsely irregular tubercles" appearing as minute ridges "on the dorso-lateral regions."

The head has the frontal margin "relatively straight" and produced into a very narrow border. The head is "marked by a pair of diagonal depressions, each of which extends from behind the eye to the middle of the frontal margin, creating the impression of infra-ocular lobes." Eyes with 13 ocelli. Flagellum of antennae with the distal article two and one-half times the length of the basal one.

The coxopodite of segment I closely resembles that of *C. silvarum* as figured by Dollfus, extending the whole length of the margin, but appears to be a little more divergent in the posterior half in the present species. This segment has the "lateral margin thickened." The coxopodite of segment II is, according to the respective figures, more acute than in *silvarum* and has the "outer free margin conspicuously arcuate."



Fig. 206. *Cubaris sanchezi* Boone.

The telson is described by Boone as "two-thirds as long as wide, the anterior and posterior margins are parallel, the anterior being only slightly the longer; the sides are roundly rather deeply constricted." The endopodites of the uropoda are longer ("five-sixths the length of the telson") in *C. sanchezi*. The exopodite is minute and inserted on the inner margin of the basal joint at its point of angulation.

Color.—Grayish with yellowish blotches on the tuberculated areas.

Length, 11 mm.; width, 5 mm.

LOCALITY.—The type and only specimen was collected at Alamedres River, "La Chorrera," Vedado, Havana, Cuba, and is in the United States National Museum (Boone).

b.—Upper surface moderately rugose or tuberculated.

Cubaris clausa (Budde-Lund), 1885

Figure 207

Armadillo clausus BUDDE-LUND, 1885, p. 23 (orig. descr.); 1893, pp. 112, 118.—
DOLLFUS, 1893a, pp. 340, 344.—BUDDE-LUND, 1904, p. 107, Pl. IX, figs. 25–29.—
ARCANGELI, 1932, p. 124.; 1934 p. 93.

Armadillo (Venezillo) clausus VERHOEFF, 1928, p. 113, Fig. 17.

Diploezochus clausus BARNARD, 1932, p. 323.

Venezillo clausus VERHOEFF, 1933, p. 102.

As the few details shown in the figures of Budde-Lund are hardly of a character to assist in recognizing the species, his description (1885) is here quoted in full:

“Ovalis vel oblonge ovalis, valde convexus, dense et reticulate punctatus. Trunci tuberculositates ordinariae manifestae, sed minores.

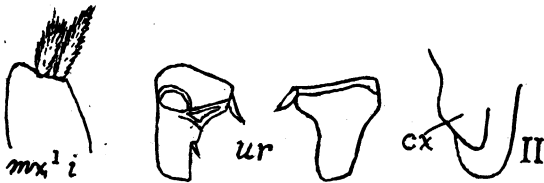


Fig. 207. *Cubaris clausa* Budde-Lund. Details, adapted from Verhoeff, 1928 (right-hand figure), and Budde-Lund, 1904 (remaining figures).

“Antennae exteriores tertia corpore parte vix longiores; flagelli articulus prior altero duplo brevior. Oculi majores; ocelli parvi, circiter 30, dense congregati. Clypeus lobis sat magnis, oblique triangularibus. Epistoma margine superiore frontem multo superante, leviter curvato, medio vix impresso.

“Trunci annulus primus epimeri margine laterali minus crasso, subaltecincto, ante levius post profundius sulcato et aequaliter fisso. Epimera annuli secundi bipartita, interiore parte latiore sed brevior. Margo posterior annulorum utrinque leviter sinuatus. Annulus primus ceteris annulis multo major et longior.

“Caudae annulus analis paulo latior quam longior, medio leviter coarctato, post rotundate truncato. Annuli 3–4–5 ut in *Arm. officinali* sed minus manifesto processu epimeri infra inflexo. Articulus basalis pedum analium paulo longior quam latior; ramus exterior minutissimus, procul ab apice insertus; ramus interior brevissimus.

“Color subuniformis, griseus.

“Long. 17 mm. Lat. 8 mm. Alt. 4.5 mm.”

Verhoeff (1928, p. 113, and 1933, p. 102) identifies with Budde-Lund's species some specimens from Maracay, Venezuela, and makes it the type of a subgenus or genus *Venezillo* (see remarks under genus *Cubaris*) giving the figure here reproduced in outline, and additional details regarding its characters, among others that the margin of the head and first thoracic segment together form a wide horizontally projecting border which makes almost a semicircle around the head and first segment. This border is as wide as the eye is long, the latter having five rows of ocelli. The first segment has the lateral margin turned out forming a broad "shovel" hollowed out above. The sulcus on the underside grows gradually narrower and does not reach the anterior end of the margin. The inner (coxal) process of epimeron II is separated from the epimeron itself by a wide cleft that is "continued forward as a groove." The endopodites of the uropods are very short (one-third the length of the exposed part of the telson).

TYPE LOCALITY.—Caracas, Venezuela. Types in Petrograd Museum (Budde-Lund). In 1893, Budde-Lund mentions specimens in the Berlin Museum, and gives La Moka as an additional locality; Dollfus records specimens from La Guaira and Corozal; and Verhoeff, specimens from Maracay. All these places are in Venezuela.

Cubaris walkeri Pearse, 1911

Figure 208

Cubaris walkeri PEARSE, 1911, p. 108 (orig. descr.), Figs. 1a-1f.

Pearse's description and figures are here reproduced:

"*Cubaris walkeri*, new species.—Body convex, minutely granulate; thoracic segments each with an elongated swollen mass of blended tubercles on each side 1 mm. from the middle line. Head more than twice as wide as long; anterior margin straight, strongly reflexed; eyes rather large, sixteen ocelli. Antennae with flagellum shorter than last joint of peduncle; first joint of flagellum less than a third as long as second. First segment of body separated by grooves from the lateral margins which are somewhat reflexed; lateral margins of other thoracic segments narrow, strongly flexed posteriorly; first coxopodite free along whole outer margin, divergent at posterior end; second coxopodite free along outer end and anterior margins, divergent at outer edge. Pleo-telson strongly constricted in the middle, about as wide as long, width at distal end one-fourth less than at proximal end; a low tubercle near proximal margin in median line. Uropoda with basal segment a little

longer than wide; inner branch robust, spatulate, more than half as long as pleotelson, attached on the posterior inner margin of basal segment; outer branch small, conical, inserted more on the dorsal than ventral surface of the basal segment at the middle of its inner margin. Color of alcoholic specimens slaty; a series of longitudinal median white blotches along the segments from the head to the pleotelson; lateral margins of first, third, fourth, and all abdominal segments more or less white. Dimensions; 11 by 5.5 millimeters."

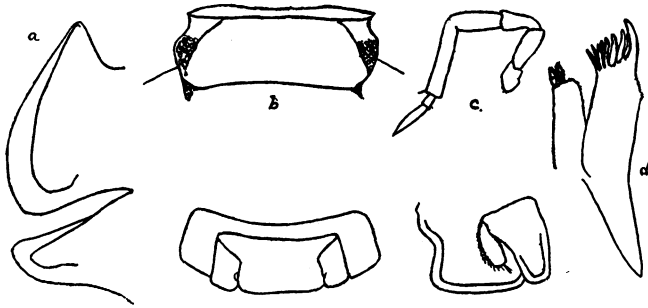


Fig. 208. *Cubaris walkeri* Pearse. Adapted from Pearse, 1911.

LOCALITY.—Cuatotolapam, Vera Cruz, Mexico, under leaves and stones at low elevation. Type in University of Michigan Museum (Pearse).

Cubaris multipunctata (Budde-Lund), 1885

Figure 209

Armadillo multipunctatus BUDDE-LUND, 1885, p. 282 (orig. descr.); 1893, p. 112.—DOLLFUS, 1893a, pp. 340, 344, Pl. IX, figs. 5a-5e.—BUDDE-LUND, 1904, p. 108.

Described by Budde-Lund as follows:

"Oblongae ovalis, valde convexus; tota superficies punctata; tubercula ordinaria sublaevia, nitida.

"Antennae exteriores tertiam corporis partem paulum superantes; flagellum breve; flagelli articulus prior altero duplo vel magis brevior.

"Oculi minores, ocelli circiter 17.

"Clypeus lobis sat magnis, latis oblique semicirculis. Epistoma planum, margine superiore transverse profundius sulcato, frontem vix superante.

"Trunci annulus primus margine laterali crasso, ante paulum revo-

luto, profunde et late ad longitudinem sulcato, post subaequaliter fisso, parte interiore quam exterior paulisper majore. Margo posterior annuli primi transversus, annulorum 2-3 utrinque levissime sinuatus. Epimera annulis secundi profunde fissa, parte interiore quam exterior minore et angustiore.

“Caudae epimera annulorum 3-4-5 infra processu parvo inflexo minus manifesto. Annulus analis duplo latior quam longior, post medium coarctatus, ut basis longior, apex brevissimus fiat; post recte truncatus. Articulus basalis pedum analium satis latior quam longior, subtriangulus; ramus exterior minutissimus, vix conspicuus, punctiformis, lateri interiori articuli basalis procul ab apice insertus; ramus interior brevissimus, haud multo longior quam latior.

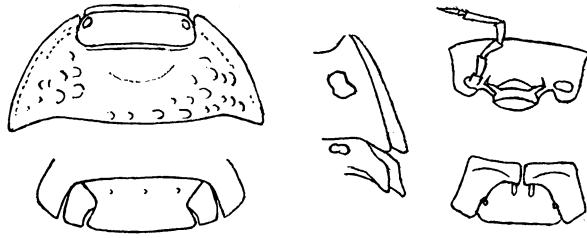


Fig. 209. *Cubaris multipunctata* (Budde-Lund). Adapted from Dollfus, 1893a.

“Color griseus vel e pallido griseus, subtus albidus.

“Long. 8.5 mm. Lat. 4 mm. Alt. 2.5 mm.”

LOCALITY.—Caracas, Venezuela. One specimen found with examples of *C. clausa* from Caracas in Berlin Museum (Budde-Lund, 1885).

See remarks under *C. rubropunctata*, which is perhaps not distinct from this species.

***Cubaris rubropunctata* (Budde-Lund), 1893**

Armadillo rubropunctatus BUDE-LUND, 1893, pp. 113 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344 (considered probable synonym of *C. multipunctata*).—BUDE-LUND, 1904, p. 107.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Budde-Lund's description, here given in full, is as follows:

“Subovalis, valde convexus; trunci tuberculitates laterales ordinariae magnae; caput fortiter rugose tuberculatum; in medio trunci segmentorum ad marginem posteriorem granula plerumque novena in series duas disposita, in segmento primo ante etiam tria granula,

duo anteriora juxtaposita majora, omnia subconfluentia; cetera superficies reticulate punctata.

"Antennae tertia corporis parte vix longiores; flagelli articulus prior altero triplo brevior.

"Oculi mediocres, a margine laterali capitis satis distantes; ocelli circiter 16.

"Clypeus lobis mediocribus, late rotundatis. Epistoma margine superiore curvato, ante leviter transverse sulcato, frontem multo superante.

"Trunci segmentum primum epimeris crassis, revolutis, margine laterali ad longitudinem late et satis profunde sulcato, post inaequaliter fisso; lacinia interior major; segmentum secundum epimeris bipartitis; pars interior exteriore multo angustior sed vix brevior, oblique retracta, subrectangula. Margo posterior segmenti primi subtransversus.

"Caudae segmentum anale duplo fere latius quam longius, in medio leviter coarctatum, post subrecte vel levissime curvate truncatum, supra in medio transverse curvate impressum. Epimera segmentorum 3-4-5 infra in basi paulum inflexa. Articulus basalis uropodum oblique subtriangulus, ejusdem fere longitudinis et latitudinis; ramus exterior minutissimus procul ab apice insertus; rami interiores brevissimi.

"Color.—Pallide flavus, punctis et maculis fuscis vel rufis creberrimis ornatus.

"Long. 15 mm. Lat. 7.5 mm."

LOCALITY.—Las Trincheras, Venezuela. One specimen obtained by sifting (Budde-Lund).

This species has not been figured and there are only a few statements in the description to prevent the acceptance of Dollfus' conjecture that it is identical with *C. multipunctata* (Budde-Lund), 1885. The first paragraph of the description of the present species indicates however a rougher, more conspicuously tuberculated surface; the descriptions of the epistome do not agree, nor do those of the telson and uropoda correspond very satisfactorily. Perhaps the strongest argument against uniting the species is the fact that Budde-Lund keeps them separate in his later work (1904), although he can hardly have been unaware of Dollfus' doubts of their distinctness.

Cubaris pumila (Budde-Lund), 1893

Armadillo pumilus BUDDE-LUND, 1893, pp. 115 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344.—BUDDE-LUND, 1904, p. 107.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Nothing additional to Budde-Lund's original record and description is known about this species.

"Oblong ovalis, convexus; trunci tuberculositates ordinariae magnae, tota superficies dense squamate punctata.

"Antennae tertia corporis parte vix longiores; flagelli articulus prior altero plus duplo brevior.

"Oculi minores; ocelli circiter 15, mediocres nonnulli minores.

"Clypeus lobis mediocribus, late rotundatis. Epistoma margine superiore frontem paulum, maxime in lateribus, superante, leviter curvato.

"Trunci segmentum primum epimeris crassioribus, paulum revolutis, in margine laterali ad longitudinem levius infra sulcatis, post inaequaliter fassis: lacinia exterior paulo major; segmentum secundum epimeris bipartitis; pars interior parva, oblique retroducta, dentiformis. Margo posterior segmenti primi utrinque leviter sinuatus, angulis posterioribus late rotundatis.

"Caudae segmentum anale paulo latius quam longius, in medio satis coarctatum, post subtransversum. Epimera segmentorum 3-4-5 infra in basi processu minuto, inflexo. Articulus basalis uropodum valde obliquus, longior quam latior; ramus exterior minutissimus, procul ab apice insertus; rami interiores breves.

"Subunicolor, e griseo brunneus.

"Long. 8 mm. Lat. 3.5 mm."

LOCALITIES.—Budde-Lund records two specimens from Caracas obtained by sifting leaf mould, and two from Las Trincheras, Venezuela.

Cubaris viticola (Dollfus), 1896

Figure 210

Armadillo viticola DOLLFUS, 1896, p. 396 (orig. descr.), Figs. 9a-9d.—BUDDE-LUND, 1904, p. 114.

Cubaris viticola RICHARDSON, 1901, p. 571; 1905, p. 642 (orig. descr. quoted), Fig. 684 (after Dollfus).

The following is Dollfus' description in full:

"Body very convex in the middle, rather depressed on the sides, covered with transverse lines of granulations.

"Cephalon.—Prosepistoma plain, fore edge slightly arched in the middle. Eyes moderate; ocelli 12. Antennae short; first joint of the flagellum three times shorter than the second.

"Pereion.—First segment with four large antero-median granulations; lateral edges hardly raised; coxopodite distant from the edge,

crested and ended by a tooth-like diverging processus. Second segment with a narrow coxopodite.

“Pleon, Telson.—Lateral parts of the pleon narrow; pleotelson longer than wide; sides slightly curved; apex one-half narrower than the basis, with rounded angles.

“Uropoda.—Basis very oblique; endopodite reaching to one-half the length of the pleotelson; exopodite a little larger than in the former species (probably Dollfus refers to *C. perlata*), visible on upper and under sides.

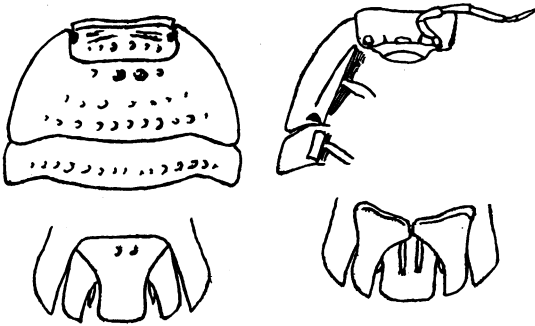


Fig. 210. *Cubaris viticola* (Dollfus). Adapted from Dollfus, 1896.

“Color.—Yellowish, veined and striped with brown.

“Dimensions.—9 by 4 millim.”

LOCALITIES.—“Grenada; Balthazar (windward), second-growth woods, beaten from vines and brush, 250 feet; Chantilly (windward), hillside, edge of forest, beaten from vines and brush, 400 feet.” Type in British Museum (Dollfus).

c.—Upper surface with large tubercles.

***Cubaris scaberrima* (Dollfus), 1893**

Figure 211

Armadillo scaberrimus DOLLFUS, 1893a, pp. 340 (orig. descr.), 344, Pl. IX, figs. 4a-4e.—BUDDE-LUND, 1904, p. 107.

Described by Dollfus as follows:

“Corps étroit, très convexe, couvert de grosses granulations perli-formes et subconiques, disposées sur tout le corps, si ce n’est sur les côtés, qui sont lisses.

“Cephalon.—Prosépistome dépassant faiblement le front. Yeux

formés d'un petit nombre d'ocelles. Antennes ne dépassant pas le deuxième segment pereiial; premier article du fouet trois fois plus court que le second.

"Pereion.—Relief antérieur du somite du premier segment bien accentué; bord latéral relevé, à marge assez épaisse; duplicature (coxopodite) du premier segment bien distincte tout le long du bord latéral.

"Pleon, Telson.—Pleotelson à côtés incurvés et présentant deux fortes granulations. Uropodes à endopodite court et épais, à exopodite rudimentaire, situé un peu au-dessus de la moitié du côté interne de la base.



Fig. 211. *Cubaris scaberrima* (Dollfus). Adapted from Dollfus, 1893a.

"Couleur.—Blanchâtre, plus ou moins marquée de gris.

"Dimensions.—3 1/2 × 1 1/2 mill. (exemplaires jeunes?)."

LOCALITY.—La Guaira, Venezuela.

Cubaris perlata (Dollfus), 1896

Figure 212

Armadillo perlatus DOLLFUS, 1896, p. 395 (orig. descr.), Figs. 8a-8d.—BUDDELUND, 1904, p. 115.

Cubaris perlata RICHARDSON, 1901, p. 571 (*perlatus*); 1905, p. 644 (orig. descr. quoted), Fig. 686 (after Dollfus).—VAN NAME, 1924, p. 205.

Not *C. perlata* Pearse, 1917, p. 7 (= *C. tuberosa*).

The original description is as follows:

"Body convex, covered with large, pearly granulations.

"Cephalon.—Prosepiostoma with a shield-like convexity which does not reach quite to the front edge. Eyes very small; ocelli 3. Antennae short; first joint of the flagellum three times as short as the second.

"Pereion.—First segment with two rounded antero-median granulations; lateral edges raised; coxopodite distinct on the entire length of the edge but not divergent. Second segment with a large and very distinct coxopodite.

"Pleon, Telson.—Pleotelson nearly as wide as long, with two large, rounded granulations near the basis; sides curved, apex a little narrower than the basis.

"Uropoda.—Endopodite reaching to two-thirds the length of the pleotelson; exopodite unperceivable.

"Color.—Light gray, granulations whitish.

"Dimensions.—4.5 by 1.5 mm."

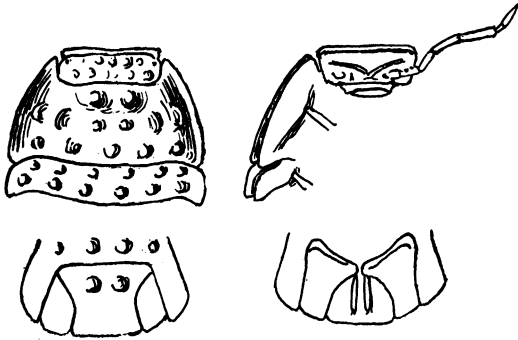


Fig. 212. *Cubaris perlata* (Dollfus). Adapted from Dollfus, 1896.

LOCALITIES.—“(St. Vincent?) Dry forest, leeward, under a log,” 800 feet altitude (one example). Type in British Museum (Dollfus).

This is one of the species of which Dollfus (p. 388) says that there was no record as to whether they were taken at St. Vincent or at Grenada.

Cubaris phylax, new species

Figure 213

Body highly arched, its outline, when seen from above, oblong, broadly rounded in front and still more so behind, where the abdominal epimera are sloped outward to a considerable extent. The dorsal surface is ornamented with large, obtusely conical tubercles, mostly arranged with much regularity. On most of the thoracic segments, these conical tubercles form two transverse rows with about a dozen in each row and several additional tubercles on the lateral or epimeral part of the segment not definitely belonging to either row; on the first segment, there are four more or less definite rows; on the head, three; the abdominal segments bear tubercles as described below. The exposed part of the segments, that bears the tubercles, is abruptly raised above the anterior part that slips under the segment next in front. The thoracic epimera, except those of the first segment, descend nearly vertically.

The front outline of the head is only slightly convex; the epistome forms an up-turned, rather closely appressed border across the front of the head. Eyes fairly large, very convex, with sixteen ocelli which, however, are not all well pigmented. Antennae rather short and not very stout; their flagellum nearly equals the last

joint of the peduncle, and has its proximal article very short, less than one-fourth the length of the terminal one.

The lateral margin of the first segment of the thorax is curved outward, though not very abruptly, forming a fairly wide horizontally extending border, on the under surface of which the coxopodite sulcus is developed along the entire length. The sulcus is shallow and ends behind in a small notch whose inner plate is longer

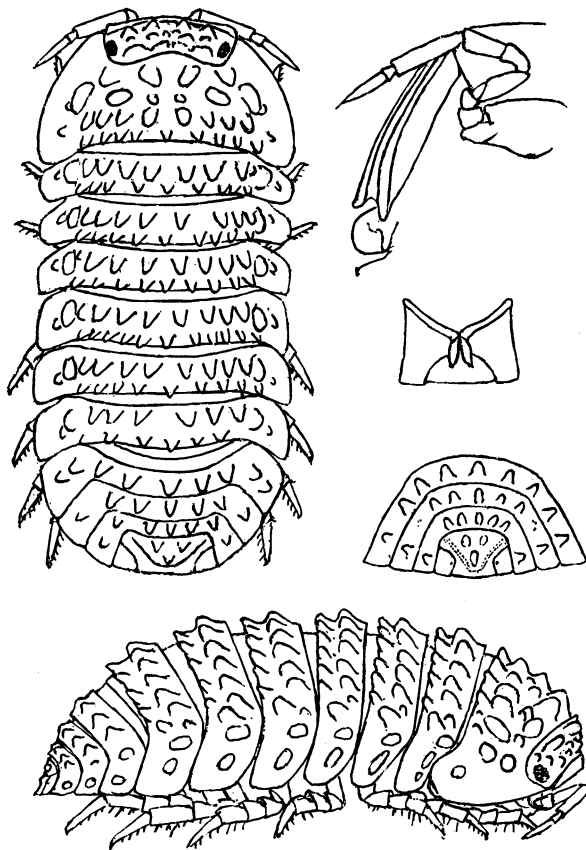


Fig. 213. *Cubaris phylax*, new species.

and much more narrowly rounded off than the outer one. The latter forms the rear lateral corner of the segment and is considerably extended back. Segment II has a narrow, backwardly directed coxopodite process, rather acute at the tip.

The abdominal segments one and two are smooth; three, four, and five each have a single row of large tubercles extending down on the epimera; the telson has a large tumid area of triangular outline occupying much of its dorsal surface and bearing three tubercles, a pair above and a median one below. The telson is only

moderately broad, its upper part about one and one-fourth times its total length, and is somewhat constricted in the middle. The exposed parts of the basal segments of the uropoda are a little longer than wide and bear the extremely minute and rudimentary exopodite close to the inner margin. The endopodites, visible only from below, are rather broad and short, and hardly reach halfway to the end of the exposed part of the lower surface of the telson.

Anterior part of thorax (segments I-V inclusive) and head, dark gray above; segments VI, VII, and the abdomen yellowish (unpigmented); under parts, legs and antennae, also yellowish (unpigmented).

The only specimen (a male) would not measure much over 7 mm. long if it could be straightened out.

LOCALITY.—Cape Macao, east end of Santo Domingo, April or May, 1913, F. N. DuBory, collector. Type and only specimen in the American Museum of Natural History (Cat. No. 6525).

GROUP II

Coxopodite sulcus and ridge on lower side of thoracic segment I is distinct on only about half, or less than half, of the length of the margin (in *C. wheeleri* almost entirely suppressed).

a.—Upper surface practically smooth, or with only weakly developed rugae on the lateral regions of the back.

Cubaris moneaguensis, new species

Figure 214

This species and *C. watsoni* described above are very close allies and closely resemble each other in form, size, and general appearance. With very few exceptions

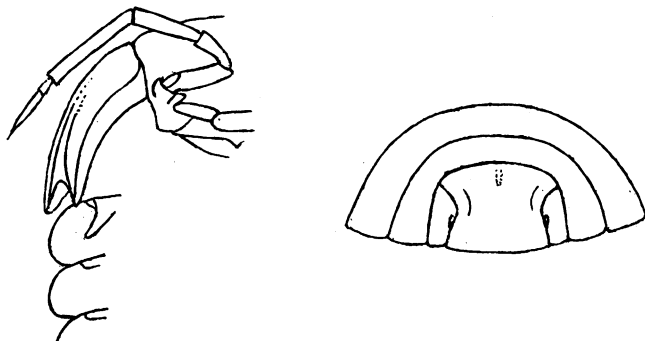


Fig. 214. *Cubaris moneaguensis*, new species.

the statements in the description of *C. watsoni* would apply exactly as well to this species.

The present one is most easily distinguished from *watsoni* by having the inferior margin of the lateral border of the first thoracic segment broader, especially toward the front, and the sulcus becomes shallower and practically fades out altogether a little in front of the middle of the length of the border, instead of being distinctly clear to the anterior end of the margin. Seen from above the margin of the first segment is turned or rolled outward slightly more than in *watsoni* and the antennae are proportionately a little longer and slenderer.

There is also a difference in the telson which is wider in the present species, less constricted in the middle portion, and nearly as wide at the end as in the upper part. The exposed portion of the basal joint of the uropoda is even narrower and more elongate than in *watsoni*.

The specimens are also like *C. watsoni* in being very lightly pigmented, though the color is grayer and is more evenly distributed, and the lower parts, limbs, and light markings of the upper parts are whitish with only a pale tinge of yellow.

Largest specimen, a female, about 15 mm. long.

LOCALITY.—Moneague, Jamaica. Eight specimens, including the type (Cat. No. 6528) collected in December, 1911, are in the American Museum of Natural History.

This is evidently also a near ally of the insufficiently described species *C. gigas* Miers from Nicaragua, but it appears to differ in having the anterior outline of the head less straight in a dorsal view, and the exposed parts of the uropoda narrower.

Cubaris oaxacana, new species

Figure 215

Closely allied to *C. grenadensis* (Budde-Lund) and *C. gigas* Miers but readily distinguished from them by the sharply rounded lateral ends of the anterior thoracic segments. Body wide and highly arched, broadly rounded in front and especially

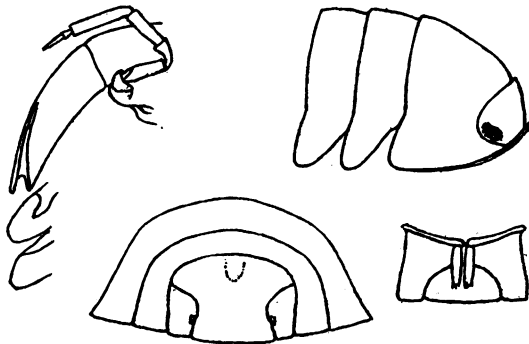


Fig. 215. *Cubaris oaxacana*, new species.

behind, where the epimera slope outward a little so as to increase the width. Surface extremely smooth; glossy when dry though minutely punctate on magnification; even on the lateral regions of the back it is scarcely roughened.

Front outline of head convex when seen from above, upper margin of epistome rather prominent, only slightly arched when seen from in front and only slightly turned up, though more so in the middle than at the sides. Antennae extremely short; the flagellum also proportionally short. Ocelli eighteen in a large specimen.

First segment of the thorax with the lateral border only narrowly rolled outward; on the inferior aspect of the margin there is a sulcus that is fairly wide and deep at the rear end, but becomes both narrower and shallower and fades out a little anterior to the middle of the length of the margin. At the rear end it ends in a cleft whose sides are nearly equal. The posterior angle of the segment as seen in a lateral view is but little produced backward and forms an angle but little less than a right angle with the apex rather sharply rounded off. The second segment has a small, stout tooth-like coxopodite process, the third merely has the anterior margin thickened. All the thoracic segments have the posterior angles a little extended backward. Segments II, III, and IV have the lateral ends quite narrow and sharply rounded off, segments V and VI have them successively more truncate, while in VII the ends are broadly truncate, as is the case in the abdominal segments.

Upper part of the telson at least one-third wider than the length; it is considerably constricted in the middle and its width at the ends is not equal to its length.

Light gray with narrow yellowish (unpigmented) borders and small yellowish markings on the dorso-lateral parts of the thoracic segments.

Length of largest specimen, a female, about 14 mm.

LOCALITY.—San Geronimo, Oaxaca, Mexico. Four specimens collected by Dr. A. Petrunkevitch, July 27, 1909, are in the American Museum of Natural History. The largest, described above, is the type (Cat. No. 6517); the others are considerably smaller.

Cubaris grenadensis (Budde-Lund), 1893

Figure 216

Armadillo grenadensis BUDDE-LUND, 1893, pp. 115 (orig. descr.), 118.—DOLLFUS, 1893a, p. 344; 1896, p. 392 (new descr.), Figs. 5a-5d.—BUDDE-LUND, 1904, p. 110.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Cubaris grenadensis RICHARDSON, 1901, p. 571; 1905, p. 651 (Dollfus' descr. quoted), Fig. 694 (after Dollfus); 1912c, p. 31.—VAN NAME, 1924, p. 205.—ARCANGELI, 1929, p. 130 (descr.); 1930a, p. 11.—BOONE, 1934, p. 591.

The following statements are from the original description:

"Subovalis, convexus; trunci tuberculositates subdeletae; cetera superficies minutissime et densissime reticulate punctata.

"Antennae tertia corporis parte paulo longiores; flagelli articulus prior altero duplo vel magis brevior.

"Oculi mediocres, a margine laterali capitis satis distantes; ocelli circiter 15. . .

“Epistoma margine superiore leviter curvato, frontem aliquantum superante, in medio levissime, vix memorabiliter reflexo.

“Trunci segmentum primum epimeris crassioribus, ante revolutis, margine laterali per posteriorem partem sulcato et post subaequaliter fisso; segmentum secundum epimeris bipartitis; pars interior exteriore multo minor et brevior et praesertim angustior, oblique retroducta, subdentiformis. . . .

“Caudae segmentum anale multo latius quam longius, in medio coarctatum, post levissime curvate truncatum, supra ad basin stria media brevi impressu, utrinque leviter excavatum. Articulus basalis

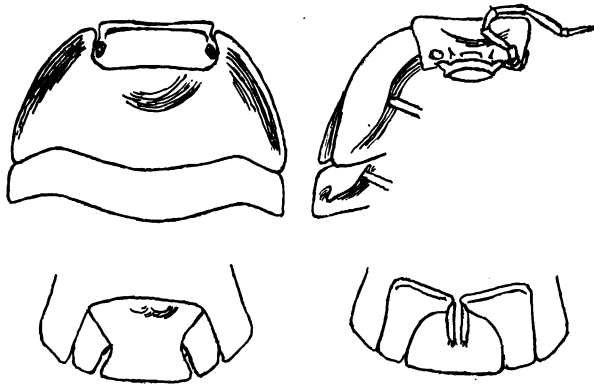


Fig. 216. *Cubaris grenadensis* (Budde-Lund). Adapted from Dollfus, 1896.

uropodum aliquanto longior quam latior; ramus exterior minutissimus, punctiformis, procul ab apice insertus. . . .

“Color cinereus vel e griseo brunneus subunicolor, tuberculositates trunci pallidiores.

“Long. 7–8 mm. Lat. 3.5–4 mm.”

Dollfus' (1896) description is as follows:

“Body much convex, nearly smooth.

“Cephalon.—Prosepistoma slightly convex, fore edge feebly arched in the middle. Eyes rather large; ocelli about 16. Antennae short; first joint of the flagellum three times shorter than the second.

“Pereion.—First segment with a blunt antero-median tubercle; lateral edges raised; coxopodite distinct and divergent on the half hind part of the edge (underside). Coxopodite of the second segment forming a tooth-like processus.

"Pleon, Telson.—Pleotelson as wide as long, with a blunt double tubercle near its basis; sides curved; apex nearly as wide as the basis; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed near the middle of the internal edge of the basis.

"Color.—Dark gray, with a light median line and light lineolae on the sides; antennae whitish.

"Dimensions.—14 by 6 mm."

Arcangeli, 1929, p. 130, gives a more detailed description of two females, collected in Cuba, which he refers to this species. This description corresponds well with the earlier ones.

DISTRIBUTION.—Budde-Lund's types (two specimens) were from Grenada, West Indies (vicinity of Georgetown); Dollfus, 1893, lists it from Venezuela, on what authority I do not know; and in his article of 1896 gives its distribution as follows: "Bequia Island (June), ravine, damp ground, under rotting leaves; Grenada; Balthazar (windward), 250 feet, cocoa orchard, under rotting leaves." Richardson (1912) records it without description from Calamar, Magdalena River, Colombia. Arcangeli reports it from Santiago de Las Vegas, Cuba.

Whether this species actually has such a wide distribution does not seem certain, as there are a number of closely allied species in this group, the distinctions between which are not easily made clear without careful illustrations. No illustrations of this species have been published except the rather crude ones of Dollfus, or reproductions of them. It will be observed that Dollfus' statement that the telson is "as wide as long" is by no means in agreement with that of Budde-Lund. However, his figure shows it much wider than long, and his statement apparently must be understood as referring to the width in the middle portion.

Arcangeli, 1929, p. 131, refers this form provisionally to Budde-Lund's subgenus *Diploexochus*.

Cubaris nigrorufa (Dollfus), 1893

Figure 217

Armadillo nigrorufus DOLLFUS, 1893a, pp. 340 (orig. descr.), 344, Pl. ix, figs. 1a-1e.—BUDDE-LUND, 1904, p. 107.

Described by Dollfus as follows:

"Corps peu large, très convexe, ponctué, sétacé et obtusément tuberculé sur les premiers somites.

"Cephalon.—Prosépipistome dépassant à peine le front. Yeux assez grands, formés d'environ 16 ocelles. Antennes moyennes, atteignant

l'extrémité du deuxième segment pereial; premier article du fouet trois à quatre fois plus court que le second.

"Pereion.—Relief antérieur du premier somite bien accentué, bord latéral relevé; la duplicature (coxopodite) du premier segment n'est distincte que sur les deux tiers postérieurs du bord latéral.

"Pleon, Telson.—Pleotelson aussi long que large, à côtés incurvés et à sommet près de deux fois moins large que la base. Uropodes à endopodite très petit; exopodite rudimentaire, situé vers les deux tiers du côté interne de la base.

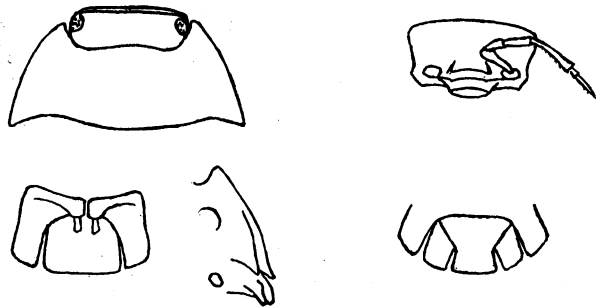


Fig. 217. *Cubaris nigrorufa* (Dollfus). Adapted from Dollfus, 1893a.

"Couleur.—Rousse, tachée et marbrée de noirâtre.

"Dimensions.—5 × 2 mill."

LOCALITY.—Colonie Tovar, Venezuela. 3 specimens.

***Cubaris similis* (Budde-Lund), 1885**

Armadillo similis BUDDE-LUND, 1885, p. 24 (org. descr.); 1904, p. 107.

Known only from the following description of Budde-Lund (1885):

"Statura et habitu omino praecedentis (*Arm. clausus*), at minor et forsitan subtilius punctatus.

"Antennae ut in *Arm. clauso*.

"Oculi mediocres; ocelli majores, circiter 20.

"Clypeus lobis magnis, oblique triangularibus. Epistoma margine superiore frontem multo superante, paulo repando.

"Trunci annulus primus epimeri margine laterali minus crasso, subaltecincto, subpellucide, e medio post versus sulcato et subaequaliter fisso; parte interiore epimeri paulo minore. Epimera annuli secundi bipartita, interiore parte multo brevior et angustior.

"Caudae annuli ut in praecedente.

"Articulus basalis pedum analium multo longior quam latior, ad

apicem haud angustatus; ramus exterior punctiformis, longe ab apice et a margine interiore articuli basalis insertus; ramus interior mediocris, annulo ultimo paulo brevior.

“Long. 13–14 mm. Lat. 6.5 mm. Alt. 3.5 mm.

“Patria.—America meridionalis? Exempla duo sine significatione patriae in Museo Petropolitano asservata vidi.”

Cubaris pisum (Budde-Lund), 1885

Armadillo pisum BUDDE-LUND, 1885, p. 32 (orig. descr.).—DOLLFUS, 1896*d*, p. 48.—BUDDE-LUND, 1904, p. 110.

Cubaris pisum RICHARDSON, 1901, p. 572; 1905, p. 653 (orig. descr. quoted and translated).—VAN NAME, 1924, p. 205.

“Ovalis, valde convexus, laevis, glaber, subnitidus.

“Antennae exteriores dimidio corporis paulo breviores, graciles; flagelli articulus prior altero triplo brevior.

“Oculi mediocres; ocelli circiter 15.

“Clypeus lobis brevibus, late rotundatis; epistoma margine superiore curvato, frontem vix superante; frons et vertex laevia.

“Trunci annulus primus margine laterali altecincto, post minus profundo et subaequaliter fisso, parte interiore paulo minore: epimera annuli secundi fissa, parte interiore minima. Margo posterior annulorum leviter utrinque sinuatus.

“Caudae annulus analis paulo latior quam longior, medio vix coarctato, post recte truncatus, supra convexus. Articulus basalis pedum analium paulo longior quam latior, ad apicem paulisper angustatus ramus exterior minutissimus, punctiformis, apici proprius insertus; ramus interior brevis.

“Color brunneus vel rufobrunneus, uniformis.

“Long. 4.5–5.5 mm. Lat. 2.5–3 mm.

“Patria.—Plurima exempla e Florida a cl. Uljanin transmissa vidi.” (Budde-Lund, 1885, p. 32).

Nothing appears to be known about this species except what Budde-Lund's description tells us. The conjecture is made by Dollfus (1896, see above) that *C. dugesi* (Dollfus) is a variety of the present species, but of this there does not seem to be any probability; the descriptions of the telson and uropoda do not correspond sufficiently well, and the localities are widely separated.

Cubaris gigas Miers, 1877

Figures 218, 219

Armadillo gigas BUDDE-LUND, 1879; p. 7; 1885, p. 40; 1904, p. 108.

Cubaris gigas MIERS, 1877*a*, p. 66 (orig. descr.), Pl. LXVIII, figs. 1–1c.—RICH-

ARDSON, 1901, p. 572; 1905, p. 648 (Miers' descr. quoted), Fig. 691 (after Miers).—PEARSE, 1915, p. 544 (see remarks below).—ARCANGELI, 1930a, p. 2.

Described by Miers as follows:

"Convex oblong-oval, nearly smooth, surface only very minutely granulated, and with only obscure indications of larger tubercles on each side of the middle line. Head transverse, with the anterior margin straight, reflexed at a right angle (as seen in a lateral view) with the upper surface of the head, and (as seen in a dorsal view) also forming a right angle with the lateral margins; antero-lateral lobes wanting. First segment of the body very concave on the sides with the lateral margins

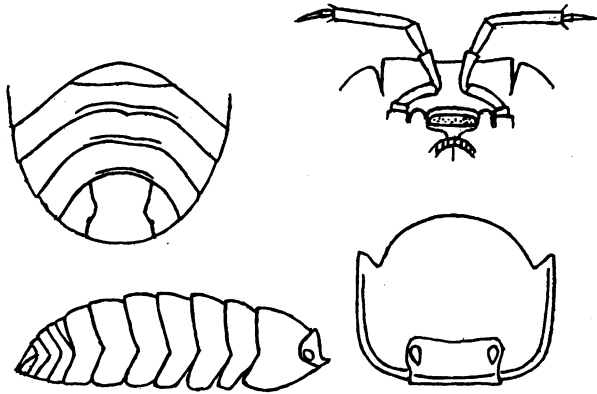


Fig. 218. *Cubaris gigas* Miers. Adapted and enlarged from Miers' (1877) figures.

strongly reflexed; all the segments distinctly flexed backward on the sides, with the posterior margins angular excavate; terminal segment of the tail about as broad as long, with the sides excavated; upper surface flat, with a shallow depression on each side and a small median pit near the base. Antennae with the flagellum much shorter than the last joint of the peduncle, with the first joint the shortest. Basal joint of the uropoda (viewed from above) oblong, terminal (apparent lateral) joint quite minute. Color light grey. Length, 10 1/2 lines."

LOCALITY.—San Juan, Nicaragua. Type in British Museum (Miers).

Pearse, 1915, reports it from Fundacion, Santa Marta, Colombia, under stones (nine examples). I have examined his specimens and agree that they correspond closely with Miers' description and figures, the

chief discrepancies being that the front outline of the head is gently convex, not straight (one must look at it very obliquely to make it appear anywhere near a straight line); that the abdomen appears to be somewhat wider than indicated in Miers' figure, and that they are all of small or only moderate size (the largest between 10 and 11 mm. long). Miers' description, however, is incomplete in respect to many important characters, and the identification therefore can be accepted only provisionally. The following notes were made on Pearse's specimens which were kindly loaned to me by the University of Michigan

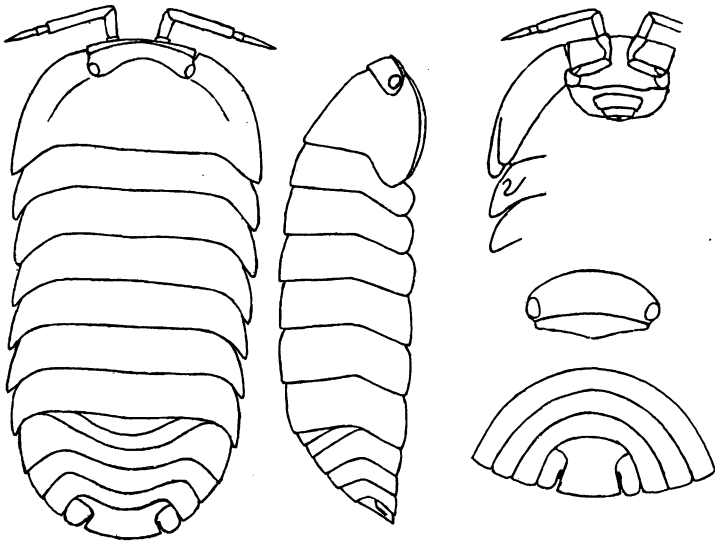


Fig. 219. *Cubaris gigas*(?) specimens of Pearse from Fundacion, Colombia.

Museum. Through an exchange, two of these specimens are now in the collection of the American Museum of Natural History.

Body wide and highly arched; oblong in outline and broadly rounded before and behind in a dorsal view. Surface very smooth and even, showing a slight and very minute granulation only on high magnification. The exposed parts of the segments are slightly but not abruptly raised above the parts that slip under the segments next in front.

Head wide; the upper edge of the epistome forms a border that projects much more at the lateral ends than in the middle and is gently convex in both front and dorsal views. Antennae rather slender; eyes with twenty or more ocelli. The epimera of the thoracic and ab-

dominal segments slope outward to some extent, thus increasing the wide appearance of the body, but they do not curve or flare outward much, except in the case of the first thoracic segment, whose lateral borders are curved outward and upward so as to form a wide shallow trough along most of the length of the segment, though it disappears before the rear angles are reached. These angles are strongly produced backward and are rounded off. The above described border turns sufficiently to allow a little of the under surface of the margin to be seen along most of the length of the segment in a side view of the latter.

Seen from below the first thoracic segment presents, at the rear end, a small notch whose inner side is considerably shorter than the outer. This notch is continued forward as a shallow, constantly narrowing groove which disappears before the middle of the length of the segment is reached. The second thoracic segment bears a rather narrow somewhat curved exopodite process flattened and rounded at the tip. No process on the third or following segments. Telson about one-eighth wider than long. The inner branches of the uropoda (visible only from below) fall far short of reaching the end of the telson; their outer branches, though small, are elongate and pointed.

Pearse makes the following statements regarding their color:

“The color of this species is rather striking. There is a salmon-colored band along each side of the body, extending through all the thoracic epimera; dorsum with the usual lateral markings; distal half of uropoda salmon-colored.”

Specimens in the U. S. National Museum from the Bahamas doubtfully identified as *C. gigas* by Richardson are not this species.

***Cubaris dumorum* (Dollfus), 1896**

Figure 220

Armadillo dumorum DOLLFUS, 1896, p. 391 (orig. descr.), Figs. 3a–3d.—BUDDLUND, 1904, p. 110.

Cubaris dumorum RICHARDSON, 1901, p. 572; 1905, p. 650 (orig. descr. quoted), Fig. 693 (after Dollfus).—VAN NAME, 1924, p. 205.

Briefly described by Dollfus as follows:

“Body very convex, nearly smooth.

“Cephalon.—Prosepistoma nearly plain fore edge straight. Eyes large; about 20 ocelli. Antennae very short; first joint of flagellum twice as short as the second.

“Pereion.—First segment with a blunt antero-median tubercle; lateral edges raised on the fore part; coxopodite separated by a cleft

extending to the third part of the segment (underside). Second segment with a square coxopodite, distinct on its total length (underside).

“Pleon, Telson.—Pleotelson quite as long as wide; sides curved; apex one-third narrower than the basis.

“Uropoda.—Basis wide, oblique; endopodite extending to one-third the length of the pleotelson; exopodite very small, placed near the internal edge of the basis (upperside).

“Color.—Dark gray or brown, with light dots and lineolae on both sides of the median line (pereion).

“Dimensions.—8 by 3.5 millim.”

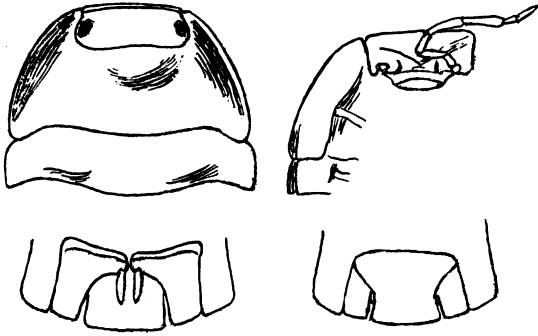


Fig. 220. *Cubaris dumorum* (Dollfus). Adapted from Dollfus, 1896.

LOCALITY.—“Mustique Island, found by beating brush.” Type in British Museum (Dollfus).

***Cubaris dugesi* (Dollfus), 1896**

Figure 221

Armadillo dugesi DOLLFUS, 1896*d*, p. 47, Figs. 1*a*–1*d*.—BUDDE-LUND, 1904, p. 110.—VERHOEFF, 1933, p. 98 (*dugezi*).

Cubaris dugesi RICHARDSON, 1905, p. 652 (Dollfus' descr. quoted and translated), Fig. 695 (after Dollfus).—VAN NAME, 1924, p. 205.

Dollfus' description is as follows:

“Corps étroit, convexe, lisse, très finement ponctué-sétacé.

“Cephalon.—Prosépistome dépassant un peu le front, surtout des deux côtés, face plane; yeux petits, environ 14 ocelles; fouet des antennes à premier article deux fois plus court que le second.

“Pereion.—Bord latéral du premier segment relevé sur toute sa longueur; mamelon antéro-médian à peine visible; coxopodites dis-

tincts seulement sur le tiers postérieur du côté du segment, mais atteignant à extrémité de celui-ci. Deuxième segment à coxopodite très distinct.

“Pleon, Telson.—Pleotelson aussi long que large, avec un petit relief suivi d’une impression, situé près de la base; incurvation latéral bien indiquée, le sommet égal en largeur environ les $\frac{3}{4}$ de la base. Uropodes à article basilaire peu oblique; endopodites très petits; exopodites minuscules, situés vers le $\frac{2}{3}$ du côté interne de la base (face supérieur).

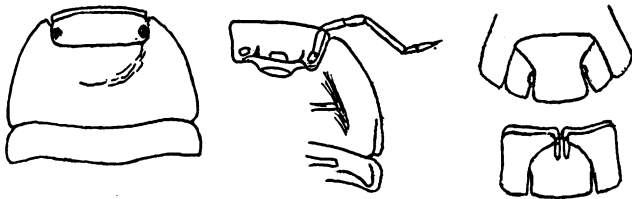


Fig. 221. *Cubaris dugesi* (Dollfus). Adapted from Dollfus, 1896d.

“Couleur.—Gris foncé uniforme.

“Dimensions.—Longueur 8 millimètres; largeur $3 \frac{1}{2}$ millimètres.”

LOCALITIES.—Corritos (Silao) and Morelia, Mexico.

Dollfus (p. 48) says of this species that it is near to *A. pisum* Budde-Lund, 1885, from Florida (see above), and may perhaps be only a variety of it.

***Cubaris beebei* Van Name, 1924**

Figure 222

Cubaris beebei VAN NAME, 1924, p. 203 (orig. descr.), Figs. 28–30.

The following extracts from the description are given here to supplement the original figures reproduced:

Back highly arched, its surface without any coarse tuberculation, though very slightly uneven in the lateral regions of the back, but under considerable magnification it exhibits evenly, though not very thickly distributed, scabrous punctations. The exposed part of each thoracic segment is somewhat elevated, though not abruptly so, above the part overlapped by the segment next in front.

Upper margin of epistome only very gently arched and turned up to form a very narrow but distinct projecting border clear across the

front of the head. This border is separated from the forehead by a very narrow impressed groove or furrow. The front outline of the head and first body segment, when seen from above, forms a broadly rounded curve. Eyes rather small, with about twelve ocelli.

Lateral border of first thoracic segment turned up rather widely in front, the reflected part diminishing to nothing as the rounded rear angle of the segment is approached, so as to form between itself and the surface of the main part of the segment a narrow shallow groove. Posterior lateral corner of the first segment with a small cleft, but this is not extended forward as an appreciable sulcus on the inferior aspect of the mar-

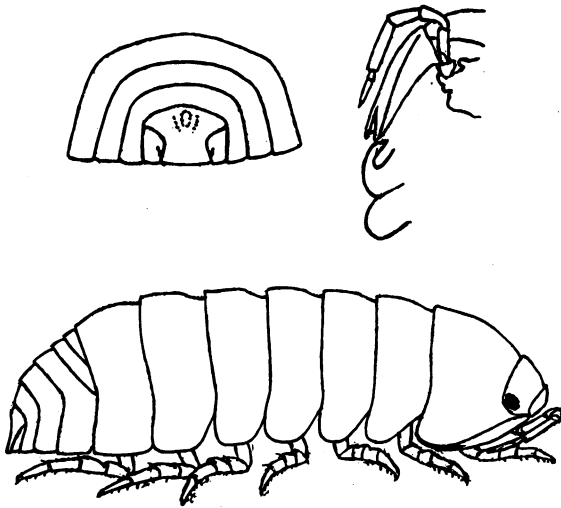


Fig. 222. *Cubaris beebei* Van Name. From Van Name, 1924, *Zoologica*, V, p. 203.

gin except for an insignificant distance. The epimeron of the second segment bears on its inner aspect a small coxopodite process ending in a flattened rounded tip. No process on third segment.

Telson broader than long by nearly one-fourth, and considerably constricted in the middle; the truncated rear end is about two-thirds the width of the upper part. On the middle line near the upper end there is an elongate depression or shallow pit with a slight elevation on either side. Basal segments of uropoda a little longer than wide. Their inner branches, visible only from below, are very short and rather wide; the outer branches are reduced to very small rudiments borne close to the inner margin of the basal joint, some distance from the end.

Color gray-brown above with the usual light markings; legs and under parts not pigmented.

Length of largest specimens (perhaps not fully grown) about 5 to 6 mm.

LOCALITIES.—Galapagos Islands; the type and four other specimens obtained on Eden Island under stones, and three others on South Seymour Island collected by sifting dead leaves. These are both small islets close to Indefatigable Island. Type in the American Museum of Natural History (Cat. No. 4836).

b.—Upper surface more or less conspicuously rugose or tuberculated.

Cubaris truncorum (Budde-Lund), 1893

Figure 223

Armadillo truncorum, BUDDE-LUND, 1893, pp. 116 (orig. descr.), 118.—DOLLFUS, 1893a, p. 340, Pl. IX, figs. 2-2c.—BUDDE-LUND, 1904, p. 104, Pl. IX, fig. 34.—ARCANGELI, 1932, p. 124; 1934, p. 93.

Budde-Lund's description is as follows:

"Subovalis, convexus; tuberculositates trunci ordinariae majores; caput rugose tuberculatum; trunci segmenta in medio ad margine pos-

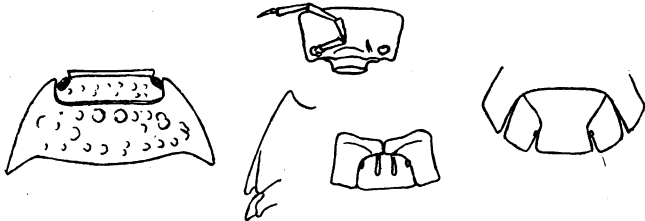


Fig. 223. *Cubaris truncorum* (Budde-Lund). Adapted from Dollfus, 1893a.

teriolem obscure et delete granulata, segmentum primum ante tuberculis duobus confluentibus subtumidum; cetera superficies minutissime et densissime squamate punctata.

"Antennae tertia corporis parte paulo longiores; flagelli articulus prior minutus, altero fere quadruplo brevior.

"Oculi mediocres, marginem lateralem capitis attingentes; ocelli circiter 16.

"Clypeus lobis mediocribus, subacute triangulis. Epistoma margine superiore in medio paulisper, in lateribus aliquantum superante.

"Trunci segmentum primum epimeris tenuibus, paulum revolutis,

marginē laterali non sulcato, post inaequaliter fisso: lacinia interior exteriore satis minor; segmentum secundum epimeris bipartitis; pars interior minuta, dentiformis, acuta, oblique retroducta. Margo posterior utrinque fortius sinuatus.

“Caudae segmentum anale paulo longius quam latius, in medio coarctatum, post recte truncatum, ad basin supra utrinque leviter impressum. Articulus basalis uropodum multo longior quam latior, subtrapezoidalis, ramus exterior minutissimus, punctiformis, procul ab apice insertus: rami interiores mediocres. Epimera segmentorum 3-4-5 subrectangula, basi quam apice paulo angustiore infra in basipaulisper inflexa.

“Color e rufo brunneus, maculis fuscis, creberrimis, presertim in quattuor series longitudinales condensatis, in capite et media cauda obscurior. Articulus basalis uropodum cum basi segmenti analis semper pallidus, apice segmenti nigro.

“Long. 6-7 mm. Lat. 3-3.5 mm.”

LOCALITIES.—Budde-Lund records it from several places in the vicinity of Caracas, Venezuela, the specimens being mostly obtained by sifting; several were found on the bark of a bombax tree. Dollfus reports it from Corozal, Caracas, and St. Esteban, Venezuela, the last one of the places also named by Budde-Lund.

In his revision of the genus *Armadillo* (*Cubaris*), Budde-Lund (1904) does not refer to Dollfus' record or figures of this species.

***Cubaris vincentis* (Budde-Lund), 1904**

Figure 224

Armadillo cinctus DOLLFUS, 1896, p. 392 (orig. descr.), Figs. 4a-4d.

Armadillo vincentis BUDDE-LUND, 1904, p. 110.

Cubaris cincta RICHARDSON, 1901, p. 572 (*cinctus*); 1905, p. 647 (orig. descr. quoted), Fig. 690 (after Dollfus).—PEARSE, 1915, p. 543 (see note below).

Cubaris vincentis VAN NAME, 1924, p. 205.—BOONE, 1934, p. 591.

The description of Dollfus (no other has been published) is as follows:

“Body moderately convex, rather wide, depressed on the fore and hind parts of the segments, with a transverse range of tubercles on each segment.

“Cephalon.—Prosepistoma nearly plain, fore edge straight. Eyes middling; ocelli about 16. Antennae; first joint of the flagellum twice as short as the second.

“Pereion—First segment with a double antero-median tubercle;

lateral edges raised; coxopodite distinct and divergent on the third hind part of the edge (underside). Coxopodite of the second segment forming a narrow quadrangular processus.

“Pleon, Telson.—Pleotelson as long as wide, with a triangular tubercle near its basis; sides curved; apex one-fourth narrower than the basis.

“Uropoda.—Basis nearly straight; endopodite very small, extending hardly to one-sixth the length of the pleotelson; exopodite minute, placed above the middle of the internal edge of the basis (upper side).

“Color.—Dark, gray, with small lighter lineolae on both sides of the median line (pereion) and three light dots on the pleotelson.

“Dimensions.—7.5 by 3.25 millim.”

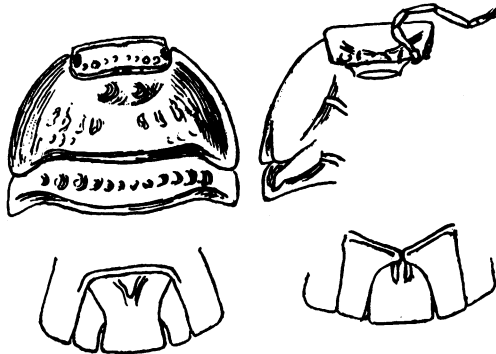


Fig. 224. *Cubaris vincentis* (Budde-Lund), 1904. Adapted from Dollfus' (1896) figure of *Armadillo cinctus*.

LOCALITIES.—Type locality “Near Layon (leeward side) on rotten wood, dry forest, 500 feet” (Dollfus). Type in British Museum (Dollfus). Layon is probably on St. Vincent, W. I. Pearse, 1915, reports “a small specimen, probably referable to this species” from near the Cincinnati Coffee Plantation, Santa Marta, Colombia (elevation 4500 ft.). This specimen is probably in the University of Michigan Museum.

Budde-Lund, 1904, p. 110, changed the name of this species to *vincentis*, the name *cinctus* having previously been employed by him for a species from the Greek Islands.

***Cubaris culebrae*, new species**

Figure 225

Body highly arched; rather coarsely granular and scabrous under magnification, and ornamented with numerous small, well defined, rounded or slightly oval

tubercles arranged in transverse rows with considerable regularity. In a dorsal view the front of the head is gently curved while the sides of the first thoracic segment are more straight, converging toward the front, where they curve in to meet the head; the rear end of the body appears quite broad owing to the epimeral ends of the abdominal segments 3 to 5 bending considerably outward. Integument firm and articulation of the segments compact. The exposed tubercle-bearing parts of the thoracic segments are noticeably but not abruptly raised above the parts fitting under the segment next in front.

Head with small low tubercles; the superior margin of the epistome forms a distinctly projecting border clear across the front of the head, though it is more up-

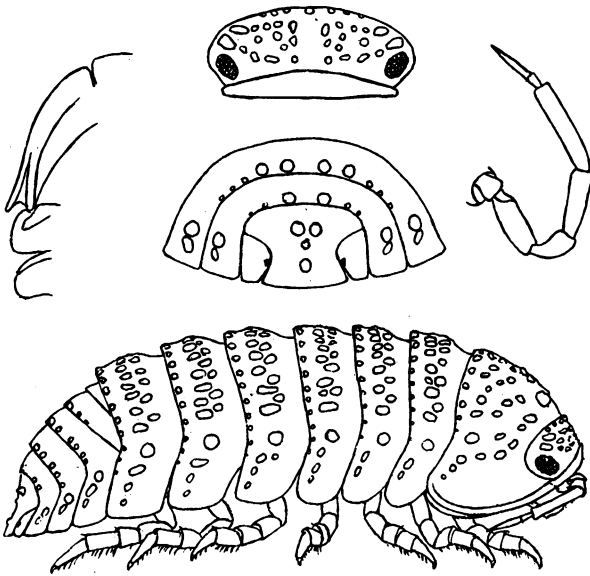


Fig. 225. *Cubaris culebrae*, new species.

turned and appressed in the middle than at the sides. Eyes well developed, with about twenty ocelli. Terminal article of flagellum of antennae more than twice the length of the proximal one.

First thoracic segment with numerous tubercles, of which a pair on the anterior median region are the largest. Its lateral borders are sharply rolled outward, rather broadly in front, and edged by a thickened margin. The posterior lateral angles are somewhat extended back and rounded off, and are cleft by a small notch to receive the second segment when the body rolls up. This notch is extended forward as a sharply defined, constantly narrowing sulcus for about one-third the length of the margin. In a lateral view the inferior margin of the segment is gently curved: the sulcus on its inferior aspect described above is slightly visible owing to a slight obliquity in its position.

The thoracic segments have their epimeral ends nearly vertical; the more anterior ones have the ends rounded off; those farther back are more truncated. They have a row of small tubercles along the posterior border and two more or less irregular transverse rows of larger ones in front of these on the lateral regions of the back, also a few on the epimera. Abdominal segments two to five inclusive have only the row along the posterior edge and a few on the epimera and telson. The end of the telson is truncated in the arc of a very large circle, and is scarcely two-thirds the width of the upper part. Outer branch of the uropoda minute and scale-like, the inner branches quite short.

Color grayish brown above, the margins of the segments usually unpigmented, as are numerous irregular spots which often correspond more or less in size and position with the tubercles, though usually larger than the latter and frequently confluent.

Length of largest specimen (a female) about 12 mm.; most of the others are much smaller.

LOCALITIES.—Type locality, Culebra Island, West Indies (east of Puerto Rico); nine specimens in the American Museum of Natural History, of which the largest male (Cat. No. 6513) is the type. Collected by Prof. W. M. Wheeler, March 4, 1906. There are also in the same museum two specimens collected by Dr. F. E. Lutz, Feb. 18, 1914, on Desecheo Island west of Puerto Rico, and five from St. John, Virgin Islands, March 9, 1925, also collected by Dr. Lutz.

***Cubaris jamaicensis* Richardson, 1912**

Figure 226

Cubaris jamaicensis RICHARDSON, 1912, p. 193 (orig. descr.), Figs. 2, 3.

Of this species its describer states that it is "closer to *Cubaris silvarum* (Dollfus) than to any other described species. It differs from that form in not having the coxopodites of the first thoracic segment distinct on the entire length of the edge, in having the coxopodite of the second segment smaller and more distant from the lateral margin, and in having the tubercles of the body more distinct and differently arranged."

The following characters were determined from the specimens in the American Museum mentioned below, which seem to belong to Richardson's species.

Body quite highly arched and showing under magnification a scabrous granulation and fairly prominent tubercles distributed as in Richardson's description and figures. On the first thoracic segment there is a pair of large low tubercles in the anterior median region; those in the groups on the lateral regions of the back are of more or less

irregular elongate form and are often somewhat confluent. The abdomen is smooth except for one pair of tubercles near the upper margin of the telson and a slight median elevation below them. The exposed and tubercle-bearing part of the segments is noticeably raised above the part fitting under the segments next in front. The epimeral ends of the abdominal segments 3 to 5 are bent or flared outward to a noticeable extent.

Front outline of head fairly convex when seen from above; the upper margin of the epistome is not very wide, but is slightly upturned so that there is a distinct groove between it and the forehead. Eyes convex; fifteen or more well-developed ocelli.

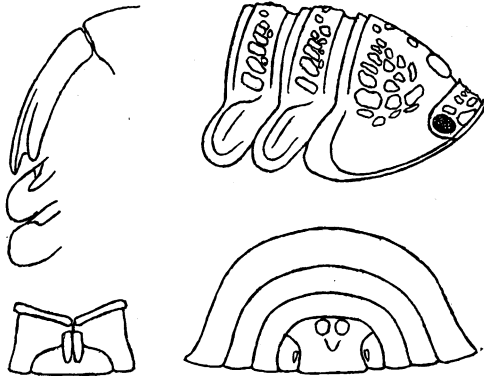


Fig. 226. *Cubaris jamaicensis* Richardson. From specimens in the American Museum of Natural History.

The first thoracic segment has the lateral border turned outward so that there is a noticeable concavity of the face of the segment just above it; this concavity is terminated behind by a distinct curved line a little way in front of the rear angle of the segment. A distinct sulcus of U-shaped cross section, and not very wide, marks off the coxopodite on the lower aspect of the margin of the segment. It ends behind in a small notch the inner side of which is considerably the shorter, and it fades out, more by becoming shallower than by becoming narrower, about the middle of the length of the segment. The second thoracic segment has a small, obliquely directed, rather acute coxopodite process; the third has none, though its anterior border is somewhat thickened.

Color brown above with the usual light (unpigmented) markings.

Neither of these two specimens is as large as the dimensions given by Richardson (9.5 by 5.0 mm.).

LOCALITIES.—Mandeville, Jamaica (type locality), 30 specimens collected by Dr. Thomas Barbour. Types in Museum of Comparative Zoölogy, Cambridge, Mass. Cotypes in U. S. Nat. Mus. (Richardson). The American Museum of Natural History contains specimens from two other localities in Jamaica: Moneague and Montego Bay, one from each place.

Cubaris verrucosa (Budde-Lund), 1904

Armadillo verrucosus BUDDE-LUND, 1904, p. 104 (orig. descr.).

The original description is here quoted in full:

“Ovalis vel breviter ovalis, convexus.

“Caput rugis vel tuberculis asperum; trunci segmentis tuberculis in posteriore elevatiore parte segmentorum irregulariter transverse biseriatas, ad latera majoribus, positas; caudae segmentis serie transverse verrucularum vel tuberculorum saepe deletiorum munita; telsum tuberculis duobus in basi positas majoribus. Altra superficies dense et minutissime squamata.

“Oculi majores, globosi, ocelli numero c. 16.

“Antennae breves, tertiam corporis partem longitudine vix aequantes; scapi articuli 2. et 4. subaeque longi; flagelli articulus 1. quadruplo brevior quam articulus 2.

“Epistoma margine superiore frontem nonnihil maxime in lateribus superante. Clypeus perpendicularis, lobis lateralibus parvis, rotundatis, subsemicircularis.

“Trunci segmentum 1. epimeris leviter altecinctis, margine laterali post mediam sulcato et post profunde subaequaliter fissis; lacinia interior rotundata, lacinia exterior rotundata truncata, interiore paulo brevior. Epimera segmenti 2. bipartita; lamina interior angusta, retroducta; pronotum perbreve, vigesima parte dorsi vix longius. Margo posterior omnium segmentorum, maxime segmenta 1. et 2., utrinque leviter incurvus. Epimera segmentorum 5.-6.-7. subtus duplicatura anteriore.

“Caudae segmenta 3.-4.-5. epimeris paulum revolutis, subrectangularis, nullo processu inferiore instructis. Pleopodes primi paris in femina perparvi, transversa, trachea parva area operculari vix conspicua instructi.

“Telsum tertia parte vel plus latius quam longius, post leviter co-

aretatum; basis multo longior quam apex, margine postico subtransverso.

"Uropodum scapus nonnihil longior quam latior; latus exterius subrectum, latus interius leviter incurvum. Exopoditum minutissimum, punctiforme, lateri interiore scapi procul ab apice insertum. Endopoditum minutissimum, vix duplo latius quam longius.

"Unicolor, griseus, maculis parvis albidis in capite et trunci segmentis ad latera ornatus; pedes pallidi, antennae griseae saepe rufescentes.

"Long. 5-6 mm. Lat. 2.5-3.2 mm."

LOCALITY.—Guayaquil, Ecuador, taken from under the bark of trees. Specimens in the Hamburg Museum (Budde-Lund).

Cubaris galapagoensis Miers, 1877

Figure 227

Armadillo galapagoensis BUDDE-LUND, 1879, p. 7 (*galapagoensis*); 1885, p. 40; 1904, p. 108.

Cubaris galapagoensis MIERS, 1877, p. 74 (orig. descr.), Pl. XII, figs. 2-2c.—VAN NAME, 1924, p. 201 (new descr.), Figs. 23-27.

The following characters are taken from the description in Van Name, 1924, pp. 201-203:

Body hard and compactly articulated; its surface minutely granulated under magnification and raised into rounded and elongate tubercles arranged with some regularity.

Eyes small, with about fifteen ocelli.

Upper edge of epistome gently arched when seen in an anterior view, and forming a narrow projecting border clear across the head.

Thoracic segments having their exposed part noticeably but not very abruptly raised above the part fitting under the segment next in front, and the rear border forming a somewhat prominent ridge. The first segment has the lateral border curved as seen in a side view, and its anterior two-thirds rolled outward to form a prominent but not very thick projecting margin. No distinctly defined groove marks this off from the lateral face of the segment. The rear lateral angles have a small nearly equal-sided cleft to receive the second segment when the body rolls up; this is not continued forward into a perceptible sulcus on the underside of the rolled-out margin except for a short distance. The second segment bears a small, short, rather bluntly pointed coxopodite process. The third segment merely has the anterior border of the epimeron thickened, but bears no process.

The abdomen has the lateral ends of segments 3, 4, and 5 broadly truncated and slightly flared outward, and each bears one oval tubercle on each side near the lateral end. Outer branches of the uropoda reduced to small rudiments, each borne on a small tubercle close to the inner margin of the outer face of the basal joint some distance from the rear margin.

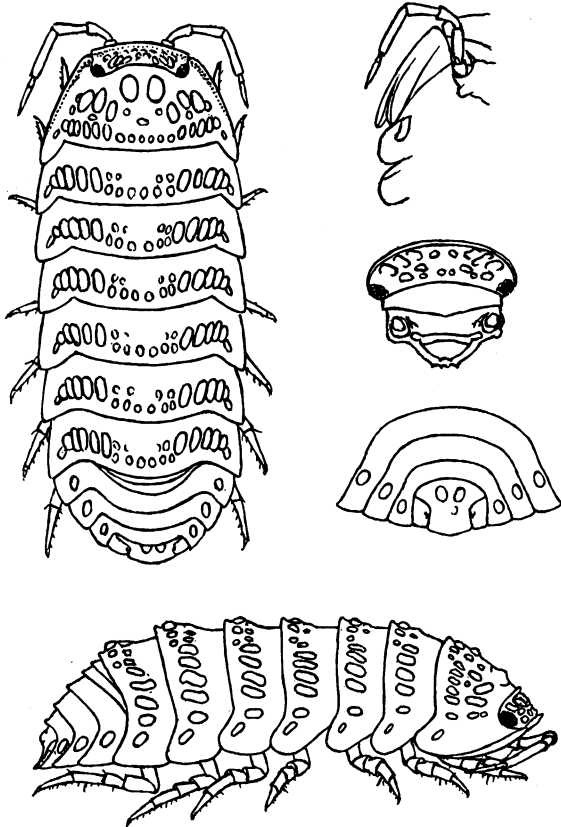


Fig. 227. *Cubaris galapagoensis* Miers. From specimens in the American Museum of Natural History. Adapted from Van Name, 1924.

Color rather dark gray with the margins of the segments and the tubercles light grayish or brownish white (unpigmented).

Length, 11 mm. (Miers, type).

LOCALITY.—Charles Island, Galapagos. Type in the British Museum (Miers). Eden Island, Galapagos, found under a stone (Van Name, 1924, specimen in the American Museum of Natural History).

Though the Eden Island specimen is smaller (only 6 mm. long) and is from a different island it agrees so well with Miers' description and figures that I cannot consider it distinct. The chief discrepancy is that Miers figures the lateral ends of the anterior thoracic segments as broader and more truncated, possibly an error on the part of his artist. Eden Island is a small islet close to Indefatigable Island, the next one north of Charles Island.

Cubaris tuberosa (Budde-Lund), 1904

Figure 228

Armadillo tuberosus BUDDÉ-LUND, 1904, p. 109 (orig. descr.), Pl. x, figs. 1-4.

Cubaris perlata PEARSE, 1917, p. 7 (not Dollfus).

Reductoniscus tuberosus KESSELYAK, 1930, pp. 61-64.

"Caput rugose tuberculatum. Trunci segmentum primum seriebus transversis tribus vel quattuor tuberculorum ornamentum; series prima tubercula quattuor majora, series secunda duo parva, series tertia multa, c. 12, mediocria, series marginalis postica c. 7 minor continet; omnia

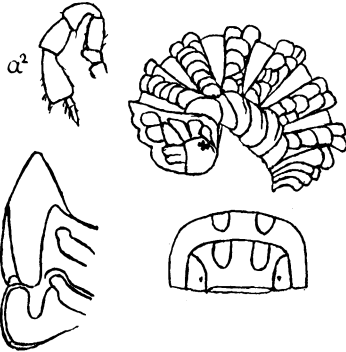


Fig. 228. *Cubaris tuberosa* (Budde-Lund). Adapted from Budde-Lund, 1904.

segmenta sequentia seriem transversam tuberculorum et post in medio tubercula quaterna habent. Caudae segmenta 3. et 4. tuberculis quaternis mediis, segmenta 5. et 6. tuberculis binis instructa.

"Oculi medioeres; ocelli numero c. 15.

"Antennae breviores, scapi articulus 4. paulo longior sed multo crassior quam 3., articulo 2. subaequalis flagelli articulus 1. plus duplo brevior quam 2.

"Epistoma supra subtriangulare prominens, marginem frontalem paulum superans, infra carinula brevis; clypeus lobis lateralibus parvis, rotundatis.

“Trunci segmentum 1. margine laterali post sulcato et subaequaliter fisso; segmentum 2. epimeris fassis; lacinia interior parva, dentiformis.

“Telsonum multo, fere duplo, latius quam longius, lateribus leviter incurvis.

“Uropodium exopoditum minutum, endopoditum breve.

“Unicolor, pallido albus.

“Long. 3.5 mm. Lat. 1.8 mm.” (Budde-Lund, 1904.)

LOCALITIES.—Port au Prince, Haiti. One specimen (type) in Hamburg Museum (Budde-Lund). Through the kindness of Prof. E. P. Creaser I have been able to examine eleven specimens collected by Prof. Pearse on St. Thomas Island and assigned by him (1917, p. 7) to *C. perlata* (Dollfus), but they belong, or are closely allied, to the present species.

Budde-Lund's figures and description fail to bring out the unusual extent to which the ends of the abdominal segments and the rear end of the telson are bent or flared outward, and they somewhat exaggerate the width of the antennal segments, which, however, are exceptionally wide. In spite of the large size of the tubercles, they are more or less irregular in size and arrangement on the lateral parts of the back, as Budde-Lund's figure indicates. From the most lateral tubercles, which are large and oblong in outline, a curved ridge extends down near the posterior border of the epimeron. The cleft at the posterior angle of the first thoracic segment is quite small, but is continued forward as a diminishing groove for half the length, or somewhat more, of the border of the first segment.

The species is evidently a very small one; none of the specimens much exceed the type in size.

The remarks made under *C. mineri*, regarding resemblance to certain Old World species, apply also in the case of this form, which in my opinion belongs, as most of the West Indian species do, to the *Venezillo* group, though Kesselyak, 1930, separated it, on the basis of Budde-Lund's description and figure, and placed it in a genus, *Reductoniscus*, which he established in that article for a form of unknown natural habitat that he found in the palm house of the botanical garden at Dahlem, near Berlin.

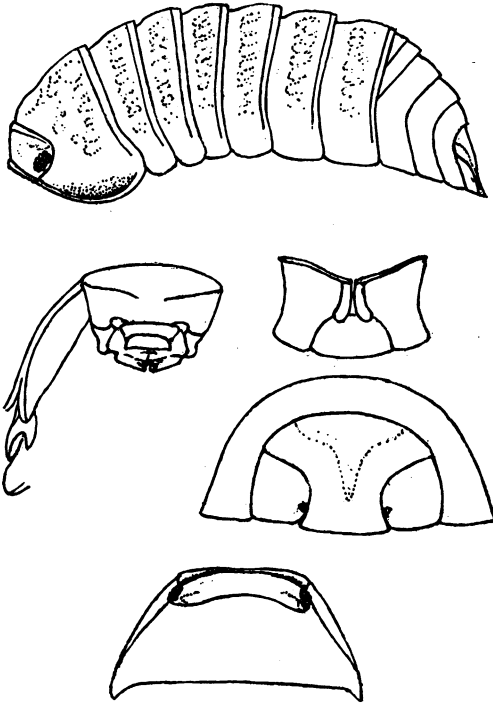
c.—In the two following species, although in other characters they show close relationship to most of the members of this group, the reduction of the coxopodite ridge and sulcus has proceeded toward complete disappearance, no indications remaining except the cleft at the rear angle of the first segment.

Cubaris ramsdeni, Boone, 1934

Figure 229

Cubaris ramsdeni BOONE, 1934, p. 589 (orig. descr.), Fig. 10.

A rather smooth species, rather sparsely scabrous-punctate under high magnification, with faintly indicated rugosity on the dorso-lateral regions. The segments have some degree of individual convexity and have the exposed part elevated (though not abruptly) more than the

Fig. 229. *Cubaris ramsdeni* Boone.

part that slips under the segment next in front, and have the rear margin with a smooth border marked off by a distinct line. The body is highly convex, oblong in a dorsal view with broadly rounded ends, especially behind, where the epimeral parts of the segments slope outward considerably.

The head has an upturned margin across the front which is nearly straight in a dorsal view, except near the ends, and is narrower and more appressed in the middle where it is pushed back so that when seen at a

certain angle the median outline recedes a little, but even there the up-turned border is separated from the forehead by a distinct furrow which becomes much wider toward the sides. The eyes have about fifteen ocelli. The antennae are broken off in all the specimens but, from the basal joints remaining, appear to have been rather slender.

The first thoracic segment has the lateral margin with a thickened border extending from the front to near the rear angle, separated from the vertical side of the segment by a rather well-marked groove wide and merging into the somewhat concaved side of the segment in front but narrow and fading out toward the rear. The coxopodite sulcus is greatly reduced and represented only by a small V-shaped cleft at the rear angle. The inner side of the V is the longest. The second segment has a moderately large, somewhat flattened and curved coxopodite process.

The telson has the upper or basal part wide (about one and one-third times the length); the posterior extension narrow with strongly incurved sides. The median basal part of its dorsal surface is somewhat tumid, the raised area extending down toward the end as a narrow ridge tapering to a point. The exopodites are very small, short-conical and inserted on the dorsal side of the basal joint close to the inner margin. The endopodites, visible only from below, are very short and broad and curved strongly outward.

The type would measure, if it could be fully straightened out, between 8 and 9 mm. long. Its colors have faded out.

LOCALITIES.—“El Ocuja1,” Guantanamo, Cuba (Boone). The type (Cat. No. 6603) and three paratypes are in the American Museum of Natural History.

***Cubaris wheeleri*, new species**

Figures 230, 231

Superficially somewhat like *Cubaris murina* Brandt in appearance. Body stout and highly arched and evenly and broadly rounded behind (slightly less so in the male than in the female) with the head wide and nearly transverse in front when seen from above. General surface of the body of smooth appearance though minute, evenly but not very closely distributed, slightly setose granules are visible with a hand lens. Only slight and poorly defined indications of the tuberculation usually present in species of this group on the lateral regions of the back are present in this species. These are too slight to detract much from the general smooth appearance of the dorsal surface.

Upper edge of epistome forming a projecting border clear across the front of the head, but this is turned up and appressed to the forehead in the middle so that it appears much narrower there than at the sides. The upper margin of the forehead has also a slightly raised border. Eyes large with fifteen to eighteen well-developed ocelli.

First segment of thorax with the lateral border gently curved, when seen in a lateral view, and rolled or turned outward to form a rather narrow projecting border, which diminishes and merges with the side of the segment a little before the rear angle is reached. The side of the segment is somewhat concave above the border, which however is not marked off from the rest of the segment by any distinct line or furrow. There is no sulcus on the lower aspect of the margin, though the rear angle of the segment which is extended backward and slightly truncated has a very small short V-shaped cleft. The second segment has a small short blunt coxopodite process. The third segment has none.

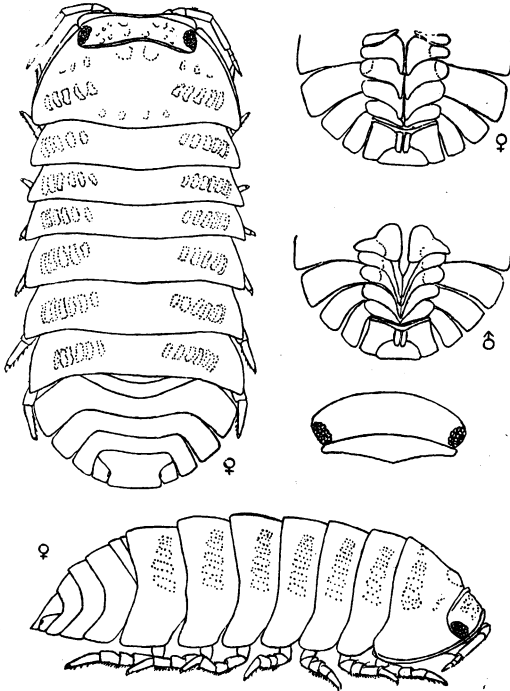


Fig. 230. *Cubaris wheeleri*, new species.

The lateral ends of the abdominal segments three to five are somewhat divergent but do not bend or flare outward perceptibly. The telson is wide with a rather short posterior extension which is a little more than half as wide as the upper part, and the exposed parts of the basal joints of the uropoda are of proportionally short, wide outline. The minute outer branch is borne in a notch on the inner border; it is elongate and less reduced than in many of the genus. The inner branches, visible only from below, are rather short and wide.

Color usually quite dark grayish brown with the usual small, light-colored, yellowish (unpigmented) markings on the lateral regions of the back. In addition, the exposed parts of the uropoda, the epimera of the abdominal segments, the basal

part of the telson and usually the whole of the fifth abdominal segment are yellowish (unpigmented). Lower parts and legs unpigmented.

The largest specimen is a male and if straightened out would measure about 9 mm. long.

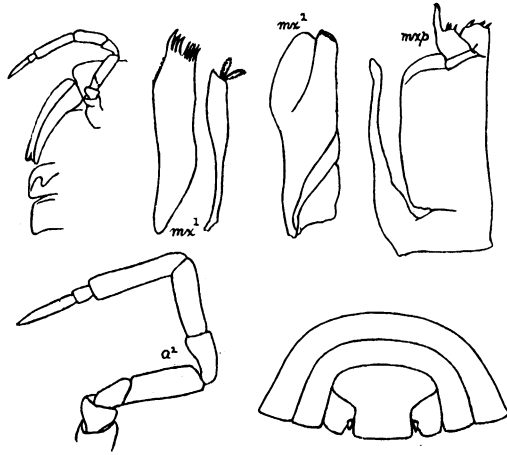


Fig. 231. *Cubaris wheeleri*, new species.

LOCALITY.—Culebra Island east of Puerto Rico. About 30 specimens, including the type (Cat. No. 6518), in the American Museum of Natural History collected by Prof. W. M. Wheeler, for whom the species is named, March 9, 1906.

GROUP III

Composed of several species having the coxopodite ridge of thoracic segment I distinct on the posterior half of the segment only, but the ridge is far removed from the margin throughout its length. These species are all strongly tuberculate or spiny.

Cubaris brevispinis Pearse, 1915

Figure 232

Cubaris brevispinis PEARSE, 1915, p. 543 (orig. descr.), Fig. 5.

The following statements are taken from Pearse's description:

“Head wider than long; front straight; anterolateral angles rounded. Eyes small, rounded, with sixteen facets.

“First thoracic segment with lateral parts large and laminar; anterior and posterior angles rounded; dorsal surface of epimera con-

cave. All thoracic epimera produced and flattened, rectangular with rounded angles. Coxopodites distinct on first and second segments, tapering with rounded tips.

"Uropoda rather slender; outer rami small, reaching halfway to posterior margin; inner rami minute, only reaching a little beyond the median constriction in the sixth abdominal somite.

"Color brown with a narrow horn-colored margin along the lateral and posterior borders of all free somites and with some irregular white spots.

"Length, 9; width, 4.3 mm."

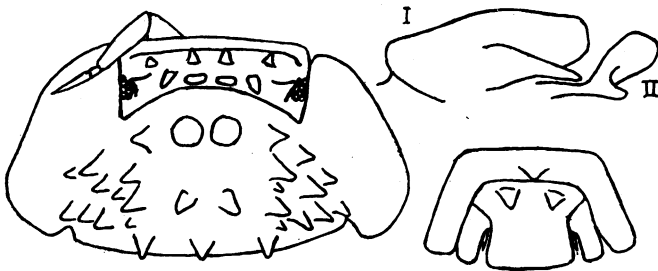


Fig. 232. *Cubaris brevispinis* Pearse. Adapted from Pearse, 1915.

LOCALITIES.—Santa Marta, Colombia, at Fundacion and La Rosa (places of comparatively low altitude) and "below the Cincinnati Coffee Plantation (altitude 4500 feet)." Type (in the University of Michigan Museum) collected above Minca (elevation 2200 feet). Specimens also in the U. S. National Museum.

"The usual haunt of this little isopod was beneath the scales of a tree with extremely rough bark. Only two specimens were found under some stones in a dry creek bed." (Pearse, 1915, p. 544.)

Cubaris mineri, new species

Figure 233

Body broadly oblong in a dorsal view, parallel-sided, broadly rounded in front and behind, and highly arched. The epimeral ends of both the thoracic and abdominal segments bend or flare strongly outward, much increasing the width of the body relative to its length and bulk.

The dorsal surface is ornamented with large regularly arranged tubercles. These are of conical form with the tip rounded off; on the segments of the thorax (except the first, on which they are more numerous) they form two rows, an anterior row of eight and a posterior row, very close to the posterior margin of each segment, of nine (seven only on segment VII). In addition there is a larger oblong tubercle at the

junction of the main and epimeral parts of the segment on each side. From this large tubercle a fairly well-defined curved ridge or keel extends down toward the lateral end of the segment. The abdominal segments are smooth except for a horizontal row of four conical tubercles on each of segments three, four, and five, and a pair on the telson. These tubercles, though large, prominent, and of regular form, do not

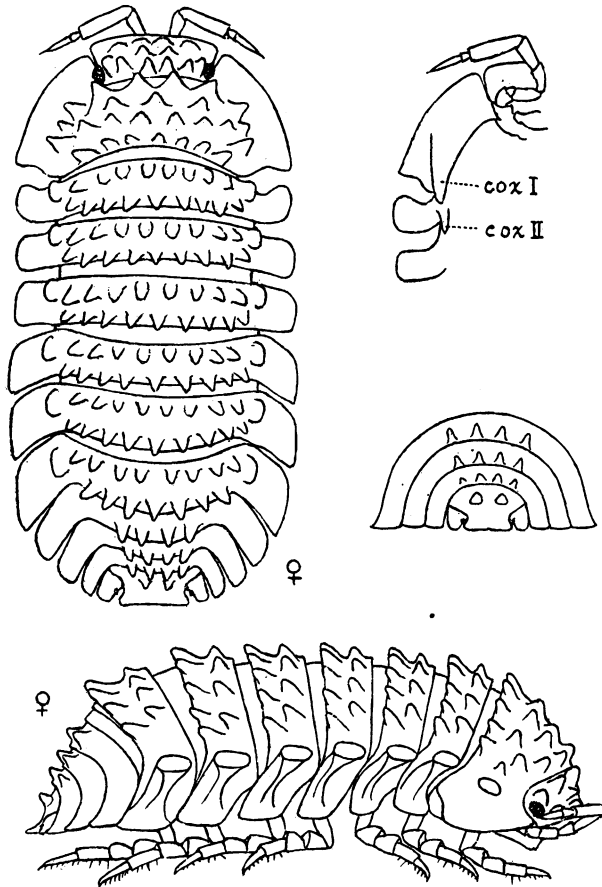


Fig. 233. *Cubaris mineri*, new species.

develop into anything that can properly be called a spine as they do in *Diploexochus echinatus* Brandt. The body surface, including that of the tubercles, is granular.

Front outline of head gently and evenly curved when seen from above. The upper border of the epistome forms a wide, rather thin, horizontally projecting border; this is nearly straight when seen from in front. There is a row of six large tubercles along the posterior or upper margin of the head, and a pair of smaller ones below

them, also a row of four above the projecting margin of the epistome. Eyes with about fourteen ocelli. Antennae rather small and short with a flagellum fully three-fourths the length of the last joint of the peduncle. The first article is about one-third the length of the terminal one, which bears only a short terminal spine.

The epimera of thoracic segments II, III, IV, V, and to a less extent the other segments, are shorter antero-posteriorly than the main part of the segment, so that the body outline is not continuous but interrupted by clefts between the epimera of successive segments. On the thorax the part of the segments bearing the tubercles is considerably and abruptly raised above the part slipping under the segment next in front.

The first thoracic segment has the lateral part curved out horizontally to form a wide, rather thin lateral border. Seen from below, this border exhibits an oblique coxopodite ridge which is produced behind into the inner plate of a notch for receiving the second segment when the body is rolled up. The outer plate of the notch, formed by the postero-lateral angle of the segment, is truncated in an emarginate manner so as to form a shallow notch instead of a rounded or more or less acute apex as in most members of the genus. The second thoracic segment bears a well-developed posteriorly directed, tooth-like coxopodite process. There is none on the succeeding segments. The legs are rather weak and slender with poorly developed spines.

The telson is very much wider than long and has the lower or terminal part strongly bent out horizontally. The truncated rear end, though much narrower than the upper part, nevertheless appears to exceed the length of the segment in its width. The middle part of the telson is constricted in width and bears a pair of tubercles, as stated above. The basal joints of the uropoda are short and wide, and round at the rear end; the internal branches, visible only from below, are very short; the external branch is minute, resembling a pointed scale, and is inserted on, or almost on, the notched inner margin of the basal joint.

The alcoholic specimens are yellowish with some brownish pigment on the upper parts.

This appears to be a small species. The largest of the three specimens, a female, would measure little over 6 mm. in length, if it could be completely straightened out.

LOCALITY.—Kamakusa, British Guiana. Three specimens collected by Mr. Herbert Lang, the type (a female, Cat. No. 6515) in January, 1923, and two smaller ones, one a male, on October 25, 1922.

Named for Dr. Roy W. Miner, of the American Museum of Natural History, through whose aid and encouragement the publication of this work has been made possible.

Cubaris longispinis Richardson, 1912

Figure 234

Cubaris longispinis RICHARDSON, 1912a p. 477, (orig. descr.), Figs. 1, 2.—ARCANGELI, 1930a, p. 2.

A species resembling *Diploexochus echinatus* Brandt in many char-

acters, though with longer spines, and lacking the peculiar division of the thoracic epimera.

The following characters are among those given by Richardson:

"Color brown, mottled with yellow. Head wider than long; front slightly excavate in the middle, the antero-lateral angles produced and rounded; eyes small, round, composite, situated close to the lateral margin, halfway between the anterior and posterior margins. Second antennae with a flagellum composed of two articles, the second of which is twice as long as the first.

"First segment of the thorax with the lateral parts large and expanded, the antero-lateral angles extending forward as far as the antero-lateral angles of the head, the post-lateral angles being rounded; dorsal surface of the lateral parts concave, with the margins produced laterally.

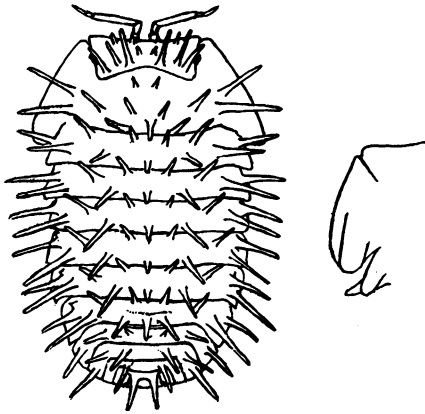


Fig. 234. *Cubaris longispinis* Richardson. Adapted from Richardson, 1912a.

The lateral parts of the second, third and fourth segments are drawn out laterally in narrow acutely ending processes; those of the fifth and sixth segments are wider and produced downward; those of the seventh are the width of the segment with only the posterior angle acutely produced. The coxopodites of the second segment are present on the underside, some distance from the edge, and are rounded plates.

"Sixth or terminal segment (of abdomen) constricted about the middle and truncate posteriorly; peduncle of the uropoda occupying the space between the sixth segment and the lateral parts of the fifth; outer branch minute and placed at the inner post-lateral angle of the

peduncle; inner branch short and not quite reaching the extremity of the sixth abdominal segment (seen from the underside)."

LOCALITY.—Porto Bello, Republic of Panama. Two specimens, including the type, in the U. S. National Museum (Richardson). They were collected by Mr. E. A. Schwarz, who found the species abundant on bushes and under rubbish on the ground.

GROUP IV

Species having the coxopodite ridge of the first segment reduced to a slight prominence or jog in the outline in the rear part of the inner surface of the lateral part of the segment well removed from the posterior lateral angle and the lateral margin of the segment. They do not appear to be closely allied to the other American species and may all be of Old World origin.

Cubaris murina Brandt, 1833

Figures 235, 236

Armadillo borellii DOLLFUS, 1894, p. 1 (descr.), Figs. 1-5.—BUDDE-LUND, 1904, p. 120.

Armadillo conglobator BUDDE-LUND, 1879, p. 7.

Armadillo cubensis SAUSSURE, 1857, p. 307 (diagnosis); 1858, p. 481 (descr.), Pl. v, figs. 42, 42a (outlines of body).

Armadillo murinus MILNE-EDWARDS, 1840, III, p. 179 (descr.).—BUDDE-LUND, 1879, p. 7; 1885, p. 27 (new descr.; synonyms).—DE BORRE, 1886, p. cxiii.—DOLLFUS, 1896d, p. 47; 1897, p. 205.—BUDDE-LUND, 1904, p. 119, Pl. x, figs. 20-22 (details).—ARCANGELI, 1927, p. 224.

Cubaris affinis MIERS, 1877a, p. 666 (descr.), Pl. LXVII, figs. 4-4b. (Not *C. affinis* (Dana), 1854.)

Cubaris cubensis MIERS, 1877, p. 74; 1877a, p. 666.

Cubaris murina BRANDT, 1833, p. 190 (orig. descr.).—GERSTAECKER, 1873, p. 527.—STUXBERG, 1875, p. 44 (*C. murinus*).—RICHARDSON, 1901, p. 571 (*C. murinus*); 1905, p. 645 (new descr.), Figs. 687-689.—RATHBUN, 1912, p. 460.—VAN NAME, 1925, p. 466.—MOREIRA, 1927, p. 194.—ARCANGELI, 1929, p. 129.—BARNARD, 1932, p. 379, Fig. 77.—MOREIRA, 1932, p. 432.—BOONE, 1934, p. 597.

See also *Cubaris brunnea* and *C. flavorbrunnea* (probably synonyms) and *C. cinera*.

Brandt's original description is as follows:

"Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum.

"Corpus oblongum sat convexum subdilatum. Dorsum e nigricante griseum. Appendices caudales dilate flavo brunneae. Patria: Brasilia."

As in the case of many other supposedly well-known species, the

descriptions and illustrations thus far published leave much to be desired. It may be recognized by the reduction of the coxopodite ridge to a slight projection near the rear end of the segment, well removed from the margin, and the conspicuous manner in which the epimeral ends of the segments, especially those of the first dorsal and the abdominal ones, bend or flare outward, though there is no distinct groove or furrow marking off the border of the first dorsal segment. The dorsal surface appears smooth (minutely granular on magnification) in spite of the presence of slightly raised confluent tubercles on the lateral regions of the back.

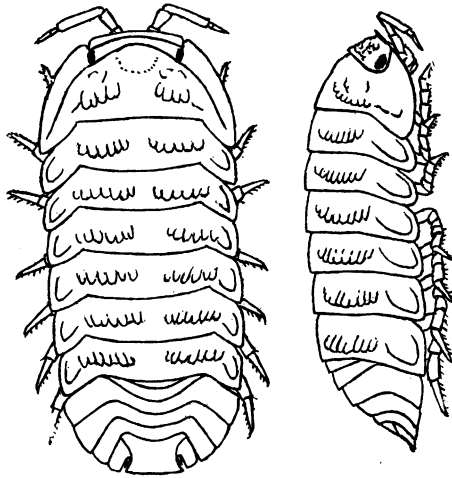


Fig. 235. *Cubaris murina* Brandt. Drawn from specimens from Havana, Cuba.

Color of upper parts varying from light or dark gray to brownish or brown, with small yellowish markings on the tuberculated areas. Exposed parts of basal segments of uropoda and terminal part of telson yellow or yellowish. Usual length not over 10 or 12 mm.

DISTRIBUTION.—Widespread in the tropical and subtropical regions of the Old and New Worlds, especially in the vicinity of towns and cities. Type locality "Brazil." Numerous American localities on record: Rio de Janeiro and points in Matto Grosso, Brazil; Rio Apa, Paraguay; Cayenne, various points in Cuba, Puerto Rico, Haiti, Dominica, St. Thomas, and Jamaica; Guanajuato, Mexico (de Borre); Colombia. Also Oahu, Hawaii. Type in Berlin Museum (Budde-Lund).

This species, though originally described from Brazil, is apparently

of East Indian origin, its introduction into America probably being due to human agencies, but if so, it must have occurred at an early period in the European settlement of South America.

Dollfus' (1894) description and figures of *Armadillo borellii*, from Rio Apa, northern Paraguay, agree extremely well with this species except

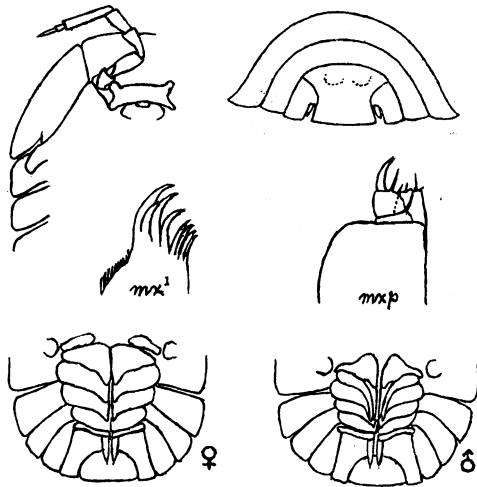


Fig. 236. *Cubaris murina* Brandt. Drawn from specimens from Havana, Cuba.

that the front margin of the head is figured somewhat too straight, and there seems to be no reason for not regarding *borellii* as a synonym, as Budde-Lund considered probable.

Cubaris cinerea Brandt, 1833

Armadillo cinereus MILNE-EDWARDS, 1840, III, p. 179.—BUDDE-LUND, 1885, p. 29 (says closely allied to *murina*. Type examined); 1904, p. 120 (says it is a good species).

Cubaris cinerea BRANDT, 1833, p. 190 (orig. descr.).—STUXBERG, 1875, p. 44 (*C. cinereus*).

Regarded as synonym of *C. murina* by Gerstaecker (1873, p. 527).

Brandt's (1833) original description is as follows:

"Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum. Corpus oblongum sat convexum. Dorsum cinereum, haud dilatatum. Ultimi caudae cinguli apex dilati flavicante brunneus. Patria: Brasilia."

DISTRIBUTION.—Brazil. Type in Berlin Museum (Budde-Lund).

Budde-Lund considered this species distinct from *C. murina* though he states that the type and only specimen is dried up and in poor condition. If the species are not distinct the name *cinerea* has page precedence over *murina* and *brunnea*. Budde-Lund (1885) thus describes the type:

“Statura et habitu omnino praecedentis (*murina*), at paulo minor. Clypeus lobus parvis rotundatis. Caudae annulus analis vix latior quam longior; ramus exterior minutissimus, procul ab apice insertus. Color cinereus; caudae annulus analis majore parte cum articulo basali pedum analium flavicante brunneus.”

This species, of course, has nothing to do with “*Oniscus cinereus* Zenker” from Dresden, Germany, briefly diagnosed and obscurely figured by Panzer, 1799, which is also alluded to as “*Armadillo (Oniscus) cinereus*” by Koch, 1847, and which is probably a synonym of *Armadillidium vulgare*.

Cubaris brunnea Brandt, 1833

Cubaris brunnea BRANDT, 1833, p. 190 (orig. descr.).—STUXBERG, 1875, p. 44 (*C. brunneus*).

Armadillo brunneus MILNE-EDWARDS, 1840, III, p. 179.—BUDDE-LUND, 1885, p. 28 (made doubtful syn. of *murina*); 1904, p. 120 (regarded as possibly a distinct species).

Other authors (RICHARDSON 1901, p. 571; 1905, p. 645.—VAN NAME, 1925, p. 466) have treated it as a syn. of *C. murina*.

Brandt's (1833) description is as follows:

“Cingulum dorsi primum margine posteriore leviter fissum, margine inferiore esulcatum. Corpus oblongum, subdilatatum. Dorsum brunneum. Patria: Demerary.”

The reasons for regarding this as distinct from *C. murina* do not seem at all convincing. The name *brunnea* does not have page precedence over either *murina* or *cinerea*, in case the species are identical.

Cubaris flavobrunnea (Dollfus), 1896

Figure 237

Armadillo flavobrunneus DOLLFUS, 1896b, p. 1 (*flavo-brunneus*, orig. descr.), Figs. 1-3.—BUDDE-LUND, 1904, p. 120.

Cubaris flavobrunnea VAN NAME, 1926, p. 2 (*flavobrunneus*); ARCANGELI, 1930a, p. 2.

It hardly seems necessary to quote Dollfus' description of this species as it corresponds closely with *C. murina* and very probably is,

as Budde-Lund suggests, a synonym of that species, although Dollfus' figures show the coxopodite process of the second segment more slender, the front of the head straighter, and the telson proportionately longer



Fig. 237. *Cubaris flavobrunnea* (Dollfus). Adapted from Dollfus, 1896.

than they actually are in *C. murina*. He gives the color as amber, irregularly marked with brown and the size as 10 by 4 mm.

LOCALITY (of the only specimen).—Punta de Sabana, Darien.

Cubaris cinchonae, new species

Figure 238

Body highly arched, and slightly narrowed in front and behind. Front outline of head convex as seen from above. Upper surface of head and thorax ornamented with rather large round or elliptical tubercles which are quite prominent on the head and anterior segments, but less so on the posterior part of the body, where they become smaller and less well defined in their outline. There is a pair of large elliptical tubercles on the anterior median region of the first thoracic segment, as well as other quite large ones on its sides. On the remaining segments the tubercles form for the most part only a single transverse row, composed of about four round ones in the median portion of the segment, and about six elliptical ones on the more lateral portions, while there are two vertically elongate elliptical ones on the epimera. The tubercle-bearing part of the segments is raised above the part that slips under the segment next in front, between these parts the surface of the segment is lower.

Upper border of epistome forming a narrow upturned border considerably but not evenly arched in an anterior view, and appressed against the forehead in the median region, though its margin is distinct all the way across the head. Antennae quite long; the flagellum is nearly equal to the last segment of the peduncle in length; its terminal article is at least three times as long as the proximal one. Eyes large, with at least sixteen well-developed ocelli.

Posterior lateral angles of the first thoracic segment much extended back and fairly acute; lateral margin of the segment evenly curved in a lateral view and but little turned or rolled out to form a border, nevertheless the surface of the segment is quite noticeably concave in the region above the anterior half of the lateral margin. When seen from below there is no trace of a sulcus or a coxopodite ridge except a slight jog in the outline quite a little removed from the posterior lateral angle of the segment. The second segment has only the merest vestige of a coxopodite process. The condition is much as in *Cubaris murina* Brandt, but on both the segments the coxopodites are much more vestigial.

The remaining thoracic segments have the posterior lateral angles less extended back, especially toward the rear of the body, where they are more truncated than in front, though the corners are in all cases a little rounded off.

Abdomen without tubercles except a pair of large elliptical ones on the upper part of the telson. Telson wide in its upper portion. Its posterior truncated end is about five-eighths the width of the upper portion. It is but little constricted in the middle. Exposed portions of the basal segments of the uropoda short; the minute external branch is borne in a notch in the inner margin; the internal branches, visible only from below, are quite wide and long, reaching to within a short distance of the end of the telson.

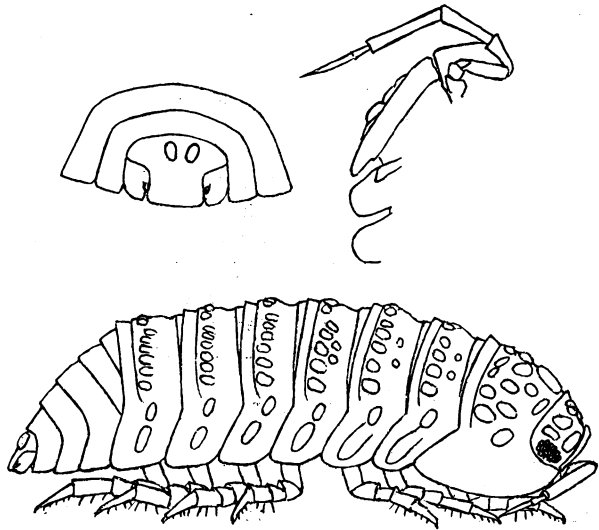


Fig. 238. *Cubaris cinchonae*, new species.

Variiegated with blackish brown and yellow on the upper parts; the usual small markings on the lateral regions of the back, the free margins of the segments and other less regularly defined areas and spots on the back are yellow (unpigmented), as are the lower parts and limbs; the telson and other abdominal segments and the epimera of the thoracic segments remaining largely blackish brown.

Length of largest specimen, a female, about 4 mm.

LOCALITY.—Botanical Gardens, Cinchona, Jamaica. Specimens in the American Museum of Natural History (type, Cat. No. 1814).

This species appears to be related to *Cubaris murina* Brandt and

may be of Old World origin, as that species undoubtedly is. It might easily have been brought to the Botanical Gardens on plants, but I have not been able to identify it with any described species. Among American forms it is nearest to *C. tenuipunctata* (Dollfus) from Mustique Island, West Indies, which is smoother, with a more elongate telson, and perhaps also is an introduced species.

GROUP V

Species in which the coxopodite ridge and sulcus have practically or entirely disappeared.

Cubaris tenuipunctata (Dollfus), 1896

Figure 239

Armadillo tenuipunctatus DOLLFUS, 1896, p. 389 (orig. descr.), Figs. 1a-1d.—
 BUDDE-LUND, 1904, p. 132.—ARCANGELI, 1934, pp. 90, 91.

Cubaris tenuipunctata RICHARDSON, 1901, p. 571; (*tenuipunctatus*) 1905, p. 640
 (orig. descr. quoted), Fig. 682 (after Dollfus).—BARNARD, 1932, p. 323.

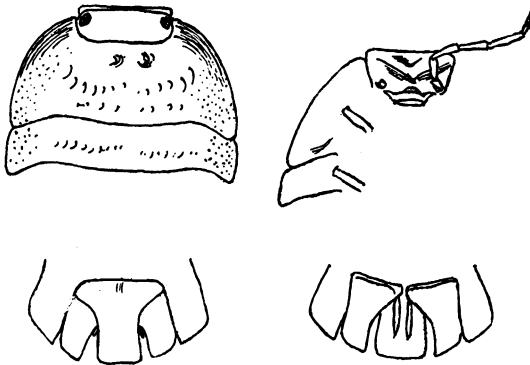


Fig. 239. *Cubaris tenuipunctata* (Dollfus). Adapted from Dollfus, 1896.

Dollfus' description is as follows:

"Body rather wide, moderately convex, slightly tuberculated on the pereon.

"Cephalon.—Prosepistoma with a shield-like convexity, a little depressed in the middle. Eyes middling; ocelli about 18. Antennae short; first joint of flagellum twice as short as the second.

"Pereion.—First segment with two antero-median rounded tubercles; lateral edges slightly raised; coxopodite hardly perceptible as a very small processus below the leg. Second segment without a distinct coxopodite.

“Pleon, Telson.—Pleotelson longer than wide, smooth, with a minute longitudinal wrinkle near the basis; sides feebly curved, the apex being half as wide as the basis.

“Uropoda.—Basis nearly straight; endopodite extending to half the length of the pleotelson; exopodite very small, placed near the middle of the internal edge of the basis (upper side).

“Color.—Gray, with irregular light markings, the sides are light and minutely punctuated with black.

“Dimensions.—10 by 4.5 mm.”

LOCALITY.—“Mustique Island, June, beaten from bush.” Type in British Museum (Dollfus).

***Cubaris depressa* (Dollfus), 1896**

Figure 240

Armadillo depressus DOLLFUS, 1896, p. 390 (orig. descr.), Figs. 2a-2d.—BUDDELUND, 1904, p. 132.—ARCANGELI, 1934, pp. 90, 91.

Cubaris depressa RICHARDSON, 1901, p. 571 (*depressus*); 1905, p. 641 (orig. descr. quoted), Fig. 683 (after Dollfus).—BARNARD, 1932, p. 323.

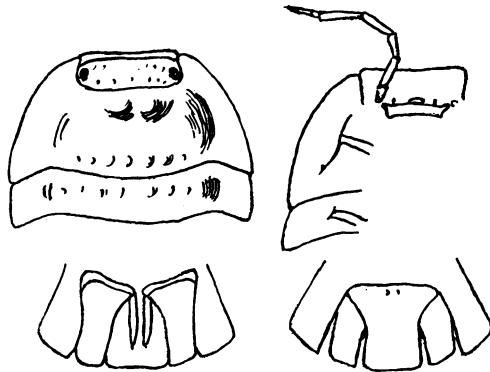


Fig. 240. *Cubaris depressa* (Dollfus). Adapted from Dollfus, 1896.

Briefly described by Dollfus as follows:

“Body wide, rather depressed, granulated on cephalon and pereion.

“Cephalon.—Prosepistoma nearly plain, fore edge a little arched in the middle. Eyes middling; ocelli about 16. Antennae: first joint of flagellum three times shorter than the second.

“Pereion.—First segment with a wide double antero-median tubercle; lateral edges not raised; coxopodite hardly perceptible, as a feeble ridge. Second segment without a distinct coxopodite.

“Pleon, Telson.—Sides of the pleon depressed: processus of the fifth segment widening at the apex. Pleotelson longer than wide, smooth: sides feebly curved; endopodite extending two-thirds of the length of the pleotelson; exopodite very small, placed near the internal edge of the basis (upper side).

“Color.—Dark gray, with a narrow light longitudinal line in the middle of the pereion, and light lineolae on both sides.

“Dimensions.—9 by 4.5 millim.”

LOCALITY.—“St. Vincent, Chateaubelais, August. One example.”
Type in British Museum (Dollfus).

There is nothing in Dollfus' illustration to indicate the location of the “feeble ridge” that represents the coxopodite of the first segment.

DOUBTFUL SPECIES

Owing to the insufficiency of the descriptions it has not been possible to place the following species in the above groups.

Cubaris affinis (Dana), 1854

Spherillo affinis DANA, 1854, p. 176 (orig. descr.).—STIMPSON, 1857, p. 505.

Armadillo affinis BUDDE-LUND, 1879, p. 7; 1885, p. 39; 1904, p. 115.—ARCANGELI, 1932, p. 124.

Cubaris affinis RICHARDSON, 1899, p. 865; 1905, p. 654 (orig. descr.).—PRATT, 1935, p. 443.

Not *Cubaris affinis* MIERS, 1877a (syn. of *C. murina* Brandt).

Dana's description is as follows:

“Corpus superficiei laeve et innotatum. Antennae subtilissime scabriculae, articulis duobus ultimis conjunctis (6to 7moque) 5to parce brevioribus. Segmentum abdominis ultimum paulo transversum, medio constrictum. Styli caudales lati, latitudine basali non longiores, angulo interno-posteriore late excavato, lateribus antico postico et externo fere rectis et inter sese rectangulatis, angulo interno-anteriore rotundato, ramo posteriore minute, parce exserto. Long. 4 1/2 lin.”

Collected in California by Dr. John L. Leconte.

Budde-Lund, 1885, p. 40, suggests that *A. californicus* Budde-Lund may be identical with this very insufficiently described species, which apparently is a *Cubaris*.

Cubaris californica (Budde-Lund), 1885

Armadillo californicus BUDDE-LUND, 1885, p. 40; 1904, p. 115.—ARCANGELI, 1932, p. 124.

Armadillo speciosus STUXBERG, 1875, p. 62 (orig. descr.).

Cubaris californica RICHARDSON, 1899, p. 865; 1900a, p. 305; 1905, p. 653 (orig. descr. quoted and translated).

Not *Armadillo speciosus* DANA, 1853, from New Zealand.

Stuxberg described this species as follows:

“*Armadillo ovalis, valde convexus, laevis, subnitidus.*

“*Antennae exteriores articulo secundo triplo longiore quam primo, quinto recto, cylindrico, longissimo, flagelli articulis inaequalibus, interiore quadruplo brevior quam exterior.*

“*Trunci segmenta quattuor priora margine postico utrinque leviter, posteriora tria levissime sinuata. Epimera mediocria, angulis anticis oblique truncatis, angulis posticis primi segmenti subrectis, rotundate-rectangulis, margine sulcatis, secundi, tertii, quarti, quinti minus minusque late rotundatis, sexti et septimi subrectis, rotundatis.*

“*Caudae segmentum ultimum latitudine minima longitudinem assequente. Color dorsi griseus, linea mediana serieque macularum majorum laterali et epimeris segmentorum trunci pallidioribus. Caput creberrime pallide punctulatum. Cauda grisea, segmento tertio bipunctato. Longitudo 5.5 mm., latitudo 3 mm.*”

LOCALITIES.—San Francisco and San Pedro, California.

Budde-Lund, 1885, who changed Stuxberg's name on account of its being preoccupied, suggests the probability of this species being identical with *C. affinis* (Dana), 1854. The descriptions, however, are insufficient to decide this.

***Cubaris cacahuamilpensis* (Bilimek), 1867**

Armadillo cacahuamilpensis BILIMEK, 1867, p. 907 (orig. descr.).—STUXBERG, 1875, pp. 46, 62.—BUDDE-LUND, 1879, p. 7; 1885, p. 40 (says possibly a *Pseudarmadillo*).—PACKARD, 1894, p. 732.

Cubaris cacahuamilpensis MIERS, 1877a, p. 666.

Sphaeroniscus cacahuamilpensis RICHARDSON, 1905, p. 663 (orig. descr. quoted and translated).

This animal is known only from Bilimek's description which is partly in Latin and partly in German. The translation of the latter portion given here is taken from Richardson, 1905, pp. 663, 664.

“*Griseo-fuscescens, subtiliter transverse verrucosus; capite transversim dilatato, margine anteriore erecto: primo thoracis segment latissimo, lobo laterali denti simillimo; abdominis segmento ultimo in medietate valde coarctato; pedibus spuriiis angustis, duplo longioribus. Long. 9 mm.; lat. 3 1/2 mm.*”

“*Grayish brown and covered with delicate little transverse rugae.*

Head very broad, three times as broad as it is long, anterior border turned up broadly, but diminishing in breadth on the sides under the eyes and especially behind. Antenna five-jointed, with a three-jointed flagellum; eyes composed of fourteen ocelli. First thoracic segment strongly arched, broadest in the middle, and edged by a delicate border; a toothlike lobe is formed on the sides anteriorly, in front of which there is found a concave depression; on the back there is a flat transverse depression. Second segment about one-third narrower; the anterior portion is depressed transversely by the overlying anterior segment; the epimeron, which becomes narrower on the sides, is rounded and turned straight downward. Segments 3 to 7 similar, with the exception that the epimera on the side appears to be more bluntly cut off. First abdominal segment quite narrow; it does not reach to the outer edge; second to fourth continue to decrease in breadth and have a horseshoe-shaped appearance; the fifth is bordered with two lateral lobes and is as long as it is broad at the base; it is strongly constricted in the middle and somewhat enlarged toward the outer border. The legs are five-jointed, fourth and fifth joint abundantly covered with spines on the inside. The uropoda are thin, twice as long as they are broad; color of feet and antennae whitish in the dead animal."

LOCALITY.—Under stones in cave at Cacahuamilpa, Mexico.

This description, though detailed, is not clear in regard to several points, and leaves us in doubt as to the generic position of the animal. The statements regarding the telson and adjacent parts indicate that it cannot be a *Sphaeroniscus*.

Cubaris granaria (Nicolet), 1849

Armadillo granarius NICOLET, 1849, p. 275 (orig. descr.).—BUDE-LUND, 1885, p. 39 (listed as insufficiently described); 1904, p. 115.

Armadillo granurus STUXBERG, 1875, p. 44.

Nicolet's brief original description, our only information of this species, is as follows:

"*A. flavescens*; corpore capiteque fortiter granariis; fronte rotundata; antennis externis crassis; articulo ultimo minimo."

"Body much granulated or roughened, forehead wide and rounded; antennae stout with the first article of the terminal flagellum long and cylindrical and the last small, conical and acute. Length 4 lines." (Translated from the original description.)

LOCALITY.—Chile, in damp places.

DIPLOEXOCHUS BRANDT, 1833

This group was established by Brandt (1833, p. 192) as a subgenus of *Cubaris*, the type and only species included being *D. echinatus* from Brazil. It was given generic rank by Milne-Edwards, 1840. The distinguishing character of the group was made the division of the epimera of the segments into two lamellae, one of which (conspicuous chiefly in a ventral view of the body) extends directly downward, while the other bends and extends out horizontally. The truncated ends of these horizontal lamellae determine the general outline of the body as seen in a dorsal or ventral view. There are, however, wide clefts or gaps between successive epimera, hence the outline of the body is not a continuous one.

In most other respects, although the dorsal surface is spinous to an unusual degree, *D. echinatus* conforms to the characters typical of *Cubaris*. The type species is the only one known to me, taking this group in the sense in which Brandt employed it. The much broader use of the name adopted by Budde-Lund and a few later writers, but not employed in the present work, has been discussed above (see under the genus *Cubaris*).

Diploexochus echinatus Brandt, 1833

Figures 241, 242, 243

Armadillo echinatus BUDDE-LUND, 1879, p. 7; 1885, p. 26 (descr.); 1904, p. 104, Pl. IX, figs. 35-37.

Cubaris echinatus PEARSE, 1917, p. 3.—VAN NAME, 1920, p. 99.

Cubaris gaigei PEARSE, 1917, p. 2 (descr.), Fig. 1.—VAN NAME, 1925, p. 466.

Diploexochus echinatus BRANDT, 1833, p. 192 (orig. descr.), Pl. IV, figs. 20-21.—MILNE-EDWARDS, 1840, p. 180.—BUDDE-LUND, 1909, p. 54.—RICHARDSON, 1912a, p. 479.—ARCANGELI, 1934, p. 93.

Oniscus echinatus given as a synonym by Brandt (1833, p. 192) was probably only the name on the label of the type and had never been published previously.

Upper surface of head and body with large, regularly arranged tapering spines or high acute tubercles which vary considerably in development in different individuals. Under magnification, the surface also shows minute, evenly scattered, setose granulations.

The body itself is rather narrow and the back only moderately arched for a member of this group, but great lateral extensions of the epimera give it a wide outline, broadly rounded at the ends, when seen from above, and the numerous spines and large tubercles increase the apparent height of the back and bulk of the body.

Front margin of head only very little curved when seen from above.

The upper margin of the epistome forms a prominently projecting border clear across the front of the head and is slightly and unevenly arched in a front view. Eyes fairly large; ocelli about eighteen. Antennae rather small and slender.

First thoracic segment with the lateral edges expanded into wide, thin, horizontally extending lamellae. No groove or furrow on the upper surface at their junction with the main part of the segment. Their rear posterior corners are angular. Examined from below, there is a long curved ridge, faint toward the anterior end of the segment

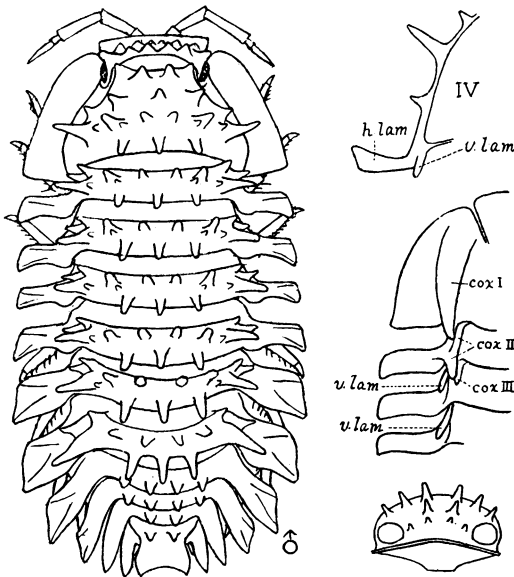


Fig. 241. *Diploexochus echinatus* Brandt. From specimens from British Guiana.

where it is rather near the outer margin, and more distinct toward the rear, where its curvature brings it much farther from the edge and where it extends farther back than the posterior lateral angle of the segment into a coxopodite process. The second segment also has a small but well-developed coxopodite process. On the third segment there is one also but it is so short and minute and situated so close to the base of the epimeron that unless the body is completely straightened out, as is by no means always the case in museum specimens, it is completely concealed by that of the second segment and is extremely likely to be over-

looked. These coxopodite processes are all more or less flattened from side to side, so as to appear narrow when seen directly from below. They are rounded at the tip.

Except the first, which has the tubercles or spines in four more or less distinct rows, the thoracic segments each have two transverse rows of spines, and well down on each side of the body, an additional one that does not seem to belong to either row. From this spine a rather poorly defined curved ridge extends downward and outward upon the surface of the laterally extending lamella of the epimeron. The part of each

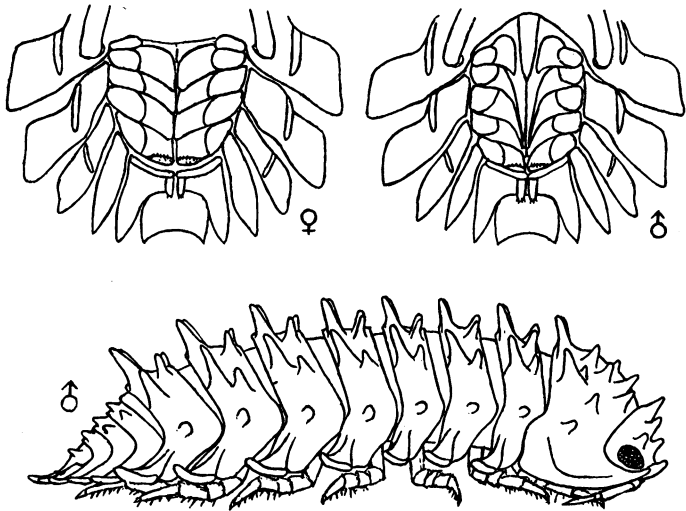


Fig. 242. *Diploezochus echinatus* Brandt. From specimens from British Guiana.

segment that bears the spines is very abruptly raised above the part which fits under the segment next in front.

The remarkable division of the epimera into two lamellae has already been described as a generic character. The vertical lamellae of the epimera extend but little below the level of origin of the horizontal lamellae; they are best developed on the last four or five thoracic segments but are noticeable on the third and fourth abdominal segments also. The telson is peculiar in being truncated at the end in a concave curve. Segments 3 and 4 of the abdomen each have a transverse row of four short spines or high pointed tubercles, segment 5 and the telson each have a pair of them.

The limbs are of moderate length but rather slender in proportion to the apparent bulk of the animal, and not very spinous.

Color (in alcohol) dark brown above with the ends of the spines and of the lateral lamellae of the epimera yellowish; the under parts and limbs yellowish.

The largest specimens in the American Museum are about 9 mm. long, but the species becomes considerably larger.

DISTRIBUTION.—Type locality, Brazil (Brandt). Budde-Lund (1904) records it from Port of Spain, Trinidad, and it appears to be rather common and widely distributed in British Guiana, as Pearse records it (as *C. gaigei*) from Dunoon "on the ground under leaves

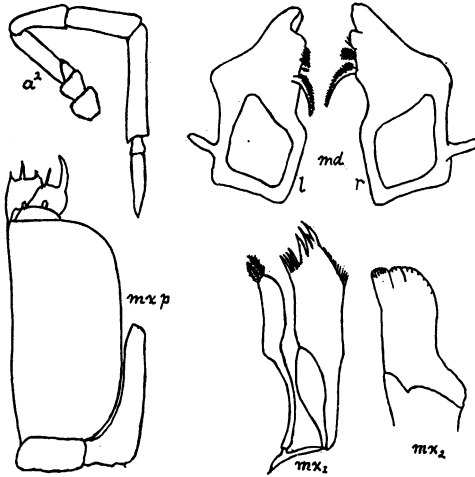


Fig. 243. *Diploexochus echinatus* Brandt. From specimens from British Guiana.

among tree clumps, and the American Museum has specimens from Tumatumari and Kamakusa in that country. One from Kamakusa was taken from the roots of an epiphyte fifteen feet from the ground.

ACANTHONISCUS KINAHAN, 1859

A genus consisting only of the following peculiar form. It is apparently related to *Cubaris* but, in addition to its remarkable spines, it differs notably in the form of the telson, which is expanded into a rounded terminal portion bearing at its end two small projections separated by a notch. The long and narrow exopodites of the uropoda also distinguish it from *Cubaris*. Unfortunately, no information regarding the existence

of coxopodite ridges or processes is given in the descriptions or figures, though it seems not unlikely that such structures are present.

***Acanthoniscus spiniger* Kinahan, 1859**

Figure 244

Acanthoniscus spiniger WHITE, 1847, p. 99 (*nomen nudum*).—GOSSE, 1851, p. 65 (see below).—KINAHAN, 1859, p. 197, Pl. XIX, fig. 4 (descr.).—BUDE-LUND, 1879, p. 5; 1885, p. 241.—STEBBING, 1893, p. 432.—RICHARDSON, 1901, p. 569; 1905, p. 637 (orig. descr. repeated), Fig. 681 (after Kinahan); 1909, p. 432 (new descr.), Figs. 1–7.—BUDE-LUND, 1910, p. 11.—ARCANGELI, 1927*a*, p. 135.

(*Oniscus spiniger*. See RICHARDSON, 1909, p. 431.)

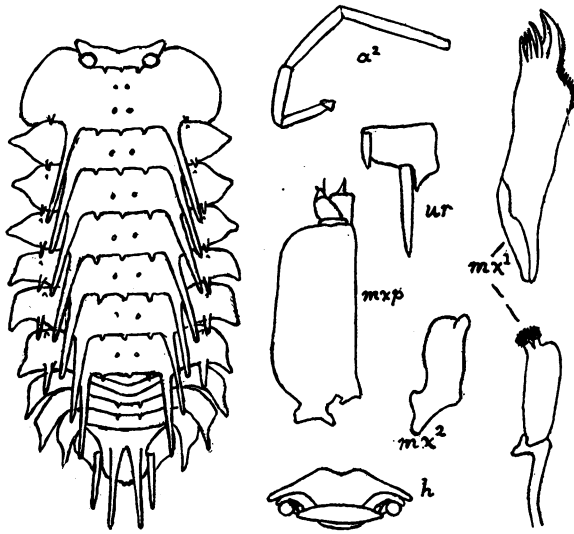


Fig. 244. *Acanthoniscus spiniger* Kinahan. Adapted from Richardson, 1909.

Richardson's description deals mainly with features clearly apparent from the figures that accompany it which are reproduced here, so that only the following quotations from it will be given:

"Body oblong ovate, capable of rolling up into a ball. Color, in alcohol, dark brown with irregular spots of light brown. . . .

"The peduncle of the uropoda resembles in form the lateral parts of the third, fourth and fifth thoracic segments; the inner posterior angle is acutely produced, the outer angle being rounded. The inner branch is inconspicuous in a dorsal view, being concealed beneath the abdomen; it is attached at the inner antero-lateral angle of the peduncle and does

not quite reach the tip of the abdomen. The outer branch is produced in a long spine, extending half its length beyond the inner posterior angle of the peduncle; in a dorsal view it is inserted on the inner lateral margin at the anterior angle."

DISTRIBUTION.—Jamaica, said by Gosse, 1851, p. 65, to be common under stones in the Bluefield Mountains, which are in the western part of the island. Kinahan described it from a single specimen in the British Museum; no other specimens appear to have reached any museum until one collected in Jamaica by Mr. H. G. Hubbard, probably in 1877, was received by the U. S. National Museum in 1908. This was the basis of Richardson's description.

Richardson adds to her description a few notes on Kinahan's type specimen with which she had her specimen compared.

ETHELUM BUDDE-LUND, 1899

This genus was established by Budde-Lund to contain several American species described by Dollfus and included by him in the Old World genus *Mesarmadillo*. They are, however, very close to the African genus *Eubelum*, which they resemble in having a series of four or more plumose tufts on the tip of the inner branch of the first maxilla instead of but two as in the majority of Oniscoidea. I cannot, however, regard this character of fundamental importance, and believe that in most other characters *Eubelum* and its allies resemble *Cubaris* too much to require their separation as a family (Eubelidae) as most authors, following Budde-Lund, have done. The rank of a subfamily (Eubelinae) seems to be the most that is warranted.

Ethelum, which contains the American members of this group, differs from *Eubelum* in the absence of a coxopodite sulcus along the under side of the margin of the first thoracic segment, this being reduced to a cleft at the rear angle. The rank of a subgenus of *Eubelum* may perhaps be sufficient for it. The telson is wide at the proximal end, with a tapering median posterior extension which may be pointed or rounded-truncate at the end. This at once distinguishes it from *Cubaris*, though as in that genus the flagellum of the antennae also has two articles, and the general form and appearance is similar.

Ethelum americanum (Dollfus), 1896

Figures 245, 246

Ethelum americanum BUDDE-LUND, 1899, p. 90 (new descr.), Pl. III, figs. 10-12.—RICHARDSON, 1905, p. 589 (descr. after Dollfus), Figs. 649 (after Budde-Lund), 650 (after Dollfus).—PEARSE, 1917, p. 1.—VAN NAME, 1925, p. 484 (new descr.), Figs. 27-36.

Mesarmadillo americanus DOLLFUS, 1896, p. 397 (orig. descr.), Figs. 11a–11d.—
RICHARDSON, 1901, p. 573.

See also remarks under *Ethelum reflexum*.

“Body convex, rather narrow, smooth.

“Cephalon.—Prosepistoma with a small shield-like convexity; the prosepistoma is continuous with the forehead in the middle and separated from it on both sides by a transverse, incomplete, preocular cut. Eyes moderate; ocelli about 12; antennae short; flagellum small, first joint three times shorter than the second.

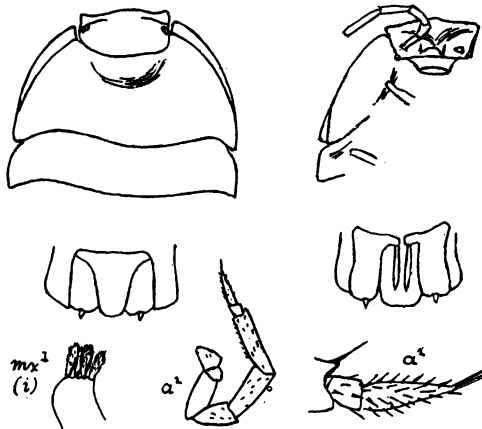


Fig. 245. *Ethelum americanum* (Dollfus). Upper four figures adapted from Dollfus, 1896, lower three from Budde-Lund, 1904.

“Pereion.—First segment with the antero-median tubercle hardly perceivable; coxopodites distinct on the entire length of the edge of the segment (upper side), forming a thick border, slightly crossed by the posterior angle of the segment. Coxopodite of the second segment hardly visible as a very small dentiform process before the legs.

“Pleon, Telson.—Pleotelson flat with curved sides and rounded apex. Uropoda; basis with a large oblong processus, extending between the lateral part of the fifth segment of the pleon and the pleotelson; endopodite reaching to two-thirds the length of the pleotelson; exopodite minute, placed at the top of the basal processes.

“Color brownish, with small light lineolae on the pereion; flagellum white; uropoda reddish.

“Dimensions.—6 by 2 1/4 mm.” (Dollfus, 1896.)

DISTRIBUTION.—St. Vincent, W. I. (type locality), from near the sea to 500 feet above sea level, under stones, leaves, rubbish, etc. (Dollfus); Dunoon, British Guiana, among bromeliad roots, vines, etc., on trees (Pearse); Kartabo, British Guiana, under dead wood at edge of jungle (Van Name, specimens in the American Museum of Natural History). Type in British Museum (Dollfus).

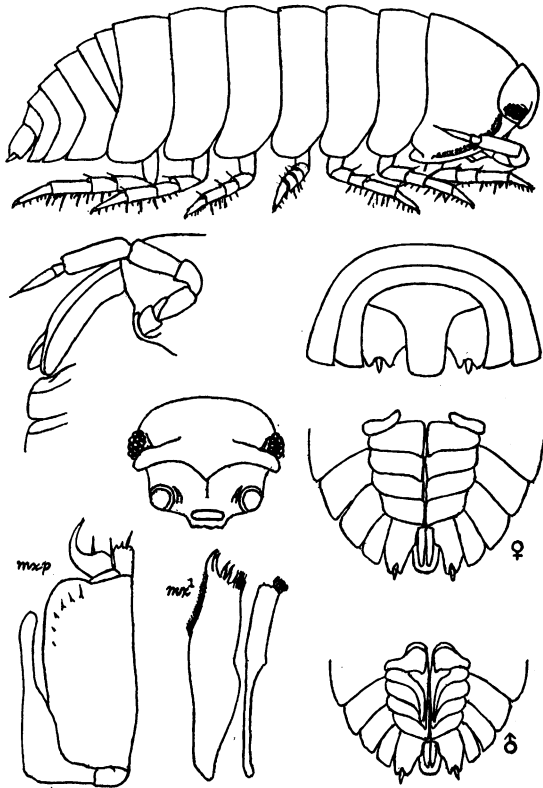


Fig. 246. *Ethelum americanum* (Dollfus). From Van Name, 1926, specimens from British Guiana.

I follow Pearse in identifying the British Guiana specimens with Dollfus' species from St. Vincent, though there are several small discrepancies. I found no coxopodite process on the second segment, only a thickening of the anterior edge (this corresponds to Dollfus' figure); there were five instead of four plumose tufts on the inner branch of the

first maxilla (verified on both right and left sides of the specimen studied), and the uropoda differ somewhat in shape and have longer branches. Not having St. Vincent specimens for comparison, I do not know how much weight to give to these differences. Possibly they may be of specific value.

The Kartabo specimens are described at length in Van Name, 1925. I would describe the surface as smooth, though Pearse states that his examples from Dunoon were slightly granular.

Ethelum reflexum (Dollfus), 1896

Figure 247

Ethelum reflexum BUDE-LUND, 1899, p. 91 (descr. after Dollfus).—RICHARDSON, 1905, p. 590 (descr. after Dollfus), Fig. 651 (after Dollfus).

Mesarmadillo reflexus DOLLFUS, 1896, p. 398 (orig. descr.), Fig. 12a-12d.—RICHARDSON, 1901, p. 573.

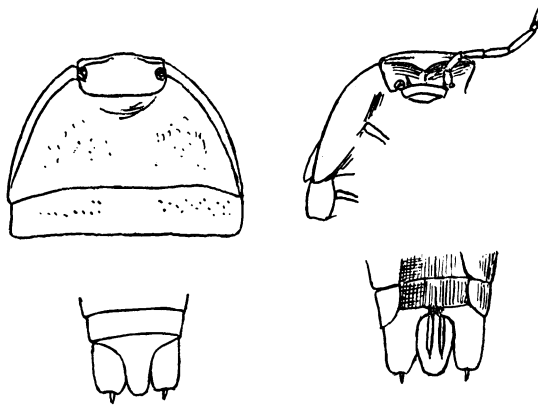


Fig. 247. *Ethelum reflexum* (Dollfus). Adapted from Dollfus, 1896.

A small species (5 mm. long) with the body surface slightly granulated, extremely closely related to, if really distinct from, *E. americanum*, but according to Dollfus' figures with a slightly narrower and more tapering telson. Dollfus appears to have had but one specimen, and the special peculiarity of the species, that the epimeral ends of the abdominal segments 3 to 5 curl inward under the body, might be explainable if this specimen were a dried up and more or less shrunken one of *E. americanum*. It does not seem like a normal character in a member of this group. For details see Dollfus' description, quoted in full in Richardson, 1905, p. 590.

DISTRIBUTION.—Only record, "Open swampy land under rubbish

S. end of the Island (St. Vincent).” Dollfus, 1896. Type in the British Museum (Dollfus).

This seems to be one of certain specimens of which Dollfus (1896, p. 398) had no record whether they were found in St. Vincent or in Grenada, W. I.

***Ethelum modestum* (Dollfus), 1896**

Figure 248

Ethelum modestum BUDDÉ-LUND, 1899, p. 91 (descr. after Dollfus).—RICHARDSON, 1905, p. 588 (descr. after Dollfus), Fig. 648 (after Dollfus).

Mesarmadillo modestus DOLLFUS, 1896, p. 397 (orig. descr.), Figs. 10a-10d.—RICHARDSON, 1901, p. 573.

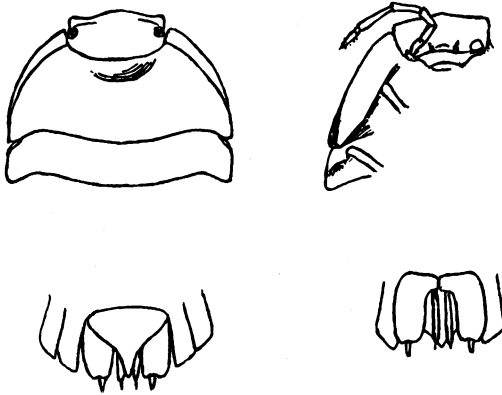


Fig. 248. *Ethelum modestum* (Dollfus). Adapted from Dollfus, 1896.

This is a small (6 mm. long), smooth species closely related to *E. americanum* but at once distinguishable from it by the narrow, pointed telson and long inner branches of the uropoda. The ocelli number sixteen. In most other particulars Dollfus' description does not differ greatly from that of *americanum*. His description is quoted in full by Richardson, 1905, p. 588.

DISTRIBUTION.—Only record, St. Vincent, W. I., low ground S. E. of the island, under rubbish. Type in the British Museum (Dollfus).

***Ethelum*, species**

Kraepelin, 1901, p. 201, records a new species of *Ethelum* determined as such by Budde-Lund, but which he neither names nor describes, that was brought to Hamburg with orchids from San Francisco, Brazil.

Superfamily **Hypotracheata** Verhoeff

Tracheae present in the exopodites of the pleopoda. They open by numerous apertures in the middle of the under lamellae of the pleopoda. The uropoda form a pair of closely fitting opercula covering the pleopoda. Telson wide. Epimera of thoracic segments I to VII marked off from the tergites (main portions) of the segments by deep furrows. All species capable of rolling up into a ball.

A small group of aberrant forms highly specialized for terrestrial life, yet showing characters in the structure of the head approaching some of the aquatic Isopoda (as *Idothea* of the suborder Valvifera) and more primitive in that respect than the other Oniscoidea.

Tylidae

See under genus *Tylos*, which is coextensive with the family.

TYLOS LATREILLE, 1829

The members of this group are littoral but completely terrestrial species found on the seacoasts of warm and warm-temperate regions, and all are so nearly alike that they are best dealt with by giving one general description and indicating under each species the characters by which it is distinguished.

Body highly arched, oblong oval in a dorsal view, and capable of being rolled up into a ball. Its surface is granulated, very scantily pigmented, and bears scattered short stiff upright hairs.

Head not deeply set back into the thorax, the eyes rather small, rounded, and widely separated. No frontal line distinguishable. First antennae very rudimentary, of one or two segments; second antennae fairly long, with a flagellum of four articles. The second antennae arise quite near together; between them the frontal lamina forms a vertically placed and very prominent triangular shield which is the most anterior part of the head and is separated from the clypeus below it by a deep but narrow cleft. Clypeus with a very prominent rounded upper border, its lateral processes only very slightly developed.

Epimeral of the thoracic segments (except I) separated from the main or tergal part by a distinct suture. Those of segments II, III, and IV are very small. Legs stout with short stiff spines. Segment I with a coxopodite sulcus along the lower aspect of the margin. On the fore part of the margin the sulcus becomes more antero-lateral in position.

Epimeral ends of abdominal segments 3, 4, and 5 squarely truncated and forming with the transversely oblong telson a continuous outline

bounding the rear end of the body. Uropoda entirely on the ventral surface and visible only from below. Their large basal joints are flat and plate-like, semicircular in outline, hinged externally and meeting closely in the median line with their straight free edges. With large inwardly extending horizontal plates borne on the inner side of the abdominal epimera 3, 4, and 5, they form a quite closely fitting operculum or cover protecting much of the ventral surface of the abdomen and pleopoda and doubtless of important service in conserving moisture. The external branches of the uropoda are small and arise from the inner median angle of the plate-like basal segments.

Tylos latreillei Adouin and Savigny, 1826

Figures 249, 250

Tylos latreillei ADOUIN AND SAVIGNY, 1826, 'Descript. Egypt.,' p. 285 (orig. descr.), Pl. XIII, fig. 1.—DOLLFUS, 1890, p. 70, Figs. 4-4a.—RICHARDSON, 1902, (*T. latreillei*), p. 300 (descr.).—VERRILL, 1902, p. 844.—RICHARDSON, 1905, (*T. latreillei*), p. 586, Figs. 646, 647.—BUDE-LUND, 1908, p. 76 (descr.), Pl. III, figs. 1-13.—PEARSE, 1915, p. 541.—VAN NAME, 1924 (*T. latreillei*), p. 189 (in part, not the figures).—ARCANGELI, 1925, p. 53.—JACKSON, 1928a, p. 574, Figs. 6.—ARCANGELI, 1930, pp. 88, 89.

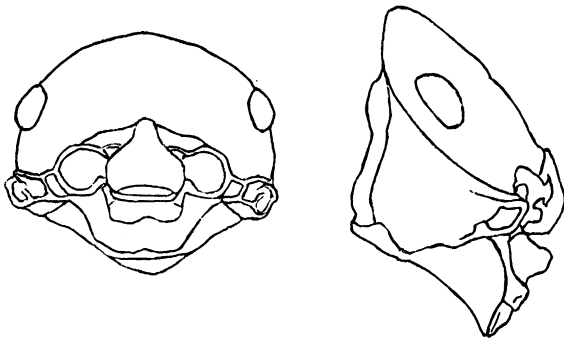


Fig. 249. *Tylos latreillei* Audouin and Savigny. Head. Adapted from Jackson, 1928.

Inwardly extending plates of fifth segment of the abdomen curved, rather narrow, more or less tapered and rounded off at the ends, and usually failing to meet on the median line of the lower aspect of abdomen, but there is some individual variation in their width and degree of approximation. Rear outline of telson slightly concave or emarginate.

DISTRIBUTION.—This is a well known species of the countries about the Mediterranean, frequenting especially the vicinity of the seashore. Richardson records it from Bermuda (see remarks under *T. niveus*)

and Florida (Miami), and Pearse (1915) from Santa Marta, Colombia. The American Museum has specimens from Puerto Rico (Punta Carolina, San Juan), and from Puerto Castilla, east coast of Honduras, which I have compared with specimens from Adria, Italy, received from Prof. Verhoeff, without finding characters that appeared to furnish any reliable basis for a conclusion that they represented different species. The examination of larger series of specimens from these various localities might lead to a different result if the opinion expressed by Budde-Lund

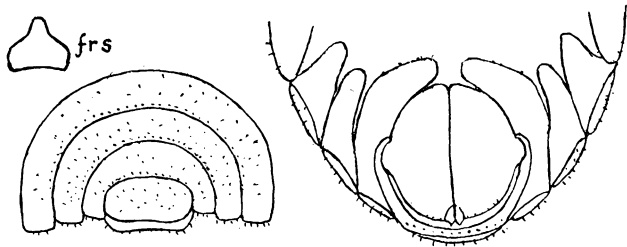


Fig. 250. *Tylos latreillei* Audouin and Savigny. Drawn from specimen from Puerto Rico, W. I. (*fr s*, frontal shield).

(1908, p. 75), that this genus is composed of a number of closely allied species of limited geographical distribution, applies to *T. latreillei*. I now feel sure that the specimens from the Galapagos Island that I assigned to this species (Van Name, 1924, p. 189) are distinct. They are described below as *T. insularis*, new species.

***Tylos punctatus* Holmes and Gay, 1909**

Figures 251, 252, 253

Tylos punctatus HOLMES AND GAY, 1909, p. 376 (orig. descr.), Figs. 3, 4.—STAFFORD, 1913, p. 182 (descr.), Fig. 6.—JOHNSON AND SNOOK, 1927, p. 292, Fig. 249.

The original description is as follows:

“Oblong, covered with scattered short spines or acute granulations. Eyes nearly round. First antennae single jointed, scale-like. Second antennae less than one-fifth the length of the body, not reaching the middle of the first thoracic segment; a hook-like process on the second joint of the peduncle; third joint nearly as long as the two preceding; flagellum slightly longer than the last joint of the peduncle, the third joint nearly as long as the two preceding; fourth joint short, conical, and furnished with numerous setae at its distal end. Lateral lobes of the head with two triangular projections in front of the eyes.

“Thoracic segments subequal, the epimera in all produced backward and rounded at the posterior angle. Legs very spiny, the terminal part of the claw marked off by an apparent suture from the longer basal

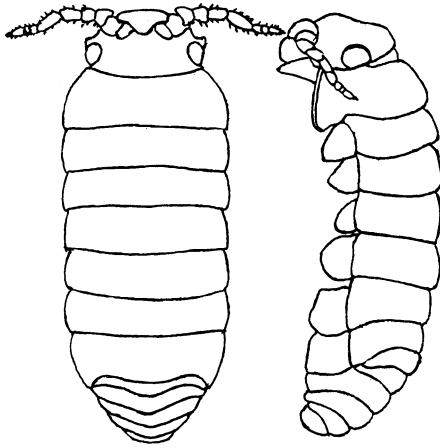


Fig. 251. *Tylos punctatus*, Holmes and Gay. Adapted from Stafford, 1913.

portion; first pair of legs with an acute lobe near the distal end of the anterior margin of the second joint; fourth joint produced and rounded in front.

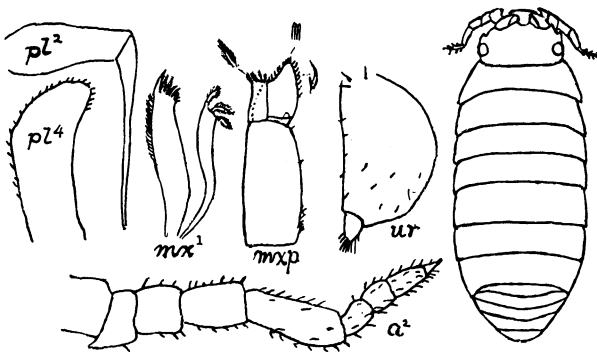


Fig. 252. *Tylos punctatus* Holmes and Gay. Adapted from Holmes and Gay, 1919.

“Third abdominal segment and to a less extent the fourth produced backward at the outer posterior angle; lateral process of fifth segment small. Last segment truncated and four or five times as broad as long.

Uropods nearly semicircular in outline, armed with a few scattered spines, the small terminal joint furnished with a few spines and several setae.

"Length, 10 mm.



Fig. 253. *Tylos punctatus* Holmes and Gay. Opercular region and frontal shield. From a cotype in the U. S. National Museum.

"LOCALITY.—San Diego, California, in sand near the beach."

Type in the U. S. National Museum.

A cotype of this species was kindly loaned me for examination by the above institution. It is very close to *T. latreillei*, if actually distinct. Judging by this single specimen and the few examples of *latreillei* available for comparison, the present species differs in having a slightly wider frontal shield with a narrower apical extension, the telson scarcely at all emarginate, the horizontal plates of abdominal segment 5 more strongly curved inward, and a little wider, yet with rounded ends that do not reach the median line. The specimen has numerous large impressed punctae on the head above and on the frontal shield, and on the telson, but whether these are a specific character I do not know.

***Tylos insularis*, new species**

Figures 254, 255

Tylos latreilli (part) VAN NAME, 1924, p. 189 (descr.), Figs. 6–10.—ARCANGELI, 1930, pp. 88, 89.

Differs from *T. latreillei* in having the epistome less prominently raised above the surface of the forehead, the telson somewhat wider and without any concavity in the outline of its lower border, and the inwardly extending plates of the fifth segment of the abdomen much broader and more truncate at the ends (being thus intermediate between *T. latreillei* and *T. niveus*), though they do not come together or reach to the median line of the abdomen. The anterior half of the operculum is more triangular, with straighter sides than in *latreillei*. For further particulars, see Van Name, 1924, the description and figures there given applying entirely to this form.

DISTRIBUTION.—(Type locality) Tower Island, Galapagos, under dead wood and slabs of lava. Type in the American Museum of Natural History, New York (Cat. No. 4824).

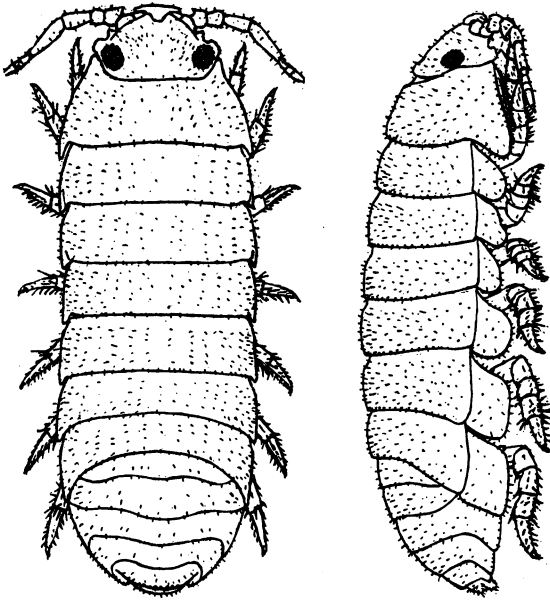


Fig. 254. *Tylos insularis*, new species.

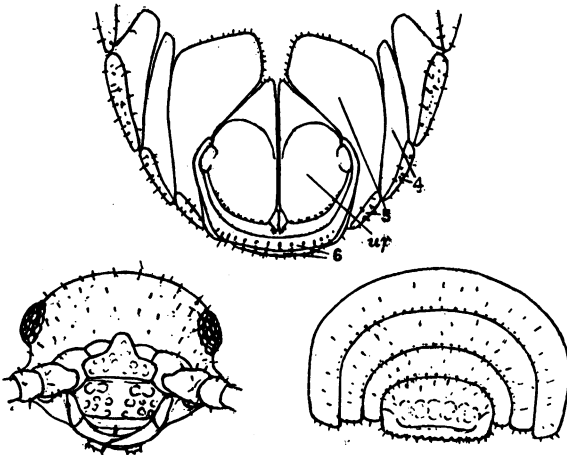


Fig. 255. *Tylos insularis*, new species.

This new species is established for the specimens of *Tylos* described and figured in the above article (Van Name, 1924) and there included in *T. latreillei*, to which they are so closely allied that I could not then make up my mind to separate them, although certain minor differences were recorded and illustrated.

***Tylos niveus* Budde-Lund, 1885**

Figure 256

Tylos niveus BUDDE-LUND, 1885, p. 278 (orig. descr.).—RICHARDSON, 1901, p. 561; 1902, p. 301 (in part); 1905, p. 585 (in part; descr. after Budde-Lund), Fig. 645 (after Dollfus, 1890, see below).—BUDDE-LUND, 1908, p. 76, Pl. III, figs. 31–33.—WAHRBERG, 1922, pp. 12, 19, Fig. 3 (No. 14), Fig. 5 (Nos. 7–9).—BOONE, 1934, p. 597 (new descr.), Figs. 11a, 11b, 14.

Tylos latreilli VAN NAME, 1924, p. 189, in part (specimens from Key Largo, Fla., only).

Other references appear to apply to some other species (perhaps *T. latreillei*) except in so far as they refer to Budde-Lund's original specimens.—DOLLFUS, 1890, p. 70 (descr.), Pl. I, figs. 5–5a (fig. 5a very misleading).—RICHARDSON, 1902 (part), p. 301.—VERRILL, 1902, p. 844.

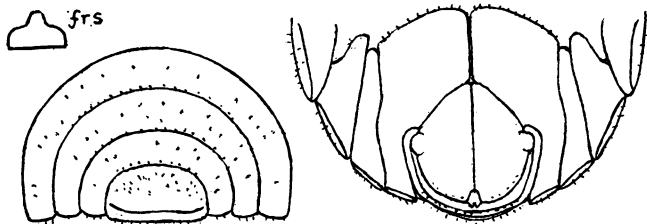


Fig. 256. *Tylos niveus* Budde-Lund. Specimens from Key Largo, Florida.

Most easily distinguished from *T. latreillei* by the large size and square outline of the ends of the internally projecting plates of the fifth segment of the abdomen, which meet along the median line of the lower aspect of the abdomen for a considerable distance. Rear outline of telson transverse, not perceptibly concave.

DISTRIBUTION.—Florida and Cuba; other records incorrect or unreliable. Budde-Lund's type locality was Key West, Florida. Dollfus' (1890) record from Bermuda needs confirmation. The American Museum of Natural History has specimens from Key Largo, Fla. (incorrectly referred to as *T. latreillei* in Van Name, 1924), and the U. S. National Museum has several, one of which I have examined, from La Puntilla, Vedado, Cuba. Boone, 1933, reports it from Cojimer, Cuba. The type is in the Cambridge, Massachusetts, Museum (Budde-

Lund). Budde-Lund's conjecture (1908, p. 77), expressed without seeing the material, that Richardson's specimens of *T. latreillei* from Bermuda were really *niveus* may be dismissed as unjustified. I have examined some of these specimens and I would include them in *latreillei*.

Some of the past errors, including my own, regarding this species, were due to a very misleading figure published by Dollfus and reproduced by Richardson, 1905.

Tylos spinulosus Dana, 1853

Figure 257

Tylos spinulosus MIERS, 1877a, p. 675.—BUDDE-LUND, 1879, p. 9; 1885, p. 279.—STEBBING, 1893, p. 424.—BUDDE-LUND, 1908, p. 78.—CHILTON, 1901, p. 121; 1910, p. 288.—VAN NAME, 1924, p. 192.

Tylos spinulosus DANA, 1853, p. 717 (orig. descr.), Pl. XLVIII, figs. 1a-1c.

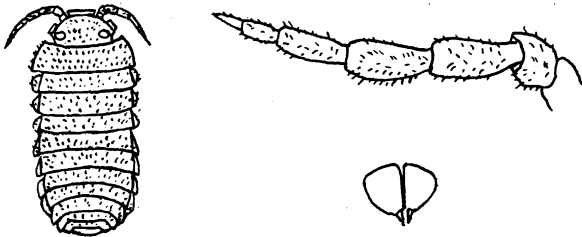


Fig.-257. *Tylos spinulosus* Dana. Adapted from Dana, 1853.

Dana's description is as follows:

"Body and antennae spinulose, spinules very short and often sub-clavate. Head below either eye having a prominent process which is truncate at extremity. Antennae reaching barely to second segment of thorax, second joint having a salient angle on anterior side near base, flagellum three-jointed, the first joint but little shorter than the preceding joint, and twice as long as the following.

"Plate 47, fig. 1a, body, enlarged four diameters, the head thrown outward; b, part of antenna, enlarged twenty-four diameter; c, caudal lamellae.

"Nassau Bay, Fuegia.

"Length, four lines; breadth, half the length. The so-called spinules are not acute, and might perhaps be more properly called setules. The processes on the head below the eyes are not in view, unless the head is placed out horizontally, as it would be carried by the animal when walking. The epistome is spinulose like the back. The caudal lamellae

have a small joint at the extremity, as described by Krauss in his South African species (Südaf. Crust., p. 63, pl. 4, figs. 5, 6); and as he suggests, there are differences between the specimens and the figures of Savigny's species, in this and other respects, which may require the institution of a new genus. The animal rolls up into a ball, like the Spheromae."

Nothing is known about this animal except from Dana's description and figures here reproduced. As pointed out by Budde-Lund, 1908, Dana's figure of the antenna does not agree with the description or with the characters of the genus *Tylos*, and his conjecture that the figure is incorrect seems plausible, as the animal seems to belong to that genus from its other characters. Chilton, 1910, says it is probably allied to a New Zealand species, *T. neozelanicus*.

This species may, however, be represented in the American Museum of Natural History by eight surprisingly large specimens (Cat. N. 7120) of *Tylos*, labeled "Tofo, Chile," perhaps an error for Toto, near Valparaiso.

Aside from their extraordinary size (the largest is fully 27 mm. long) they differ from *latreillei* in having the epistome semicircular in outline with no median upward extension. It is very widely set off from the forehead, which has two large low circular bosses or flattened tubercles. The rear border of the telson is slightly convex, not emarginate, and is narrowly but conspicuously flared or bent outward. The ventral plates of the fifth abdominal segment have their inwardly projecting ends tapering to a rounded tip, which usually fails to reach the median line.

Tylos, species

De Borre, 1886, p. cxiii, mentions a *Tylos* from Peru, saying "L'exemplaire conservé dessiché n'est pas malheureusement propre à pouvoir être décrit." Budde-Lund, 1908, p. 79, remarks that it is probably different from any described species.

FRESH-WATER ISOPODA

The fresh-water Isopoda are not numerous in species and do not form a natural group, but a mixed assemblage of members of several different suborders (Chelifera, Flabellifera, Valvifera, Asellota and Epicaridea), and most of them belong to families, and in many cases also to genera, whose other members are marine. The Asellidae, however, are a fresh-water family.

In this work, 48 species are dealt with as members of the American fresh-water fauna. No attempt has been made to include all marine forms that may sometimes ascend estuaries and streams into brackish or only slightly saline water, as parasites on fishes or shrimps, or of their own accord.

For more details regarding the characters of the suborders and families to which these aquatic forms belong, see the works of Richardson (1905, 'A monograph of the isopods of North America,' Bull. U. S. Nat. Mus., No. 54) and Sars (1899, 'An account of the Crustacea of Norway,' II, Isopoda).

SUBORDER OR ORDER CHELIFERA

(Syn. Tanaidacea or Tanaioidea)

Head fused with the first or with both the first and second segments of the thorax, to form a carapace with a branchial cavity on each side. This character is not found in other Isopoda. The remaining segments (five or six in number) of the thorax are distinct, with slightly developed epimera. The first pair of thoracic legs chelate. Uropoda terminal with one or two slender segmented branches.

In many recent classifications, this group is separated from the Isopoda and is regarded as a group of equal rank, instead of as one of its primary divisions. It is composed mainly of marine species.

Tanaidae

In this family the body is not conspicuously attenuated behind, the mandibles have no palp and the first antennae never have more than one flagellum, which is often absent or rudimentary in the female.

TANAIS AUDOUIN AND MILNE-EDWARDS, 1829

"Eyes present and well developed. Abdomen composed of five or six segments. Only three pairs of pleopoda present, all fully developed. Uropoda simple, single branched. Incubatory pouch formed of two lamellae issuing from the base of the fifth pair of legs. Mandibles strong with the molar expansion well developed." (Richardson, 1905, p. 7.)

Tanais fluviatilis Giambiagi, 1923

Figures 258, 259

Tanais fluviatilis GIAMBIAGI, 1923, p. 248 (orig. descr.), 3 text-figs.

Most of the characters given in Giambiagi's description are so clearly apparent from the illustrations that it does not seem necessary to quote it here.

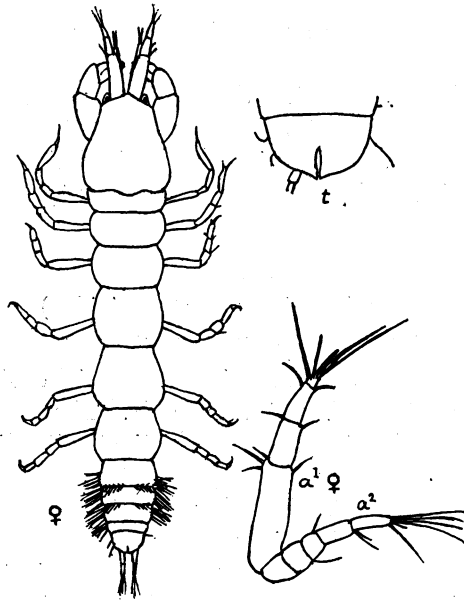


Fig. 258. *Tanais fluviatilis* Giambiagi. Adapted from Giambiagi, 1923.

The first pair of legs are stout and chelate, the second, third, and fourth have a sharp, nearly straight dactylus, while in the last three pairs the dactylus is strongly curved. The uropoda are composed of a single branch with four joints, the two basal joints are short.

The males have the chelae of peculiar form and longer antennae, as shown in the detailed figure.

Length of type specimen, a female not fully adult, 3.2 mm. (Dimensions of adults not given.)

This species inhabits minute tubes built of agglutinated sand attached to shells of mollusks (*Anodontites*) and stones.

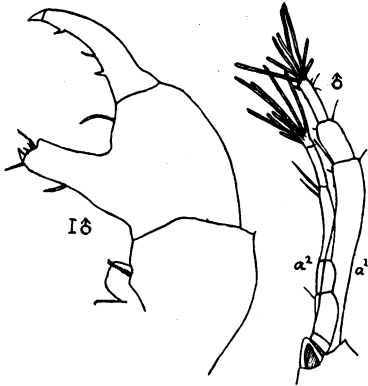


Fig. 259. *Tanais fluviatilis* Giambiagi. Adapted from Giambiagi, 1923.

LOCALITIES.—Type locality, Rio Santiago, Province of Buenos Aires, Argentina. Type in Museo Nacional de Historia Natural, Buenos Aires. Other specimens in the same museum from Conchillas, Department of Colonia (Republica Oriental), Argentina.

NOTOTANAIS RICHARDSON, 1907

First antennae with three segments in the male and five in the female; second antennae with five in both sexes. Head of male wide at the base and prolonged into a narrow forward portion. It is fused with the first thoracic segment. Abdomen with six well-defined segments. Uropoda with two branches each of two segments. (See Richardson, 1907, *Isopodes. Exp. Antarct. Franc. (1903-1905), Crustacés*, p. 1.)

The species described below fits fairly well into the definition of this marine sub-antarctic genus, in spite of the differences, both geographical and ecological, in its habitat. *N. dimorphus*, described under the name *Paratanais dimorphus* by Beddard, 1886, 'Rept. Voy. "Challenger,"' *Zool.*, XVII, p. 130, seems to be its nearest ally.

Nototanais beebei Van Nane, 1925

Figure 260

Nototanais beebei VAN NAME, 1925, p. 469, Figs. 1, 2.

Description of male:

"Body elongate; the average width is contained six or seven times in the length. Back flattened, the segments being only slightly

arched from side to side. All the segments are free and separately movable except the first thoracic segment, which is immovably united with the head. The specimens do not vary greatly in size; the largest do not much exceed 2 mm. in length. The alcoholic specimens are of the usual yellowish color.

“Head very elongate (over one-quarter of the total body length), its posterior end wide and rounded, and deeply set back into the first thoracic segment; its sides converge gradually toward the rather

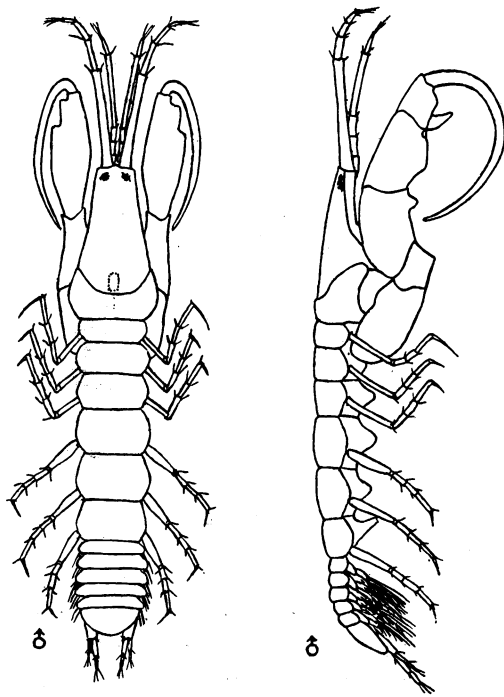


Fig. 260. *Nototanais beebei* Van Name. From Van Name, 1925, *Zoologica*, VI, p. 469.

narrow front end, which is truncate and has a slight median projection. Eyes represented by two pigmented areas on the upper surface at the extreme front end of the head. First antennae stout, of five segments, the basal one being very long, the terminal one minute; second antennae smaller and shorter, also of five segments, the three first short, the fourth very long; the second segment bearing a spine or scale on the median side at its distal end. The upper surface of the head is fairly smooth and

even except for an oval depression on the median line near the posterior border.

"The first thoracic segment is the widest part of the body and bears the enormous chelae which terminate in a long recurved scythe-like dactylus. The lower border of these chelae presents several teeth or projections, notably a long, triangular downwardly and distally directed one near the end of the propodus. Their superior border is evenly curved.

"In strong contrast to their flattened dorsal surfaces, the thoracic segments (especially toward the posterior end of the body) have their median ventral region produced downward into a keel-like projection. On the seventh segment this is long and more or less terete, and has an obliquely forward and downward direction. Except the first, the thoracic segments are of nearly uniform width, though varying greatly in length, the fifth, sixth and seventh being the longest; the abdominal segments are equally wide but all very short except the telson, which is broadly rounded behind. The thoracic legs are long, weak and slender; the first pair behind the chelae have the terminal claw much longer than the others, and the last three legs are somewhat stouter than those in front. The pleopoda are developed on all the five first segments of the abdomen. They are short, and bear an abundance of long swimming hairs. The uropoda each consist of a short basal segment which reaches a little beyond the telson and two terete branches, the inner of which is longer and stouter, though so far as I could demonstrate, they both consist of two segments.

"No female specimens obtained. The female may be expected to have smaller and simpler chelae and but three segments in the first antennae." (Van Name, 1925, p. 470.)

LOCALITY.—Five specimens, including the type, were collected at Kartabo, British Guiana, by William Beebe and preserved in the American Museum of Natural History. They were taken from the stomach of a catfish, *Pimelodus clarias* (Black).

SUBORDER FLABELLIFERA OR CYMOTHOIDEA

First pair of legs without chelae. Uropoda usually broad and inserted laterally on the telson, forming with it a large horizontally expanded fan-like swimming fin.

Cirolanidae

Body of compact form and more or less ovate or elliptical in a dorsal view, the back usually well arched. Eyes commonly small and

widely separated. Both pairs of antennae with many articles, the peduncle and flagellum being well differentiated. The two terminal articles of the palp of the maxillipeds are setose but not provided with hooks on the margins. The mandibles are wide throughout their length, with a more or less trifid cutting part and an elongate triangular molar portion.

The members of this family are mostly active predaceous forms with a hard cuticle, which often attach themselves to fishes as temporary external parasites. Most of them are small.

CIROLANA LEACH, 1818

First antennae without a right angle bend at the junction of their first and second segments. Peduncle of second antennae with five or six segments. Second segment (from the base) of the maxillipeds with one or more hooks on the inner margin. First pleopoda resembling the second pair in having only the outer branch hard and rigid, and the inner branch somewhat membranaceous.

***Cirolana cubensis* Hay, 1903**

Figure 261

Cirolana cubensis HAY, 1903, p. 430 (orig. descr.), Fig. 1.—RICHARDSON, 1905, p. 114 (new descr.), Figs. 98 (after Hay) and 99.—EIGENMANN, 1909, pp. 201 (descr.), 202.—RATHBUN, 1912, p. 460.—BRIAN, 1923, p. 116.—CHAPPUIS, 1927, p. 70.

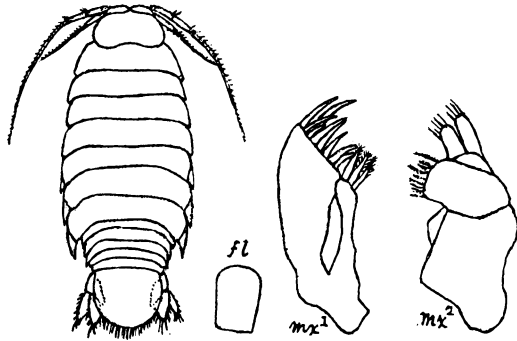


Fig. 261. *Cirolana cubensis* Hay. Adapted from Hay, 1903.

Richardson's description is here quoted in part:

"Body ovate; a little more than twice as long as wide; 3 mm.:7 mm.

"Head twice as wide as long—1 mm.:2 mm.—with the anterior margin rounded and produced in a median point. The eyes are absent. The first pair of antennae have the peduncle composed of only two

articles, both long and narrow; the second is a little longer than the first. The flagellum is composed of fourteen articles, and extends to the posterior margin of the second thoracic segment. The second pair of antennae have the first three articles short and subequal; the fourth and fifth articles are subequal in length, and each is as long as the first three articles taken together. The flagellum is composed of thirty articles, and extends to the middle of the fifth thoracic segment. The maxillipeds are composed of seven articles. The palp of the mandibles is composed of three articles. The frontal lamina is short and broad, with the anterior extremity rounded. . . .

“The first segment of the abdomen is entirely covered by the seventh thoracic segment, with the exception of the post-lateral angles. The terminal segment is rounded posteriorly and has the posterior margin smooth. The uropoda do not extend beyond the extremity of the abdomen. The inner branch is twice as wide as the outer branch and is posteriorly pointed. The inner branch is obliquely truncate. The margins are smooth and furnished with hairs, as is the terminal abdominal segment. The inner angle of the peduncle of the uropoda is produced. The first pair of legs are somewhat prehensile. All the others are ambulatory.”

LOCALITY.—Cavern at San Isidro, Cuba. About 25 specimens obtained by Dr. C. H. Eigenmann in 1902. Type in U. S. Nat. Museum. Eigenmann (1909, p. 202) gives information regarding its habits, abundance, and voracity.

Cirolana browni, new species

Figures 262, 263, 264

MALE.—Body stout, strongly convex, broadest at the fourth and fifth segments. Abdomen somewhat narrower than the thorax, the branches of the uropoda large and broad. Head only moderately wide, the curvature of its anterior outline seen from above is broken only by the merest suggestion of a rostral process, though the frontal lamina, as described below, extends still farther forward.

Body surface fairly even except for a system of tubercles unusually well developed for this genus. There is a pair of rather large but low tubercles on the upper median part of the head and a curved row of four across the middle of the first thoracic segment. Close to the posterior margin of this and of the remaining thoracic segments, and also the second to fifth abdominal segments, there is a row of tubercles, usually about twelve to fourteen on each segment. They are quite prominent in the case of the rows on the posterior segments of the thorax and on the fourth and fifth abdominal segments, but the tubercles of each row diminish toward the sides of the body, both in size and height. The telson has large though low tubercles near the anterior corners and smaller ones irregularly scattered. On the posterior part of the body there is more or less pubescence to which mud adheres.

Anterior surface of head very steeply inclined. Eyes of somewhat square outline with about thirty-two to thirty-five ocelli. The eyes are separated by nearly three times their diameter. A horizontal line or suture crosses the head between the eyes. The first pair of antennae arise quite close together at the extreme anterior part of the head; only a very narrow wedge-shaped downward extension of the minute rostrum separates their rather broad, somewhat inflated bases. Their basal segment consists of two segments immovably united, the proximal one broad and rounded and the second elongate, tapering and rather stout. Together the two parts

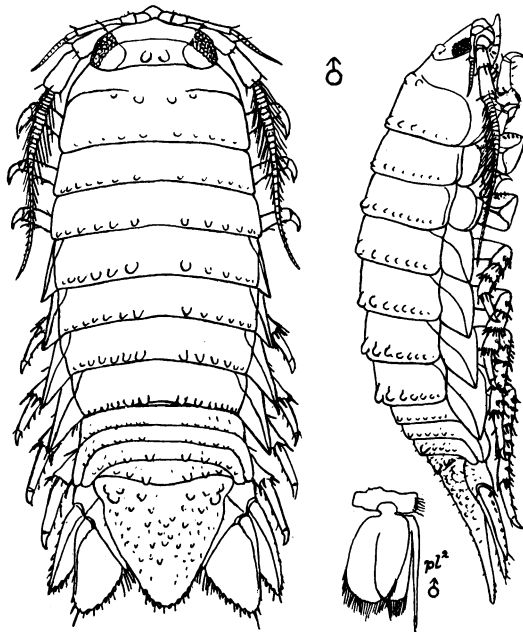


Fig. 262. *Cirolana browni*, new species, male.

fail to equal the next segment, which is slender and cylindrical. The flagellum consists of about eleven articles, the first one the longest. The second antennae extend horizontally outward and have five segments in the peduncle, the first two very short, the third, fourth, and fifth successively longer. The flagellum consists of about thirty to thirty-four articles, those of the proximal half short and bearing long hairs. When well drawn back the first pair reach to the middle of the first thoracic segment, the second pair to the end of the fourth segment.

The most characteristic feature of the head is the unusually large frontal lamina. Seen from below, this is of pentagonal form somewhat rounded off in front, extending forward between the bases of the second antennae, which it separates, as a spade-like process reaching farther forward than any other part of the head. The lower surface

of the frontal lamina and of the short wide clypeus and the labrum lying posterior to it give the head a nearly horizontal under surface; the upper side of the projecting part of the frontal lamina slopes up between the bases of the second antennae and nearly joins the lower end of the narrow wedge-shaped rostral plate that separates the bases of the first antennae.

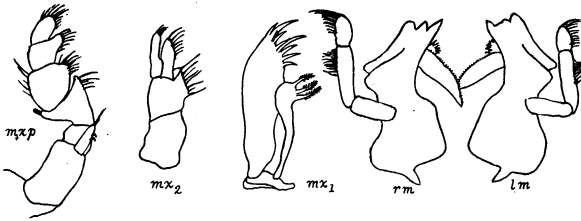


Fig. 263. *Cirolana browni*, new species. Mouth parts. Drawn from a male specimen.

It can be observed in the figures of the mouth parts that the two mandibles are not alike at the tip. The tip of the left overlaps that of the right and the middle one of the three teeth on the right mandible is replaced by a nearly straight edge on the left.

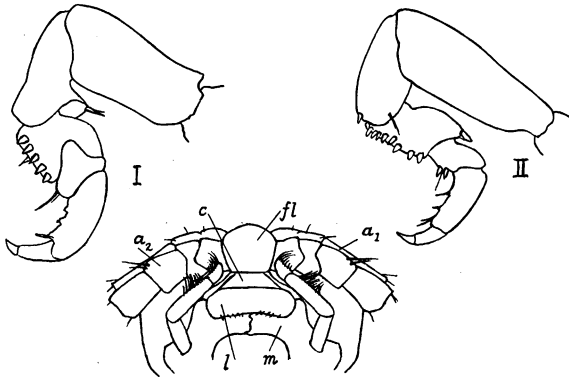


Fig. 264. *Cirolana browni* new species.

a, antenna; *c*, clypeus; *fl*, frontal lamina; *l*, labrum; *m*, mandibles.

All thoracic segments but the first have movable epimera, the surface of each being crossed by an oblique ridge, somewhat curved, which runs toward the produced posterior angle. The first three pairs of limbs, which are prehensile, diminish successively in length and stoutness, the last four pairs are ambulatory in character and increase in length toward the rear.

Only the third and fourth abdominal segments have their lateral ends extended

and bent backward. The telson has nearly the outline of an equilateral triangle with the tip rounded off. The inner branch is broader and slightly longer than the outer. The styloid process of the second pleopod is long, narrow, and straight, tapering to a needle-like point at the tip, and exceeds the foliate parts of the appendage in length.

Color (in alcohol) yellowish, with more or less blackish pigment on the upper parts, though this is almost wanting on the uropoda and terminal parts of the telson.

Length of largest male, 11.1 mm.; width, 4 mm.

FEMALE.—Very similar to the male but with the dorsal surface considerably smoother, noticeable tubercles being almost entirely confined to the posterior parts of the body, and the pubescence is less developed, the greater part of the upper surface being smooth and glossy. First thoracic leg very stout as in male; the second antennae are slenderer and less hairy though nearly as long as in the males.

Length of the two female specimens (which have well-developed marsupial plates), 9 to 10 mm.

LOCALITY.—Danny's River three miles below Rodas, Santa Clara Province, Cuba. Eight specimens (6 males, 2 females) collected by Dr. Barnum Brown. All specimens in the American Museum of Natural History. A large male (Cat. No. 6519) has been designated as type.

This is a near relative of *C. parva* Hansen, 1890, a West Indian marine species, but is remarkable for the spade-like extension of the frontal lamina and the development of the tuberculation. The locality indicates that it inhabits entirely fresh water.

CONILERA LEACH

Resembling *Cirolana* in most characters but having both branches (instead of only the outer branch) of the first pleopoda hard, forming an operculum to protect the other pleopoda.

Conilera stygia (Packard), 1900

Conilera stygia PACKARD, 1900, p. 228 (orig. descr.).—RICHARDSON, 1905, p. 120.—CHAPPUIS, 1927, p. 72.

“It is totally eyeless, and adds another to the blind fauna of our caves and wells. Hitherto the genus has been represented by but a single species, inhabiting the British coast. Compared with Bate and Westwood's figure of *C. cylindracea*, the body is longer, the antennae much longer, reaching to the middle of the first thoracic segment, those of the second pair nearly to the middle of the seventh thoracic segment. Only the first three pairs of legs are short with a very thick hand; the four hinder pairs of legs are long, slender. The two last divisions of the pleopoda are unequal, the outer division very narrow, but a little more than half as long as the broad inner division or endopodite. Length of body, 25 mm.; breadth, 5 mm.

"This form is like most, if not all, other blind or eyeless arthropods in having a longer body, antennae, and legs in compensation for the loss of eyes."

LOCALITY.—Monterey, Mexico. Found in wells.

NOTE.—There is a brief allusion, without description, to what is evidently this same species, in some article by Packard of earlier date than 1900, in which it is incorrectly mentioned as an "asellid crustacean." I have not been able to locate the reference.

Cirolanides BENEDICT, 1886

Distinguished from *Cirolana* by having only the first pair of legs prehensile and by the absence of eyes. The following is the only species known.

***Cirolanides texensis* Benedict, 1896**

Figure 265

Cirolanides texensis BENEDICT, 1896, p. 616 (orig. descr.).—EIGENMANN, 1900, pp. 228 (*texanus*), 229.—RICHARDSON, 1900a, p. 217.—ULRICH, 1902, p. 88 (descr.), Pl. xv (misprinted *Cirolanides*).—RICHARDSON, 1905, p. 120 (descr.), Fig. 103.—EIGENMANN, 1909, p. 201.—WARD AND WHIPPLE, 1918, p. 841, Fig. 1304.—BRIAN, 1923, p. 116.—CHAPPUIS, 1927, p. 71.

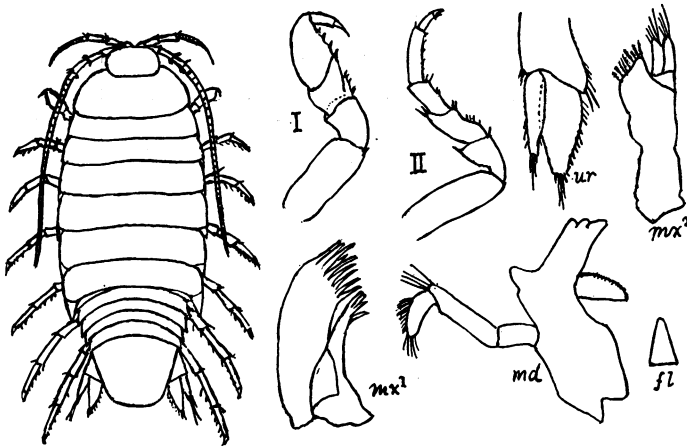


Fig. 265. *Cirolanides texensis* Benedict. Adapted from Richardson, 1905 (published by courtesy of Dr. Benedict).

As the details of this species are well shown in the figures here reproduced, it does not seem necessary to quote the somewhat lengthy descriptions given by the above authors, but attention may be called to the following characters:

Eyes entirely wanting. Flagella of first and second antennae with about fifteen and thirty articles, respectively. Body surface very smooth and hard; unpigmented. Only the first thoracic segment has the posterior corner rounded off; the second has it approximately rectangular and the succeeding ones have it acutely produced to an increasing degree. The abdominal segments also all have the rear angles acutely produced. Only the first pair of legs are prehensile.

Length of largest specimens recorded, 17 mm.

LOCALITY.—From an artesian well at San Marcos, Texas, where it occurs in rather small numbers.

Ulrich, 1902, p. 83, says, "During my stay of three days, I secured several specimens. It can readily be seen in the receiving basin of the well when thrown out." The American Museum of Natural History has four specimens from the same locality. Type in U. S. National Museum.

Excorallanidae

The genus *Excorallana* Leach, through superficially resembling *Cirolana*, has been separated as a distinct family on account of the peculiar modification of the mandibles. These have the molar part and movable lacinia wanting, and are developed into a pair of large and powerful hooks, whose ends overlap across the median line when they are in their normal closed position. The compound eyes are often very large, covering much of the surface of the head.

EXCORALLANA LEACH

See under the family Excorallanidae.

Excorallana berbicensis Boone, 1918

Figure 266

Excorallana berbicensis BOONE, 1918 (orig. descr.), p. 594. Pl. xch, fig. 1.—VAN NAME, 1925, p. 471 (descr.), Figs. 3-8.—NIERSTRASZ, 1931, p. 163.

The original description of this species was evidently based on females only. The discovery of the male shows that it is closely related to the marine tropical American species, *E. tricornis* (Hansen), 1890, from which, however, it may be at once distinguished by the absence of incisions on the sides of the tapering part of the telson. In the female, the upper surface of the head is smooth, but in the male the head bears an anterior median process or prominent tubercle, and a pair of somewhat smaller ones between the eyes as in *E. tricornis*, and the surface of the head within the triangle thus formed is depressed or concave.

"Body rather elongate, more so in the female, where the greatest width is contained over three times in the length, than in the male, where it is contained about two and three-quarters times. . . . Articula-

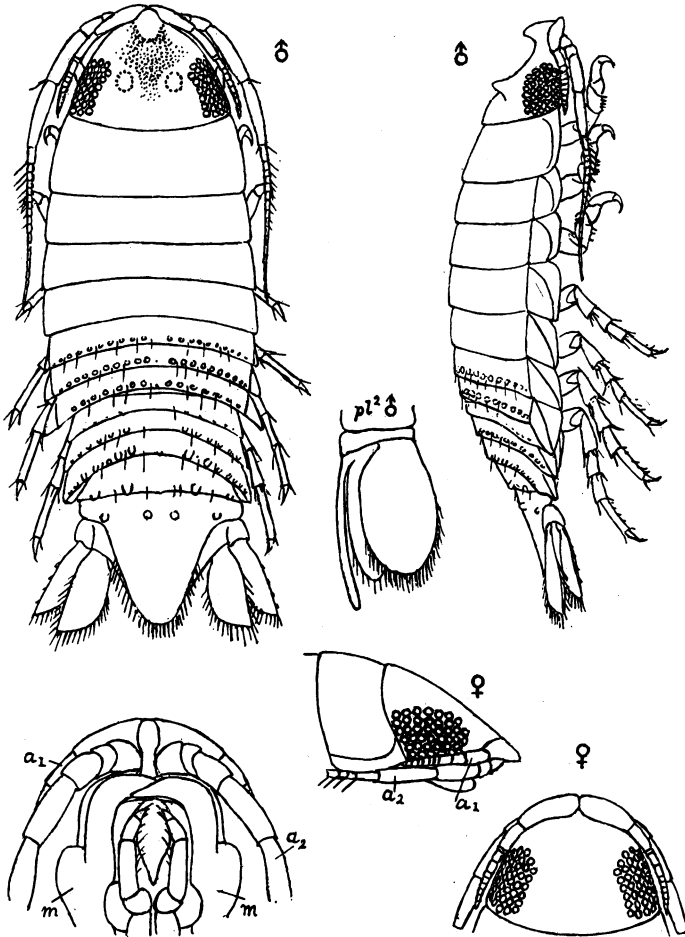


Fig. 266. *Excorallana berbicensis* Boone. From Van Name, 1925, *Zoologica*, VI, p. 472.

tion firm; body surface for the most part hard and smooth, except for a minute irregular pitting visible only on considerable magnification. The last two or three thoracic and the third and fourth abdominal segments bear a row of small tubercles near the posterior edge, also a few short

backwardly directed hairs. The fifth abdominal segment bears four tubercles along the posterior border; the telson has two pairs of small ones on the anterior part (two near the middle and two near the bases of the uropoda). These tubercles, which are all small, are more conspicuous in the male specimen, though present in both sexes. Legs of the first three pairs stout and provided with prehensile claws. The merus of the first pair bears on its lower outer aspect a row of five blunt tubercles. On the succeeding pair there are four of these tubercles (the middle one of the row being wanting); on the third pair there are but three. This is the condition in both the male and female specimens. The fourth to seventh legs are elongate, slender, and not prehensile.

"The head is narrow and rounded in front except for a small median process. The eyes are large with about eight horizontal rows of ocelli, with eight ocelli in the longest rows. The first antennae meet at the median line and form the extreme front outline of the head; they have ten articles in the flagellum, the first being very short and the second (in the female specimen, also the third) article being somewhat elongated. They reach, when drawn back, a little way beyond the rear border of the head. The second antennae have the three basal joints short and the fourth and fifth long, the flagellum has eighteen to twenty articles of which the first is more elongated than the succeeding ones; they reach, when well drawn back, along the fourth thoracic segment to about its middle. They are a little slenderer in the female than in the male." (Van Name, 1925, pp. 471, 473.)

Length of largest specimen, 13 mm.

LOCALITIES.—Rivers of British Guiana. The type specimens were from the Rio Berbice, and are preserved in the U. S. National Museum (Boone). Two additional specimens, including a male, from Kartabo, collected by William Beebe (see Van Name, 1925) are in the American Museum of Natural History. These were taken, one from the gills, the other from the pectoral fin of specimens of the fish *Lycengraulis grossideus* (Cuvier).

Cymothoidae

Both antennae reduced, usually of comparatively few segments and not well differentiated into peduncle and flagellum. Maxillipeds with a palp of the two articles, terminal article furnished with hooks. Mandibles with palps. All seven pairs of legs (in *Artystone* only six pairs) end in large, hooked claws.

Mostly parasites, externally or in the mouth or gill cavities of fishes. They are usually of rather large size (for isopods) and more decidedly

parasitic than the *Cirolanidae*, the females, at least, often remaining permanently attached to their hosts and often becoming more or less asymmetrical, though without undergoing any structural modification.

There is great individual variation, and variation with age and sex in the members of this family. Not only many of its species, but some of the numerous genera that have been distinguished, are based on very unimportant and unreliable characters and will hardly stand the test of impartial investigation.

NEROCILA LEACH

"Body relaxed, very often flattened. Head posteriorly produced in three lobes, not at all immersed. First pair of antennae almost contiguous at the base.

"First segment of thorax with the anterior margin deeply trisinate. Posterior angles of the segments from the second to the last increasing gradually in length, the first of these often but little produced, the posterior ones almost always produced and often abruptly longer than the first ones. The anterior epimera almost always extend to or beyond the posterior angle of the segment; the posterior epimera are produced and acute, but do not reach the posterior angle of the segment.

"Abdomen free, rarely covered at the base or the sides. Legs rather long." (Richardson, 1905, p. 219.)

Nerocila fluviatilis Schioedte and Meinert, 1881

Figure 267

?*Nerocila falklandica* CUNNINGHAM, 1871, Trans. Linn. Soc. London, XXVII, p. 500 (descr.), Pl. LIX, fig. 2.

Nerocila fluviatilis RICHARDSON, 1904, p. 23.

Nerocila fluviatilis SCHIOEDTE AND MEINERT, 1881, p. 66 (descr.), Pl. v, figs. 6-9; 1884, p. 414.

This is one of a group of species of the genus *Nerocila* distinguished largely by very unsatisfactory characters, as they are subject to great variation with the age and development of the individual. The eyes are fairly well developed even in old specimens, the second antennae have eleven joints, the first antennae presumably eight, as usual in the genus, though this is not stated. The color is yellowish with black markings which form three longitudinal dark stripes on the back. Length of largest specimen (female) 24 mm.

For such other details as cannot be made out from the illustrations here given, the reader is referred to the work of Schioedte and Meinert, whose description is of much too great length to be quoted here, speci-

ally since the fresh-water habitat of this species seems to require investigation.

It was described from the La Plata River at Montevideo, parasitic on the fins of fishes, therefore from salt water. On the other hand, the statement that one poor specimen came from a catfish does not necessarily indicate its occurrence in fresh water. If it is identical with Cunningham's insufficiently described and crudely figured *N. falklandica* from Falkland Sound, that is further evidence that it is marine. Location of the type not stated. Specimens in Copenhagen and Cambridge, Massachusetts, Museums (Schioedte and Meinert).

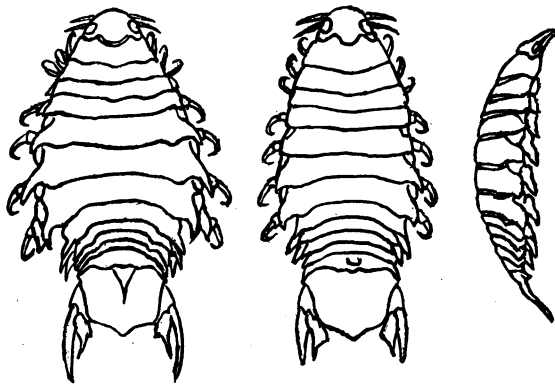


Fig. 267. *Nerocila fluviatilis* Schioedte and Meinert. Adapted from Schioedte and Meinert.

Schioedte and Meinert in a later installment of their work (1884, p. 414) report two specimens in the Vienna Museum that were collected by Natterer at "Inisanga, Brazil," which appears to be a misprint for Irisanga, a place which does not appear on any map available, but which, from the records of Natterer's journeys, evidently is in the interior of the northern part of the State of São Paulo. This, however, fails to explain why the species had received the name *fluviatilis* previous to existence of these specimens being known to the authors who named it. It seems possible that there may be some mistake as to the locality, if these specimens are correctly referred to the marine form.

BRAGA SCHIOEDTE AND MEINERT, 1883

This genus, related to, if really distinct from, the well-known marine genus *Anilocra*, is distinguished, according to Schioedte and Meinert,

principally by the arched forehead, the small epimera and the short abdomen. The claws of the seventh pair of legs are weak and small compared with those of the preceding pair.

The genus is composed of a few very insufficiently known, mainly marine species. As in related groups, the males differ considerably from the females, being smaller, narrower-bodied, and of more active habits.

***Braga cichlae* Schioedte and Meinert, 1883**

Figure 268

Braga cichlae SCHIOEDTE AND MEINERT, 1881, p. 94 (orig. descr.), Pl. VII, figs. 10, 11.—RICHARDSON, 1911, p. 96.—MONOD, 1931, p. 363.—SCHOUTEN, 1932, p. 105 (*sichlae*).

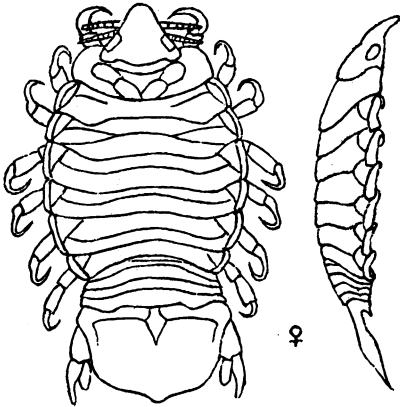


Fig. 268. *Braga cichlae* Schioedte and Meinert. Adapted from Schioedte and Meinert.

An insufficiently known species described from a single specimen (a virgin female) 17 mm. long, from the tongue of a cichlid fish (and therefore probably a fresh-water form), taken at José Apu, Brazil, a place I have failed to locate. In view of the clearness with which the figures show the main characters of the specimen, it does not seem necessary to quote here the lengthy description given by Schioedte and Meinert. The first antennae are stated to have eight segments, the second antennae nine.

***Braga patagonica* Schioedte and Meinert, 1884**

Figure 269

Braga patagonica SCHIOEDTE AND MEINERT, 1884, p. 419 (orig. descr.), Pl. XVIII, figs. 17, 18.—RICHARDSON, 1911, p. 96.—MONOD, 1931, p. 363, 364, Figs. 1-3.—SCHOUTEN, 1932, p. 105, Figs. 1, 2 (after Monod).

Described from a single dried female specimen from salt water on the Patagonian coast near the Rio Negro.

Monod, 1931, assigns to this species a pair of specimens from fresh water, from the vicinity of Asuncion, Paraguay. He gives no description, but states that the female closely agrees with the description of

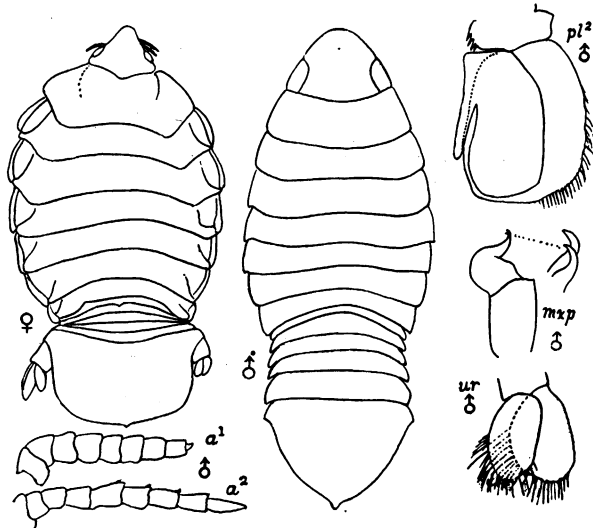


Fig. 269. *Braga patagonica* Schioedte and Meinert. Adapted from Monod, 1931.

this species given by Schioedte and Meinert. His female specimen was 35 mm. long; the male about 6 mm. long. Monod's figures are here reproduced in outline.

Braga fluviatilis Richardson, 1911

Figure 270

Braga fluviatilis RICHARDSON, 1911, p. 94 (orig. descr.), Figs. 1, 2.—NIERSTRASZ, 1931, p. 127.—MONOD, 1931, pp. 363, 364.—SCHOUTEN, 1932, p. 106.

This must be regarded as a doubtful species, as it was described from a single immature male found in the mouth of a large catfish (native name "armado"), taken in fresh water in the Parana River or one of its tributaries, March 10, 1910, near San Ignacio. But little information is contained in the description that cannot be equally well made out from the figures given and here reproduced in outline. The

first and second antennae have seven and nine articles, respectively. The legs are all prehensile, and without a keel on the basis. The

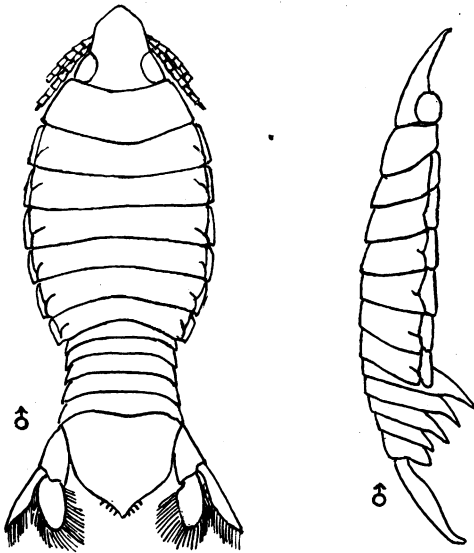


Fig. 270. *Braga fluviatilis* Richardson. Adapted from Richardson.

uropoda are not margined with hairs. Surface smooth, color yellow with dark brown markings.

Length, 10 mm.

TELOTHA SCHIOEDTE AND MEINERT, 1884

Established by Schioedte and Meinert, 1884, for the following two South American fresh-water species, which are but doubtfully distinct from each other. They have the body wider and the thoracic region of more rounded outline as seen from above, but there hardly appear to be any sufficient grounds for separating them from the well-known marine genus *Cymothoa*, the type of the family. *Telotha* is distinguished from *Artystone*, a genus of quite similar appearance, by having all seven pairs of legs prehensile and terminating in hooked claws.

Telotha henselii (von Martens), 1869

Figure 271

Cymothoa henselii VON MARTENS, 1869, p. 33 (orig. descr.), Pl. II, fig. 6.

Telotha henselii SCHIOEDTE AND MEINERT, 1884, p. 287 (descr.), Pl. X, figs. 11, 12.—WEBER, 1892, p. 538.—RICHARDSON, 1904, p. 23.—NIERSTRASZ, 1915, p. 95.—VAN NAME, 1925, p. 478 (descr.), Figs. 19–23.—NIERSTRASZ, 1931, p. 137.

The following statements are as quoted from Van Name, 1935:
 "The body is quite broadly oval, rather highly arched in old specimens, but flatter in young ones. The head is wider than long and of

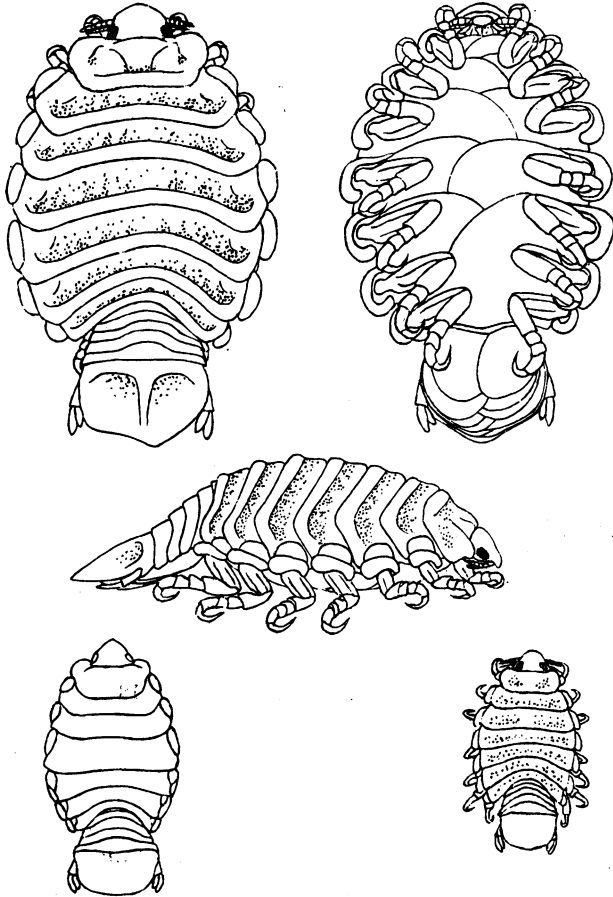


Fig. 271. *Telotha henselii* (von Martens). Three upper figures, a female 16 mm. long. Lower left figure, female 26 mm. long. Lower right figure, young individual 6.6 mm. long. From Van Name, 1925, *Zoologica*, VI, p. 479.

triangular outline, rounded in front; its anterior margin is considerably bent downward. The eyes are oblong and fairly well pigmented; the first antennae, which arise a little distance apart, are stout, but little compressed in cross section, and have only eight segments (according

to Schioedte and Meinert they have nine). The second antennae usually exceed the first pair a little in length, they are much slenderer and have nine segments. The head is not deeply set back into the thorax.

"The thoracic segments have the posterior border thickened and very prominent, in front of this the surface of the segment is more or less irregularly roughened and sculptured. The epimera are large and thick, especially in the middle region of the body, and are surmounted by large convex bosses on the lateral ends of the main portion of the segments.

"The legs are strong and of moderate length; their length increases toward the rear of the body. The dactyli are large and strongly hooked. The propodus of all the legs is curved, increasing the hook-like prehensile character of the limb; in the case of the three anterior legs that joint is somewhat flattened, though not much widened. The thighs are not compressed; their external aspect (the inferior aspect when the legs are drawn together under the body) is flattened or even slightly concaved. There is never more than a very slightly prominent ridge or keel.

"The abdomen is rather narrow in front, moderately immersed in the thorax, and widens behind. The telson is very broad and has the posterior margin normally very gently curved, but in the individual shown in figs. 19 to 21, it is unevenly worn off, as are also some of the pleopoda, evidently by pressure and friction from some part of the host. The telson has the anterior margin thickened and the dorsal surface more or less arched or convex; in the older specimens there is a poorly defined median ridge or keel each side of which the surface is minutely pitted and roughened. The uropoda and their branches are small and short; in adults they do not reach much beyond the end of the telson."

Length of largest specimen, 26 mm. Length of specimen (a female with marsupium) on which the above description is chiefly based, 16 mm. (No description of adult male available.)

LOCALITIES.—Types (preserved in Berlin Museum) taken from the gills of a cichlid fish (*Geophagus* sp.) taken at Porto Alegre, Rio Grande del Sul, Brazil (von Martens, Schioedte, and Meinert). The latter authors also mention specimens from "somewhere in Brazil," and Richardson, 1904, gives the locality "Rio in Brazil."

Specimens of various ages, apparently referable to this species, were collected at Kartabo, British Guiana, from a giant catfish (*Brachyplatystoma* sp.) and another catfish, *Pimelodus clarias* (Bloch), by William Beebe, and are preserved in the American Museum of Natural History, New York.

The illustrations and description here given are from the above British Guiana specimens. See also remarks under *Telotha lunaris*, below, and under the genus *Livoneca* regarding what is possibly a larval form of this species.

***Telotha lunaris* Schioedte and Meinert, 1884**

Figure 272

Telotha lunaris SCHIOEDTE AND MEINERT, 1884, p. 289 (orig. descr.), Pl. x, figs. 13, 14, fig. 15 (larva from marsupium).—NIERSTRASZ, 1915, p. 95; 1931, p. 137.

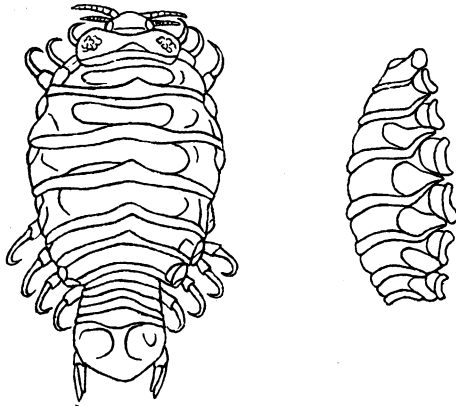


Fig. 272. *Telotha lunaris* Schioedte and Meinert. Adapted from Schioedte and Meinert, 1884.

This species was described and figured from a single specimen, a female 28 mm. long, from the gill cavities of the fish *Stemachius brazilensis* Reinhardt, taken in the Rio del Velhas, Brazil.

Considering the very great variability in this group, individually and with age and state of the reproductive functions, the validity of this species, which is evidently closely allied to *T. henselii* just described, cannot be regarded as very well established, though the smoother body and narrower abdomen, less deeply set back into the thorax, and the sinuous curve (usually forming an obtuse angle at the median line) of the impressed transverse line on the segments may be characters of specific value. The first antennae are stated to have eight segments, the second, nine.

LIVONECA LEACH

“Body suboval, more or less twisted.

“Head most always deeply immersed. First pair of antennae widely separated at the base, rather compressed.

“Anterior margin of the first thoracic segment widely sinuated in the middle, more or less sinuated or incised at the antero-lateral angles.

“Abdomen very little immersed, continuous with thorax, not narrower than thorax.” (Richardson, 1905, p. 256.)

In Van Name, 1925, p. 478, Fig. 18, a larval isopod 2.4 mm. long taken in British Guiana on a giant catfish (*Brachyplatystoma*) is described briefly and figured, and the suggestion is made that it might be the young of a species (*L. guianensis*) of this genus. It seems more probable that it is the young of *Telotha henselii*, which infests that fish.

***Livoneca symmetrica* Van Name, 1925**

Figures 273, 274

Livoneca symmetrica VAN NAME, 1925, p. 473 (orig. descr.), Figs. 1-14.

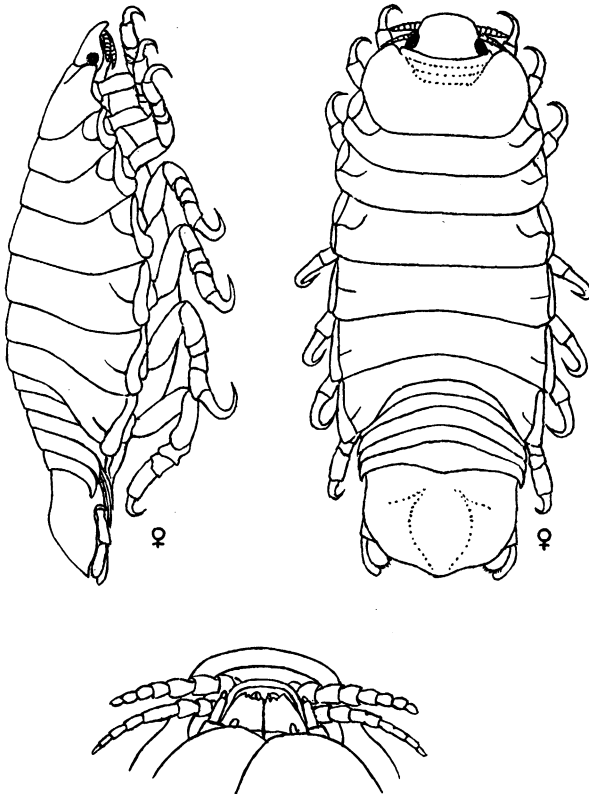


Fig. 273. *Livoneca symmetrica* Van Name, female. From Van Name, 1925, Zoologica, VI, p. 474.

Description of adult female (no specimens of adult male):

“The body surface is very slightly rough, pale yellowish in color, and bears minute scattered spots of blackish pigment.

“The head in a dorsal view is gently rounded in front and behind, with straight sides converging toward the front. It is scarcely at all set back into the thorax, though the first segment of the latter is produced forward a little way into a small lobe of rounded-triangular shape at each of the forward corners. The eyes are rounded-oblong in outline,

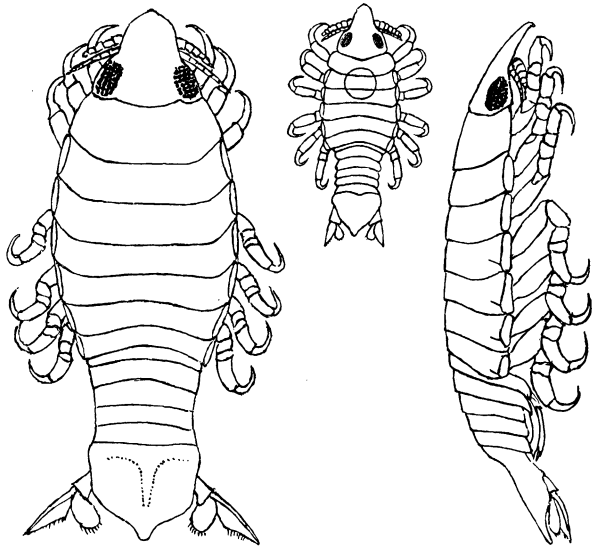


Fig. 274. *Livoneca symmetrica* Van Name. Young individuals 3.6 mm. and 8.5 mm. long, respectively, the small one from the marsupium of a female. From Van Name, 1925, *Zoologica*, VI, p. 475.

of fair size, and well pigmented. The front of the head is somewhat bent down over the bases of the antennae. The antennae of the two sides arise well apart. The first pair is the stoutest, and is eight-jointed. The second pair is more slender and a little longer and is nine-jointed. The form of the thoracic segments and their epimera are sufficiently shown in the figures here given. The legs are fairly long, but the thighs are not expanded or provided with a keel. The dactyli are strongly hooked and increase in length from the first to the sixth pair; those of the seventh pair are smaller even than those of the first. The abdomen is wide and slightly diminishes in width toward the rear. It is deeply

set into the thorax, and the lateral ends of all its segments except the first (which, however, is of the full width) are bent backward and pointed. The telson is wide and strongly arched and has the posterior outline slightly produced, forming an obtuse median angle. The uropoda reach to or slightly beyond its end; the outer branch is slightly falcate, the inner is shorter and oval. Both are rounded at the end." (Van Name, 1925, pp. 473, 474.)

Length of adult females, 17 mm. to 20.6 mm. (Larval stages described, Van Name, 1925, pp. 474-476, Figs. 12-14.)

LOCALITY.—Kartabo, British Guiana, parasitic on various river fishes. Type from gills of *Myloplus rubripennis*, others from *Sarasalmo strombeus*, *Hemidorus carinatus* ("from the scales"), *Cichla ocellaris*, and *Brachyplatystoma* species. The above specimens, including the type, are in the American Museum of Natural History.

Livoneca guianensis Van Name, 1925

Figure 275

Livoneca guianensis VAN NAME, 1925, p. 476 (orig. descr.), Figs. 15-17 (18).

Description of female (no male specimens):

"The body surface is smooth and highly polished, of the usual yellow color without pigment except a very few blackish dots distributed chiefly along the median dorsal line and near the rear borders of the segments.

"The upper surface of the head is convex and the anterior tip is considerably bent down. The eyes are small, rounded and situated on the sides of the head; they are well pigmented. The first antennae arise well apart. They are very short and stout, with eight joints, of which the second is considerably the longest, but not swollen. The joints are not compressed. The second antennae are slender and have but seven joints which are somewhat compressed. The first two are wide but very short, the others are so elongate that this pair of antennae slightly exceeds the first pair in length.

"The first segment of the thorax is wide and moderately long; the second and third (the latter the widest of all, as above stated) are short; the succeeding ones are all rather long. They have rather narrow but thick epimera, which except in the case of the seventh, fail by a greater or less interval to reach all the way along the lateral end of the segment. The legs are only moderately stout, but considerably compressed laterally, so that they appear much stouter in a side view. The

dactyli are sharp and hooked, and vary comparatively little in length; those of the first pair are, however, the longest, although the last pair of legs exceeds the others in total length.

"The abdominal segments have the lateral ends obliquely truncated and the posterior corners rounded off. The telson is about as wide as

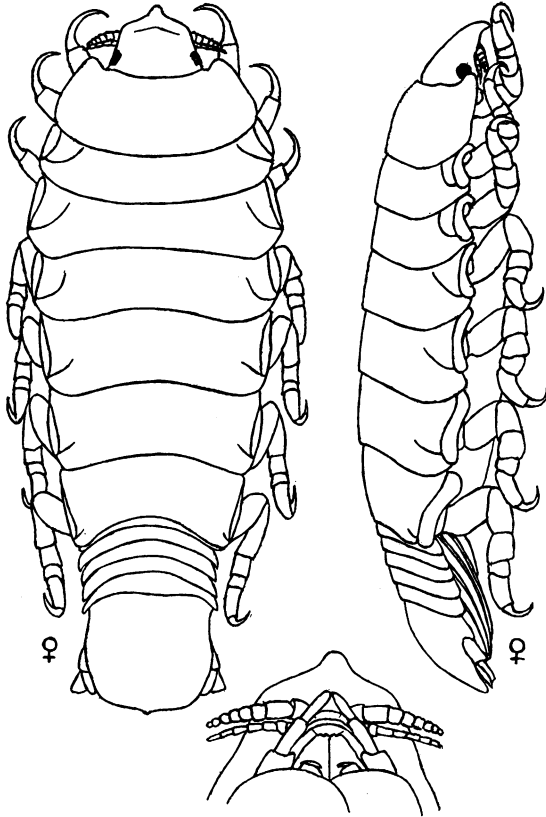


Fig. 275. *Livoneca guianensis* Van Name, female. From Van Name, 1925, *Zoologica*, VI, p. 477.

the rest of the abdomen and about as long as it is wide. It narrows but little toward the rear end, which is rounded off, but bent down so as to appear almost truncated in a dorsal view of the animal." . . . (From Van Name, 1925, pp. 476, 477.)

Length of largest specimen, 26 mm.

LOCALITY.—Three specimens, including the type, were obtained at Kartabo, British Guiana, and are in the American Museum of Natural History. Host of the type not recorded. The others were from the gills of the river fishes, *Leporinus fasciatus* (Bloch) and *Pimelodus clarias* (Bloch). See remarks on young under genus *Livoneca*.

***Livoneca lazzari* (Pearse), 1921**

Figure 276

Aegathoa lazzari PEARSE, 1920, p. 39 (*nomen nudum*); 1921, p. 461 (orig. descr.), Fig. 2.—MONOD, 1922, p. 406.

Described by Pearse as follows:

“Head wider than long, and narrower posteriorly. Eyes large ellipsoidal; with about 48 facets; almost covering postero-lateral

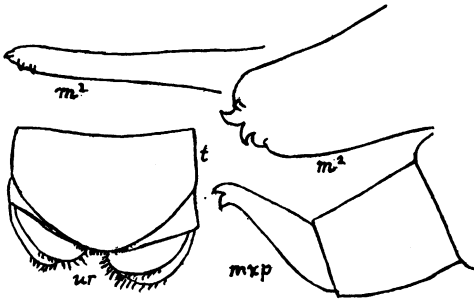


Fig. 276. *Livoneca lazzari* (Pearse), details. Adapted from Pearse, 1921.

angles. First antennae with seven segments, second antennae with eight segments. Maxillipeds bearing a two-segmented palp, which is armed at the tip with two hooks. First maxilla slender, armed at tip with three pairs of hooks; second maxilla robust armed at tip with two pairs of hooks. First segment of thorax longest, 0.5 mm. The following segments progressively shorter. The epimera of all segments except the first separated on the lateral margins. Abdomen somewhat narrower than the thorax; length 1.8 mm., segments as long as those of the thorax. Sixth or terminal segment broadly rounded and obtusely pointed posteriorly. Uropoda extending beyond tip of terminal segment. Both rami of uropoda rounded posteriorly. Posterior margins of the uropoda and the terminal abdominal segment are pringed with hairs. All the legs are prehensile and end in long curved dactyli. They are without spines.”

3.7 mm. long; 1.3 mm. wide.

LOCALITY.—Lake Valencia, Venezuela, the type parasitic on the fish *Astyanax bimaculatus* (Linnaeus); also parasitic on the fish *Gephyrocharax valenciae* Eigenmann. Type in University of Michigan Museum, paratype in U. S. National Museum.

This description is apparently from immature specimens, probably of the genus *Livoneca*. For a discussion of the reasons for rejecting the genus *Aegathoa* see the above article of Monod.

ASOTANA SCHIOEDTE AND MEINERT, 1881

“Frons profunde bisinuata.

“Corpus compactum, crassum vel crassiusculum, post compressum. Frons producta, procumbens, fornicata, profunde bisinuata. Oculi manifesti, minuti, aequati, latera capitis non attingentes. Antennae primi paris rectae, breves, subteretes, scapo obscure definito; 8-articulatae. Antennae secundi paris breves, teretes; 9-articulatae. Margo anticus annuli primi trunci profunde sinuatus. Anguli postici annulorum trunci vix vel non prominuli. Epimera prior involuta, posteriora subpendula, angustiuscula vel angusta, angulum annuli fere explentia.

“Pedes breviusculi, subtenuis, longitudine subaequales, paris ultimi ceteris manifesto longiores. Ungulae parium sex priorum longae vel longiusculae; paris septimi breviusculae, ceteris multo breviores atque tenuiores. Cauda ad basin obtecta. Latera annulorum quinque priorum integra, angustata. Annulus analis sublingulatus, fornicatus, in medio inflatus. Pedes anales brevissimi, remis perbrevis; remus interior quam exterior manifesto longior.” (Schioedte and Meinert, 1881, pp. 154–155.)

The following is the type and only species.

Asotana formosa Schioedte and Meinert, 1881

Figure 277

Asotana formosa SCHIOEDTE AND MEINERT, 1881, p. 155, Pl. x, figs. 10–12.—WEBER, 1892, p. 538.—RICHARDSON, 1904, p. 23.—NIERSTRASZ, 1931, p. 130.

The deeply three-lobed anterior outline of the head and the bosses and keel on the telson and other characters brought out in the generic diagnosis given above will doubtless suffice for the recognition of any adult specimen of this species.

LOCALITY.—River Iça, southern Peru. Type and only specimen in Cambridge, Massachusetts, Museum (Schioedte and Meinert).

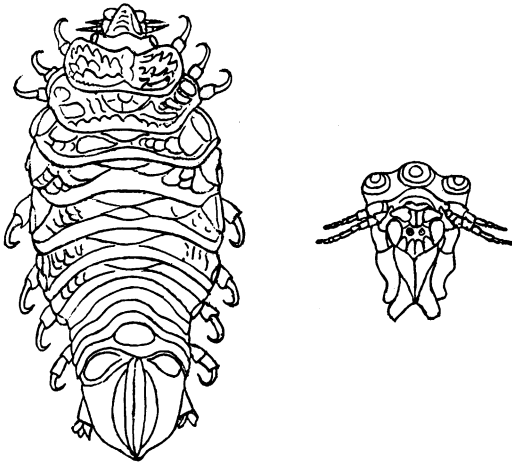


Fig. 277. *Asotana formosa* Schioedte and Meinert. Dorsal view and lower side of head. Adapted from Schioedte and Meinert, 1881.

ARTYSTONE SCHIOEDTE, 1866

This is one of the few satisfactorily differentiated genera of this family. It is similar to *Telotha* in most characters, but has the seventh pair of legs ambulatory in character, instead of prehensile, these being rather long, comparatively straight and ending in a small claw which is not hooked. The following is the type and only species. The male is not known.

Artystone trysibia Schioedte, 1866

Figure 278

Artystone trysibia SCHIOEDTE, 1866, p. 206 (orig. descr.), Pl. XI, figs. 4a-4i.—SCHIOEDTE AND MEINERT, 1884, p. 402, Pl. XVIII, figs. 1-4.—RICHARDSON, 1904, p. 23.

Much resembling *Telotha henselii* except for the difference in the seventh pair of legs which is a generic character. Aside from this, it differs in the following characters.

The first antennae are much smaller and shorter than the second, though both have about eight or nine articles. The head and abdomen are rather deeply immersed in the thorax and the abdomen is less narrowed anteriorly; the rear borders of the thoracic segments are more sinuous and the telson is longer and narrower, obtusely triangular be-

hind and its lateral borders have a tendency to become unrolled, accentuating its narrow appearance.

Color yellowish (unpigmented except the eyes).

Size of largest specimen, 30 mm. long, about 16 mm. wide.

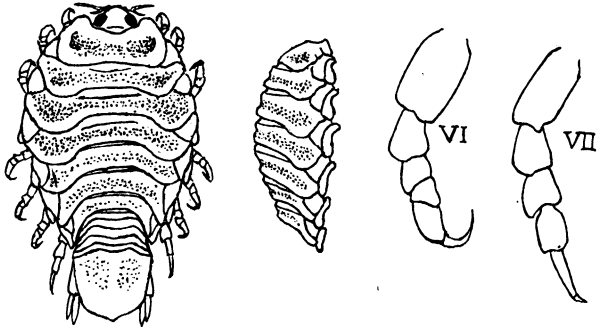


Fig. 278. *Artystone trysibia* Schioedte and Meinert. Female 25 mm. long, in the American Museum of Natural History.

LOCALITIES.—Schioedte (1866) described this species from a specimen taken from a fish in the La Plata River, which might indicate a salt-water habitat. Schioedte and Meinert, 1884, describe and figure a second specimen from “somewhere in Brazil.” Richardson, 1904, lists it as a fresh-water form. The American Museum of Natural History has two large specimens (30 mm. and 25 mm. long, respectively) from Avapupu, Rio Roraima, collected by Mr. G. H. H. Tate in December, 1927, and hence unquestionably from fresh water.

Sphaeromidae

Body compact, highly arched and in some cases capable of being rolled up into a ball, as in many land isopods. Head broad, both antennae of rather numerous articles well differentiated into peduncle and flagellum.

Abdomen of only two distinct segments, the anterior composed of segments 1–5 united, the other, the telson (segment 6), is very large and broad, and bears the uropoda laterally inserted. The inner branch of the uropoda is immovable; the outer (which is sometimes wanting) is movably articulated.

SPHAEROMA LATREILLE

“Body contractile, able to roll into a complete ball. Abdomen

composed of two segments, the first of which is formed by the fusion of several coalesced segments. The terminal segment is rounded, entire.

"The branches of the uropoda are similar, both being salient. The outer branch of the uropoda is denticulate along the exterior margin; the inner branch is immovable and fixed to the side of the abdomen; the outer branch is movable, and capable of folding under the inner branch.

"The second, third, and fourth articles of the palp of the maxillipeds not produced into lobes, but furnished with exceedingly long hairs.

"Legs ambulatory in structure." (Richardson, 1905, p. 280.)

This genus contains certain species that bore in submerged wood, and are in some places destructive to piles of wharves and other structures. Most of them inhabit salt or at least strongly brackish water, and therefore do not come under consideration in the present work.

Sphaeroma terebrans Bate, 1866

Figure 279

Sphaeroma destructor RICHARDSON, 1897, p. 105 (new descr.); 1901, p. 534; 1904, p. 24; 1905, p. 282 (descr.), Figs. 294-296.—VAN NAME, 1920, p. 63 (descr.), Figs. 16-19.—ATWOOD AND JOHNSON, 1924, p. 26.—Pratt, 1935, p. 436.

Sphaeroma terebrans BATE, 1866, Ann. Mag. Nat. Hist., (3) XVII, p. 28, Pl. I, fig. 5.—RICHARDSON, 1905, p. 282 (*tenebrans*).—NIERSTRASZ, 1931, p. 192. (See Stebbing, 1904, Spolia Zeyland., II, part 5, p. 16, and Van Name, 1920, p. 64.)

"The body is stout, short, and highly arched; in its general outline and in its power of rolling into a ball superficially resembling some of the terrestrial isopods. The dorsal surface is granular, on the posterior half of the body, the granules are coarse and the larger ones bear tufts of minute hairs to which mud adheres. The thoracic segments, especially the fourth and fifth, have on the dorsal part a well-marked transverse ridge, and more or less well-developed paired tubercles are present on the last one or two of the thoracic and on the abdominal segments, of which there are but two in the genus. The posterior end of the abdomen is broad and obtuse; its posterior lateral margins are conspicuously bent upward.

"The first and second antennae have flagella with 8 or 9 and 12 or 13 articles, respectively.

"The first legs have a short spine on the inner distal end of the propodus. It is present in both sexes but is wanting on the other legs. All the legs, however, including the first, have a short rounded extension of the posterior aspect of the propodus, which overlaps the base of the dactylus.

“The number of teeth on the outside edge of the external branch of the uropoda has been used as a distinguishing character in the species of this group. The Congo specimens indicate that it is not reliable for such a purpose. They have from three to five well-formed teeth in addi-

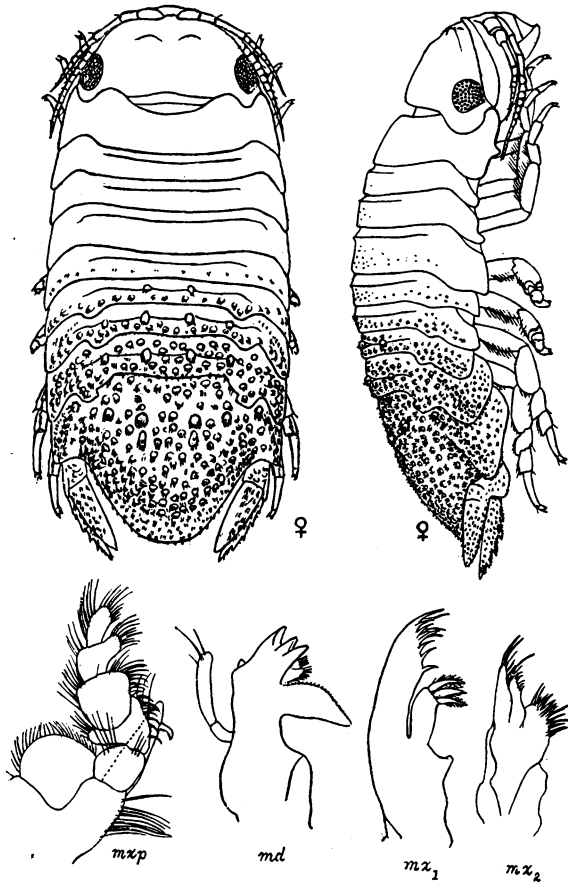


Fig. 279. *Sphaeroma terebrans* Bate. Female, and mouth parts.

tion to the apical point. The proximal tooth is often so reduced as to make it doubtful whether it should be counted or not, or it may be poorly developed or wanting on one side only.

“The drawings here reproduced are from a female. The males are, however, closely similar in general form, size, and appearance, but, as a rule, have the tubercles of the dorsal surface a little more prominent.

Often there are fairly well-developed tubercles on the sixth as well as seventh thoracic segment and one or two pairs of small tubercles posterior to the central pair on the last abdominal segment. The males also have the postero-lateral borders of that segment more broadly and conspicuously turned up than the females. This gives the posterior end of the body a slightly narrower outline as seen from above.

"The largest individuals measure 9.5 mm. to 10 mm. long to the tip of the abdomen. Their color varies from yellowish to a fairly dark brown or greenish brown, the color being due to minute, irregularly branching pigment-spots." (Van Name, 1920, p. 64.)

DISTRIBUTION.—Found boring in decaying wood, dead mangrove roots, etc., in warm and tropical regions of both the Old and New World, and is often destructive to piles of wharves, bridges, and other wooden structures in both salt and fresh water. Bate described it from Brazil from salt water; Richardson described it (as *S. destructor*) from entirely fresh water at Palatka, Florida.

EXOSPHAEROMA STEBBING

Differs (according to Richardson, 1905, p. 287) from *Sphaeroma* in having the second, third, and fourth articles of the palp of the maxillipeds produced into lobes and the outer branch of the uropoda not denticulate on the outer margin.

Exosphaeroma dugesi (Dollfus), 1893

Figure 280

Exosphaeroma dugesi RICHARDSON, 1905, p. 295 (descr.), Figs. 313, 314.—BRUES, 1924, p. 415.

Sphaeroma dugesi DOLLFUS, 1893, p. 115 (orig. descr.), Figs. 1, 2.—RICHARDSON, 1904, p. 24.

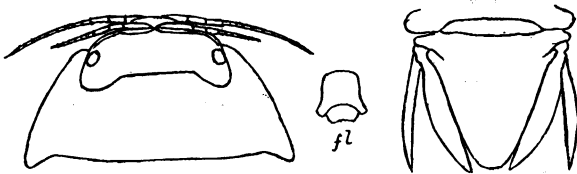


Fig. 280. *Exosphaeroma dugesi* (Dollfus). *fl*, frontal lamina and clypeus. Adapted from Dollfus, 1893, and Richardson, 1905.

The following extracts are quoted from Richardson's description: "Body ovate, twice as long as wide, 6 mm.: 12 mm.

"Head twice as wide as long, 2 mm.: 4 mm., with a frontal border

arising between the eyes and produced in a small median point. Eyes small, round, composite, and situated in the post-lateral angles of the head. . . . The flagellum (of the first antennae) is composed of eight articles. . . . The flagellum (of the second antennae) is composed of twelve articles. . . . The frontal lamina is large and conspicuous, and has the anterior division wide and long, with the post-lateral or ventral angles drawn out, giving it somewhat of a horse-shoe shape. The clypeus is transversely oblong, and fits into the concavity of the posterior part of the frontal lamina; its posterior margin is fringed with cilia. . . .”

LOCALITY.—Warm springs of Aguas Calientes. State of Aguas Calientes, Mexico.

***Exosphaeroma thermophilum* (Richardson), 1897**

Figure 281

Exosphaeroma thermophilum RICHARDSON, 1905, p. 294 (descr.), Figs. 311, 312.—COCKERELL, 1912, p. 49.—GIAMBIAGI, 1922, p. 236.—BRUES, 1924, p. 415.

Sphaeroma thermophilum RICHARDSON, 1897a, p. 465 (orig. descr.); 1900a, p. 223; 1904, p. 24.

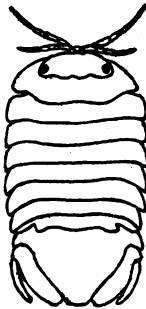


Fig. 281. *Exosphaeroma thermophilum* (Richardson). Adapted from Richardson, 1905.

This species, according to the original description of Richardson, can be readily distinguished from *E. dugesi*, to which it is closely related, by the absence of hairs on the body and by the uropoda, whose form is clearly shown in the figure.

LOCALITY.—A warm spring at Socorro, New Mexico.

***Exosphaeroma oregonensis* (Dana), 1853**

Figure 282

Sphaeroma oregonensis DANA, 1852–1855, p. 778 (orig. descr.), Pl. LII, fig. 4; 1856, p. 177.—RICHARDSON, 1904a, p. 214.

Exosphaeroma oregonensis RICHARDSON, 1905, p. 296 (descr.), Figs. 315, 316.

This well-known and widely distributed species of the northern North Pacific has been reported as found in fresh water at Popoff Island, Alaska (Richardson, 1904a, p. 214, *Sphaeroma o.*); 1905, p. 296, but is

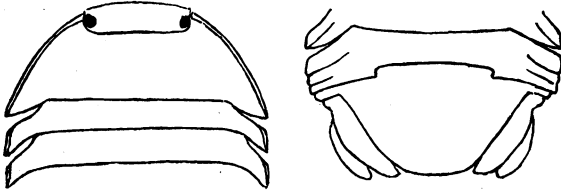


Fig. 282. *Exosphaeroma oregonensis* (Dana). Adapted from Dana, 1855.

normally a species of salt or strongly brackish water and does not appear to require description in this work.

***Exosphaeroma rhombfrontalis* Giambiagi, 1922**

Giambiagi (1922, pp. 239-241, Pl. III) describes and figures under this name a marine species from Argentina which inhabits waters that are at times of greatly diminished salinity, but the species apparently has no claim to be considered a fresh-water form.

SUBORDER VALVIFERA OR IDOTHEOIDEA

This group is not represented in America, so far as I am aware, by any true fresh-water species. In it the uropoda are valve-like and attached under the abdomen to the lateral edges of the large terminal segment of the body which is composed of several united abdominal segments. The uropoda close like a pair of doors over the pleopoda 1 to 5, which are modified for respiratory purposes.

Idotheidae

See Richardson, 1905, pp. 346, 347, 368, 404, for diagnoses of the family and of the following genera.

***Pentidotea lacustris* (Thomson), 1879**

A fresh-water form from New Zealand with which Miers, 1881a, (p. 39, Pl. I, figs. 11, 12) doubtfully identifies specimens from "Port Henry, Straits of Magellan." It is uncertain whether the New Zealand fresh-water and the South American forms are really specifically identical. They appear to be at least distinct varieties (see Chilton, 1909, p. 659, and 1916, Jour. Zool. Res., I, p. 156), and Miers gives no data to show that the South American specimens were from fresh water.

For original description see Thomson, 1879, Trans. Proc. New Zealand Inst., XI, p. 251 (*Idotea lacustris*).

Cleantis linearis Dana, 1849

Cleantis linearis DANA, 1849, Amer. Jour. Sci., (2) VIII, p. 427 (orig. descr.); 1852-1855, p. 708 (descr.), Pl. XLVI, figs. 9a-9i.

Recorded by Richardson (1904, p. 23) as a fresh-water species, on what grounds I do not know. Dana described it from the coast of Patagonia.

Mesidotea entomon (Linnaeus), 1767

Figure 283

Oniscus entomon LINNAEUS, 1767, 'Syst. Nat.', 12th Ed., p. 1060.

Mesidotea entomon RICHARDSON, 1905, p. 348, Figs. 374-376.—BOONE, 1920, pp. 19, 21.

Mesidothea entomon JOHANSEN, 1920, pp. 145, 147; 1922, p. 17.

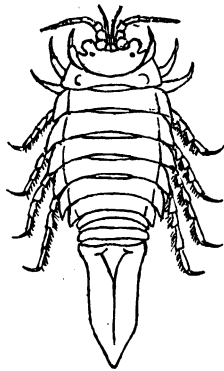


Fig. 283. *Mesidotea entomon* (Linnaeus). Adapted from Gerstaecker, 1881, in Bronn, 'Klass. u. Ordn. d. Thier-Reichs,' V.

This is a marine species attaining a length of 75 mm., found in the sand and gravel of sea beaches and in water to fifteen fathoms in depth in the circumpolar regions, south on the American coasts to Labrador and Pacific Grove, California. For description see Richardson, 1905, p. 348.

Johansen (1922) reports it as ascending into brackish and fresh water in arctic Alaska, and expresses the belief that it may live in certain lakes there in a landlocked condition. These lakes, however, are strongly saline in their deeper parts. Boone, 1920, p. 21, reports egg-bearing specimens found in water "quite fresh" in the outlet of a lake at Konganevik, Camden Bay, Alaska.

It has also been reported from fresh-water lakes in Sweden by Loven.

According to Packard (1871, p. 752; 1872, p. 19; 1879, p. 19), "a species representing this has been detected by Dr. Stimpson at the bottom of Lake Michigan." I know of no description of such a species.

SUBORDER ASELLOTA

Legs of the first pair not cheliform. Uropoda terminal, biramous. Pleopoda exclusively branchial, one pair in the female being generally transformed into a single operculum covering the succeeding pairs. Epimera very small or obsolete. All the segments of the abdomen fused together, although occasionally one or two short segments are partially visible anterior to the terminal segment.

Asellidae

Body depressed; segments of thorax with the lateral part expanded in the form of lamellae. Eyes small or sometimes wanting, widely separated. Both antennae with flagella of many articles. The abdominal segments, except sometimes the first two, which are very short, are fused into a single large, broad, flattened terminal segment. First and second pairs of pleopoda small (the second wanting in the female), the third pair large and forming an operculum for the succeeding pairs. Mostly fresh-water forms, many inhabiting subterranean waters.

In using the descriptions and figures of members of this family it should be remembered that in it the outline and appearance of the body varies very greatly with the state of contraction of the intersegmental muscles, owing to the very loose articulation of the segments. Further investigation as to the constancy of the characters on which some of the American species of this group are based seems to be needed. The length of the antennae and of the uropoda and their branches and the number of articles in the antennal flagella are subject to great variation individually and with age. (See statements under *A. incisus*, also the note under *Conilera stygia* Packard.)

ASELLUS GEOFFROY ST.-HILLAIRE, 1764

Mandibles with a palp. Last six pairs of legs with the dactylus provided with one claw. Eyes present.

Asellus communis Say, 1818

Figures 1, 284, 285

Asellus communis SAY, 1818, p. 427 (orig. descr.).—MILNE-EDWARDS, 1840, p. 147.—DE KAY, 1844, p. 49.—SMITH, 1874, p. 657, Pl. I, fig. 4.—FORBES, 1876, pp. 8, 10, Figs. 17, 18.—O. P. HAY, 1882, p. 241.—BOVALLIUS, 1886, p. 12.—UNDERWOOD, 1886, p. 358.—HERRICK, 1887, p. 40.—PACKARD, 1888, pp. 30, 31, etc.—STEBBING,

1893, p. 377.—RICHARDSON, 1900a, p. 297; 1901, p. 551; 1905, p. 420, Figs. 472, 473.—PAULMIER, 1905, p. 178, Fig. 50.—RATHBUN, 1905, p. 43.—NORTON, 1909, p. 250.—BANTA, 1910, pp. 246, etc.—FOWLER, 1912, p. 239 (descr.), Pl. LXXII.—STAFFORD, 1912, p. 118 (descr.), Figs. 65, 66.—HUNTSMAN, 1913, p. 274.—SHELFORD, 1913, pp. 90, etc., Fig. 55.—PRATT, 1916, p. 377, Fig. 602.—NEEDHAM AND LLOYD, 1916, p. 191.—KUNKEL, 1918, p. 231 (descr.), Fig. 74.—WARD AND WHIPPLE, 1918, p. 841, Fig. 1305.—RACOVITZA, 1920, p. 79 (descr.), Figs. 52-73.—JOHANSEN, 1920, pp. 146-148 (notes on habits).—RACOVITZA, 1923, p. 112; 1925, pp. 576, 597, 620, Figs. 195, 197-199.—JOHANSEN, 1925, p. 138; 1926, p. 26; 1929, p. 105.—ALLEE, 1929, p. 14.—STAMMER, p. 130 (see below).—MILLER, 1933, p. 102.—PRATT, 1935, p. 439, Fig. 604.

Asellus militaris O. P. HAY, 1878, p. 90.

Asellus vulgaris GOULD, 1841, p. 337.

See also remarks under *Asellus intermedius*.

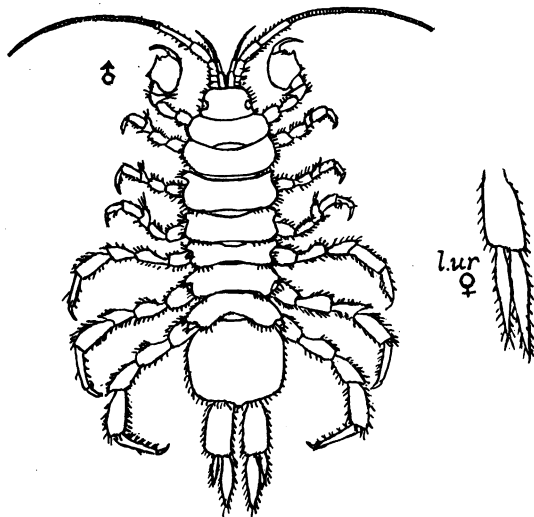


Fig. 284. *Asellus communis* Say. Large figure after Harger (in Smith, 1874).

"Body oblong-ovate, about three times as long as wide; thorax and abdomen of equal width. Head narrower in front than behind and with anterior margin excavate. Eyes small, round, compound, situated laterally, half way between front and hind margins.

"First antennae extending to the middle of last joint of second pair; second joint longer than third which, in turn, is longer than the first; flagellum made up of about fourteen joints. Second antennae more than half as long as body; fifth joint of peduncle one and two-thirds as long as fourth joint, which equals the length of the first three joints together; flagellum much longer than peduncle.

“Mandibles with triarticulate palp. Maxillipeds with five-jointed palp.

“First pair of legs subchelate; carpus very minute; propodus oblong, with hind margin bearing several stout spines at junction with palm; dactyl nearly as long as propodus and deeply serrated; succeeding legs with numerous spines; merus prolonged on anterior margin and armed with a group of long spines. Coxal plates very small.

“Abdomen composed of two short segments which are visible only on the mid-dorsal line and a large terminal one which is nearly as long as it is wide and has the postero-lateral angles rounded and the posterior margin produced in a broad triangular process between the uropods. Uropods as long as last segment of abdomen; rami styliform, inner ramus as long as peduncle, outer one about two-thirds as long.

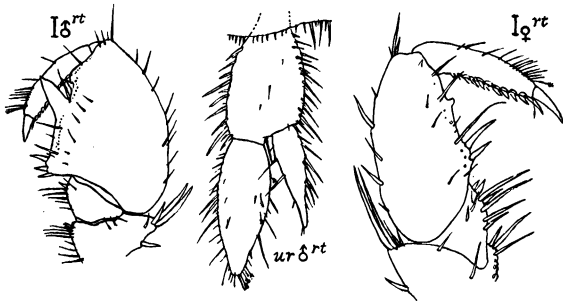


Fig. 285. *Asellus communis* Say. Details adapted from Racovitza, 1920. Specimens from Washington, D. C.

“Length 15 mm.” (Kunkel, 1918, pp. 231, 232.)

Epimera are present on all the thoracic segments, and are situated at the anterior lateral corners of the anterior segments, but farther back along the lateral margin in the posterior segments. In segments V, VI, and VII, they occupy a notch or emargination in the posterior part of the border.

To this description, it should be added that the chelae of the first legs are much wider in the male than in the female and that the females also have the legs slenderer and the uropoda narrower than in the male, both the basal joint and the two branches of the uropoda being narrower and the latter more nearly of the same length, though the inner branch is always longer. Immature individuals have the legs, chelae and uropoda more slender than those of adults.

Color brown or dusky, more or less spotted or mottled with small yellowish markings, noticeable only on magnification. Packard, 1888, p. 33, proposes the name var. *pallida* for two white specimens from the subterranean waters of "Lost River" (perhaps in Mammoth Cave).

DISTRIBUTION.—This is by far the most abundant and widely distributed fresh-water isopod in the eastern half of the United States, also in southern Canada (Ontario, Quebec, and Nova Scotia), occurring both in ponds and running streams, especially where there are water plants, and throughout much of its extensive range it is the only fresh-water isopod. More observations regarding the northern, southern, and western limits of its range are still to be desired. Type locality: vicinity of Philadelphia.

This species was carefully described and the details of the appendages figured by Racovitza, 1920, but unfortunately his studies seem to have been based on three specimens only, from the Potomac River at Washington, D. C.

Stammer, 1932, makes this the type of a subgenus, *Conasellus*, to which he also assigns *A. intermedius*, *A. brevicauda* and *A. hoppinae*.

***Asellus intermedius* Forbes, 1876**

Figure 286

Asellus intermedius FORBES, 1876, p. 10 (orig. descr.), Figs. 12–16.—UNDERWOOD, 1886, p. 358.—PACKARD, 1888, p. 33.—RICHARDSON, 1900a, p. 297; 1905, p. 422 (descr.), Figs. 474–476.—NORTON, 1909, p. 250.—PEARSE, 1913, p. 3.—JOHANSEN, 1920, p. 148 (see below).—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

Sides of head entire, with a small lobe on either side near the base. Eyes small, composite. Flagellum of the first antennae composed of nine articles, that of the second antennae of about fifty articles.

"The first segment of the thorax has the lateral margins entire, with the anterior angle not developed and the epimeral lobe large and conspicuous and placed antero-laterally. The second, third, and fourth segments have the lateral margins entire, with the antero-lateral angles well developed, and the epimera small and almost inconspicuous and placed antero-laterally. The fifth segment has the anterior part of the lateral margin produced in a well-defined lobe, with the epimeron large and conspicuous and placed about the middle of the lateral margin, just below the anterior lobe. The sixth and seventh segments have the posterior part of the lateral margin excavate, the anterior part projecting in a large lobe, and the epimera large and conspicuous and posteriorly situated just below the middle of the lateral margin. . . .

"The first pair of legs are subchelate, and have the propodus armed on the inferior margin with a triangular process about the middle, and below this a strong conspicuous spine. The inferior margin of the dactylus is furnished with a row of numerous short spines. All the other pairs of legs are ambulatory." (Richardson, 1905, pp. 422, 423.)

Length, 7 mm.

DISTRIBUTION.—"Found in the hill country of southern Illinois under stones in small streams." Type (in the Harvard Museum) re-described by Richardson, who adds (1905, p. 423):

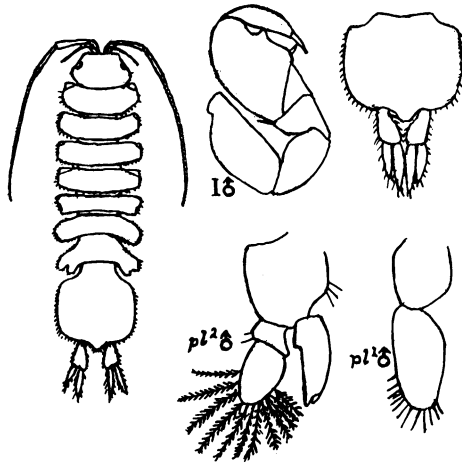


Fig. 286. *Asellus intermedius* Forbes. Adapted from Forbes, 1876 and Richardson, 1905.

"Specimens collected in the Potomac River near Washington of the same or perhaps a closely related species differ only in their larger size, being 4 mm. : 11 mm. ; in having three more articles in the flagellum of the first antennae, the flagellum of the second antennae having also a larger number of articles, sixty-three altogether, and in having the uropoda equal to two-thirds the length of the terminal segment."

Norton, 1909, reports it from localities in Maine (Brunswick, Portland, and vicinity). Pearse, 1913, reports it from Omaha, Nebraska, and Alma, Michigan. It is assigned to the subgenus *Conasellus* by Stammer, 1932. According to a statement made by Johansen, 1920, at the end of p. 148, it would seem that this species was regarded by Huntsman and by Johansen himself as not distinct from *A. communis*, a possibility which has also occurred to the present writer.

Asellus aquaticus (Linnaeus), 1761

Figure 287

Asellus aquaticus PARKER AND HASWELL, 1897, 'Treatise on Zoology,' I, p. 545, Fig. 432.—SARS, 1899, p. 97 (descr.), Pl. XXXIX.—RICHARDSON, 1905, p. 428 (descr.), Fig. 486.—RACOVITZA, 1919–1925, see remarks below.—JOHANSEN, 1920, p. 147.—NIERSTRASZ AND SCHUURMAN STECKHOVEN, 1930, p. 99, Fig. 46.—BIRSTEIN, 1933, p. 474.

Asellus groenlandicus KROYER, 1838, p. 318.—HANSEN, 1888, p. 190.

Oniscus aquaticus LINNAEUS, 1761, 'Fauna Svecica,' 2nd Ed., p. 500 (orgi. descr.).—FABRICIUS, 1780, 'Fauna groenlandica,' p. 251.

Described thus by Sars, 1899, p. 97:

"Body oblong oval, in male slightly widening behind, in female with the greatest width about in the middle and equalling half the

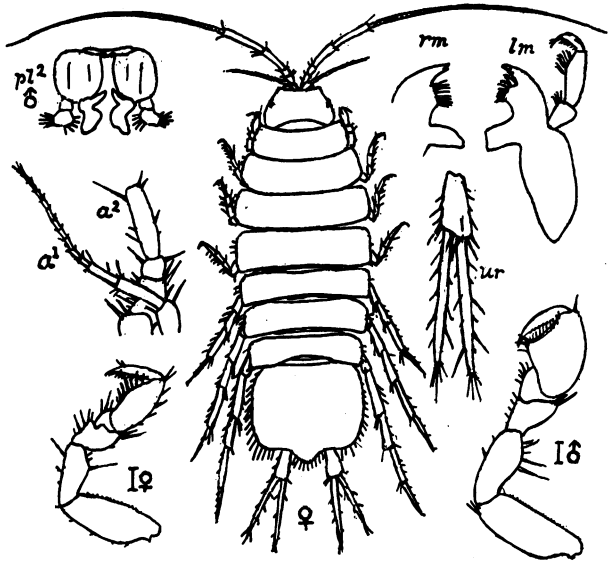


Fig. 287. *Asellus aquaticus* (Linnaeus). Adapted from Sars, 1899.

length, not including the caudal segment. Cephalon broader than it is long, with a slightly setous prominence on each side near the base, frontal edge straight. Segments of mesosome of nearly uniform size, lateral parts transversely truncated at the tip, and clothed with stiff hairs. Caudal segment about half the length of the mesosome, rounded quadrangular in form and fringed all round with stiff hairs; terminal edge bisinuate, with an obtuse median prominence. Eyes consisting

each of only 4 visual elements, ocular pigment not confluent. Superior antennae about the length of the peduncle of the inferior ones, flagellum composed of 10–12 articulations. Inferior antennae not quite as long as the body, flagellum more than twice the length of the peduncle. Legs densely clothed with spiniform bristles; 1st pair rather short with the propodus in female oblong oval, in male subtriangular, inner edge forming an obtuse prominence, armed with 3 strong spines. Uropoda with the rami more than twice as long as the basal part, and edged with scattered spiniform bristles. Colour very dark, fuscous, spotted with white. Length of adult female 8 mm., of male 12 mm."

According to Richardson, 1905, who described Greenland specimens, epimera are present on all the thoracic segments. On the first they are conspicuous and situated on the anterior lateral corners, on the second and third they are similarly situated but very small. In the fifth and succeeding segments, they become larger and are situated farther back, near or at the posterior corners. It appears to have slender limbs and uropoda than *communis*.

For descriptions and figures of many details of this species, especially of the appendages, the reader may be referred to Racovitza's (1919–1925) 'Notes sur les Isopodes,' many of which deal largely with this species.

DISTRIBUTION.—This is the common species of *Asellus* throughout most of the more northern parts of the Old World, but its distribution is probably not so wide as was formerly supposed, as other allied forms have been confused with it. (See Racovitza, 1919–1925, No. 2, p. 36.) It is apparently entitled to a place in the American list only because it occurs in Greenland, where it has been recorded by several authors, but *A. tomalensis* of northwestern America may perhaps be a very close ally.

Packard's (1897) record from Labrador, quoted by Richardson, 1905, refers to a land isopod (see Johansen, 1926, p. 140). The "*Asellus aquaticus*" from the Rideau River, Ontario, mentioned in a note in the Ottawa Naturalist, 1907, p. 102, was doubtless nothing but the common *A. communis* Say (see Johansen, 1920, p. 148).

***Asellus tomalensis* Harford, 1877**

Figure 288

Asellus tomalensis HARFORD, 1877, p. 54 (orig. descr.).—RICHARDSON, 1899, p. 856 (1899, Ann. Mag. Nat. Hist., (7) IV, p. 322); 1900a, p. 297.—HAY, 1902, p. 422.—RICHARDSON, 1904, p. 668 (new descr.), Figs. 15–17; 1904a, p. 224 (descr.), Figs. 110–112.—HOLMES, 1904, p. 321 (descr.), Pl. xxxvii, figs. 39–42.—RICHARDSON,

1905, p. 431 (descr.), Figs. 487-489.—HOUSE, 1911, p. 132.—JOHANSEN, 1922, p. 156.—FEE, 1927, p. 20 (descr.).—JOHANSEN, 1929, p. 105.—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

Harford (1877) described this species very briefly and insufficiently from a single mutilated specimen taken at Tomales Bay, California, but evidently in fresh water. Holmes, 1904, redescribed it at some length and figured the type. Two of his figures are here reproduced. Richardson 1904, 1905, gave a new description and several figures, yet our in-

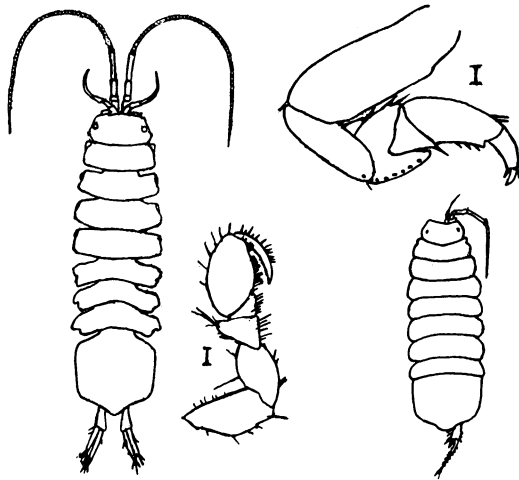


Fig. 288. *Asellus tomalensis* Harford. Two right-hand figures from original type (Holmes, 1904). Two left-hand figures after Richardson, 1905.

formation regarding it remains very insufficient for determining its diagnostic characters and relationships. According to Holmes, it may readily be distinguished from *communis* by the fact that in a dorsal view the thoracic epimera are concealed by the main portion of the somites in *tomalensis* but visible in *communis*. It appears probable that its relationship is closer with *aquaticus* than with *communis* and other American forms. Richardson gives the number of articles in the flagella of the first and second antennae as approximately ten and fifty-five, respectively. Length of Holmes type, about 7.5 mm.

DISTRIBUTION.—In fresh-water streams and lakes in the coastal region from northern California (Tomales Bay, the type locality), to British Columbia (Vancouver, Nanaimo and Ischaschat). Holmes

records it from a well in Humboldt County, California; Richardson (1904, p. 668) described and assigned to this species specimens from a lake near Seattle, Washington. The identity of Richardson's specimens was questioned by Holmes (1904, p. 323), but seems to have been settled satisfactorily by a comparison with the type (see Richardson, 1904, p. 668), which is in the Academy of Natural Sciences, San Francisco.

House, 1911, lists it from Indiana, doubtless incorrectly.

***Asellus attenuatus* Richardson, 1900**

Figure 289

Asellus attenuatus RICHARDSON, 1900a, p. 297 (characters in key); 1901, p. 552 (descr.), Figs. 26-28.—HAY, 1902, p. 422.—RICHARDSON, 1905, p. 426 (descr.), Figs. 482-485.—FOWLER, 1912, p. 521.—STAMMER, 1932, p. 130.—MILLER, 1933, p. 102.

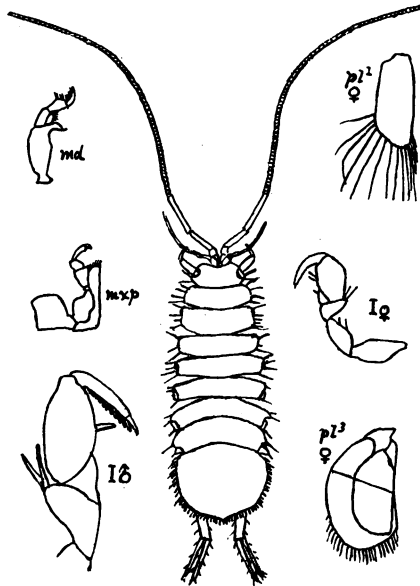


Fig. 289. *Asellus attenuatus* Richardson. Adapted from Richardson, 1905.

“Distinguished from *A. communis* by the very narrow cylindrical branches of the uropoda, and the narrow oval propodus of the first pair of legs which lacks prominent acute teeth on the palmar margin but is armed in the male with one stout spine. First antennae with a flagellum of thirteen articles, that of the second antennae with very numerous (over sixty) articles according to Richardson's figures. The second antennae are as long as the body.

"Epimera are present on all the thoracic segments and are situated at the anterior angles in the first four; the fifth has the posterior two-thirds emarginate, the epimeron conspicuous in the emargination; the sixth and seventh posteriorly emarginate, with the epimeron conspicuous." (Richardson, 1905, p. 427.)

Color reddish brown mottled with white. All the free margins of the body fringed with hairs; the lateral margins of the segments armed with spines. Dimensions not given.

LOCALITY.—Washington Ditch, Dismal Swamp, Virginia, many specimens collected. Type in U. S. National Museum (Richardson).

***Asellus brevicauda* Forbes, 1876**

Figure 290

Asellus brevicauda FORBES, 1876, p. 8 (orig. descr.), Figs. 8–11.—UNDERWOOD, 1886, p. 358.—PACKARD, 1888, p. 34.—RICHARDSON, 1900a, p. 297; 1905, p. 423. (descr.), Figs. 477–479.—STAMMER, 1932, p. 130 (see below).—MILLER, 1933, p. 102.

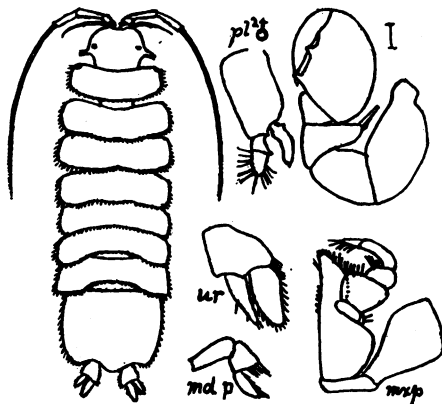


Fig. 290. *Asellus brevicauda* Forbes. Adapted from Forbes, 1876, and Richardson, 1905.

Anterior margin of head excavate and its antero-lateral angles somewhat truncate; its lateral margins near the rear produced into a small lobe on each side. First antennae with a flagellum of eleven to thirteen articles. The second antennae have a flagellum with from sixty to ninety articles (the higher number in the male).

Lateral margins of thoracic segments straight and entire or nearly so. Epimera distinguishable on the first segment only.

First legs of male with the palmar margin of the propodus straight,

with one strong tooth at its base and another at its middle. In the female the propodus is narrower and the palmar margin somewhat concave; the tooth at the middle is smaller but distinct. Many additional details are given in the original description.

DISTRIBUTION.—“Abundant in the hill country of southern Illinois, under stones in small streams.” (Forbes). Richardson, 1905, mentions Jackson and Union Counties in Illinois, and a small creek emptying into Redfoot Lake, Tennessee.

This species is assigned to the subgenus *Conasellus* by Stammer, 1932.

***Asellus hoppinae* Faxon, 1888**

Figure 291

Asellus hoppinae PACKARD, 1894, p. 731.

Asellus hoppinae FAXON, in GARMAN, 1889, p. 237 (orig. descr.), Pl. II, fig. 2.—HAY, 1902, p. 422.—RICHARDSON, 1905, pp. 420, 425, Figs. 480, 481.—STAMMER, 1932, p. 130 (see below).—MILLER, 1933, p. 102.

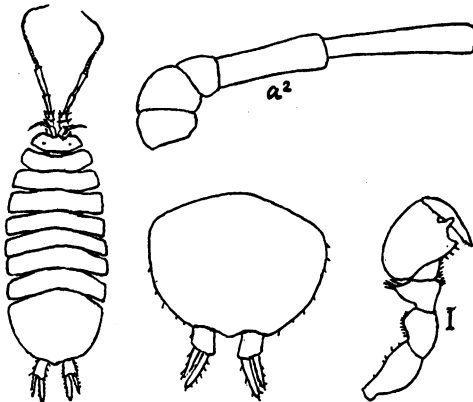


Fig. 291. *Asellus hoppinae* Faxon. Adapted from Faxon 1889, and Richardson, 1905.

Epimera not evident on any of the segments of the thorax. Head with the lateral margins not produced into lobes. First pair of antennae with a flagellum of about seven articles; they extend almost to the end of the fourth article of the peduncle of the second antennae. Second pair of antennae extending to the posterior margin of the seventh thoracic segment, their flagellum with about forty articles. First pair of legs subchelate, the propodus with two triangular processes on the clasping margin. Inner branch of uropoda twice as long as the basal segment, the outer branch about three-fourths its length.

DISTRIBUTION.—Subterranean waters in southwestern Missouri. Type locality: Day's Cave (Missouri). The American Museum of Natural History has one from Pine Run Cave, Stone County, Missouri.

This species is assigned to the subgenus *Conasellus* by Stammer, 1932.

***Asellus incisus*, new species**

Figure 292

Lateral parts of head expanded and flattened. The lateral margins, which converge toward the front, have a sharply defined narrow notch or cleft extending in at right angles toward the eyes, which are placed some distance in from the margin. Anterior border of head with an emargination or sinuous outline. Eyes somewhat

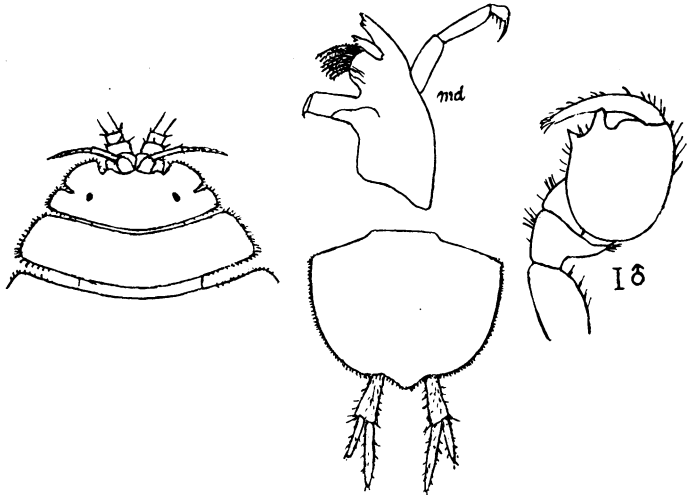


Fig. 292. *Asellus incisus*, new species.

irregularly oval, rather small but well pigmented and conspicuous. Flagellum of first antennae with about eight articles. Second antennae very long, almost as long as the body and with over seventy articles in the flagellum in the type.

The epimera are coalesced with their segments. There is a great variation in the length of the uropoda as a whole and in their branches. In the type, their basal segment projects beyond the telson for more than one-fourth of the length of the latter. The external branch much exceeds in length the exposed part of the basal segment and the inner branch is less than two-thirds the length of the outer. The other specimens, perhaps because not fully adult, have the uropoda much shorter, partly because the branches are proportionately shorter, but chiefly because the basal segment extends less beyond the end of the telson (in some young examples it projects but very little), and in many cases there is much less difference in the length of the two branches, though the inner is always longer and stouter.

Color very light yellowish brown, more or less unevenly mottled or marbled.

Length of the largest specimen (type), 15.5 mm. The remaining specimens obtained are all much smaller and more or less immature, ranging from 9 mm. to less than 4 mm. in length.

LOCALITY.—Spring in Marvel’s Cave, Stone County, Missouri. 18 specimens including the type (Cat. No. 6527), in the American Museum of Natural History.

This species apparently is well distinguished from our other species of *Asellus* by having a notch or cleft in the lateral margin of the head as in most species of *Mancasellus*, but having a well-developed mandibular palp, it cannot be placed in that genus.

Asellus species

Asellus sp. undet. PACKARD, 1888, p. 151, Pl. IV, fig. 4; 1894, p. 731.

The rather small and crude figure of this species, drawn from a single specimen obtained in Gill’s Branch, near Lancaster, Garrard County, Kentucky, would represent *A. hoppinae* fairly well except that the antennae and uropoda are somewhat longer, and the latter slenderer. No eyes appear in the figure but from Packard’s few statements (he remarks on its resemblance to *A. hoppinae*, 1894, p. 731) we may judge that it is not a blind species.

CAECIDOTEA PACKARD, 1871

This group is composed of blind species inhabiting subterranean waters in various parts of the United States. It is poorly distinguished from *Asellus*, the loss of the eyes and a more elongate terminal body segment being the chief differences, and as its species have without doubt arisen independently from different members of *Asellus*, its recognition as distinct from that genus has been objected to by several authorities, notably by Miller, 1930.

It is retained in the present work as a matter of convenience, without implying a single phylogenetic origin for its members. Type *C. stygia* Packard, 1871.

The following key to the species is given by Creaser, 1932, pp. 5, 6.

- 1a.—Eyes present but reduced. Japan.....*C. kawamurai* Tattersall, 1921.
- 1b.—Eyes absent.
 - 2a.—Outer terminal ramus of uropod at least half as long as peduncle.
 - 3a.—Length of telson and abdomen more than one-third as long as length of head and thorax. Tennessee and Georgia.....
.....*C. nickajackensis* Packard, 1881.

- 3b.—Length of telson and abdomen one-fourth as long as length of head and thorax. Japan..... *C. akiyoshiensis* Ueno, 1927.
- 2b.—Outer terminal ramus of uropod distinctly less than one-half as long as peduncle.
- 4a.—Uropods not as long as body. Second antenna shorter than body.
- 5a.—Propodus of first walking leg of male with two tubercles along margin opposed to dactylus. Alabama..... *C. alabamensis* Stafford, 1911.
- 5b.—Propodus of first walking leg of male with three tubercles along margin opposed to dactylus. Kansas..... *C. tridentata* Hungerford, 1922.
- 5c.—Propodus of first walking leg of male with five tubercles along margin opposed to dactylus. Virginia, Kentucky, Indiana, and Illinois..... *C. stygia* Packard, 1871.
- 5d.—Propodus of first walking leg of male with about four long spines on inner margin. Dactylus with eleven spines on margin opposed to propodus. Tennessee..... *C. richardsonae* Hay, 1901.
- 4b.—Uropods as long as body. Second antenna twice as long as body. Missouri..... *C. antricola* Creaser.

C. smithii Ulrich is not included on the ground of being insufficiently known.

Caecidotea stygia Packard, 1871

Figure 293

Asellus stygius FORBES, 1876, p. 11 (descr.), Figs. 19, 20.—UNDERWOOD, 1886, p. 359.—PRATT, 1935, p. 439 (*stygia*).

Caecidotea microcephala COPE, 1872, p. 411, Figs. 109, 110; 1872*a*, pp. 163, 174.—SMITH, 1873, p. 244.

Caecidotea stygia PACKARD, 1871, p. 752 (orig. descr.), Figs. 132, 133; 1872, p. 19, Figs. 132, 133; 1873, p. 95.—SMITH, 1874, p. 661.—PACKARD, 1879, p. 19, Figs. 132, 133.—HUBBARD, 1880, pp. 36, 79, 80, Fig. 10.—PACKARD, 1888, pp. 10, 12, etc., 29 (descr.), Pl. III, figs. 1–8, Pl. IV, figs. 1, 2.—STEBBING, 1893, p. 377.—PACKARD, 1894, pp. 729, 742.—RICHARDSON, 1900*a*, p. 297; 1901, p. 553.—HAY, 1902, pp. 423, 424 (*stygius*), 427, 428, Figs. 4, 5*a*, 5*g*.—RICHARDSON, 1905, p. 434 (descr.), Figs. 490–492.—BANTA, 1910, pp. 246, etc.—FOWLER, 1912, p. 522.—PRATT, 1916, p. 377.—RACOVITZA, 1920, p. 99; 1923, p. 107; pp. 580, 620 (*Caecidothea*), Figs. 196, 200, 201.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

Cecidotea stygia PACKARD AND COPE, 1881, p. 879.—PACKARD, 1885, p. 85; 1885*a*, p. 99.

This, the type species of the genus, is widely distributed in underground waters, and if the various authors who have referred specimens to it are all correct, it is very variable. According to Hay (1902) rudi-

ments of eyes may be found in some individuals. The number of joints in the first antennae is given as from ten to seventeen. The second have from seventy or less to eighty-five articles in the flagellum. In the female, they are about two-thirds the length of the body, in the male, somewhat longer. According to Richardson, epimera are present on all the thoracic segments and have on the first three segments the form of "small and narrow plates placed just below the anterolateral angles. On the fourth segment, they occupy the middle of the lateral margin. On the last three, they are posteriorly placed." According to the same author, the propodus of the first leg has two large and three small

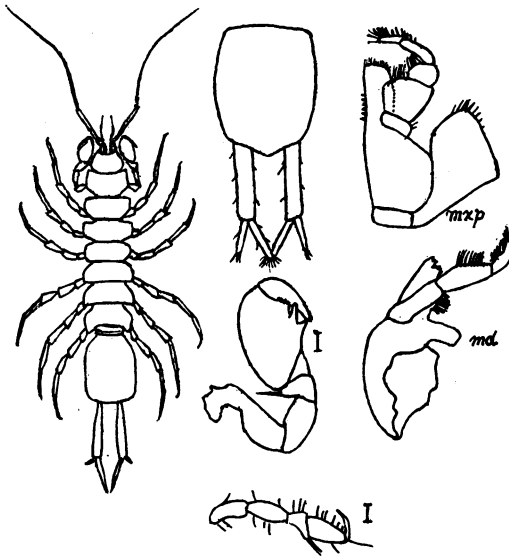


Fig. 293. *Caecidotea stygia* Packard. Adapted from Hay, 1902 (left figure), and Richardson, 1905 (details).

narrow teeth on the palmar surface of the chela. But Packard's original illustration, perhaps representing a female, shows no teeth but a row of six slender spines there. The uropoda vary greatly in development, individually and with age. In normal adult specimens, their basal segments are very long and narrow, about equaling the telson in length, the inner branch is likewise very long, while the outer is short.

Color practically white.

Length, up to 16 mm.

DISTRIBUTION.—This is given in detail by Packard, 1888, p. 32,

and comprises pools and streams in various caves in Kentucky, including Mammoth (the type locality), White's, Diamond, Salt, Wyandotte, and Walnut Spring Caves. Also, in Indiana, Bradford, and Carter Caves; wells in Illinois, and wells in Annville, Lebanon County, Pennsylvania, and springs and wells in limestone rocks in Cumberland and York Counties, Pennsylvania. Richardson adds Grahams Spring, Lexington, Virginia.

A "variety" which, however, he does not name, with but eight to nine joints in the first antennae, shorter head and body, and shorter abdomen, is recorded by Packard, 1888, p. 32, from Long Cave, near Glasgow Junction, Kentucky.

Caecidotea alabamensis Stafford, 1911

Figure 294

Caecidotea alabamensis STAFFORD, 1911, p. 572 (orig. descr.), Figs. 189, 190.—HUNGERFORD, 1922, pp. 175, 176.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

According to Miss Stafford, this species is most closely related to *C. stygia*. "But it differs from *C. stygia* in having the propodus of the first leg armed with two large triangular processes only, and three spines, whereas *C. stygia* has two large and three small triangular processes and no spines. The uropoda of this Isopod, *C. alabamensis*, are somewhat longer than the terminal abdominal segment. The outer branch of the uropoda is half as long as the inner branch whereas in *C. stygia* the outer is two-thirds as long as the inner.

"In *C. stygia* the first two articles of the first antennae are subequal in length but in *C. alabamensis* the second is longer than the first. In the former the flagellum of the first antennae has twelve articles, in the latter it has but ten articles. In *C. stygia* only five articles are given for the peduncle of the second antennae, whereas this isopod appears to have six, four small articles instead of three, although this may be merely a difference in observation. The flagellum of the second antennae of *C. alabamensis* has about eighty-five articles; that of *C. stygia* has but seventy. The terminal abdominal segment of *C. stygia* is less elongated than that of *C. alabamensis*, one and one-half times as long as wide in the former, once and two-thirds as long as wide in the latter. In *C. stygia* the median terminal lobe is less prominent than in *C. alabamensis*."

Length about 9 mm.; width about 1.5 mm.

LOCALITY.—A well in Auburn, Alabama, in the east central part of the state.

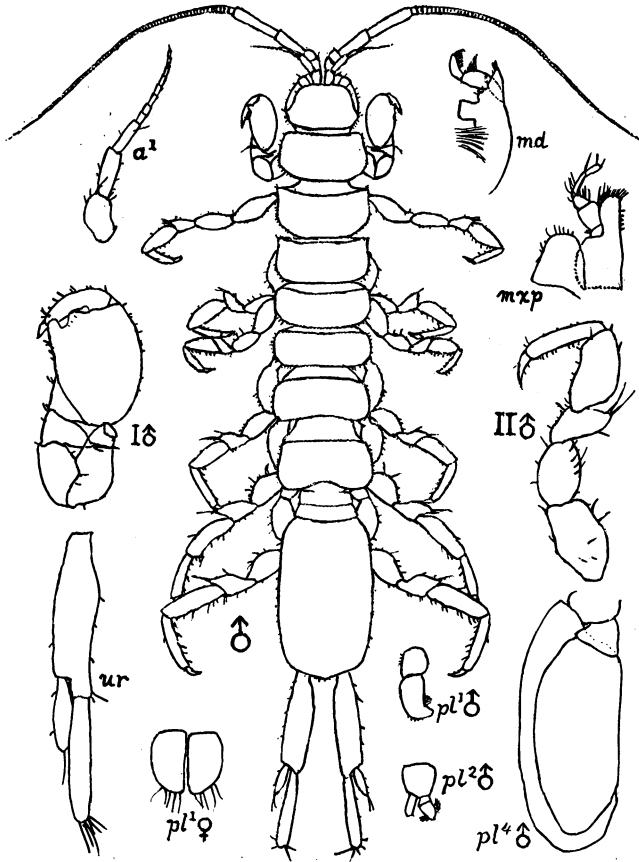


Fig. 294. *Caecidotea alabamensis* Stafford. Adapted from Stafford, 1911.

***Caecidotea nickajackensis* Packard, 1881**

Figure 295

Caecidotea nickajackensis PACKARD, 1881 (in Packard and Cope), p. 879 (orig. descr.), Pl. VII, fig. 3; 1888, p. 33 (descr.), Pl. III, figs. 9, 9a.—UNDERWOOD 1886, p. 359.—RICHARDSON, 1900a, p. 297.—HAY, 1902, pp. 426–429 (descr.), Figs. 1, 3, 5, 5b, 5d, 5e.—RICHARDSON, 1905, p. 436 (descr.), Figs. 493, 494.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

Caecidotea troglodytes HAY, 1902, p. 427 (see remarks below).

Cecidotea nickajackensis PACKARD AND COPE, 1881, p. 879.

The following statements are from Packard's description (1888, p. 33):

“Body longer, narrower and slenderer than in *C. stygia*. The first antennae are sometimes very long and reach to the end of the third joint of the second antennae, and are purplish white. . . . The second antennae . . . extend backward as far as the base of the abdomen. The legs are much longer and slenderer than in *C. stygia* and the caudal appendages are moderately long in one and short in another; in one individual the outer branch is much shorter and smaller than in the others; and in most it is as long as the basal joint. On the whole, the caudal appendages are no longer than the telson.”

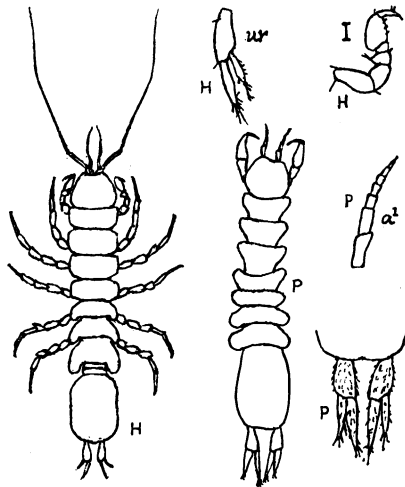


Fig. 295. *Caecidotea nickajackensis* Packard. Adapted from Packard, 1888 (P), and Hay, 1920 (H).

LOCALITIES.—Type locality, Nickajack Cave at Shellmound, Tennessee, near Chattanooga. (Packard's types have been lost, according to Hay.) Also, Metcalf, Georgia, in the extreme southern part of the state, 300 miles from Nickajack Cave. According to Hay, 1902, p. 427, these Georgia specimens may possibly represent a distinct species closely allied to Packard's Nickajack Cave form for which he proposes the name *Caecidotea troglodytes*. His figures of them are here reproduced in outline.

Richardson (1905) does not recognize them as distinct. The following details taken from Richardson's descriptions are apparently based on the Metcalf, Georgia, specimens:

The flagellum of the first antennae is composed of nine articles, that of the second antennae of fifty-three articles. Small epimera are present on all the thoracic segments, situated on the anterior part of the lateral margin in the first three segments, farther back in the fourth and posteriorly situated in the last three. Propodus of the first legs armed in the inferior margin with a triangular process near the distal end, and a long spine at the proximal extremity.

Caecidotea richardsonae Hay, 1902

Figure 296

Caecidotea richardsonae HAY, 1901, p. 180 (orig. descr.); 1902, p. 424 (descr.), Figs. 2, 5c, 5f.—RICHARDSON, 1905, p. 437 (descr.), Fig. 495.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 6.—MILLER, 1933, p. 102.

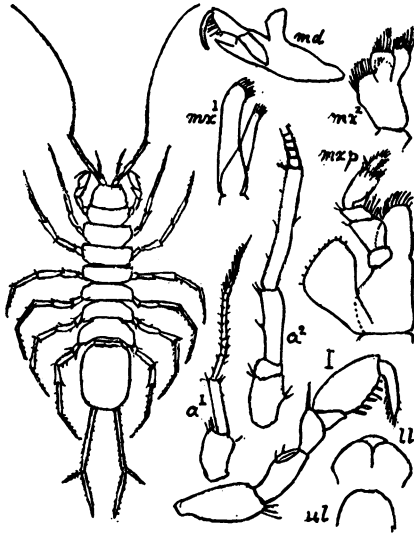


Fig. 296. *Caecidotea richardsonae* Hay. Adapted from Hay, 1902.

Distinguishable from *nickajackensis*, according to Hay, 1902, by the slenderer, frailer body, whiter coloration, longer legs, and much longer uropoda (more like those of *stygia*). The body is more parallel-sided, and narrower than in *nickajackensis*, but the telson is proportionately shorter and has sides of slightly convex outline. The first antennae have eleven articles in the flagellum, the second pair, which are as long as the body, have about eighty-six articles in the flagellum.

The propodus of the first pair of legs is thus described by Hay

(1902, p. 425): "The hand is broad, inflated and convex; the dactyl is strong and has an acuminate, somewhat sinuous tip and is provided, especially along its opposable margin, with stiff bristles. It shuts against the hand between two rows of strong spike-like teeth." Richardson (1905, p. 438) says: "The propodus is armed on the inferior margin with about four spines. The dactylus is armed with a row of about eleven spines along the inferior margin."

Length about 13.6 mm.

DISTRIBUTION.—A few examples, including the type, were found in the stream in Nickajack Cave at Shellmound near Chattanooga, Tennessee, by Hay in 1901, who failed to find there any specimens agreeing with Packard's *C. nickajackensis* previously described from that cave.

***Caecidotea smithii* Ulrich, 1902**

Figures 297, 298

Caecidotea smithii EIGENMANN, 1900, p. 229 (*nomen nudum*, also Science, XII, p. 301).

Caecidotea smithii ULRICH, 1902, p. 93 (orig. descr.), Pl. XVI, figs. 10–18.—CHAPPUIS, 1927, p. 61.—CREASER, 1931, p. 6.

Caecidotea smithii RICHARDSON, 1905, p. 438 (descr.), Fig. 496.—MILLER, 1933, p. 102.

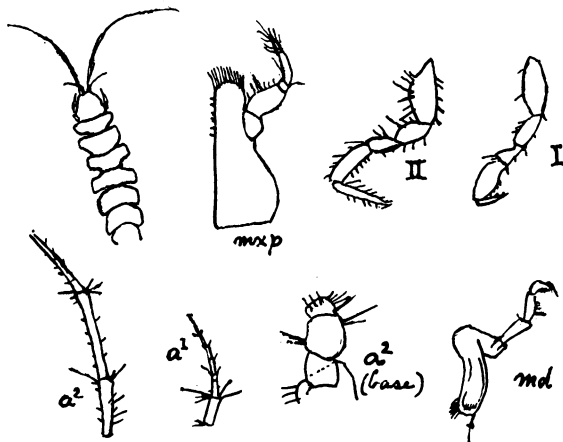


Fig. 297. *Caecidotea smithii* Ulrich. Adapted from Ulrich, 1902.

"Body of loosely jointed segments. Head as in *C. stygia* Pack. No trace of eyes. Inner antennae short, not more than half as long as basal portion of outer antennae. Flagellum of inner antennae consists of five segments, the second 1/4 of first, remaining ones longer. Last

segment of flagellum with a spine more than twice length of segment, beside which there is an olfactory club $2/3$ as long. Another somewhat shorter olfactory club on penultimate segment. Last segment of the basal portion of the inner antennae provided with three spines, as in *C. stygia*. Outer antennae probably as long as body. Basal portion of 5 segments, the first three short and thick, the fourth and fifth much longer and more slender. The flagellum consists of at least 40 segments. Mouth parts essentially as those of *C. stygia*. Legs long and slender, first pair subchelate, remaining ones with a weak claw. Inferior margin of the body segments beset with short spines.

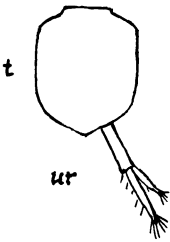


Fig. 298. *Caecidotea smithii* Ulrich. From specimen from Pine Run Cave, Mo., perhaps referable to this species.

“Size.—Very small, probably not over 3 mm. in length.

“Color.—White.” (Ulrich, 1902, p. 93.)

LOCALITY.—Subterranean stream near San Marcos, southern Texas. Collected by Dr. C. H. Eigenmann from the United States Fish Commission well. “The above description is from a fragment.” (Ulrich). The American Museum of Natural History has a few small fragmentary specimens (Cat. No. 6085) including no males with chelae, from Pine Run Cave, Stone County, southern Missouri, which may belong to this species or to *C. antricola* Creaser, or to an undescribed species.

***Caecidotea tridentata* Hungerford, 1922**

Figure 299

Caecidotea tridentata HUNGERFORD, 1922, p. 175, Pl. xv.—CREASER, 1931, p. 5.—MILLER, 1933, p. 102.

The illustrations, based on those of Hungerford, show the distinguishing characters of this species. First antennae with from twelve to eighteen articles in the flagellum, the flagellum of the second antennae has sixty to eighty articles.

“In the males the propodus is very large and bears three well developed processes, one at the base and two near the distal end. The

basal one is bifurcate in some and in others bears instead a strong seta. . . . The uropods are longer than the abdominal segment that bears them, the relative length being 5:3. The two branches are of very unequal length. . . . There is considerable variation in the comparative length of these parts. . . . The females are smaller than the males and do not have as well-developed propodi." (Hungerford, 1922.)

This is the largest species of the genus, the body length ranging from 9 mm. to 19 mm.

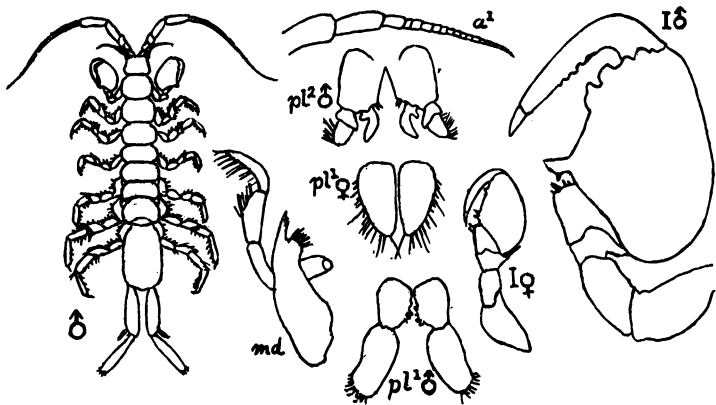


Fig. 299. *Caecidotea tridentata* Hungerford. Adapted from Hungerford, 1922.

LOCALITIES.—Type locality a cistern (according to Hungerford's statement, apparently supplied only by rain water from a roof) in Lawrence, Kansas. Specimens, including the types, in the Kansas University Collection. Specimens of this species donated by E. A. Popenoe, Topeka, Kansas (no further information regarding their locality), are in the U. S. National Museum, according to Hungerford.

***Caecidotea antricola* Creaser, 1931**

Figure 300

Caecidotea antricola CREASER, 1931, p. 1 (orig. descr.), Pls. I, II.—MILLER, 1933, p. 102.

Only the male is described at length and figured in detail. The male attains a large size; body length 18 mm., with second antennae 41 mm. long, and uropoda 19 mm. long. Dimensions of female not given, and only the chela figured.

The following details from the description of the male are quoted

to supplement the figures here reproduced (Creaser figures also the maxilliped, first maxilla, and mandible):

“First antenna with broad basal segment armed with three spines.

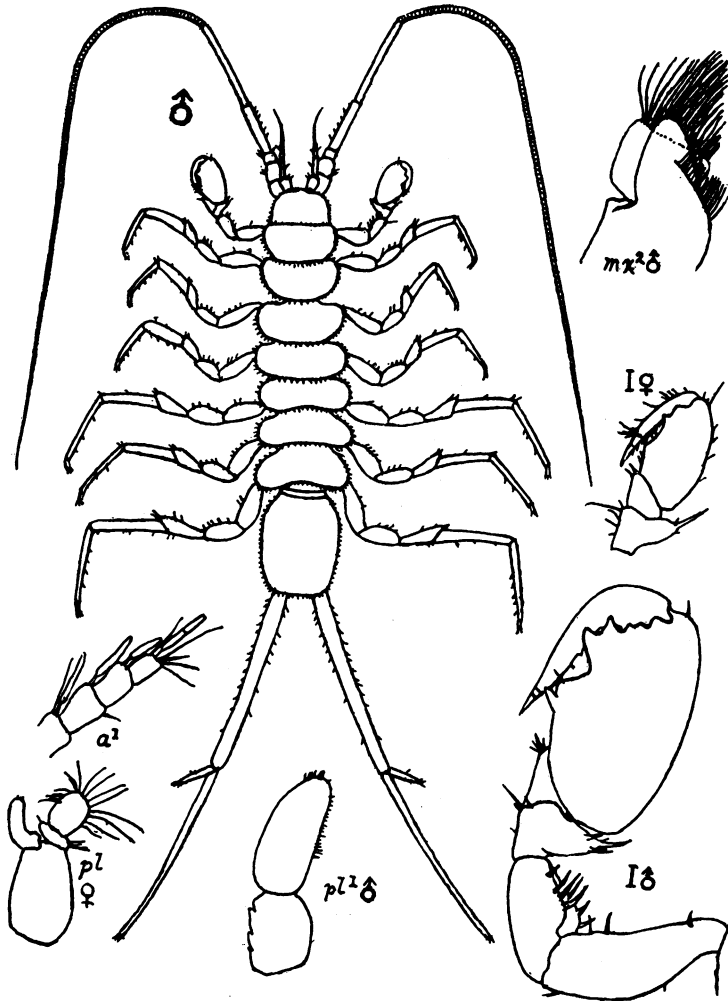


Fig. 300. *Caecidotea antricola* Creaser. Adapted from Creaser, 1831.

. . . Flagellum composed of 20 segments. Apices of segments 12, 13, 15, 17, 18, 19, and 20 with a single club-shaped seta (perhaps of a sensory nature) in addition to normal setae which are found on almost every

segment. . . . Second antennae with a . . . flagellum with more than 109 segments, the first one enlarged. About every fifth segment near middle of flagellum bearing a cluster of 3 or 4 setae.

“Mandible with two series of teeth at apex, the outer with four, the inner with three. Margin of mandible below inner row of teeth with plumose setae. Mandibular palp with three segments, the last two bearing many long setae. . . .

“Color milky white, the dark intestine showing through.”

LOCALITY.—River Cave, Snyder Estate, Hahatonka, Camden County, Central Missouri, where it was found to be “very abundant” in August, 1930. Types in the University of Michigan Museum. (See also remarks under *C. smithii*.)

MANCASELLUS HARGER, 1876

New name substituted for the original generic name *Asellopsis* Harger (1874, p. 601) on account of preoccupation (Harger, 1876, p. 305).

Resembles *Asellus* in most characters but the mandibles are without a palp. Epimera coalesced with their segments. Eyes are present. Dactylus of last six pairs of legs ending in two claws. Type *M. tenax* (Smith), 1871.

Five American species and one variety have been described but they are all so similar that it seems best to devote space chiefly to the distinguishing characters though the reliability of some of these is open to question. Most of the figures given by the authors are here reproduced in outline. The key for distinguishing them, given by Richardson, 1905, p. 410, is as follows:

a.—Lateral margins of head entire. *Mancasellus brachyurus* Harger.

a'.—Lateral margins of head not entire.

b.—Uropoda shorter than terminal segment of the body.

c.—Uropoda half as long as terminal segment of body. Propodus of first pair of legs armed with two triangular processes. Lateral margins of head with a deep cleft on either side. . . . *Mancasellus macrourus* Garman.

c'.—Uropoda two-thirds as long as terminal segment of body. Propodus of first pair of legs armed with one triangular process or three acute teeth. Lateral margins of head with a large rounded sinus on either side.

d.—Propodus of first pair of legs armed with one triangular process. Sides of sinus on lateral margins of head not meeting.

. *Mancasellus tenax* Smith.

d'.—Propodus of first pair of legs armed with three acute teeth. Sides of sinus on lateral margins of head sometimes meeting.

. *Mancasellus dilatus* Harger.

- b'.—Uropoda as long as terminal segment of body.
- c.—Propodus of first pair of legs armed with one triangular process. Second pair of antennae as long as or longer than the body. Inner branch of uropoda nearly three times as long as outer branch.....
 *Mancasellus lineatus* (Say).
- c'.—Propodus of first pair of legs armed with two processes, one triangular and the other truncate. Second pair of antennae shorter than the body. Inner branch of uropoda twice as long as outer branch.....
 *Mancasellus danielsi* Richardson.

M. herricki is insufficiently known to locate exactly in such a key, but would be placed near to *M. tenax*.

***Mancasellus tenax* (Smith), 1871**

Figures 301, 302

Mancasellus tenax HARGER, 1876, p. 304.—HAY, 1882, p. 242.—HERRICK, 1887, p. 40.—UNDERWOOD, 1886, p. 359.—STEBBING, 1893, p. 377.—RICHARDSON, 1900a, p. 297; 1905, pp. 415, 416 (descr.), Figs. 466, 467.—PEARSE, 1910, p. 73.—HUNTSMAN, 1913, p. 274; 1918, p. 148.—RACOVITZA, 1920, p. 105; 1920a, p. 28, Figs. 85-113.—JOHANSEN, 1920, pp. 127, 146; 1926, p. 95, Fig.—RACOVITZA, 1923, p. 118; 1925, pp. 584, 610, 620, Figs. 203, 206-208.—RAWSON, 1928, p. 90.—JOHANSEN, 1931, p. 83.

Asellopsis tenax SMITH, 1874, p. 659 (orig. descr. by Harger), Pl. I, fig. 3; 1874a, pp. 695, 706.—HARGER, 1874, p. 601.

Asellus tenax SMITH AND VERRILL, 1871, p. 453 (orig. descr.).

See also remarks under *M. dilatus* below.

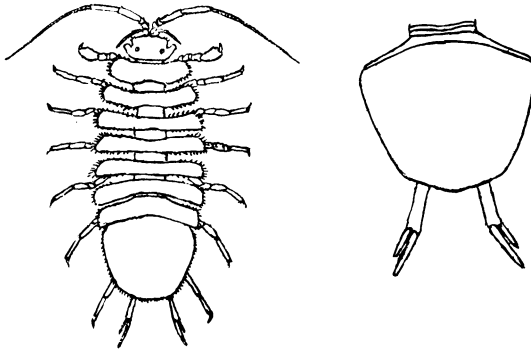


Fig. 301. *Mancasellus tenax* (Smith). Adapted from Harger (in Smith, 1874), and Richardson, 1905 (details).

“Anterior margin of the head broad, excavated for the bases of the antennulae; external angles rounded; margin expanded with a large, rounded sinus on a line with the eyes; behind this the margin expands

into a rounded lobe. The posterior margin of the head is broad and rounded behind, adapted to the first thoracic segment. Eyes of more than twenty facets, considerably within the margin of the head, oval or somewhat reniform." (Smith, 1871, p. 659.)

First antennae with a flagellum of about five articles; second antennae about half as long as the body with a flagellum of about thirty articles.

"First pair of thoracic legs chelate; carpus small, triangular, and closely united with the propodus, which is thickened in the male, with a broad, low tubercle on the inner margin a little above the base; dactylus

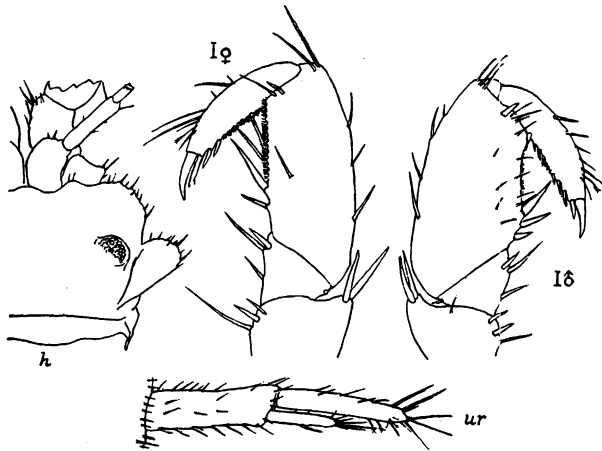


Fig. 302. *Mancasellus tenax* (Smith). Adapted from Racovitza, 1920.

more than half as long as the propodus, its palmary edge armed with spines, of which the distal ones are the larger, and at the end with a large spine." (Smith, 1871, p. 660.)

Color above dark fuscous, spotted and mottled with yellowish. According to Johansen, 1920, p. 146, young individuals have four longitudinal dark stripes.

Length, excluding appendages, 8 to 13 mm.

DISTRIBUTION.—Points in Lake Superior in 4 to 13 fathoms (type locality south side of St. Ignace among *Cladophora*); Thunder Bay, Lake Huron, 30 fathoms among algae (Smith); and Johansen, 1920, Alexandria Bay, Thousand Islands, New York, and several localities in southern Canada (Provinces of Ontario and Quebec). Johansen states that it is often found under stones (in shallow water). Specimens

from Irvington, Indiana, reported by Hay, 1882, may belong rather to *M. dilatus* (see below).

This species was carefully redescribed and its details figured by Racovitza, 1920a, from specimens (probably original material of Smith) from Lake Superior, received from the U. S. National Museum.

Mancasellus dilatus (Smith), 1874

Asellopsis tenax var. *dilata*, SMITH, 1874, p. 661 (orig. descr.).

Mancasellus tenax var. *dilata* RICHARDSON, 1905, p. 410, 416 (descr.).—HUNTS-
MAN, 1913, p. 274.—PEARSE, 1910, p. 73.—RACOVITZA, 1920a, p. 44.

See remarks below regarding *M. tenax* Hay, 1882, p. 242.

Smith, 1874, p. 661, described a variety *dilata* of *M. tenax* as follows (description quoted also in Richardson, 1905, p. 416):

"The flagellum of the antennulae contains one or two more segments. The lateral portions of the head and segments of the body, especially in fully adult specimens, are expanded so that the outline of the animal is a broader oval. The open sinus in the lateral margin of the head is a narrow incision, rounded at the bottom, but with the sides sometimes meeting. The propodus in the first pair of legs is nearly as much enlarged in the males as in *A. communis*, and is armed on its palmary margin with three acute teeth, of which the middle one is the largest."

LOCALITIES.—Detroit River at Ecorse, Michigan, type locality (Smith). Racovitza, 1920, doubtfully refers to this variety (which he considers may perhaps be a distinct species) specimens from Irvington, Indiana, recorded as *M. tenax* by Hay, 1882. It would appear quite as worthy of recognition as a species as some of the others of the American species of this family that have been described.

Mancasellus brachyurus Harger, 1876

Figures 303, 304

Mancasellus brachyurus HARGER, 1876, p. 304 (orig. descr.).—UNDERWOOD, 1886, p. 359.—BOVALLIUS, 1886, p. 39.—HERRICK, 1887, p. 40.—H. GARMAN, 1890, p. 29, Figs. c, e, g, i, k.—STEBBING, 1893, p. 377.—RICHARDSON, 1900a, p. 296; 1901, p. 551; 1902a, p. 505; 1905, p. 411 (descr.), Figs. 459-461.—FOWLER, 1912, p. 522.—RACOVITZA, 1920a, p. 44 (*brachiurus*).

Lateral margins of head entire. First antennae with six, the second with about fifty-five articles in the flagellum. Propodus of first legs of male with a prominent acute tooth on the palmar margin near the base.

Length about 15 mm.

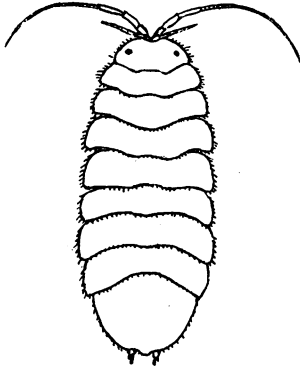


Fig. 303. *Mancasellus brachyurus* Harger. Adapted from Richardson, 1905.

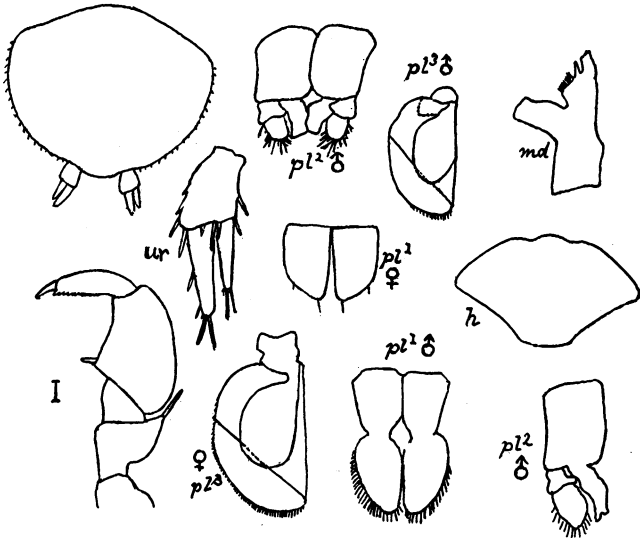


Fig. 304. *Mancasellus brachyurus* Harger. Adapted from Richardson, 1905, and Garman, 1890.

LOCALITIES.—McKee's Spring, Lexington, Virginia, and Gaylord, Virginia. Reputed injurious to water cress. There are a few specimens from the former locality in the American Museum of Natural History, also a considerable number from the ponds of the fish hatchery at Pleasant Mount, in the northeastern corner of Pennsylvania (watershed of the Delaware River) where it is found among water cress, and is an important food of the trout.

Mancasellus macrourus Garman, 1890

Figures 305, 306

Mancasellus macrourus GARMAN, 1890, p. 28, Figs. a, b, d, f, h, i.—RICHARDSON, 1900a, p. 297; 1902a, p. 505.—HAY, 1902, p. 423, Fig. 1.—RICHARDSON, 1905, p. 413 (descr.), Figs. 462–465.—ZELENY, 1907, pp. 325 ff., Pls. VI–XII.—PRATT, 1916, p. 377.—RACOVITZA, 1920, pp. 103, 105; 1920a, p. 45 (descr.); 1923, p. 118; 1925, pp. 583, 586, 610, 620, Figs. 202, 204, 205 (name misspelled, *macrurus*), Figs. 114–134.—CHAPPUIS, 1927, p. 61.—MARKUS, 1930, p. 220, etc.—PRATT, 1935, p. 439.

Lateral margins of head converging toward the front and cleft opposite the eyes, which are situated some distance within the margin,

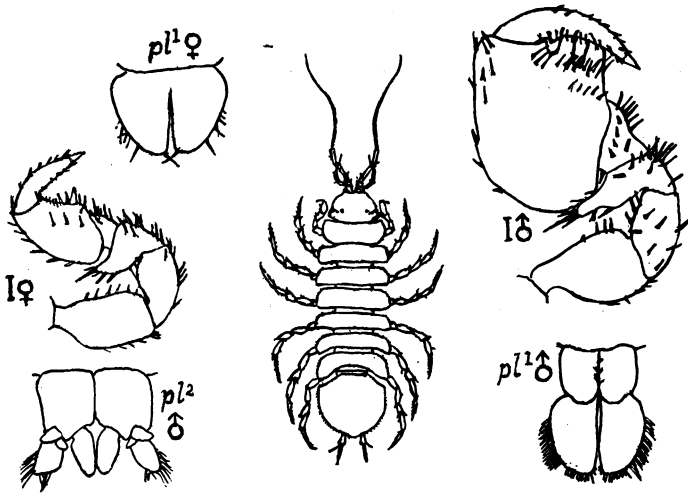


Fig. 305. *Mancasellus macrourus* Garman. Adapted from Hay, 1903 (entire animal), and Markus, 1930 (details).

by a narrow notch or fissure extending in at right angles. First antennae with a flagellum of six to eight articles; that of the second with thirty-five to forty-three articles.

DISTRIBUTION.—Types from "eastern Kentucky, where it is abundant in springs and spring-fed rivulets and ponds," according to Garman. Other authors record it from points in southern Ohio, Kentucky, Tennessee and northwestern Georgia, including Echo River in Mammoth Cave, Kentucky, apparently the only record from subterranean waters, though Hay, 1902, p. 423, reports it from just outside Nickajack Cave, near Chattanooga, Tennessee.

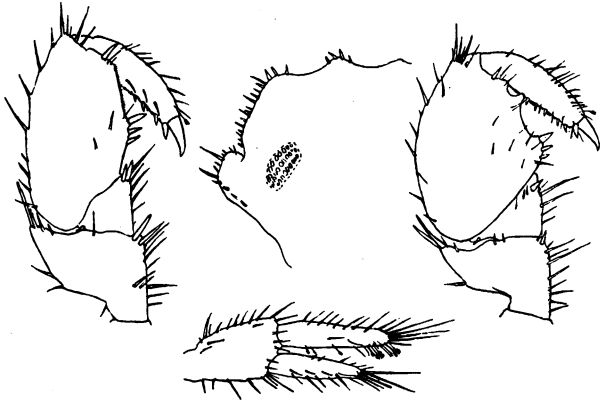


Fig. 306. *Mancasellus macrourus* Garman. Details. Adapted from Racovitza, 1920.

This species has been carefully redescribed and details figured by Racovitza, 1920, from specimens from Nashville, Tennessee, received from the U. S. National Museum.

***Mancasellus danielsi* Richardson, 1902**

Figure 307

Mancasellus danielsi RICHARDSON, 1902a, p. 505 (orig. descr.), Figs. 1-4; 1905, p. 417 (descr.), Figs. 468-471.—SHELFORD, 1913, pp. 135, 154, 174.—ALLEE, 1929, p. 24.

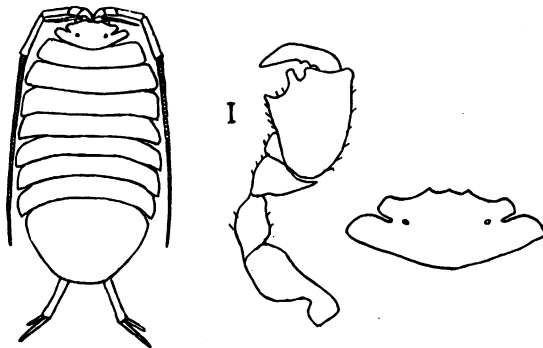


Fig. 307. *Mancasellus danielsi* Richardson. Adapted from Richardson, 1905.

Closely related to *M. tenax*, from which Richardson distinguishes it because of its longer antennae and uropoda, a wider caudal segment, and teeth on the grasping edges of the chelae of the first pair of legs, as

shown in her figures here reproduced. The first antennae are stated to have a flagellum of eight articles. The figure shows nearly sixty articles in the flagellum of the second antennae, which are about as long as the body.

LOCALITY.—Lily Lake, at Laporte, Indiana (Richardson); Fox Lake, Illinois (Shelford); Dune Creek, Northern Indiana (Allee). Type in U. S. National Museum (Richardson).

Mancasellus herricki, new name

Figure 308

Mancasellus sp. HERRICK, 1887, p. 40, Pl. v, fig. 8.

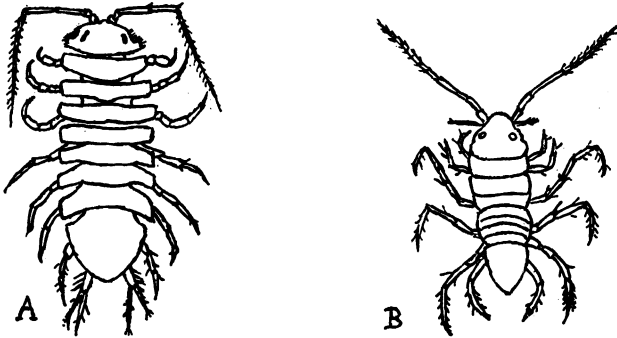


Fig. 308. *Mancasellus herricki*, new name. Adapted from Herrick, 1887.

I propose this name for a species figured by Herrick in the above work, but not named or described except by a statement that the head has the lateral margins emarginated as in *M. tenax*, the segments more closely associated, the pleon excavated in front on either side and not truncate posteriorly but rather acute, and the caudal stylets short with the outer ramus at least two-thirds as long as the inner.

LOCALITY.—Tuscaloosa, Alabama. Type apparently not preserved.

I cannot identify this with any other described form. Herrick also figures on the same plate (Fig. 9) a larval form which he states is "apparently a larva of some member of this genus."

Mancasellus lineatus (Say), 1818

Asellus lineatus SAY, 1818, p. 428 (orig. descr.).—DE KAY, 1844, p. 50.—UNDERWOOD, 1886, p. 359.

Mancasellus lineatus RICHARDSON, 1900a, p. 297; 1901, p. 551; 1905, p. 416 (orig. descr. quoted).

I follow Richardson in placing this species in *Mancasellus* rather than *Asellus* though no real evidence for the change seems to be available, since the presence of a cleft or sinus in the margin of the head is not conclusive (see *Asellus incisus*). All that has been published about it seems to be based on Say's original description, which is as follows:

"Body oblong; interior antennae much shorter than the peduncle of the exteriors; caudal appendices, peduncle cylindrical.

"Inhabits South Carolina.

"Cabinet of the Academy.

"Body oblong, not distinctly attenuated before; segments subequal, entire; head at base equal to the preceding segment, a sinus each side in the middle; eyes prominent, black; antennae exteriors as long as the body in one sex; in the other, longer, interiors nearly attaining the tip of the second joint; hands with a prominent angle on the middle of the inferior edge, thumb closing on and surpassing the angle, shorter than the hand; nails somewhat bifid at tip; terminal caudal segment longitudinally subovate, styles elongated cylindrical, equal to the terminal segment of the body, laciniae very unequal, inner one nearly thrice the length of the outer one, truncate at tip; color, pale brown with a double dorsal brown line, united at tip of the tail, a brown line or two each side of the tail. Length nearly one-fourth of an inch.

"This animal is not an uncommon inhabitant of the swamps in the forests of South Carolina." (Say, 1818, p. 428.)

SUBORDER EPICARIDEA OR BOPYROIDEA

A group of Isopoda that are parasites of other Crustacea, commonly living in the branchial cavity or attached to the underside of the abdomen of their host.

The females are large and become profoundly modified for their parasitic existence; they do not move when they have once attained their position on the host, and when inhabiting the branchial cavity they cause a conspicuous swelling on the side of the carapace of the host. The males are very minute and much less modified from the ordinary isopod type. They remain capable of locomotion, but one may usually be found clinging to the ventral side of the body of the much larger female, whose marsupium, when fully developed, is very large and commonly distended with a great number of small eggs.

Bopyridae

The chief family of the order; its members are parasitic on Deca-

poda (chiefly on *Macrura* or *Anomura*). In the females, the body is usually quite asymmetrical; its segmentation is distinct and the usual seven pairs of thoracic limbs are developed, though small and weak; there are five pairs of incubatory plates, and most or all of the pleopoda are recognizable, though of simple or more or less rudimentary structure. The males have all the thoracic segments well defined, and well-developed prehensile legs. Their abdominal segments are often more or less, coalesced and have only rudimentary appendages, if any at all.

PROBOPYRUS GIARD AND BONNIER, 1888

Parasites in the branchial cavity of shrimps, especially those of the family Palaemonidae. When the host is of a species that grows large, only young individuals are found infested (up to about 80 mm. long, as far as the writer has observed).

"Segments of abdomen in female dorsally defined; lateral parts or pleural lamellae not developed. Five pairs of double-branched pleopods are present. Uropoda wanting.

"Segments of abdomen in male fused dorsally, but defined on the lateral margins. Five pairs of small tuberculiform pleopods present. Uropoda wanting." (Richardson, 1905, p. 553.)

Palaegyge Giard and Bonnier, 1888, is a synonym (see Nierstrasz and Brender à Brandis, 1929, p. 18). Though both genera were established in the same article, *Probopyrus* has page precedence.

The female parasite lies in the branchial chamber of the shrimp, with the head directed posteriorly and usually somewhat dorsally, relative to the host's body, and with the ventral aspect outward and the dorsal aspect, which is perfectly flat, against the gills of the host. The body is asymmetrical to a varying, but usually considerable, degree: the convexity of the long axis is toward the ventral side of the host, and consequently toward the left if the parasite was borne in the left branchial chamber of the host, and toward the right in the opposite case.

Probopyrus bithynis Richardson, 1904

Figures 309, 310, 311

Palaegyge meeki RICHARDSON, 1912, p. 521 (orig. descr.), Figs. 1-4.—CHOPRA, 1923, p. 486.—NIERSTRASZ AND BRENDER À BRANDIS, 1923, p. 93; 1925, p. 7.—VAN NAME, 1926, p. 2 (Paraiso, Canal Zone, in fresh water, on *Macrobrachium acanthurum*).

Probopyrus bithynis RICHARDSON, 1904, p. 68 (orig. descr.), Figs. 46-51; 1905, p. 557 (descr.), Figs. 606-611.—PEARSE, 1911, pp. 108, 109; 1915, p. 550.—CHOPRA, 1923, p. 510.—NIERSTRASZ AND BRENDER À BRANDIS, 1923, p. 94; 1929, pp. 21, 23.—VAN NAME, 1925, p. 481 (descr.), Figs. 24, 25.

Probopyrus bithynis var. *gigas* NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 20.

Probopyrus floridensis var. *gigas* NIERSTRASZ AND BRENDER à BRANDIS, 1925, p. 5 (descr.).

Probopyrus sp. BEEBE, 1925, p. 59.

Probopyrus panamensis RICHARDSON, 1912b, p. 523 (orig. descr.), Figs. 5-8.—RATHBUN, 1912, p. 460.—VAN NAME, 1925, p. 483; 1926, p. 2.—NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 20 (fresh waters of Canal Zone, on *Macrobrachium jamaicense* or *M. olfersii*).

Probopyrus meeki NIERSTRASZ AND BRENDER à BRANDIS, 1929, p. 23.

See also remarks below on *Probopyrus pandalicola* (Packard).

I can find no sufficient grounds for regarding the above forms otherwise than as representatives of a single species. The following description is from British Guiana specimens:

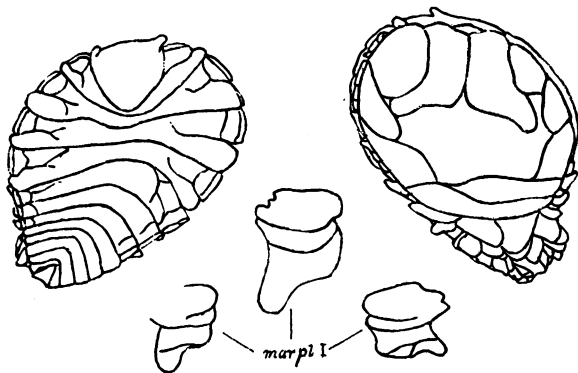


Fig. 309. *Probopyrus bithynis* Richardson. Adapted from Richardson, 1904. Specimens from Mississippi River. The small figures show 1st marsupial plates of three individuals to illustrate variation.

The female is without eyes, and measures 10 to 11 mm. in greatest length in the case of the largest individuals, which are naturally to be found in the larger and older shrimps. The marsupial plates, which are far too short to completely cover the immense mass of eggs that the animal bears, are more or less pigmented with conspicuous blackish pigment, some of which also occurs on the lateral parts of the segments of the shorter side of the body on both ventral and dorsal sides of the thorax, on the dorsal side especially along the lines of articulation between these segments. The amount and intensity of the pigment is variable, but usually quite conspicuous, even through the carapace of the host, which exhibits a large localized swelling over the location of the

parasite. The head may or may not have the anterior lateral angles produced into more or less distinct lobes. Each of the pleopoda consists of a short basal portion bearing two broad leaf-like smooth-edged branches. There are five pairs, decreasing in size from the first to the fifth segment of the abdomen. Uropoda are wanting.

The males vary in length from 1.7 mm. to about 3 mm., this difference being due in part to actual individual variation, but still more largely to the state of contraction of the body muscles, the body being very soft. This is clearly shown in the outlines of four individuals

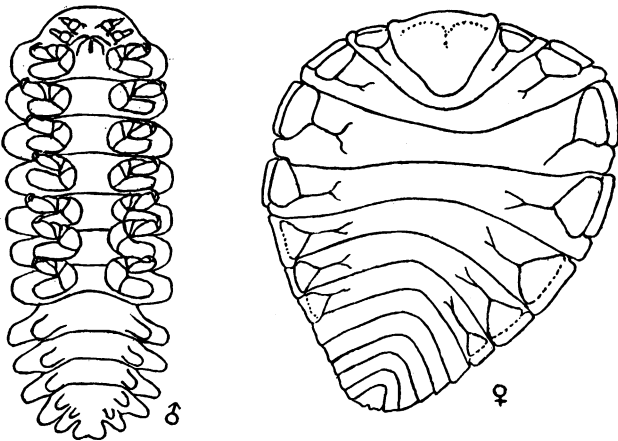


Fig. 310. *Probopyrus bithynis* Richardson. From Van Name, 1925, *Zoologica*, VI, p. 481. Male, ventral aspect; female, dorsal aspect. Specimens from British Guiana.

shown in the figure, which also brings out the fact that the amount of constriction between segments is largely a matter of degree of contraction and cannot be relied on as a specific character. They have two pairs of small antennae, eyes, if any are discernible, represented by small pigment spots, and small but well-developed prehensile legs. The head and thoracic segments are distinct and separate, but all the abdominal segments are fused into a semicircular mass with ten lobes around the edge representing the ends of the segments, and a median lobe, often more or less emarginate or cleft at the end, representing the telson. The pleopoda are represented by five pairs of small, soft, rounded projections on the lower surface. No uropoda are present.

DISTRIBUTION.—Parasitic on the following species of shrimps of

the genus *Macrobrachium* (= *Palaemon*, or *Bithynis* of some authors) inhabiting rivers and streams.

M. ohionis (Smith), Mississippi River near New Orleans (type locality). Type in U. S. Nat. Museum. Richardson, 1904.

M. acanthurum (Wiegmann) Escondido River, Nicaragua. Richardson, 1905.

M. olfersii (Wiegmann) Cuatotolapam, Vera Cruz, Mexico, Pearse, 1911, and La Rosa, Santa Marta, Colombia, Pearse, 1915.

M. amazonicum (Heller) formerly not distinguished from the closely allied *M. lemarrei* of the Old World. Kartabo, British Guiana, Van Name, 1925; Surinam, and Essequibo River, British Guiana; Nierstrasz and Brender à Brandis, 1925, 1929.

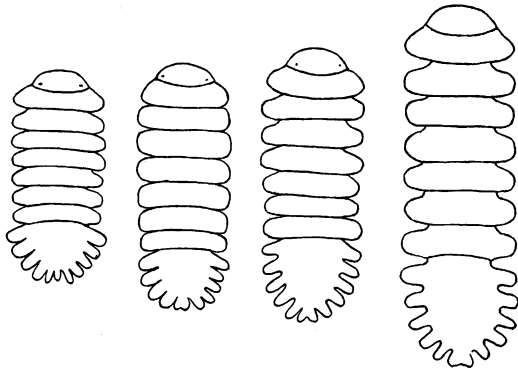


Fig. 311. *Probopyrus bithynis* Richardson. Four males (dorsal view) showing variation in size and form. Specimens from British Guiana.

Also recorded from the fresh waters of the Canal Zone (under the names *P. panamensis* and *Palaegyge meeki* Richardson, 1912) on *M. jamaicense*, *acanthurum*, and *olfersii*.

Nierstrasz and Brender à Brandis make *P. bithynis* a subspecies of *P. floridensis* Richardson, 1904, parasitic on a small shrimp, *Palaemonetes exilipes* Stimpson, which is marine or perhaps to some extent an inhabitant of brackish water. I hesitate to accept this view as the above species of *Macrobrachium* are true fresh-water forms and according to Richardson's figure, *P. floridensis*, has the ends of the abdominal segments much more rounded off than is the case in *bithynis*. But even if the two forms are only subspecifically distinct, *P. bithynis* would be the name of the form parasitic on *Macrobrachium* and *P. bithynis flori-*

denis that infesting *Palaemonetes exilipes*, as the name *bithynis* has page precedence over *floridensis*.

Probopyrus bithynis is also very closely allied to *P. pandalicola* Packard, 1879 (see Richardson, 1905, p. 554 (descr.), Figs. 599–601, also Ward and Whipple, 1918, p. 842), parasitic on a small shrimp, *Palaemonetes vulgaris* (Say), of the Atlantic coast of the United States, which often ascends streams into brackish or even almost fresh water.

Probopyrus oviformis Nierstrasz and Brender à Brandis, 1929

Figure 312

Probopyrus oviformis NIERSTRASZ AND BRENDER À BRANDIS, 1929, p. 22 (orig. descr.), Fig. 24.

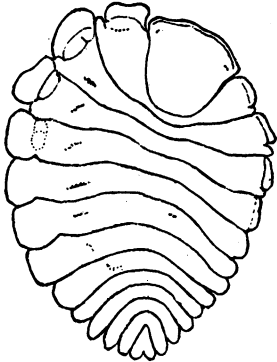


Fig. 312. *Probopyrus oviformis* Nierstrasz and Brender à Brandis. Adapted from illustration of the above authors, 1929.

This species is based on a single female specimen only 2.5 mm. long and 2 mm. wide, bearing no eggs and very probably not fully adult. Its characters can be better appreciated from the figure here reproduced than by quoting from the description, though attention should be called to the small size, the large size of the coxal plates of the longer side of the body, the rounded-off ends of the abdominal segments and the narrow, notched telson. It will require the collection of more material to determine to what extent these characters should be considered specific rather than individual.

LOCALITY.—Jolly Hill, St. Croix, West Indies, on a *Macrobrachium* ("Palaemon") found in a small brook.

ADDITIONAL ISOPODA WHICH HAVE BEEN REPORTED, APPARENTLY
INCORRECTLY, AS FRESH-WATER SPECIES

Colamura porteri Boone, 1920

(Suborder Flabellifera, Family Anthuridae)

A marine form listed incorrectly among land and fresh-water isopods in Zool. Record for 1920. (See Boone, 1920, Rev. Chilena Hist. Nat., XXIV, no. 2, pp. 25, 31.)

Lathraena insidiosa Schioedte and Meinert, 1881

(Suborder Flabellifera, Family Cymothoidae)

This is a marine and brackish water species parasitic on the fish *Centengraulis edentulus* from a river at Santos, Brazil, near its mouth. Listed as fresh-water species by Richardson, 1904, p. 23, and Weber, 1892, p. 538. For description and figures, see Schioedte and Meinert, 1881, p. 98, Pl. VII, figs. 14, 15.

Haplophthalmus puteus Hay, 1899

(Suborder Oniscoidea, Family Trichoniscidae)

See under *Haplophthalmus danicus*, page 91.

Cassidinidea ovalis (Say), 1818

(Suborder Flabellifera, Family Sphaeromidae)

A marine species (see Richardson, 1905, p. 274, also in Introduction, p. ix). Hansen, 1905, Quart. Jour. Micro. Sci., XLIX, p. 131, mentions a specimen "from Cincinnati," doubtless an erroneous locality, if the city in Ohio is implied.

Glossobia laticauda (Milne-Edwards), 1840

(Suborder Flabellifera, Family Cymothoidae)

Parasitic on flying fishes and other pelagic fishes, incorrectly included among fresh-water forms by Richardson, 1904, p. 23 (under name *Ceratothoa laticauda*).

BIBLIOGRAPHY

- ABBOTT, C. H. 1918. 'Reaction of land isopods to light.' Jour. Exper. Zool., XXVII, pp. 193-246, text figs.
- ALLEE, W. E. 1926. 'Distribution of animals in a tropical rain-forest with relation to environmental factors.' Ecology, VII, pp. 445-468.
1929. 'Studies in animal aggregations: natural aggregations of the isopod *Asellus communis*.' Ecology, X, pp. 14-36.
- ARCANGELI, A. 1914. 'La collezione di isopodi terrestri del R. Museo di Zoologia degli Invertebrati di Firenze.' Atti. Soc. Ital. Sci. Nat. Milano, LII, pp. 455-486.
1921. 'Note isopodologiche. Il genere *Platyarthus* Brandt.' Atti. Soc. Ital. Sci. Nat. Milano, I.X, pp. 189-210, Pl. VII.
1922. 'Isopodi terrestri del Museo Zoologico della R. Università di Napoli.' Ann. Mus. Zool. Univ. Napoli, V, No. 2, pp. 1-8, Fig. 1.
1923. 'Revisione del gruppo degli *Haplophthalma*, isopodi terrestri.' Arch. Zool. Ital., X, pp. 259-321, Pls. VII, VIII.
1925. 'Gli isopodi terrestri della Sardegna.' Boll. Mus. Zool. Comp. Anat. Univ. Torino, (N. S.), XXXIX, 75 pp., 2 Pls.
1926. 'Contributo alla conoscenza della fauna isopodologica delle terre circostanti all'alto Adriatico.' Atti. Mus. Civico di Storia Nat., XI, pp. 1-62, 1 Pl.
1927. 'Isopodi terrestri raccolti nell'Estremo Oriente dal Prof. Filippo Silvestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XX, pp. 211-269, Figs. 1-22.
- 1927a. 'Revisione dei generi degli isopodi terrestri. 1. Sopra alcuni generi di Africa e di America.' Atti. Soc. Ital. Sci. Nat. Milano, LXVI, pp. 126-141.
1929. 'Isopodi terrestri raccolti in Cuba dal Prof. F. Silvestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XXIII, pp. 129-148, Figs. 1-6.
1930. 'Isopodi terrestri raccolti nelle isole Canarie dal Prof. Filippo Silvestri (con aggiunte).' Boll. Lab. Zool. Gen. Agrar. Portici, XXIV, pp. 82-91, 1 text fig.
- 1930a. 'Contributo alla conoscenza del "Microgenton" di Costa Rica.' Boll. Lab. Zool. Gen. Agrar. Portici, XXV, pp. 1-29, 8 Figs.
- 1930b. 'Due nuove specie del genere "*Rhyscotus*" B.-L., isopodi terrestri.' Boll. Lab. Zool. Gen. Agrar. Portici, XXV, pp. 30-38, Figs. 1, 2.
1931. '*Circoniscus bezzii* Arc., nuova specie di isopodo terrestre del Brasile.' Boll. Zool. Napoli, II, pp. 115-122, Pl. II.
- 1931a. 'Sul rapporto numerico dei sessi negli isopodi terrestri.' Boll. Mus. Anat. Comp. Univ. Torino, (3) XLI, No. 13, pp. 1-34.
1932. 'Isopodi terrestri raccolti dal Prof. Silvestri nel Nord-America.' Boll. Lab. Zool. Gen. Agrar. Portici, XXVI, pp. 121-141, Figs. 1-7.
- 1932a. 'Considerazioni sopra la validità dei nomi generici *Armadillo*, *Armadillidium*, *Oniscus*, *Porcellio*.' Boll. Zool. Napoli, III, pp. 123-127.

- 1932b. 'Escursione zoologica all "Oasi di Marrakesch nell" Aprile 1930. Isopodi terrestri.' Boll. Zool. Napoli, III, pp. 225-232, Pl. II.
- 1932c. 'Isopodi terrestri di Dominica (Piccole Antille).' Boll. Mus. Anat. Comp. Univ. Torino, (3) XLII, No. 18, pp. 1-6, Figs. 1-14.
1934. 'Note di revisione sulla famiglia Armadillidae.' Boll. Mus. Anat. Comp. Univ. Torino, XLIV, pp. 84-119.
- ATWOOD, W. G., AND JOHNSON, A. A. 1924. 'Marine structures, their deterioration and preservation.' Nat. Research Coun., Washington, pp. 1-534, figs. and charts 1-169.
- BANTA, A. M. 1910. 'A comparison of the reactions of a species of surface isopod with those of a subterranean species. Part. I.' Jour. Exper. Zool., VIII, pp. 243-310, 6 figs.
- BARNARD, K. H. 1932. 'Contributions to the crustacean fauna of South Africa, No. 11. Terrestrial Isopoda.' Ann. South African Mus., XXX, part 2, pp. 179-388, Figs. 1-80.
- BARNES, T. C. 1932. 'Salt requirements and space orientation of the littoral isopod *Ligia* in Bermuda.' Biol. Bull., LXIII, pp. 496-504, Fig. 1.
- BATE, C. S. 1868. 'Carcinological gleanings, No. 3,' Ann. Mag. Nat. Hist., (4) I, pp. 442-448, Pl. XXI. (Includes information received by letter from R. O. Cunningham.)
- BEEBE, W. 1924. 'Galapagos: World's End.' New York, pp. i-xxii, 1-443, 107 illus.
1925. 'Studies in a tropical jungle. One quarter of a square mile of jungle at Kartabo, British Guiana.' Zoologica, VI, pp. 1-193, Figs. 1-16.
- BENEDICT, J. E. 1896. 'Preliminary description of a new genus and three new species of crustaceans from an artesian well at San Marcos, Texas.' Proc. U. S. Nat. Mus., XVIII, pp. 611-617.
- BILIMEK, D. 1867. 'Fauna der Grotte Cacahuamilpa in Mexico.' Verh. Zool.-bot Gesell. Wien, XVII, pp. 901-908.
- BIRSTEIN, J. 1933. 'Die Land- und Süßwasser-Isopoden des arktischen Gebietes.' Fauna Arctica, VI, pp. 471-476.
- BLAKE, C. H. 1929. 'Notes on the wood-lice of New England.' Bull. Boston Soc. Nat. Hist., No. 50, pp. 9-12, Figs. 1-4.
1930. 'Redescription of *Armadilloniscus ellipticus* (Harger) with some account of its habits.' (On Isopoda Oniscoida, first paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 279-284, Figs. 1-11.
1931. 'New land isopods from New England.' (On Isopoda Oniscoida, second paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 341-348, Figs. 1, 2.
- 1931a. 'Distribution of New England wood-lice.' (On Isopoda Oniscoida third paper.) Occas. Papers Boston Soc. Nat. Hist., V, pp. 349-355.
- BLATCHLEY, W. E. 1896. 'Indiana caves and their fauna.' 21st Ann. Rep. Dept. of Geology of Indiana.
- BOONE, (P.) L. 1918. 'Descriptions of ten new isopods.' Proc. U. S. Nat. Mus., LIV, pp. 591-604, Pls. LXXXIX-XCII.
1920. 'Isopoda.' Rep. Canadian Arctic Exp., VII, part D, 40 pp.

1921. 'Report on the Tanidacea and Isopoda collected by the Barbados-Antigua Expedition from the University of Iowa in 1918.' Univ. of Iowa Studies, IX, pp. 91-98, 1 Pl.
1934. 'New and rare Cuban and Haitian terrestrial Isopoda.' Bull. Amer. Mus. Nat. Hist., LXVI, pp. 567-598, Figs. 1-14.
- BORRE, A. P. DE. 1886. 'Crustacés Isopodes recueillis par feu Camille Van Volxem, pendant son voyage en Portugal en 1871.' Ann. Soc. Ent. Belgique, XXX (Comptes-Rendus, (3) No. 72), pp. cxii-cxiii.
- BOVALLIUS, C. 1886. 'Notes on the family Asellidæ.' Bihang K. Dansk. Vet. Akad. Handl., XI, No. 15, pp. 1-52.
- BRANDT, J. F. 1833. 'Conspectus monographiæ Crustaceorum Oniscodorum Latreillii.' Bull. Soc. Imp. Nat. Moscou, VI, pp. 171-193, Pl. IV. (Also published with separate paging.)
- BRIAN, A. 1923. 'Descrizione di un rarissimo isopodo cavernicolo *Troglozega virei* Valle.' Ann. Mus. Civ. Stor. Nat. Genova, LI, pp. 115-126, Pls. I, II.
1929. 'Descrizione di un nuovo genere di isopodo terrestre troglobio raccolto dal Prof. Silvestri in una grotta di Cuba.' Boll. Lab. Zool. Gen. Agr. Portici, XXII, pp. 188-197, Pls. I-III.
- BRUES, C. T. 1924. 'Observations on animal life in the thermal waters of Yellowstone Park, with a consideration of the thermal environment.' Proc. American Acad. Arts Sci., LIX, pp. 371-437, 1 Pl.
- BUDDE-LUND, G. 1879. 'Prospectus generum specierumque Crustaceorum Isopodum terrestrium.' Pp. 1-10. Copenhagen.
1885. 'Crustacea Isopoda Terrestria per familias et genera et species descripta.' Pp. 1-319. Hauniæ.
1893. 'Landisopoder fra Venezuela indsamlede af Dr. Fr. Meinert.' Entom. Meddel., pp. 111-129.
1899. 'A revision of Crustacea Isopoda Terrestria, with additions and illustrations. I, *Eubelum*.' Entom. Meddel., pp. 67-97, Pls. I-v. (Also published as separate, pp. 1-31, Pls. I-v.)
1904. 'A Revision of Crustacea Isopoda Terrestria with additions and illustrations.' II, *Spherillonia*, III, *Armadillo*. Copenhagen, pp. 33-144, Pls. VI-x.
1908. 'Die Landisopoden der deutschen Südpolar-Expedition 1901-1903, mit Diagnosen verwandter Arten. Deutsche Südpolar-Expedition,' IX (Zool. I), pp. 69-92, Pls. III-IV.
- 1908a. 'Isopoda von Madagaskar u. Ostafrika.' In: Voeltzkow, 'Reise in Ostafrika in d. Jahren 1903-1905.' II, pp. 265-308, Pls. XII-xviii.
1909. 'Isopoda (I, Land-Isopoden).' In: Schultze, 'Zool. u. anthr. Ergebn. Forschungr. in westl. u. zentr. Südafrika.' II, pp. 53-70, Pls. v-vii, Jena.
1910. 'Crustacea. 2. Isopoda.' In: Sjöstedt, 'Wiss. Ergebn. schwed. zool. Exped. n. d. Kilimandjaro.' III, part 21, pp. 3-20, Pls. I, II.
1912. 'Terrestrial Isopoda, particularly considered in relation to the distribution of the southern Indo-Pacific species.' In: 'Rep. Percy Sladen Trust Exp.,' Trans. Linn. Soc. London, Zool., (2)

- XV, pp. 367-394, 3 Pls. (Revised and foot notes added by Rev. T. R. R. Stebbing.)
- CHAPPUIS, P. A. 1927. 'Die Tierwelt der unterirdischen Gewässer.' Die Binnen-gewässer, III, 175 pp., 4 Pls., 62 text figs.
- CHILTON, C. 1890. 'Revision of the New Zealand Idoteidæ.' Trans. Proc. New Zealand Inst., XXII, pp. 189-204.
1892. 'Notes on some New Zealand Amphipoda and Isopoda.' Trans. Proc. New Zealand Inst., XXIV, pp. 258-269.
1901. 'The Terrestrial Isopoda of New Zealand.' Trans. Linn. Soc. London, Zool., (2) VIII, pp. 99-152, Pls. xi-xvi.
1909. 'The Subantarctic islands of New Zealand.' Crustacea, pp. 601-671, Figs. 1-19; Biological Relations, pp. 793-807, Wellington.
1910. 'Additions to the terrestrial Isopoda of New Zealand.' Trans. New Zealand Inst., XLII, pp. 286-291.
1914. '*Deto*, a subantarctic genus of terrestrial Isopoda.' Jour. Linn. Soc. London, Zool., (2) XXXII, pp. 435-456, Pls. xxxix and xl.
1916. 'Some terrestrial Isopoda from the shore of the lake.' In: 'Fauna of the Chilka Lake.' Mem. Indian Mus., V, pp. 461-482, 36 text figs.
1922. 'Note on the isopod known as *Geoligia perkinsi* Dollfus (Crust.)' Proc. Hawaiian Ent. Soc., V, No. 1, 4 pp.
1924. 'Occurrence in South America of the shore isopod *Ligia novae-zealandiae* Dana.' New Zealand Jour. Sci. and Tech., VI, pp. 287, 288.
- 1924a. In: 'Tanaidacea and Isopoda.' 'Fauna of the Chilka Lake.' Mem. Indian Mus., V, pp. 875-895, Pl. lx.
1925. 'Some Amphipoda and Isopoda from the Chatham Islands.' Rec. Canterbury Mus., II, pp. 317-320.
- CHOPRA, B. 1923. 'Bopyrid isopods parasitic on Indian Decapoda Macrura.' Rec. Indian Mus., XV, pp. 411-550, Pls. xi-xxi, text figs. 1-30.
- COCKERELL, T. D. A. 1912. 'Fauna of Boulder County, Colorado, Part II.' Univ. Colorado Studies, IX, pp. 41-52.
1927. 'Zoology of Colorado.' Pp. 1-262, Pls. and text figs.
- COLLINGE, W. E. 1915. 'Description of a new genus and species of terrestrial Isopoda from British Guiana.' Jour. Linn. Soc. London, Zool., (2) XXXII, pp. 509-511, Pl. l.
1917. 'Description of *Paracubaris spinosus*, a new genus and species of terrestrial Isopoda from British Guiana.' Jour. Linn. Soc. London, Zool., XXXIV, pp. 61-63, Pl. vi.
- 1917a. 'Description of a new species of terrestrial isopod from the Guacharo Cave, Trinidad.' Jour. Zool. Research, II, pp. 29-30, Figs. 1-3.
1922. 'On the terrestrial isopod *Eluma caelatum* (Miers) = *purpurascens* Budde-Lund.' Jour. Linn. Soc. London, Zool., XXXV, pp. 103-106, Pl. viii.
- COPE, E. D. 1872. 'On the Wyandotte Cave and its fauna.' Amer. Naturalist, VI, pp. 406-422, Figs. 109-116.

- 1872a. 'Report on the Wyandotte Cave and its fauna.' 3d and 4th Ann. Rep. Geol. Surv. Indiana, pp. 157-182.
- CREASER, E. P. 1931. 'A new blind isopod of the genus *Caecidotea* from a Missouri cave.' Occ. Papers Mus. Zool. Univ. Michigan, No. 222, pp. 1-7, Pls. I, II.
- CUNNINGHAM, R. O. See Bate, C. S., 1868.
- DAHL, F. 1892. 'Die Landfauna von Bermuda.' In: 'Ergeb. Plankton Exped. Humboldt-Stiftung,' part 1, pp. 105-112, Pl. III.
1916. 'Die Asseln oder Isopoden Deutschlands.' VI, 90 pp., 107 Figs. Jena.
- DANA, J. D. 1852-1853 (1855). 'United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U. S. N.' XIII, Crustacea, 1618 pp., Atlas (dated 1855) with 96 Pls. Isopoda, Part 2, pp. 696-805, Pls. XLVI-LIII.
1856. 'Catalogue and descriptions of Crustacea collected in California by Dr. John L. LeConte.' Proc. Philadelphia Acad. Nat. Sci., VII, pp. 175-177.
- DE CALABRESE, D. See Giambiagi, D.
- DE KAY, J. E. 1844. 'Zoology of New York, or the New York Fauna, Part VI, Crustacea.' 70 pp., 13 Pls.
- DOLLFUS, A. 1889. 'Sur quelques isopodes du Musée de Leyde.' Notes Leyden Mus., XI, pp. 91-94, Pl. v.
1890. 'Isopods terrestres du Challenger.' Bull. Soc. Étud. Sci. Paris, XII, pp. 63-70, 2 Pls. (Also reprinted paged 1-8.)
- 1890a. 'Note au sujet des isopodes terrestres du Challenger.' Bull. Soc. Etud. Sci. Paris, June, 1890.
1891. 'Crustacés Isopodes.' In: 'Mission Sci. Cape Horn,' 1882-1883, VI (2), pp. F55-F76, Pls. VIII, VIIIa.
1893. '*Sphaeroma dugesi*, nova species.' Bull. Soc. Zool. France, XVIII, p. 115, Figs. 1, 2.
- 1893a. 'Voyage de M. E. Simon au Venezuela (Décembre 1887-Avril 1888).' 25me Mém. Isopodes Terrestres. Ann. Soc. Ent. France, LXII, pp. 339-346, Pls. IX, X, 1 text fig.
- 1893b. 'Sur la distribution du genre *Ligia* Fabr.' Feuil. Jeun. Nat., XXIV, pp. 23-26, Figs. 1-4.
1894. 'Viaggio del dott. Alfredo Borelli nella Republica Argentina e nel Paraguay.' Pt. VI. Isopodes Terrestres, Boll. Mus. Zool. Anat. Univ. Torino, IX, No. 183, pp. 1-3, 8 text figs.
1896. 'On West Indian terrestrial isopod Crustaceans.' Proc. Zool. Soc. London, pp. 388-400, Figs. 1-13.
- 1896a. 'Recherches zoologiques dans les serres du Museum du Paris.' Feuil. Jeun. Nat., XXVI, pp. 90-94, Figs. 1-2.
- 1896b. 'Isopodes terrestres recueillis dans le Darien par M. le Dr. E. Festa.' Boll. Mus. Zool. Anat. Univ. Torino, XI, No. 228, pp. 1-2, 3 text figs.
- 1896c. 'Les isopodes terrestres du nord de l'Afrique du Cap Blanc à Tripoli.' Mém. Soc. Zool. France, IX, pp. 523-553, Figs. 1-5.

- 1896*d*. 'Sur les Crustacés Isopodes terrestres du Mexique.' *Bull. Soc. Zool. France*, XXI, pp. 46-49, Figs. 1, 2.
- 1896*e*. 'Sur la Distribution géographique des Armadilliens en Europe.' *Compt. Rend. Séances 3me Congrès Intern. Zoologie Leyde*, 16-21 Septembre 1895, pp. 356-358.
1897. 'Les Crustacés Isopodes terrestres à grande dispersion.' *Feuil. Juen. Nat.*, XXVII, pp. 205-212.
- 1897*a*. 'Viaggio del Dott. A. Borelli nel chaco Boliviano e nella Republica Argentina.' VI, Isopodes terrestres. *Boll. Mus. Zool. Anat. Univ. Torino*, XII, No. 289, pp. 1-4, Figs. 1-4.
- EIGENMANN, C. H. 1900. 'A contribution to the fauna of the caves of Texas.' *Proc. Amer. Assoc. Adv. Sci.*, pp. 228-230; reprinted in *Science* (N. S.), XII, pp. 300-302.
1909. 'Cave vertebrates of America.' *Carnegie Inst. Washington, Pub. No. 104*, pp. 1-241, Pls. I-XXIX, text figs. 1-72.
- EVERMANN, B. W., AND CLARK, H. W. 1918. 'The crustaceans of Lake Maxinkuckee.' *Proc. Indiana Acad. Sci.*, pp. 225-229.
- FAXON, W. 1889. See Garman, S.
- FEE, A. R. 1927. 'The Isopoda of Departure Bay and vicinity, with descriptions of new species, variations, and color notes.' *Contr. Canadian Biol.* (N. S.), III, pp. 15-34, Pl. I.
- FITCH, A. 1855. 'First report on the noxious insects of New York.' *Trans. N. Y. Agric. Soc. for 1854*, pp. 705-880.
1856. 'First and second reports on the noxious, beneficial and other insects of New York.' *Albany. Isopods*, pp. 116-121.
- FORBES, S. A. 1876. 'List of Illinois Crustacea.' *Bull. No. 1, Illinois Mus. Nat. Hist.*, pp. 3-25, Figs. 1-30.
- FOWLER, H. W. 1912. 'The Crustacea of New Jersey.' *Rep. N. J. Mus.*, 1911, pp. 29-650, Pls. I-CL.
- GANDARA, G. 1926. 'Las cochinillas de la humedad (Isopoda).' *Mem. Soc. Ant. Alzate, Mexico*, XLIV, pp. 285-297.
- GARMAN, H. 1890. 'A new fresh-water crustacean.' *Bull. Essex Inst.*, XXII, pp. 28-30, 1 Pl.
- GARMAN, S. 1889. 'Cave animals from southwestern Missouri.' (Crustacea by Faxon, W.) *Bull. Mus. Comp. Zool.*, XVII, pp. 225-240, Pls. I, II.
- GAY, C. See Nicolet, H.
- GEISER, S. W. 1928. 'A simple trap for the capture of terrestrial isopods.' *Amer. Midland Naturalist*, XI, No. 5, 2 pp.
1929. 'Albinism in terrestrial isopods.' *Anat. Record*, XLIV, p. 246, 247.
1932. 'The frequency of occurrence of albinism in terrestrial isopods.' *Lab. Contr. Sci. Dept. Southern Meth. Univ.*, I, No. 1, pp. 4-7.
1933. 'Notes on Texas Crustacea.' *Field and Lab.*, II, pp. 29-32.
- GERSTAECKER, A. 1854. 'Ueber eine neue Myriapoden- und Isopoden-Gattung.' *Ent. Zeitung, Stettin*, XV, pp. 310-315, Pl. II.
1873. 'Gliederthiere,' in von der Decken, 'Reisen in Ost-Afrika in den

- Jahren 1859-1865.' III, part 2, pp. 1-542, Pls. I-XVIII (Isopoda, pp. 525-528.)
- GIAMBIAGI, D. (De Calabrese). 1922. 'Cuatro neuvos isopodos de la Argentina.' Physis, V, pp. 231-244, Pls. I-IV.
1923. 'Una nueva especie de "Tanais."' Physis, VI, pp. 248-253, 3 Figs.
1925. 'Crustaceos Isopodos.' Res. Prim. Exp. a Tierra del Fuego (1921), pp. 1-20, text figs. 1, 2, Pls. I-V. Buenos Aires.
1931. 'Oniscoideos del Río de la Plata.' Anal. Mus. Nac. Buenos Aires, XXXVI, pp. 417-429, Pls. I-IX.
- GOSSE, P. H. 1851. 'A naturalist's sojourn in Jamaica.' London. Pp. i-xii, 1-508, Pls. I-VIII.
- GOULD, A. A. 1841. 'Report on the Invertebrata of Massachusetts comprising the Mollusca, Crustacea, Annelida, and Radiata.' 373 pp., 15 Pls.
- GRAEVE, W. 1914. 'Die Trichonischinen der Umgebung von Bonn.' Zool. Jahrb., Syst., XXXVI, pp. 203-228, Pls. IV-VI.
- GUÉRIN, M. 1837. 'Sur une nouvelle espèce de Porcillion provenant de l'île de Cuba.' Compt. Rend. Acad. Sci. Paris, IV, p. 132.
- GÜNTHER, A. See Miers, E. J., 1877.
- HANSEN, H. J. 1888. 'Oversigt over det vestlige Grönlands Fauna.' Vidensk. Meddel. Nat. Foren. Kjöbenhavn, 1887, pp. 177-198.
1897. 'Reports on the dredging operations of the West Coast of Central America to the Galapagos, to the West Coast of Mexico and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U. S. Fish Commission Steamer "Albatross" during 1891.' Part XXII, The Isopoda. Bull. Mus. Comp. Zool., XXXI, pp. 95-129, Pls. I-VI, 1 map.
- HARFORD, W. G. W. 1877. 'Description of a new genus and three new species of sessile-eyed Crustacea.' Proc. California Acad. Sci., VII, pp. 53-54.
- 1877a. 'Description of three new species of sessile-eyed Crustacea with remarks on *Ligia occidentalis*.' Proc. California Acad. Sci., VII, pp. 116-117.
- HARGER, O. 1873. See Verrill and Smith, 1873.
1874. 'On a new genus of Asellidae.' Amer. Jour. Sci., (3) VII, pp. 601, 602.
- 1874a. See Smith, 1874.
1876. 'Description of *Mancasellus brachyurus*, a new fresh-water isopod.' Amer. Jour. Sci., (3) XI, pp. 304, 305.
1878. 'Descriptions of new genera and species of Isopoda from New England and adjacent regions.' Amer. Jour. Sci., (3) XV, pp. 373-379.
1879. 'Notes on New England Isopoda.' Proc. U. S. Nat. Mus., II, pp. 157-165.
1880. 'Report on the Marine Isopoda of New England and adjacent waters.' In: Report of the U. S. Commissioner of Fish and Fisheries, for 1878. Part 6, pp. 297-462, Pls. I-XIII.

- HAY, O. P. 1878. 'Description of a new species of *Asellus*.' Bull. Illinois State Lab. Nat. Hist., No. 2, pp. 90-92.
1882. 'Notes on some fresh-water Crustacea together with descriptions of two new species.' Amer. Naturalist, XVI, pp. 241, 242.
- HAY, W. P. 1899. 'Description of a new species of subterranean isopod.' Proc. U. S. Nat. Mus., XXI, pp. 871, 872, Pl. LXXXVI.
1901. 'Two new subterranean crustaceans from the United States.' Proc. Biol. Soc. Washington, XIV, pp. 179, 180.
1902. 'Observations on the crustacean fauna of Nickajack Cave, Tennessee, and vicinity.' Proc. U. S. Nat. Mus., XXV, pp. 417-439, Figs. 1-8.
1903. 'On a small collection of crustaceans from the Island of Cuba.' Proc. U. S. Nat. Mus., XXVI, pp. 429-435, Figs. 1-3.
- HELLER, C. 1861. 'Vorläufiger Bericht über die während der Weltumseglung der k. k. Fregatte Novara gesammelten Crustaceen.' Verh. zool. bot. Gesell. Wien, XI, pp. 495-498.
1868. 'Crustaceen.' In: 'Reise der Oest. Fregatte "Novara" um d. Erde.' Zool., II, part 3, pp. 1-280, Pls. I-XXV. (Isopoda, pp. 130-148, Pl. XII.)
- HERRICK, C. L. 1887. 'List of the fresh-water and marine Crustacea of Alabama.' Geol. Survey Alabama, Monograph 2, Bull. No. 1, V, pp. 1-56, Pls. I-VII.
- HILTON, W. A. 1915. 'The early development of *Ligyda* with reference to the nervous system.' Jour. Ent. Zool. Pomona College, VII, pp. 211-227, Figs. 1-2, 6 Pls.
- HOLMES, S. J. 1904. 'On some new or imperfectly known species of West American Crustacea.' Proc. California Acad. Sci., (3) III, pp. 307-324, Pls. XXXV-XXXVII.
- HOLMES, S. J., AND GAY, M. E. 1909. 'Four new species of isopods from the coast of California.' Proc. U. S. Nat. Mus., XXXVI, pp. 375-379, Figs. 1-6.
- HOUSE, J. L. 1911. 'Crustacea of Winona Lake.' Proc. Indiana Acad. Sci. for 1910, pp. 129-133.
- HUBBARD, H. G. 1880. 'Two days collecting in the Mammoth Cave, with contributions to a study of its fauna.' Amer. Entomol., I, pp. 34-40, 79-84.
- HUNGERFORD, H. B. 1922. 'A new subterranean isopod.' Kansas Univ. Sci. Bull., XIV (whole ser. XXIV), pp. 175-181, Pl. xv.
- HUNTSMAN, A. G. 1913. 'Invertebrates other than insects and mollusks.' In: 'Nat. Hist. Toronto Region,' pp. 272-287.
1918. 'Freshwater Malacostraca of Ontario, Canada.' Contrib. Canadian Biol., Fasc. II, pp. 146-149.
- IVES, J. E. 1891. 'Crustacea from the northern coast of Yucatan, the harbor of Vera Cruz, the west coast of Florida and the Bermuda Islands.' Proc. Acad. Nat. Sci. Philadelphia, XLIII, pp. 176-200, Pls. v, VI.
- JACKSON, H. G. 1922. 'A revision of the isopod genus *Ligia* (Fabricius).' Proc. Zool. Soc. London, pp. 683-703, Pls. I, II.

1923. 'A revision of the isopod genus *Ligidium* (Brandt), Crustacea.' Proc. Zool. Soc. London, pp. 823-839, Figs. 1-10.
1926. 'Woodlice from Spain and Portugal, with an account of *Benthana*, a subgenus of *Philoscia*.—Crustacea.' Proc. Zool. Soc. London, I, pp. 183-201, Pls. I-VIII, 1 text fig.
- 1926a. 'The morphology of the isopod head. Part I. The head of *Ligia oceanica*.' Proc. Zool. Soc. London, II, pp. 885-911, Pls. I-IV.
1927. 'A new subgenus of *Ligia*, with further observations on the genus.' Ann. Mag. Nat. Hist., (9) XIX, pp. 129-136, Pl. II.
1928. 'Hermaphroditism in *Rhyssolus*, a terrestrial isopod.' Quart. Jour. Micro. Sci., (N. S.), LXXI, pp. 527-539, Figs. 1-6.
- 1928a. 'The morphology of the isopod head.' Part II. The terrestrial isopods. Proc. Zool. Soc. London, I, pp. 561-595, Figs. 1-20.
- JOHANSEN, F. 1920. 'The larger freshwater Crustacea from Canada and Alaska.' Parts I and II. Amphipoda and Isopoda. Canadian Field-Nat., XXXIV, pp. 126-132, 145-148.
1921. 'Freshwater Crustacea from Canada.' Canadian Field-Nat., XXXV, pp. 36, 99-100.
1922. 'The crustacean life of some arctic lagoons, lakes, and ponds.' In: 'Rep. Canadian Arctic Exp.,' VII, part N, 31 pp., 7 Pls.
- 1922a. 'A freshwater isopod new to Canada.' Canadian Field-Nat., XXXVI, p. 156.
1924. 'A biological excursion to Anticosti Island.' Canadian Field-Nat., XXXVIII, p. 161-164.
1925. 'Further notes on Canadian freshwater isopods and amphipods.' Canadian Field-Nat., XXXIX, pp. 138-139.
1926. 'Observations on Canadian freshwater Crustacea made in 1925.' Canadian Field-Nat., XL, pp. 92-96, 1 Fig.
- 1926a. '*Asellus aquaticus* not found in Labrador.' Canadian Field-Nat., XL, p. 140.
- 1926b. 'On the woodlice (Oniscoidea) occurring in Canada and Alaska.' Canadian Field-Nat., XL, pp. 165-167.
1928. 'Woodlice (Oniscoidea) from British Columbia.' Canadian Field-Nat., XLII, p. 106.
1929. 'Further observations on Canadian land and freshwater Crustacea made in 1928.' Canadian Field-Nat., XLIII, pp. 104-106.
1931. 'Observations on Canadian freshwater Crustacea made in 1927-1929.' Canadian Field-Nat., XLV, pp. 80-83.
- JOHNSON, A. A. See Atwood and Johnson.
- JOHNSON, M. E., AND SNOOK, H. J. 1927. 'Seashore animals of the Pacific Coast.' Pp. 1-659, Figs. 1-700, 1 Pl. New York, Macmillan Co.
- KESSELYAK, A. 1930. 'Ueber Isopoden.' Zool. Anzeiger, XCI, pp. 50-66, Figs. 1-25.
- KINAHAN, J. R. 1859. 'On the genus *Platyarthrus* (Brandt); with notices of allied undescribed genera.' Proc. Dublin Univ. Zool. and Bot. Assoc., I, pp. 188-201, 2 text figs., Pl. XIX.
- KOCH, C. L. 1847. 'System der Myriapoden mit den Verzeichnissen und Berich-

- tigungen zu Deutschlands Crustaceen, Myriapoden, und Arachniden. Regensburg.
- KRAEPELIN, K. 1901. 'Ueber die durch den Schiffsverkehr in Hamburg eingeschleppten Tiere.' Mitt. Naturhist. Mus. Hamburg, XVIII, pp. 185-209. (Isopoda, determined by Budde-Lund, on p. 204.)
- KRÖYER, H. 1838. 'Grönlands Amfipoder.' Kong. Danske Videns. Selsk. Afh., VII, pp. 229-326, Pls. I-IV.
- KUNKEL, B. W. 1918. 'The Arthrostraca of Connecticut.' Conn. State Geol. Nat. Hist. Survey. Bull. No. 26, 261 pp., 84 text figs.
- LEIDY, J. 1855. 'Contributions toward a knowledge of the marine invertebrate fauna of the coasts of Rhode Island and New Jersey.' Jour. Acad. Nat. Sci. Philadelphia, (2) III, pp. 135-152.
- LOCKINGTON, W. N. 1877. 'Description of seventeen new species of Crustacea.' Proc. California Acad. Sci., VII, pp. 41-48.
- LOHMANDER, H. 1927. 'On some terrestrial isopods in the United States National Museum.' Proc. U. S. Nat. Mus., LXXII, No. 2713, pp. 1-18, Figs. 1-6.
- LONGNECKER, M. 1924. 'The terrestrial isopods of Iowa.' Proc. Iowa Acad. Sci., XXX, pp. 197-199.
- MACCAGNO, T. 1931. '*Ligia porteri* Macc., nuova specie di isopodo terrestre del Cile.' Boll. Zool. Napoli, II, pp. 151-157, Pl. III.
- MALONEY, J. O. 1930. 'A new species of isopod from Potter Creek, California.' Univ. of California Pub. Zool., XXXIII, pp. 291-295, 13 Figs.
- MARKUS, H. C. 1930. 'Studies on the morphology and the life history of *Manca-sellus macrourus*.' Trans. Amer. Micros. Soc., XLIX, pp. 220-237, 1 Pl.
- MARTENS, E. V. 1869. 'Südbrazilische süss- und brackwasser-Crustaceen nach den Sammlungen des Dr. Reinh. Hensel.' Arch. Nat., XXXV, pp. 1-37, Pls. I, II. (Isopoda, pp. 33, 34.)
- MICHAELSEN, W. 1897. 'Land- und Süsswasser-Asseln aus der Umgebung Hamburgs.' Jahrb. d. Hamburg. Wiss. Anst., XIV, Beiheft 2, pp. 119-134.
- MIERS, E. J. 1877. Crustacea: in 'Account of the zoological collection made during the visit of H. M. S. "Petrel" to the Galapagos Islands.' By Arthur Günther. Proc. Zool. Soc. London, pp. 73-75, 1 Pl.
- 1877a. 'On a collection of Crustacea, Decapoda, and Isopoda chiefly from South America, with descriptions of new genera and species.' Proc. Zool. Soc. London, pp. 653-679, Pls. LXVI-LXIX.
1881. Crustacea: in 'Account of the zoological collections of H. M. S. "Alert" in the Straits of Magellan and on the coast of Patagonia.' Proc. Zool. Soc. London, pp. 61-79, Pl. VII.
- 1881a. 'Revision of the Idoteidae, a family of sessile-eyed Crustacea.' Jour. Linn. Soc. London, XVI, pp. 1-88, Pls. I-III.
- MILLER, M. A. 1933. 'A new blind isopod, *Asellus californicus*, and a revision of the subterranean asellids.' Univ. of Calif. Pub., Zool., XXXIX, pp. 97-110, Figs. 1-14.
- MILNE-EDWARDS, M. 1840. 'Histoire Naturelle des Crustacés. III.' Paris. (Isopoda on pp. 115-283, Pls. XXXI-XXXIII.)

- MONOD, T. 1922. 'Remarques sur le genre "*Aegathoa*" Dana suivies de la description d'*Ae. indicatrix*, nov. sp.' Assoc. Franc. Avanc. Sci. Congrès Montpellier, pp. 405-413, Figs. 1, 2.
1926. Tanaidacés: 'Isopodes et Amphipodes; in Résultats du voyage de la "*Belgica*" en 1897-99.' Pp. 1-67, Figs. 1-61.
1931. 'Sur un *Braga* du Paraguay.' Ann. Parasitol., IX, pp. 363-365, Figs. 1-3.
- MOORE, H. F. 1901. 'Report on Porto Rican Isopoda.' Bull. No. 20, U. S. Fish Comm., part 2, pp. 163-176, Pls. VII-XI. (Volume dated 1900.)
- MOREIRA, C. 1927. 'Duas especies novas de crustaceos isopodes terrestres do Brazil.' Bol. Biol. Lab. Parasitol. Fac. Med. Univ. São Paulo, Fasc. 10, pp. 194-200, Figs. 1-6.
1932. 'Crustacés isopodes terrestres du Brésil.' Bull. Soc. Zool. France, LVI (ann. 1931), pp. 426-433, Pls. I-III.
- NEEDHAM, J. G., AND LLOYD, J. T. 1916. 'The life of inland waters.' Pp. 1-438, Figs. 1-244.
- NICOLET, H. 1849. Isopodos: in Gay, C., 'Historia fisica y politica, Chile.' Zool. III, pp. 256-287. Atlas Zoologico (1854), II, Pls. Crustaceos III and IV.
- NIERSTRASZ, H. F. 1915-1917. 'Die Isopoden-Sammlung im Naturhistorischen Reichs-Museum zu Leiden.' I, Zool. Meddel. Rijks Mus. Nat. Hist. Leiden, ann. 1915, pp. 71-108, 2 Pls.; II, idem, ann. 1917, pp. 87-120, 2 Pls.
1931. 'Die Isopoden der Siboga-Expedition.' Flabellifera. In: 'Siboga-Exp.,' XXXIIc, pp. 121-233, 129 text figs., 2 Pls.
- NIERSTRASZ, H. F., AND BRENDER À BRANDIS, G. A. 1923. 'Die Isopoden der Siboga-Expedition.' Epicaridea. In: 'Siboga-Exp.,' XXXIIb, 65 pp., Pls. IV-IX.
1925. 'Epicaridea.' In: 'Bijdragen tot de Kennis der Fauna van Curaçao, pp. 1-8, 1 Pl.
1929. 'Epicaridea.' Part I. In: 'Papers from Dr. Th. Mortensen's Pacific Exp., 1914-1916, No. 48.' Vidensk. Meddel. Danske Nat. Foren., LXXXVII, 44 pp., 53 text figs.
- NIERSTRASZ, H. F., AND SCHUURMAN STECKHOVEN, J. H., JR. 1930. 'Isopoda genuina.' In: 'Die Tierwelt der Nord- und Ostsee,' X, part e, pp. 57-172, 126 text figs.
- NORTON, A. H. 1909. 'Some aquatic and terrestrial crustaceans of the State of Maine.' Proc. Portland Soc. Nat. Hist., II, pp. 245-255, 1 Fig.
- OMER-COOPER, I. 1924. 'The terrestrial Isopoda of Mesopotamia and the surrounding districts.' Jour. Bombay Nat. Hist. Soc., XXIX, pp. 93-105, text figs. 1, 2, Pls. I-VI.
1926. 'Revision of the genus *Periscyphis* Gerst.' (Isopoda Terrestria.) Proc. Zool. Soc. London, I, pp. 349-400, Figs. 1-79.
- ORTMANN, A. E. See Ward, H. B., and Whipple, G. C.
- PACKARD, A. S. 1867. 'View of the recent invertebrate fauna of Labrador.' Mem. Boston Soc. Nat. Hist., I, p. 296.
1871. 'The crustaceans and insects.' In Packard and Putnam: 'The

- Mammoth Cave and its inhabitants.' Amer. Naturalist, V, pp. 744-761, Figs. 122-133. (Reprinted 1872 and 1879, pp. 11-28.)
1872. See 1871.
1873. 'On the cave fauna of Indiana.' 5th Rep. Peabody Acad. Sci., pp. 93-97.
1879. See 1871.
1885. 'On the structure of the brain of *Asellus* and the eyeless form *Cecidotaea*.' Amer. Naturalist, XIX, pp. 85, 86.
- 1885a. 'On the structure of the brain of sessile-eyed Crustacea.' Mem. Nat. Acad. Sci., III, 14 pp., 5 Pls.
1888. 'The cave fauna of North America with remarks on the anatomy of the brain and origin of the blind species.' Mem. Nat. Acad. Sci., Washington, IV, part I, pp. 3-156, Pls. I-XXVII, 21 text figs.
1894. 'On the origin of the subterranean fauna of North America.' Amer. Naturalist, XXVIII, pp. 727-751, 1 Pl.
1900. 'A new eyeless crustacean from Mexico.' Proc. Amer. Assoc. Adv. Sci., XLIX, p. 228.
- PACKARD, A. S., AND COPE, C. D. 1881. 'The fauna of Nickajack Cave.' Amer. Naturalist, XV, pp. 877-882, 1 Pl.
- PACKARD, A. S., AND PUTNAM, F. W. See Packard, 1871.
- PANNING, A. 1928. 'Isopoda.' In Michaelsen: 'Deutsch-Südwestafrika,' II, pp. 169-201, Figs. 1-11.
- PAULMIER, F. C. 1905. 'Higher Crustacea of New York City.' Bull. 91, New York State Mus., pp. 117-189, Figs. 1-59.
- PEARSE, A. S. 1910. 'A preliminary list of the Crustacea of Michigan.' Rep. No. 12, Michigan Acad. Sci., pp. 68-76.
1911. 'Report on the Crustacea collected by the University of Michigan Walker Exp. in the State of Vera Cruz, Mexico.' Rep. No. 13, Michigan Acad. Sci., pp. 108-114, 2 Pls.
1913. 'Notes on Crustacea recently acquired by the museum.' Occas. Papers Mus. Zool. Univ. Michigan, No. 1, pp. 1-4.
1914. 'Report on crustacea collected by the Walker-Newcomb Expedition in Northeastern Nevada in 1912.' Occ. Papers. Mus. Zool. Univ. Michigan, No. 3, pp. 1-4.
1915. 'An account of the Crustacea collected by the Walker Expedition to Santa Marta, Colombia.' Proc. U. S. Nat. Mus., XLIX, pp. 531-556, Figs. 1-9, Pls. LXX-LXXIII.
1917. 'Isopoda collected by the Bryant Walker Expedition to British Guiana, with notes on Crustacea from other localities.' Occ. Papers Mus. Zool. Univ. Michigan, No. 46, pp. 1-8, Figs. 1-3.
1920. Univ. of Wisconsin Studies in Science. No. 1, p. 39. 'The fishes of Lake Valencia, Venezuela.'
1921. 'Crustacea from Lake Valencia, Venezuela.' Proc. U. S. Nat. Mus., LIX, pp. 459-462, Figs. 1, 2.
- PERTY, M. 1830-1834. 'Delectus animalium articulorum quae in itinere per Braziliam annis 1817-1823 . . . collegerunt.' J. B. de Spix, et C. F. Ph. de Martius. Pp. 1-224, Pls. I-XL. Monachii. (Isopods pp. 211, 212, Pl. XL.)

- PICADO, C. 1913. 'Les Broméliacées épiphytes considérés comme milieu biologique.' Bull. Sci. France Belgique, XLVII, pp. 215-360, Figs. 1-40, Pls. VI-XXIV.
- POPENOE, C. H. 1917. 'Mushroom pests and how to control them.' Farmer's Bull. No. 789, U. S. Dept. of Agric., pp. 1-16, Figs. 1-7.
- PORTER, C. E. 1899. 'Datos para la fauna i flora de la Provincia de Atacama.' Rev. Chilena Hist. Nat., III, pp. 179-182.
1903. 'Carcinologia Chilena. Breve nota acerca de los crustáceos colectados en Coquimbo por el Dr. F. T. Delfin, i descripción de una nueva especie.' Rev. Chilena Hist. Nat., VII, pp. 147-153, 1 text fig.
1905. 'Carcinologica Chilena: Sobre algunos crustaceos de Juan Fernández (con láminas).' Rev. Chilena Hist. Nat., IX, pp. 27-35.
- PRATT, H. S. 1916. 'A manual of the common invertebrate animals.' Chicago, pp. 1-737, Figs. 1-1017. Second Edition, Philadelphia, 1935, pp. 1-854, Figs. 1-974.
- PROCTER, W. 1933. 'Biological survey of the Mount Desert region.' Part V, pp. 1-402, Pls. I-XV, text figs. 1-42, 2 charts.
- RACOVITZA, E.-G. 1908. 'Isopodes terrestres (Seconde série).' Arch. Zool. Exper. Gen., (4) IX, pp. 239-415, Pls. IV-XXIII, Figs. 1-17.
- 1919-1925. 'Notes sur les isopodes.' Nos. 1, 2 (1919). Arch. Zool. Exper. Gen., LVIII (Notes et Revue), pp. 31-43, Figs. 1-12; Nos. 3-5 (1919), pp. 49-77, Figs. 13-51; Nos. 6, 7 (1920), pp. 79-115, Figs. 52-84; Nos. 8, 9 (1920a), LIX, pp. 28-66, Figs. 85-134; Nos. 10, 11 (1923), LXI, pp. 75-122, Figs. 135-151; No. 12 (1924), LXII, pp. 35-38, Figs. 152-158; No. 13 (1925), LXIII (fasc. 4), pp. 533-622, Figs. 159-210.
- RATHBUN, M. J. 1905. 'Fauna of New England, 5. List of the Crustacea.' Occ. Papers Boston Soc. Nat. Hist., VII, pp. 1-117. (Separate check list of the included species, paged 1-11, accompanies this.)
1912. 'Some Crustacea from Cuba.' Bull. Mus. Comp. Zool., LIV, pp. 451-460, Pls. I-V.
- RAWSON, D. S. 1928. 'Preliminary studies of the bottom fauna of Lake Simcoe, Ontario.' Univ. of Toronto Pub. (Biol.), No. 31, pp. 75-102.
- RICHARDSON, H. 1897. 'Description of a new species of *Sphaeroma*.' Proc. Biol. Soc. Washington, XI, pp. 105-107.
- 1897a. 'Description of a new crustacean of the genus *Sphaeroma* from a warm spring in New Mexico.' Proc. U. S. Nat. Mus., XX, pp. 465, 466.
1899. 'Key to the isopods of the Pacific Coast of North America, with descriptions of twenty-two new species.' Proc. U. S. Nat. Mus., XXI, pp. 815-869, Figs. 1-34. (Also reprinted in Ann. Mag. Nat. Hist., (7) IV, pp. 157-187, 260-277, 321-338.)
1900. 'Results of the Branner Agassiz Expedition to Brazil.' Proc. Wash. Acad. Sci., II, pp. 157-159.
- 1900a. 'Synopsis of North American invertebrates.' The Isopoda. Amer. Naturalist, XXXIV, pp. 207-230, 295-309, Figs. 1-16.
1901. 'Key to the Isopods of the Atlantic Coast of North America with

- descriptions of new and little-known species.' Proc. U. S. Nat. Mus., XXIII, pp. 493-579, Figs. 1-34.
1902. 'The marine and terrestrial isopods of the Bermudas, with descriptions of new genera and species.' Trans. Connecticut Acad. Sci., XI, pp. 277-310, Pls. xxxvii-xl. (Terrestrial Isopoda, pp. 299-308, Pl. xi.)
- 1902a. 'A new fresh-water isopod of the genus *Mancasellus* from Indiana.' Proc. U. S. Nat. Mus., XXV, pp. 505-507, Figs. 1-4.
- 1902b. 'A new terrestrial isopod of the genus *Pseudarmadillo* from Cuba.' Proc. U. S. Nat. Mus., XXV, pp. 509-511, Figs. 1-4.
1904. 'Contributions to the natural history of the Isopoda.' Proc. U. S. Nat. Mus., XXVII, pp. 1-89, 657-681, 131 text figs.
- 1904a. 'Isopod crustaceans of the northwest coast of North America.' Harriman Alaska Exp., X, pp. 213-230, text figs. 96-117.
1905. 'A monograph of the isopods of North America.' Bull. No. 54, U. S. Nat. Mus., pp. i-lxiii, 1-727, Figs. 1-740.
1907. 'A new terrestrial isopod from Guatemala, the type of a new genus.' Proc. U. S. Nat. Mus., XXXII, pp. 447-450, Figs. a-g.
1909. 'The isopod crustacean *Acanthoniscus spiniger* Kinahan re-described.' Proc. U. S. Nat. Mus., XXXVI, pp. 431-434, Figs. 1-7.
- 1909a. 'Isopods collected in the northwest Pacific by the U. S. Bureau of Fisheries steamer "Albatross" in 1906.' Proc. U. S. Nat. Mus., XXXVII, pp. 75-129, Figs. 1-50.
1910. 'Description of a new terrestrial isopod from Guatemala.' Proc. U. S. Nat. Mus., XXXVII, pp. 495-497, 1 Fig.
- 1910a. 'Terrestrial isopods collected in Costa Rica by J. F. Tristan, with descriptions of new genus and species.' Proc. U. S. Nat. Mus., XXXIX, pp. 93-95, Figs. 1-4.
1911. 'Description d'un nouvel isopode du genre Braga provenant d'une riviere de l'Amerique du Sud.' Bull. Mus. Hist. Nat. Paris, XVII, pp. 94-96, Figs. 1, 2.
1912. 'Marine and terrestrial isopods from Jamaica.' Proc. U. S. Nat. Mus., XLII, pp. 187-194, Figs. 1-3.
- 1912a. 'Description of a new terrestrial isopod belonging to the genus *Cubaris* from Panama.' Proc. U. S. Nat. Mus., XLII, pp. 477-479, Figs. 1, 2.
- 1912b. 'Descriptions of two new parasitic isopods belonging to the genera *Palaegyge* and *Probopyrus* from Panama.' Proc. U. S. Nat. Mus., XLII, pp. 521-524, Figs. 1-8.
- 1912c. 'Terrestrial Isopoda of Colombia.' Mém. Soc. Sci. Neuchât. Sci. Nat., V, pp. 29-32.
1913. 'Terrestrial isopods collected in Costa Rica by Mr. Picado, with the description of a new genus and species.' Proc. U. S. Nat. Mus., XLIV, pp. 337-340, Figs. 1-5.
- Ross, W. A. 1914. 'Report on insects of the year.' 44th Ann. Rep. Ent. Soc. Ontario, pp. 23-25.
- SARS, G. O. 1899. 'An account of the Crustacea of Norway.' II, Isopoda, pp. i-x, 1-270, 104 Pls. Bergen.

- SAUSSURE, H. de. 1857. 'Diagnoses de quelque Crustacés nouveaux des Antilles et du Mexique.' Rev. Mag. Zool., (2) IX, pp. 304-308.
1858. 'Mémoire sur divers Crustacés nouveaux des Antilles et du Mexique.' Mém. Soc. Phys. Hist. Nat. Genève, XIV, pp. 417-496, Pls. I-VI (Isopods, pp. 476-485, Pl. v). Apparently also reprinted with separate paging.
- SAY, T. 1818. 'An account of the Crustacea of the United States.' Jour. Philadelphia Acad. Sci., I (Isopoda, pp. 393-401, 423-433).
- SCHIOEDTE, J. C. 1866. 'Krebsdyrenes Sugemund.' Naturh. Tidsskr., (3) IV, pp. 169-206, Pls. x, xi.
- SCHIOEDTE, J. C., AND MEINERT, F. 1879-1884. 'Symbolae ad monographiam Cymothoarum Crustaceorum Isopodum familiae.' Naturh. Tidsskr., (3) XII (1879-1880), pp. 321-414, Pls. VII-XIII; XIII (1881-1883), pp. 1-166, 281-378, Pls. I-XVI; XIV (1884), pp. 221-454, Pls. VI-XVIII.
- SCHOUTEN, G. B. 1932. 'Isópodo del género *Braga*.' Rev. Soc. Cien. Paraguay, III, pp. 105, 106, Figs. 1, 2.
- SCHWENCK, —. 1927. 'Os tatusinhos como disseminadores de parasitoses intestinaes.' S. Paulo, Brazil.' (I have not seen this work.)
- SHELFORD, V. E. 1913. 'Animal communities in temperate America as illustrated in the Chicago regions.' Bull. Geogr. Soc. Chicago, No. 5, 362 pp., 306 figs.
- SHUTT, F. T. 1886. 'Notes on the anatomy of the wood-louse.' Proc. Canad. Inst., Toronto, (3) III, pp. 293, 294.
- SMITH, S. I. 1873. 'Professor Cope's Crustaceans.' Amer. Naturalist, VII, pp. 244, 245.
1874. 'The Crustacea of the fresh waters of the United States.' Rep. U. S. Comm. Fisheries for 1872 and 1873, pp. 637-665, Pls. I-III. (Isopoda by Harger, O.)
- 1874a. 'Sketch of the invertebrate fauna of Lake Superior.' Rep. U. S. Comm. Fisheries for 1872 and 1873, pp. 690-707.
1875. 'The crustaceans of the caves of Kentucky and Indiana.' Amer. Jour. Sci., (3) IX, pp. 476, 477.
1880. 'Notes on Crustacea collected by Dr. G. M. Darrow at Vancouver and Queen Charlotte Islands.' Rep. Progress Geol. Survey Canada, 1878, 1879, p. 218.
- SMITH, S. I., AND VERRILL, A. E. See also Verrill and Smith.
1871. 'Notice of the Invertebrata dredged in Lake Superior in 1871 by the U. S. Lake Survey.' Amer. Jour. Sci., (3) II, pp. 448-454.
- SNOOK, H. J. See Johnson and Snook.
- SPANDL, H. 1926. 'Die Tierwelt der unterirdischen Gewässer.' Pp. 1-235, Figs. 1-116. Wien. (This work not seen.)
- STAFFORD, B. E. 1911. 'A new subterranean isopod.' Pomona College Jour. of Entom., III, pp. 572-575, Figs. 189-190.
1912. 'Studies in Laguna Beach Isopoda. I.' Rep. Laguna Mar. Lab., Pomona College, Calif., I, pp. 118-133, Figs. 65-73.
1913. 'Studies in Laguna Beach Isopoda.' Pomona College Jour. Entomol. Zool., V, No. 2, pp. 161-172, 182-188, Figs. 1-10.

- STEBBING, T. R. 1893. 'A history of Crustacea.' New York, pp. 1-466, Pls. I-XIX.
1900. 'On some crustaceans from the Falkland Islands, collected by Mr. Rupert Vallentin.' Proc. Zool. Soc. London, pp. 517-568, Pls. XXXVI-XXXIX.
- 1900a. 'On Crustacea brought by Dr. Willey from the South Seas.' Willey's Zool. Results., Part V, pp. 605-690 Pls. LXIV-LXXIV.
1912. See Budde-Lund, G., 1912.
1914. 'Crustacea from the Falkland Islands collected by Mr. Rupert Vallentin, F. L. S., Part I.' Proc. Zool. Soc. London, pp. 341-378, Pls. I-IX.
- STAMMER, H.-J. 1932. 'Zur Kenntniss der Verbreitung und Systematik der Gattung *Asellus*, insbesondere der mitteleuropäischen Arten (Isopoda). Zool. Anzeiger, XCIX, pp. 113-131, Figs. 1-14.
- STEPHENSEN, K. 1917. 'Conspectus Crustaceorum et Pycnogonidorum Groenlandiae.' Meddel. om Groenland, XXII, No. 1.
1927. 'Crustacea from the Auckland and Campbell Islands.' Vidensk. Meddel. Dansk. Nat. Foren., LXXXIII, pp. 289-390, Figs. 1-33.
- STIMPSON, W. 1856. 'On some California Crustacea.' Proc. California Acad. Sci., I, part 2, pp. 95-99.
1857. 'The Crustacea and Echinodermata of the Pacific Shores of North America.' Boston Jour. Nat. Hist., VI, pp. 503-513.
- STOLLER, J. H. 1902. 'Two new land isopods.' 54th Rep. New York State Mus., pp. 208-213, Figs. 1, 2.
- STUXBERG, A. 1872. 'Tvenne nya Oniscider beskrifne.' Oefvers. k. Svensk. Vet. Akad. Förh., XXIX, No. 9, pp. 3-6, Pl. x.
1875. 'Om Nord-Amerikas Oniscider.' Oefvers. k. Svensk. Vet. Akad. Förh., XXXII, No. 2, pp. 43-63. (Lists South American species also.)
- SUMNER, F. B., OSBURN, R. C., AND COLE, L. J. 1913. 'A biological survey of the waters of Woods Hole and vicinity.' Bull. U. S. Bureau of Fisheries, XXXI, 860 pp., 274 charts, 1 map.
- THIELEMANN, M. 1910. 'Beiträge zur Kenntnis der Isopodenfauna Ostasiens.' Abh. k. bayr. Ak. Wiss. math.-phys. Kl., Suppl., II, Abh. 3, pp. 1-109, 1 Pl.
- ULRICH, C. J. 1902. 'A contribution to the subterranean fauna of Texas.' Trans. Amer. Micros. Soc., XXIII, pp. 83-101, Pls. XIV-XVIII.
- UNDERWOOD, L. M. 1886. 'List of the described species of fresh-water Crustacea from America, north of Mexico.' Bull. Illinois State Lab. Nat. Hist., II, pp. 323-386.
- VANDEL, A. 1933. 'Liste des espèces de Trichoniscidae jusqu' ici signalés en France. . . .' Arch. Zool. Exper. Gen., LXXV, pp. 35-54, Figs. 1-21.
- VAN NAME, W. G. 1920. 'Isopods collected by the American Museum Congo Expedition.' Bull. American Mus. Nat. Hist., XLIII, pp. 41-108, Figs. 1-126.
1924. 'Isopods from the Williams Galapagos Expedition.' Zoologica, V, pp. 181-210, 2 maps, 36 Figs.

1925. 'The isopods of Kartabo, Bartica District, British Guiana.' *Zoologica*, VI, pp. 461-503, Figs. 1-77.
1926. 'Forest isopods from Barro Colorado Island, Panama Canal Zone.' *Amer. Mus. Novitates*, No. 206, pp. 1-15, Figs. 1-22.
- VERHOEFF, K. W. 1907. 'Ueber paläarktischen Isopoden.' (9 Aufsatz.) *Zool. Anz.*, XXXI, pp. 457-505. (*Uropodias* Richardson discussed, pp. 462, 463.)
- 1907a. 'Ueber Isopoden.' (10 Aufsatz.) *Sitzungsber. Ges. Naturf. Freunde*, Berlin, pp. 229-281.
1908. 'Ueber Isopoden.' (12 Aufsatz.) 'Neue Oniscoidea aus Mittel- und Südeuropa und zur Klärung einiger bekannte Formen.' *Arch. Naturg.*, LXXIV, part 1, pp. 163-198, 2 Pls.
- 1908a. 'Ueber Isopoden.' (15 Aufsatz.) *Arch. Biontol.*, II, pp. 339-387, Pls. xxix-xxxI.
- 1908b. 'Neue Isopoden-Gattungen.' *Zool. Anz.*, XXXIII, pp. 520-525.
1916. 'Zur Kenntniss der Ligidien, Porcellioniden und Onisciden.' (24 Isopoden-Aufsatz.) *Arch. f. Naturg.*, LXXXII, Abt. A., Heft 10, pp. 108-169, 3 text figs., Pls. I, II.
1917. 'Ueber augenlose Armadillidien und kritische Pruefung der Familie Armadillidiidae.' (25 Isopoden-Aufsatz.) *Arch. Naturg.* LXXX-III, Abt. A., Heft 1, pp. 160-170, Figs. 1-6.
- 1917a. 'Zur Kenntnis der Entwicklung der Trachealsysteme und der Untergattungen von *Porcellio* und *Tracheoniscus*.' (22. Isopoden Aufsatz.) *Sitzungsber. Ges. Naturf. Freunde*, Berlin, pp. 195-223, Figs. 1-7.
1918. 'Zur Kenntnis der Ligidien, Porcellioniden und Onisciden.' (24 Isopoden-Aufsatz.) *Arch. f. Naturg.*, LXXXII, Abt. A, Heft 10, pp. 108-177, Pls. I, II, Figs. 1-3.
1920. 'Ueber die Atmung der Landasseln.' (Ueber Isopoden, 21 Aufsatz.) *Zeitschr. wiss. Zool.*, CXVIII, pp. 365-477, 1 text fig. Pls. VII, VIII.
1926. 'Isopoda Terrestria von Neu-Caledonien und den Loyalty-Inseln.' *Nova Caledonia, Zool.*, IV, pp. 243-366, Figs. 1-141.
1928. 'Ueber einige Isopoden der zoologischen Staatssammlung in Muenchen.' (38 Isopoden-Aufsatz.) *Zool. Anz.*, LXXVI, pp. 25-36, 113-123, Figs. 1-31.
1933. 'Neue Isopoda terrestria aus Mexico und dem Mediterrangebiet.' (50 Isopoden-Aufsatz.) *Zool. Anz.*, CIII, pp. 97-119, Figs. 1-24.
- VERRILL, A. E. 1902. 'The Bermuda Islands.' *Trans. Connecticut Acad. Sci.*, XI, part 2, pp. v-x, 413-956, Figs. 1-248, Pls. LXV-CLV. (Isopods, pp. 844, 845, Figs. 230-275.) Also published with separate paging (Isopods, pp. 432, 433.)
- VERRILL, A. E., AND SMITH, S. I. See also Smith and Verrill.
1873. 'Report on the invertebrate animals of Vineyard Sound.' *Rep. U. S. Comm. Fish and Fisheries for 1871-1872*, I, 484 pp., 38 Pls. (Isopoda by O. Harger.) Dated 1874; first separates distributed 1873.
- WAHRBERG, R. 1922. 'Results of Dr. E. Mjöberg's Swedish Scientific Expeditions

- to Australia, 1910-1913,' No. 30. 'Terrestre Isopoden aus Australien.' Ark. f. Zoologi, XV, pp. 1-298, Figs. 1-78.
- 1922a. 'Einige terrestre Isopoden von den Juan Fernandez Inseln.' In Skottsberg, C., 'The Natural History of Juan Fernandez and Easter Island,' III, pp. 277-288, 4 text figs.
- WALKER, E. M. 1927. 'The woodlice or Oniscoidea of Canada (Crustacea, Isopoda).' Canadian Field-Nat., XLI, pp. 173-179, Figs. 1-10.
- WALLACE, N. A. 1919. 'The isopods of the Bay of Fundy.' Univ. of Toronto Stud., Biol. Ser., No. 18, pp. 1-42.
- WARD, H. B., AND WHIPPLE, G. C. 1918. 'Fresh-water biology.' Pp. 1-1111, Figs. 1-1547 (pp. 828-850, 'Crustacea Malacostraca,' by Ortman, A. E.).
- WEBER, M. 1892. 'Die Süßwasser-Crustaceen des Indischen Archipels nebst Bemerkungen über die Süßwasser-Fauna in Allgemeinen.' 'Zool. Ergebn. Reise in Niederland. Ost.-Indian,' II, pp. 528-571, 1 Pl., 22 text figs.
- WHITE, A. 1847. 'List of the Crustacea of the British Museum.' London. Pp. i-viii, 1-143 (Isopoda, pp. 93-111).
- ZELNY, C. 1907. 'The direction of differentiations in development. I. The antennule of *Mancasellus macrourus*.' Arch. Entw.-Mech., XXIII, pp. 324-343, Pls. VI-XII.

SUPPLEMENT TO BIBLIOGRAPHY

- BARNES, T. C. 1934. 'Further observations on the salt requirements of *Ligia* in Bermuda.' Biol. Bull., LXVI, pp. 124-132, 1 fig.
- CREASER, E. P. 1936. 'Crustaceans from Yucatan.' Carnegie Inst. Washington, Pub. No. 457, pp. 117-132, Figs. 1-43.
- GEISER, S. W. 1934. 'Further observations on the sex-ratios of terrestrial isopods.' Field and Lab., III, No. 1, pp. 5-10.

SUPPLEMENT

Additional species that came to notice too late to be included in their proper places in the systematic series or in the regional lists.

Trichoniscidae

Trichoniscus nearcticus, Arcangeli, 1932

Figure 313

Trichoniscus (subgenus?) *nearcticus* ARCANGELI, 1932, p. 137 (orig. descr.), Fig. 7.

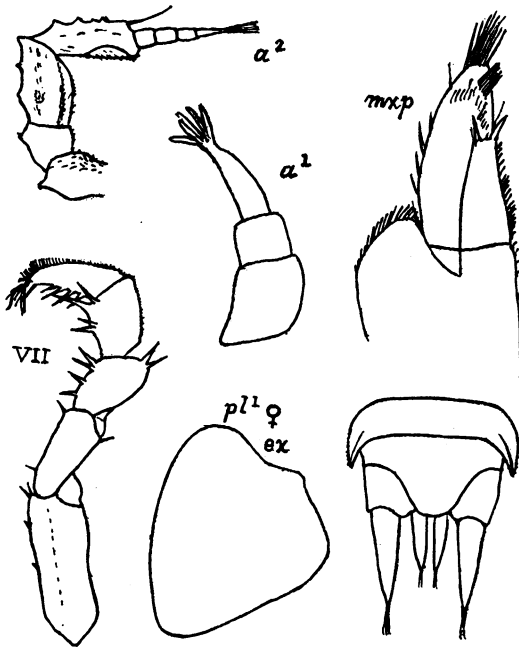


Fig. 313. *Trichoniscus nearcticus* Arcangeli. Adapted from Arcangeli, 1932.

An eyeless species having the body somewhat more convex in the anterior portion than usual in this group. The body is opaque, unpigmented, with the surface roughened by granulations which on high magnification are seen to be each constituted of a conoidal group of serrate scales. The granulations tend to be disposed in three transverse rows on the first and two on the remaining thoracic segments; on the abdominal segments they occur only along the posterior borders.

The head is fully set back into first body segment and in a dorsal view presents a gently arched outline which projects a little in front of the

well-developed trapezoidal lateral lobes, which extend directly outward so that their distal margins are continuous with the lateral margin of the first body segment. The antennae are short; extended back they reach little beyond the rear margin of segment I. Their flagellum has four articles.

Only segment I of the thorax has the rear lateral angles of the epimera rounded off. Beginning with segment IV, this angle is more acute and more extended back in successive segments. These epimera have an oblique granular raised line extending forward and upward from the rear lateral angle. The legs are short with rather wide segments, especially the merus, carpus, and propodus. The abdominal segments 3 to 5 have epimera with the posterior angle acute, not in contact with that of the next following segment, and, in segments 3 and 4, bent back to reach about half the length of the next segment.

Length, 2.73 mm.; width, 1.13 mm. (at the sixth thoracic segment.)

LOCALITY.—MacLeay Park, Portland, Oregon, one female specimen.

PROTRICHONISCUS ARCANGELI, 1932

Resembling *Trichoniscus* but distinguished by peculiarities in the pleopoda. See description of *P. heroldi*, the type and only species.

***Protrichoniscus heroldi* Arcangeli, 1932**

Figure 314

Protrichoniscus heroldi ARCANGELI, 1932, p. 133 (orig. descr.), Figs. 5, 6.

This is a small eyeless species with a somewhat translucent body, having the body surface minutely areolated and rendered delicately granular by quite thickly scattered and very minute triangular scale-like setae, which are larger on the rear border of the telson and somewhat modified from those on other parts of the body.

Front outline of head convex in a dorsal view, with well-developed obliquely extending lateral lobes of somewhat trapezoidal outline. Antennae of about half the length of the body; their flagellum consists of six articles.

The rear angles of the first and apparently also the second thoracic segments are rounded, but beginning slightly with the fourth, there is an increasing backward extension of the epimera. The epimera of abdominal segments 3 to 5 are narrow and without projecting angles. They are appressed to the sides so that in a dorsal view the side outline of the abdomen appears continuous.

The peculiarities of the first and second pleopoda on which the genus *Protrichoniscus* is chiefly based are described in detail by Arcangeli; only a few of the main points can be noted here. In the male the first pair each consist of an exopodite of long-triangular outline, articulated to a large, somewhat rectangular protopodite, to which the almost vestigial endopodite is attached close to the inner end of the articulation of the exopodite. In the second pleopoda of the male the exopodite is present only as a flattened expansion of the transversely elongated protopodite, not as a distinctly articulated piece. The endopodite forms a slender styloid process of two distinct segments.

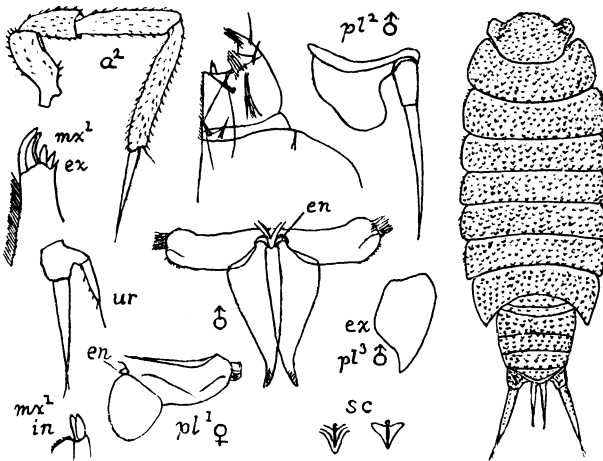


Fig. 314. *Protrichoniscus heroldi* Arcangeli. Adapted from Arcangeli, 1932.

In the female the exopodite of the first pair is short and oval and the endopodite is vestigial, as in the male, while the second pair resemble those of the male, but with a shorter, less robust, and less pointed endopodite. The similarity of these pleopoda in the two sexes leads Arcangeli to suspect that this may be a hermaphroditic species, the male condition developing first.

Length, 4.47 mm.; width, 1.93 mm.

LOCALITIES.—San Mateo, California, in fissures in a muddy beach; Muir Woods, California.

Cubaridae

Cubaris microphthalmus (Arcangeli), 1932

Figure 315

Armadillo (Diploezochus) microphthalmus ARCANGELI, 1932, p. 122 (orig. descr.),
Fig. 1. (Name corrected to *microphthalmus* in description and cut legend.)

This species belongs to group I of the genus *Cubaris* as classified in the present work. It appears sufficiently recognizable by the very small eyes and by the straight sides of the extended part of the telson, and by the straight sides of the extended part of the telson,

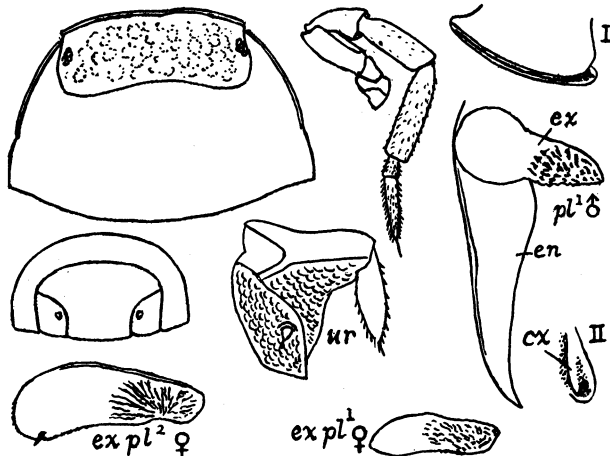


Fig. 315. *Cubaris microphthalmus* (Arcangeli). Adapted from Arcangeli, 1932.

and is not regarded by Arcangeli as referable to the imperfectly described *C. affinis* (Dana) or *C. californica* (Budde-Lund), both of which are also from California.

It is a smooth species except for small, very slightly marked tubercles on the head, the surface finely punctate with minute setae. The eyes have but four well-formed ocelli besides several imperfect ones. The color is whitish above, clouded with brownish, especially on the head.

Length, 6.5 mm.; width, 3 mm.

LOCALITY.—Saratoga, California.

Sphaeromidae

Exosphaeroma bondi, new species

Figure 316

Body wide (about one half the length) with the back well arched; the form is

similar in the two sexes except as noted below in describing the abdominal appendages.

Head trapezoidal, with its lateral and anterior outlines sinuous, rather deeply set back into the thorax. There is a thin outwardly projecting margin along its sides. The rear margin is concave; the eyes (which appear rather small owing to only a part of their 20 or more ocelli being pigmented) are wide apart in the rear lateral projections of the head.

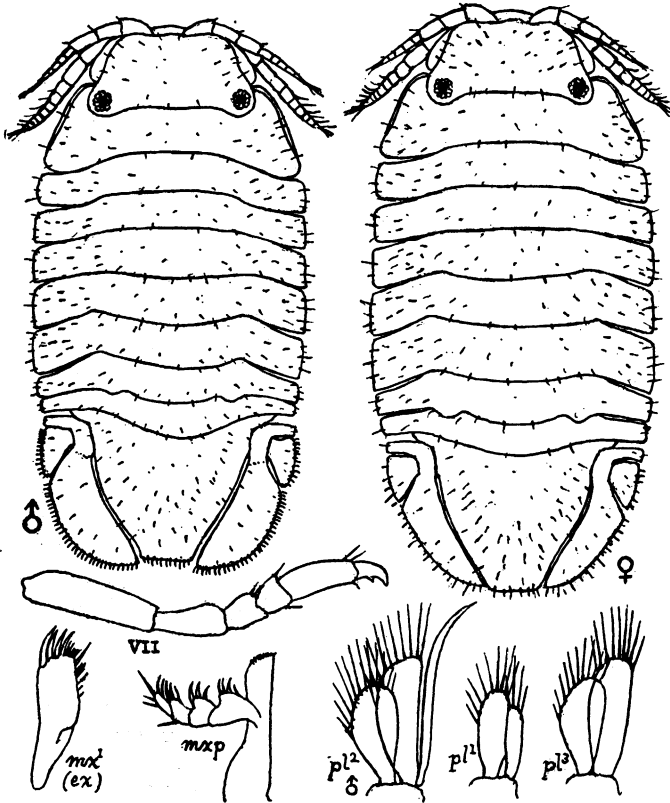


Fig. 316. *Exosphaeroma bondi*, new species.

The first antennae are rather short, and have a flagellum of only five or six articles; the second antennae are much stouter and also longer, having two short and three longer segments in the peduncle and a flagellum of about eight articles. They can reach, when drawn back, near the rear corners of the first thoracic segment.

The buccal mass projects well forward, so that its front margin is visible in a dorsal view of the head when the latter is in its usual position; the maxilliped has the second, third, and fourth joints of the palp somewhat produced into lobes.

The body surface is without any noticeable tuberculation and is fairly even;

it is pubescent with short stiff scattered hairs to which fine mud and minute débris of all kinds tend to adhere.

The first thoracic segment is the largest and longest, it has a thin projecting lateral border similar to that on the head, but narrower. The second and following thoracic segments are short, but increase in length and in the amount of backward deflection of the epimera to the sixth segment; the seventh diminishes again in these respects. When the body is straightened out, there are narrow gaps between the epimera of successive segments.

The legs do not exhibit much differentiation. The anterior pairs are smaller and weaker than those farther back, and all are of ambulatory character, ending in weak double claws which can have little or no grasping power.

As is characteristic of this group, the abdominal segments are reduced to two by consolidation of the normal six somites, the first being very short, though little narrower than the rear end of the thorax with which it articulates. By far the larger part of the abdomen is composed of the large terminal segment, which is wide in front, where it has two small lateral projections; its main portion is very convex and tumid above, with slightly curved sides converging to a rather narrow squarely truncated rear end; the uropoda, articulated with the terminal segment at their inner anterior angle but extending along the converging sides of the terminal segment, round out the body outline.

The pleopoda of the three anterior segments have their inner and outer branches foliate and bordered with long setae; they do not appear to differ much in the two sexes, except that in the male the second pleopoda each bear a long saber-shaped, sharply pointed stylus arising from its median border. This stylus is considerably longer than the foliate parts of the appendage, reaching, in fact, to near the end of the abdomen, and those of the two sides are curved so that they cross each other some distance from their ends when lying in the usual posteriorly directed position.

The uropoda consist of a short obliquely transverse basal part bearing a movably articulated, short, flattened triangular external branch and a long flattened internal branch, apparently less movably joined to the basal part, and extending along the sides of the terminal abdominal segment. In the male this internal branch is quite wide and extends a trifle beyond the end of the last segment of the body, having a regularly, rather broadly curved convex external outline, and bearing over thirty short regularly disposed spines or setae along this border. In the female the external branch scarcely reaches the end of the last segment and is narrower, especially toward the end, thus giving the rear end of the entire animal a more tapering outline in that sex, and it bears fewer and slenderer spines, less uniform in length and distribution than in the male, along its external border.

Yellowish, practically unpigmented, or sometimes with scattered dots of blackish pigment.

Size very small; the largest females are about 2.10 mm. to 2.13 mm. in length; the largest males, 1.87 to 1.90 mm.

LOCALITY.—Étang Saumatre, a large brackish lake in the low part of the interior of Haiti. About 25 specimens were turned over to me for study by Dr. R. M. Bond of Yale University, who collected them under stones near the shore, February 20, 1933, and for whom I take pleasure

in naming the species. Of these specimens, six were females with a marsupium in which very young eggs could be distinguished. These individuals appeared to be adult or nearly so; there were also five apparently adult males; the remainder of the lot consisted of smaller, often noticeably immature specimens of various sizes. Most of them were returned to Dr. Bond; the type, a male, is in the American Museum of Natural History (Cat. No. 6923); also the female cotype (Cat. No. 6924) and several paratypes.

Oniscidae

Halophiloscia brasiliensis Moreira, 1932

Figure 317

Halophiloscia brasiliensis MOREIRA, 1932, p. 428 (orig. descr.), Pl. II.

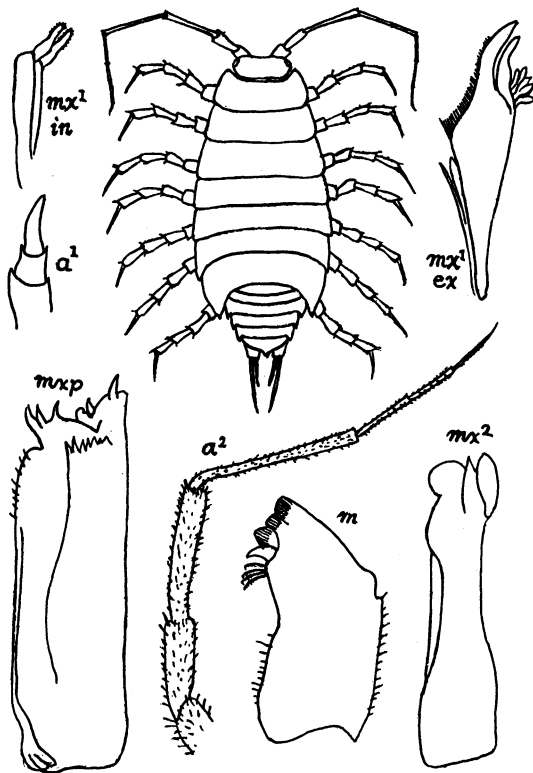


Fig. 317. *Halophiloscia brasiliensis* Moreira. Adapted from Moreira, 1932.

The facts stated in the brief description given by Moreira are for the most part plainly shown in his illustrations as reproduced here in outline, so that it is needless to quote from it, except his statements that the body has very minute punctations and hairs, that the head is convex and smooth, the predominating color reddish chestnut with whitish arabesque markings on the thorax, and the dactylus, propodus and carpus of the legs bluish.

Length of largest specimens, 14 mm.; width, 7 mm.

LOCALITY.—Rio de Janeiro, Brazil (4 specimens.) Types in the collection of the Instituto Biologico de Defesa Agricola, Rio de Janeiro.

It seems most likely that Moreira is correct in assigning this species to *Halophiloscia* rather than to one of the subdivisions of *Philoscia*, thus making six probable members of the former group that have been recorded from the New World.

***Pentoniscus dominicanus* Arcangeli, 1932**

Figure 318

Pentoniscus dominicanus ARCANGELI, 1932c, p. 1 (orig. descr.), Figs. 1-3.

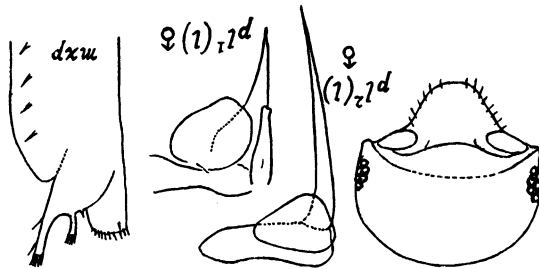


Fig. 318. *Pentoniscus dominicanus* Arcangeli. Adapted from Arcangeli, 1932c.

Omitting certain details which can mostly be well seen in the illustrations, the following are the main points brought out in Arcangeli's description.

In the general form of the body, in the absence of granulations, and in color, this species much resembles *Pentoniscus pruinus* Richardson, but is easily distinguished from it by the head, which presents a narrow but distinct frontal line which, curving backward, permits the convex epistoma and the supra-antennal line to be visible in a dorsal view. Lateral margins of the thoracic segments slightly raised. There are no noticeable sexual differences in the legs. The telson is a little shorter with very slightly concave sides and with the apex not rounded off.

Length, 2.7 mm.; width, 1 mm. (at sixth segment).

LOCALITY.—Roseau, Dominica, B. W. I. One male and four imperfect females. Specimens in the museum of the University of Turin, Italy.

ROSTROPHILOS CIA ARCANGELI

The following is the type and only species.

Rostrophiloscia dominicana Arcangeli, 1932

Figure 319

Rostrophiloscia dominicana ARCANGELI, 1932c, p. 4 (orig. descr.), Figs. 7-14.

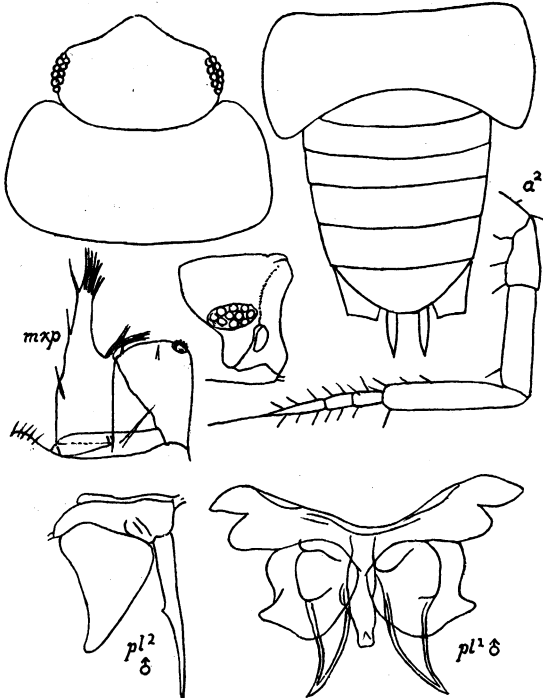


Fig. 319. *Rostrophiloscia dominicana* Arcangeli. Adapted from Arcangeli, 1932c.

The main characters of this species and genus, among them especially the remarkable triangular production of the front of the head, in which according to Arcangeli both the prosepistoma and cephalic tergite are involved, are well shown in the figures.

It bears considerable superficial resemblance to a *Rhyscotus*. The

dorsal surface is smooth, shining, with very minute and inconspicuous hairs. The forehead is not separated from the prosepistoma by a definite frontal line; the supra-antennal line is narrow, straight, and transverse. Eyes with ten ocelli; antennae little less than one-third of the body length.

The body segments have the lateral ends and rear angles considerably rounded; only in segments VI and VII are they a little extended backward.

The abdominal segments have very short, downwardly bent epimera not noticeable in a dorsal view. The telson is broadly rounded behind.

The coloration, described and shown in some detail by Arcangeli, is brown with the light markings usual in the *Philoscia* group.

Length, 3.06 mm.; width (at segment IV), 1.96 mm.

LOCALITY.—Laudat, Dominica. Type in the Museum of the University of Turin, Italy.

Cubaridae

Cubaris schultzei (Verhoeff), 1933

Figure 320

Venezillo schultzei VERHOEFF, 1933, p. 98, 102 (orig. descr.), Figs. 5-8.

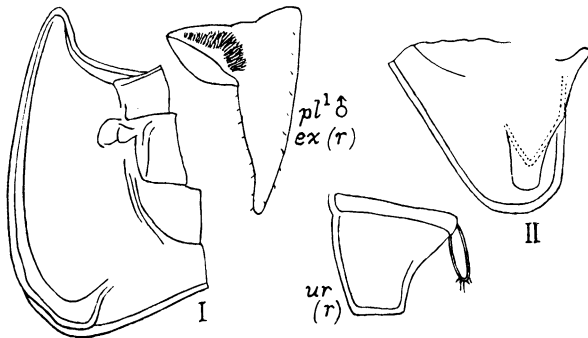


Fig. 320. *Cubaris schultzei* (Verhoeff). Adapted from Verhoeff, 1933.

Placed by Verhoeff in his group *Venezillo* (see remarks under genus *Cubaris*) which he raises to the rank of a full genus.

This species apparently belongs in group I of the provisional arrangement of *Cubaris* adopted in this work, as the coxopodite sulcus on the margin of segment I is stated to extend three-fourths of the length of the margin. (This however is not visible in Verhoeff's figure.) The general body surface is dull and entirely free from granulations,

but is closely undulated and verrucose on the thoracic tergites. The rear borders of the tergites of segments I to III are almost straight.

Segment II has a long, rather narrow coxopodite process which reaches nearly to the rear margin of the epimeron. The thoracic epimera are not bent or flared outward, except slightly so in the anterior part of the body. The anterior margin of the head forms a flattened obtuse angle and is only weakly developed, and without any sharp edge. A lateral border on the first thoracic segment is slightly indicated on the anterior part only.

Ocelli in four rows. Seventh legs of the male with a process on the basal joint. Flagellum of the antennae with the first article twice as long as wide. For additional details, especially of certain mouth parts and pleopoda, the reader must be referred to Verhoeff's description.

Color blackish gray to black, with whitish gray spotting, a larger spot just inside the epimera beside the usual small ones over the muscular insertions on the thoracic tergites.

Length of male, 9.5 mm.; of largest female, 11.5 mm.

LOCALITY.—“Near Chilopa” (probably Chilapa), State of Guerrero, Mexico; in the humus of a mountain forest.

Cubaris mexicana (Verhoeff), 1933

Figure 321

Microdillo mexicanus VERHOEFF, 1933, p. 98, 100 (orig. descr.), Figs. 1-4.

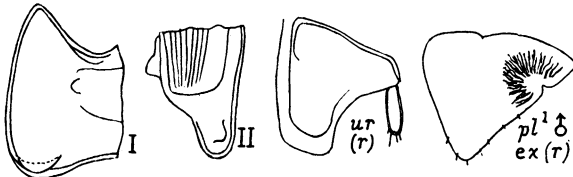


Fig. 321. *Cubaris mexicana* (Verhoeff). Adapted from Verhoeff, 1933.

For this species Verhoeff establishes a new group, *Microdillo*, to which he assigns full generic rank, although the comparison of its characters which he makes with those of *Cubaris* (*Venezillo*) *schantzei* (he leaves entirely out of consideration the numerous other species of the *Venezillo* group) is not at all convincing as regards the justification for considering the distinctions as of so much importance.

In color, general form, and appearance and character of the body surface, this species much resembles *C. schultzei* just described, though of smaller size; male 4.66 mm. long, largest female 8.5 mm. long.

The second article of the flagellum of the antenna is three times as

long as the first. The ocelli form four rows. Anterior border of forehead arched, not very prominent in profile, sharp-edged, but nearly obliterated in the middle third.

The sides of the first thoracic segment descend steeply and are turned up into a well-marked border with a furrow above. Coxopodite cleft of segment I only extending along the posterior quarter of the lower margin. In front of this the margin is undivided and rather sharp-edged. Coxopodite process of segment II, small, rounded, and far removed from the border. Seventh legs of male without a process on the basal joint.

LOCALITY.—“Near Chilopa” (probably Chilapa), State of Guerrero, Mexico, in the humus of a mountain forest.

Mexicostylus squamatus Verhoeff, 1933

Figure 322

Mexicostylus squamatus VERHOEFF, 1933, p. 104 (orig. descr.), Figs. 9–15.

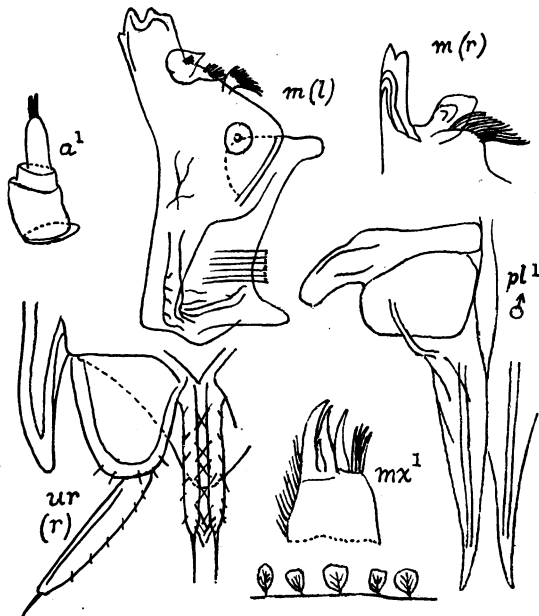


Fig. 322. *Mexicostylus squamatus* Verhoeff. Adapted from Verhoeff, 1933.

The new genus *Mexicostylus*, established by Verhoeff to contain this species, is very close to *Trichorhina*, a group whose diagnostic characters and limits have not as yet been exactly determined. The

present form seems to be peculiar in the character of the small scale-like appendages covering the dorsal surface, which are described as leaf-like, and are figured as having a midrib with lateral veins.

The head, as usual in this group, is without lateral or median lobes or a frontal line; only three ocelli are pigmented. The antennae are moderately long, the terminal half light-colored, their surface with bristles and minute tubercles. The second article of the flagellum is three times as long as the first.

Various details of the mouth parts and pleopoda, uropoda, etc., are described by Verhoeff; these are in part shown in the illustrations. The legs have a partly undulated verrucose surface; the seventh legs of the male are without special peculiarities. The epimera of the abdominal segments 3 to 5 are well developed and nearly acute.

Color chiefly brown above, speckled with light spots which form a sieve-like pattern on the head. The epimera are lighter.

Length of male, 3.5 mm.; of female, 4 mm.

LOCALITY.—“Chilopa” (probably Chilapa), State of Guerrero, Mexico, in the humus of a mountain forest. Found with *Porcellionides pruinosus*.

Asellidae

Caecidotea californica (Miller), 1933

Figure 323

Asellus californicus MILLER, 1933, p. 97 (orig. descr.), Figs. 1-14.

Miller gives a lengthy description of this species and careful figures, but makes no comparison with other species and indicates no characters as especially diagnostic. As the figures reproduced here appear to show its most important characters, only a few details are quoted from the description.

Body loosely articulated, surface smooth; margins of segments fringed with hair.

Flagellum of first antennae with 8 segments; that of the second antennae with about 40 segments. The distal outer margin of the propodus of the last pair of legs bears a single plumose seta. Examination of a series of specimens indicates that the “proportionate lengths of the second antennae and uropods are functions of the age of the individuals,” and that the peduncle and endopod of the uropoda undergo with growth “greater elongation than the exopod which appears relatively short and almost rudimentary in the larger specimens.”

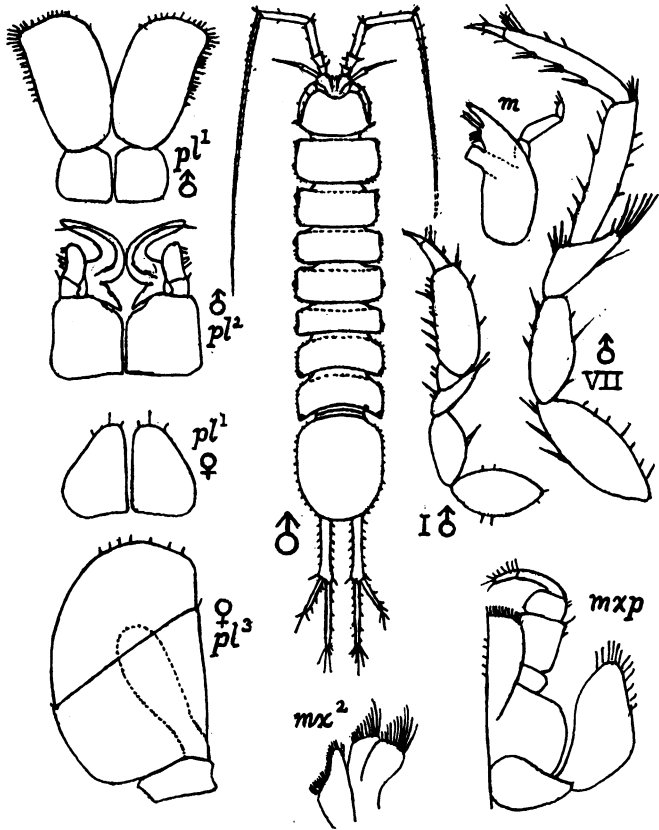


Fig. 323. *Caecidotea californica* (Miller). Adapted from Miller, 1933.

Color in alcohol creamy white.

Length of largest specimen (a male), 11 mm.

LOCALITY.—Fresh-water well near Kelseyville, Lake County, California.

Miller places this species in *Asellus* because he rejects *Caecidotea* as a genus. It belongs in *Caecidotea* if that group is given recognition.

Oniscidae

Porcellionides mulaiki, new species

As this work was about to be printed, specimens of an undescribed species were received from the extreme southern part of Texas, from Mr. S. Mulaik, for whom it is named.

It so closely resembles *Porcellionides virgatus* (Budde-Lund) that the illustrations given for that species would serve for it fairly well, save for the following details: the antennae are slenderer and have the first article of the flagellum noticeably longer than the terminal one in both sexes; the lateral lobes of the head, though similarly rounded, are rather wider and less prominent than in *virgatus*, and body surface is rather smoother, the transverse furrow on the thoracic segments being less well marked.

The coloration is similar in pattern but lighter, though the epistome and lower part of the forehead are conspicuously dark colored in contrast to most parts of the animal.

It appears to be a larger species. Length of largest female about 13 mm., of largest male, nearly 12 mm.

LOCALITIES.—Bird Island, Cameron County, Texas, ten specimens including the type (Cat. No. 7214, American Museum of Natural History), and Edinburgh, Hidalgo County, Texas, one specimen. Perhaps Arcangeli's record of *P. virgatus* from Uvalde, Texas, may really belong to this species.

Cirolanidae

Cirolana anops Creaser, 1936

Cirolana anops CREASER, 1936, Carnegie Inst. of Washington, Pub. No. 457, p. 117, Figs. 1-12.

A blind species closely related to *C. cubensis*, as its describer points out. Among the conspicuous differences are that it has a wider telson with its rear border gently rounded and lacking the spines which are conspicuous in *C. cubensis*; the branches of the uropoda are widened and rounded at the ends, and the front outline of the frontal lamina is more produced and narrowly rounded (in the figure almost pointed).

LOCALITIES.—Underground waters in several caves in northwestern Yucatan. Type locality, San Bulha Cave at Notul; also found in Santa Elena Cave, south of Talcha; San Isidro Cave, Salar Colony, Merida; Amil Cave on Tixcacal Hacienda, southeast of Merida. Type in museum of University of Michigan. Paratypes in U. S. National Museum.

INDEX TO VOLUME LXXI

Reference to these species in the faunal lists, or those of minor importance, such as mention for comparison with other species, are not covered in this index.

In case of synonyms, the name adopted in this work is given in parentheses.

- Acanthoniscus, 401
 spiniger, 402
- Actoniscus (Armadilloniscus), 102
 ellipticus (Armadilloniscus e.), 102
 lindahli (Armadilloniscus l.), 104
 tuberculatus (Armadilloniscus t.),
 103
- Aegathoa, 444
 lazzari (Livoneca l.), 443
- Alloniscus, 212
 ambiguus (Trichorhina ambigua),
 198
 argentinus, 220
 borellii, 219
 compar, 218
 cornutus, 213, 214, 215, 224
 cornutus var. lagunae, 215
 griseus, 221
 maculosus (Ligidium gracile), 67
 mirabilis, 217
 pahillosus (Trichorhina papillosa),
 196
 papillosus (Trichorhina papillosa),
 196
 perconvexus, 215, 216, 217
 quisquiliarum (Trichorhina q.), 194
 tomentosus (Trichorhina tomentosa), 193
- Alloniscus sp., 222
- Arhina, 223
 porcellioides, 224, 225
 porcelloides (A. porcellioides), 224
- Armadillidae (Cubaridae), 282
- Armadillidiidae, 276
- Armadillidium, 276
 caelatum (Eluma c.), 280
 cinereum (A. vulgare), 276
 nasatum, 279, 280
 pilulare (A. vulgare), 276
 quadrifrons (A. nasatum), 279
 vulgare, 276, 277, 278
- Armadillo (Cubaris), 326
 affinis (Cubaris a.), 395
 bolivianus (Cubaris boliviana), 335
 borellii (Cubaris murina), 387
 brunneus (Cubaris brunnea), 390
 cacahuamilpensis (Cubaris c.), 396
 californicus (Cubaris californica),
 395
 cinctus (Cubaris vincentis), 369, 370
 cinereus (Cubaris cinerea), 389
 clausus (Cubaris clausa), 345
 congener (Cubaris congenera), 340
 conglobator (Cubaris murina), 387
 cubensis (Cubaris murina), 387
 depressus (Cubaris depressa), 394
 dugesii (Cubaris d.), 365
 dugesii (Cubaris dugesi), 365
 dumorum (Cubaris d.), 364
 echinatus (Diploexochus e.), 398
 flavobrunneus (Cubaris flavobrunnea), 390
 galapagoensis (Cubaris g.), 375
 gallapagoensis (Cubaris galapagoensis), 375
 gigas (Cubaris g.), 361
 granarius (Cubaris granaria), 397
 granurus (Cubaris granaria), 397
 grenadensis (Cubaris g.), 357
 microphthalmus (Cubaris microphthalmus), 512
 microphthalmus (Cubaris microphthalmus), 512
 multipunctatus (Cubaris multipunctata), 347
 murinus (Cubaris murina), 387
 nigrorufus (Cubaris nigrorufa), 359
 perlatus (Cubaris perlata), 352
 pilularis (Armadillidium vulgare),
 277
 pisum (Cubaris p.), 361
 pumilus (Cubaris pumila), 349
 rubropunctatus (Cubaris rubropunctata), 348
 scaberrimus (Cubaris scaberrima),
 351

- silvarum (Cubaris s.), 342
 similis (Cubaris s.) 360
 speciosus DANA, 395
 speciosus STUXBERG (Cubaris californica), 395
 tenuipunctatus (Cubaris tenuipunctata), 393
 truncorum (Cubaris t.), 368
 tuberosus (Cubaris tuberosa), 377
 venustus (Cubaris venusta), 341
 verrucosus (Cubaris verrucosa), 374
 vincentis (Cubaris v.), 369
 viticola (Cubaris v.), 350
 vulgaris (Armadillidium vulgare), 277
 zigzag (Cubaris z.), 334
 Armadilloniscinae, 102
 Armadilloniscus, 101
 ellipticus, 102
 lindahli, 104, 105
 tuberculatus, 103, 104
 Artystone, 445
 trysibia, 445
 Asellidae, 453, 21, 417, 521
 Asellopsis (Mancasellus), 477
 tenax (Mancasellus t.), 477
 tenax var. dilata (Mancasellus d.), 479
 Asellota, suborder, 453
 Asellus, 453
 aquaticus, 458
 attenuatus, 461
 brevicauda, 462
 californicus (Caecidotea californica), 521
 communis, 453, 7, 454, 455, 459
 communis var. pallida, 456
 groenlandicus (A. aquaticus), 458
 hoppiae (A. hoppinae), 463
 hoppinae, 463
 incisus, new species, 464
 intermedius, 456, 457
 lineatus (Mancasellus l.), 483
 militaris (A. communis), 454
 stygius (Caecidotea stygia), 466
 stygia (Caecidotea s.), 466
 tenax (Mancasellus t.), 477
 tomalensis, 459, 460
 vulgaris (A. communis), 454
 Asellus sp., 465
 Asotana, 444
 formosa, 444, 445
 Atracheata, superfamily, 42
 Balloniscus, 136
 brevicornis (Philoscia b.), 137
 maculata (Philoscia maculata), 138
 nigricans (Philoscia n.), 137
 sellowii (Philoscia s.), 136
 Bathytropa, 188, 189
 simoni (Trichorhina s.), 195
 thermophila (Trichorhina t.), 192, 188
 Bathytropina (Trichorhina), 189
 thermophila (Trichorhina t.), 192
 Benthana, 128
 angustata (Philoscia a.), 134, 135
 bilineata (Philoscia b.), 135
 offersii (Philoscia o.), 130, 131
 pauper (Philoscia p.), 132, 133
 picta (Philoscia p.), 129
 villosa (Philoscia v.), 133, 134
 Bethalus, 331
 Bisilvestria, 209
 marrassinii, 209
 Bopyroidea, suborder (Epicaridea), 484
 Bopyridae, 484
 Brackenridgia, 92
 cavernarum, 92, 93
 Braga, 432
 cichlae, 433
 fluviatilis, 434, 435
 patagonica, 433, 434
 sichlae (B. cichlae), 433
 Caecidotaea (Caecidotea), 472
 smithii (Caecidotea s.), 472
 Caecidotea, 465
 akiyoshiensis, 466
 alabamensis, 468, 469
 antricola, 474, 475
 californica, 521, 522
 kawamurai, 465
 microcephala (C. stygia), 466
 nickajackensis, 469, 470
 richardsonae, 471

- smithii, 472, 473
 smithsii (*C. smithii*), 472
 stygia, 466
 tridentata, 473, 474
 troglodytes (*C. nickajackensis*), 465
Caecidothea (*Caecidotea*), 466
Calycuoniscus, 185
 barbouri (*Trichorhina* b.), 190
 bodkini, 186, 187
 spinosus, 187, 188
Cassinidea, 490
 ovalis, 490
Cecidotea (*Caecidotea*), 466, 469
 nickajackensis (*Caecidotea* n.), 469
 stygia (*Caecidotea* s.), 466
Chelifera, order or suborder, 417
Chaetophiloscia, 107
Ciralonides (*Cirolanides*), 427
Circoniscus, 306
 bezzii, 311, 312
 gaigei, 306, 307, 308
 hamatus, new species, 309
 spinosus, 310
Cirolana, 422
 anops, 523
 browni, new species, 423, 424, 425
 cubensis, 422
 parva, 426
Cirolanidae, 421
Cirolanides, 427
 texensis, 427
 texanus (*C. texensis*), 427
Clavigeroniscus, 85
 riquieri (*Trichoniscus* r.), 85
Cleantis, 452
 linearis, 452
Colamura, 490
 porteri, 490
Conasellus, 456, 457, 463, 464
Conilera, 426
 cylindracea, 426
 stygia, 426
Cordioniscus, 86
 stebbingi (*Trichoniscus* s.), 86, 87
 stebbingi var. *rhenana*, 86
Coxopodias, 313
 ruthveni, 314
 tristani, 313
Cubaridae, 282, 512, 518
Cubaris, 326, 328, 330
 affinis (*DANA*), 395, 396
 affinis *MIERS* (*C. murina*), 387
 aguayoi, 339
 beebei, 366, 367
 boliviana, 335
 booneae, new species, 336
 borellii (*C. murina*) 387
 brevispinis, 382, 383
 brunnea, 390
 brunneus (*C. brunnea*), 390
 cacahuamilpensis, 396
 californica, 395
 cinchonae, new species, 391, 392
 cincta (*C. vincentis*), 369
 cinctus (*C. vincentis*), 369
 cinerea, 389
 cinereus (*C. cinerea*), 389
 clausa, 345, 346
 colomboi, 333
 congenera, 340
 cubensis (*C. murina*), 387
 culebrae, new species, 370, 371
 depressa, 394
 depressus (*C. depressa*), 394
 dugesi, 365, 361, 366
 dumorum, 364, 365
 echinatus (*Diploexochus* e.), 398
 flavobrunnea, 390
 flavobrunneus (*C. flavobrunnea*),
 390, 391
 fongosiensis, 328
 gaigei (*Diploexochus echinatus*),
 398
 galapagoensis, 375, 376
 gigas, 361, 362, 363
 granaria, 397
 grenadensis, 357, 358
 hendersoni, 337, 338
 jamaicensis, 372, 373
 longispinis, 385, 386
 mexicana, 519
 microphthalma, 512
 mineri, new species, 383, 384
 moneaguensis, new species, 355
 multipunctata, 347, 348
 murina, 387, 388
 murinus (*C. murina*), 387
 nigrorufa, 359, 360

- oaxacana, new species, 356
 perlata (DOLLFUS), 352
 perlata PEARSE (*C. tuberosa*), 378
 perlatus (*C. perlata*), 352
 phylax, new species, 353, 354
 pisum, 361
 pumila, 349
 ramsdeni, 379
 regulus, 328
 rubropunctata, 348
 sanchezi, 343, 344
 scaberrima, 351, 352
 schultzei, 518
 silvarum, 342, 343
 similis, 360
 tenuipunctata, 393
 tenuipunctatus (*C. tenuipunctata*),
 393
 tuberosa, 377
 truncorum, 368
 venusta, 341
 verrucosa, 374
 vincentis, 369, 370
 viticola, 350, 351
 walkeri, 346, 347
 watsoni, new species, 331
 wheeleri, new species, 380, 381, 382
 zigzag, 334
Cyclisticus (*Cylisticus*), 259
Cylindroniscus, 93
 seurati, 93, 94
Cylisticus, 259
 convexus, 259, 260, 261
Cymothoa, 435
 henselii (*Telotha* h.), 435
Cymothoidae, 430
Cymothoidea, suborder (*Flabellifera*),
 421
Delatorreia, 325
 hoplites, 325, 326
Deto, 97
 bucculenta, 98, 99
 bucculentus (*D. bucculenta*), 98
 novae-zealandiae, 99
Detonella, 100
 papillicornis, 100, 101
Diploexochus, 398, 328, 334, 359
 clausus (*Cubaris clausa*), 345
 echinatus, 398, 399, 400, 401
 microphthalmus, 512
Eluma, 280
 caelata, 280
 caelatum (*E. caelata*), 281
 purpurascens (*E. caelata*), 281, 282
Epicaridea, suborder (*Bopyroidea*), 484
Ethelum, 403, 407
 americanum, 403, 404, 405
 modestum, 407
 reflexum, 406
Ethelum sp. 407
Eubelidae, 23, 403
Eubelinae, 403
Eubelum, 23, 403
Euphiloscia (*Ligidium*), 76
 elrodii (*Ligidium* e.), 76
Excorallana, 428
 berbicensis, 428, 429
 tricornis, 428
Excorallanidae, 428
Exosphaeroma, 449
 bondi, new species, 512, 513
 dugesii, 449
 oregonensis, 450, 451
 rhombofrontalis, 451
 thermophilum, 450
Flabellifera, suborder, 421
Fluvicola, DE KAY, 1844, pp. 53, 54
 (not an isopod)
Gedania, 198, 190
 ambigua (*Trichorhina* a.), 198, 199
 papillosa (*Trichorhina* p.), 196, 198
Geologia, 44, 66
 simoni (*Ligia* s.), 63
Globarmadillo, 316
 armatus, 317
Glossobia, 490
 laticauda, 490
Halophiloscia, 167
 bermudensis (*Philoscia* b.), 175
 brasiliensis, 515
Halophilosciinae, 168
Halophilosciini, tribe, 167

- Haplarmadillo, 315
 monocellatus, 315, 316
 Haplophthalminae, 90
 Haplophthalmus, 89
 danicus, 90, 490
 puteus (H. danicus), 90, 490
 Hespera, 118
 debilis (Philoscia variegata), 118
 nitida, 123, 118
 Hirtiligia, 57
 baudiniana (Ligia b.), 58, 57
 Hypergnathus (Rhyscotus), 264
 texensis (Rhyscotus t.), 274
 Hypotracheata, superfamily, 408

 Idotea, 452
 lacustris (Pentidotea l.), 451
 Idotheidae, 451
 Idotheoidea, suborder (Valvifera), 451
 Ischioscia, 118
 lobifera (Philoscia variegata), 118,
 121, 122
 mineri (Philoscia m.), 125
 nitida (Philoscia n.), 123, 124
 variegata (Philoscia v.), 118, 119
 Isopoda, order, 7

 Lathraena, 490
 insidiosa, 490
 Leptotrichus, 252
 emarginatus (Nagara cristata), 257,
 258
 granulatus, 253
 isthmicus (Trichorhina isthmica),
 203
 pittieri (Trichorhina p.), 200
 vedadoensis, 255
 Ligia, 43, 44
 baudiana (L. baudiniana), 58
 baudiniana, 58, 44, 48, 59
 cajennensis, 60
 cayennensis (L. cajennensis), 60
 cinerascens, 51
 cursor, 56, 54, 57
 dilatata BRANDT 46, 66
 dilatata PERTY (Stymphalus dilata-
 tus), 66
 dilatata STIMPSON (Ligia pallasii),
 46, 66
 exotica, 48, 44, 46, 49
 exotica var. hirtitarsis (L. baudini-
 ana), 48, 58
 filicornis, 54
 gaudichaudii (L. exotica), 48
 gracilis (L. baudiniana), 58
 grandis (L. exotica), 48
 hawaiensis, 52, 44
 hirtitarsis (L. baudiniana), 58
 italica, 60
 litigiosa, 57
 muscorum (L. platycephala), 61
 novae-zealandiae, 54, 44, 55, 56
 occidentalis, 50, 44, 51
 oceanica, 44, 45, 50
 olfersi (L. olfersii), 53
 olfersii, 53, 44
 pallasii, 46, 47
 perkinsi, 65
 platycephala, 61, 44, 62
 porteri (L. novae-zealandiae), 54
 richardsonae (L. simoni), 63, 44
 septentrionalis (L. pallasii), 46
 simoni, 63, 44, 61, 64, 65
 stimpsoni (L. pallasii), 46
 Ligidium, 67
 elrodii, 76
 gracile, 67, 68, 69
 gracile var. flavum, 69
 gracilis (L. gracile), 67
 hypnorum, 71, 72, 73
 kofoidi, 75
 latum, 74
 longicaudatum, 70
 tenuis, 67
 Ligiidae, 42
 Ligyda (Ligia), 43, 44
 baudiana (Ligia baudiniana), 58
 baudiniana (Ligia b.), 58
 cajennensis (Ligia c.), 60
 cinerascens (Ligia c.), 51
 exotica (Ligia e.), 48
 occidentalis (Ligia o.), 50
 oceanica (Ligia o.), 45
 olfersii (Ligia o.), 53
 pallasii (Ligia pallasii), 47

- pallasii* (*Ligia* p.), 46
platycephala (*Ligia* p.), 61
richardsonae (*Ligia simoni*), 63
Ligydiidae (*Ligiidae*), 42
Livoneca, 438
 guianensis, 441, 442
 lazzari, 443
 symmetrica, 439, 440
Lygia (*Ligia*), 52, etc.
 cursor (*Ligia* c.), 56
 hawaiensis (*Ligia* h.), 52
 novi-zealandiae (*Ligia novae-zealandiae*), 54
 occidentalis (*Ligia* o.), 50
Lyprobium, 210
 cristatus (*Nagara cristata*), 257, 212
 modestus, 211
 pusillus, 211

Mancasellus, 476
 brachiurus (*M. brachyurus*), 479
 brachyurus, 479, 480
 danielsi, 482
 dilatus, 479
 herricki, new name, 483
 lineatus, 483
 macrourus, 481, 482
 macrurus (*M. macrourus*), 481
 tenax, 477, 478, 479
 tenax var. *dilata* (*M. dilatus*), 479
 tenax var. *dilatus* (*M. dilatus*), 479
Mancasellus sp. (*M. herricki*), 483
Megaligia, 44, 48, 50, 51
 cinerascens (*Ligia* c.), 51
 exotica (*Ligia* e.), 44, 48
 flicornis (*Ligia* f.), 54
 hawaiensis (*Ligia* h.), 52
 occidentalis (*Ligia* o.), 50
 olfersii (*Ligia* o.), 53
Mesarmadillo, 403
 americanus (*Ethelum americanum*), 404
 modestus (*Ethelum modestum*), 407
 reflexus (*Ethelum reflexum*), 406
Mesidotea, 452
 entomon, 452
Mesidothea (*Mesidotea*), 452
 entomon (*Mesidotea* e.), 452

Metoponorthus (*Metoponorthus*), 238
Mesoponorthus (*Metoponorthus*), 238
Metoponorthus (*Porcellionides*), 238
 advena (*Porcellionides* a.), 247
 argentinus (*Alloniscus* a.), 220
 brunneus (*Porcellionides* b.), 250
 chilensis (*Porcellionides* c.), 246
 fuegiensis (*Porcellionides* f.), 249
 pruinus (*Porcellionides* p.), 238
 saussurei (*Porcellionides* s.), 245
 schwencki (*Porcellionides pruinus*), 238
 schwencki (*Porcellionides pruinus*), 238
 schwencki (*Porcellionides pruinus*), 238
 sexfasciatus (*Porcellionides* s.), 240
 virgatus (*Porcellionides* v.), 241
Metoponosthus (*Metoponorthus*), 238
Metopoporthus (*Metoponorthus*), 238
Mexicostylus, 520
 squamatus, 520
Microdillo, 519
 mexicanus (*Cubaris mexicana*), 519
Microniscus DOLLFUS (*Oligoniscus*), 91
 monocellatus (*Oligoniscus* m.), 91
Miktoniscus, 87
 halophilus (*Trichoniscus* h.), 88
 halophilus (*Trichoniscus* h.), 88
Minca (*Coxopodias*), 313, 314
 ruthveni (*Coxopodias* r.), 314, 315

Nagara, 256
 cristata, 257
Nerocila, 431
 falklandica (*N. fluviatilis*), 432
 fluviialis (*N. fluviatilis*), 431
 fluviatilis, 431, 432
Nesoligia, 44
 cursor (*Ligia* c.), 56
 litigiosa (*Ligia* l.), 57
 novae-zealandiae (*Ligian.*), 54, 44, 55
Nototanais, 419
 beebei, 419, 420
 dimorphus, 419

Oligoniscus, 91
 monocellatus, 91

- Oniscidae, 105, 106, 515, 522
 Oniscoidea, suborder, 42
 Oniscophiloscia, 126
 mirifica (*Philoscia* m.), 126, 127
 Oniscus, 182
 affinis (*O. asellus*), 182
 angustatus (*Philoscia angustata*), 134
 angustus (*Pseudophiloscia angusta*), 179
 aquaticus (*Asellus* a.), 458
 armatus, 185
 asellus, 182, 183, 227, 184
 bilineatus (*Philoscia bilineata*), 135
 bucculentus (*Deto bucculenta*), 98, 99
 cinereus ZENKER, 390
 convexus (*Cylisticus* e.), 259
 echinatus (*Diploexochus* e.), 398
 entomon (*Mesidotea* e.), 452
 hypnorum (*Ligidium* h.), 71
 muscorum (*Philoscia* m.), 113
 murarius (*O. asellus*), 183
 nigrescens (*Philoscia offersii*), 130
 oceanicus (*Ligia oceanica*), 45
 spiniger (*Acanthoniscus* s.), 402
 tuberculatus (*Deto bucculenta*), 98, 99
 vicarius (*O. asellus*), 183

 Palaegyge (*Probopyrus*), 485
 meeki (*Probopyrus bithynis*), 486, 488

 Paracubaris (*Circoniscus*), 306
 spinusos (*Circoniscus* s.), 310

 Paraphiloscia, 178

 Paratanais, 419
 dimorphus, 419

 Pentidotea, 451
 lacustris, 451

 Pentoniscus, 107
 dominicanus, 516
 exilis, 109, 110
 pruinusos, 107, 108

 Periscyphis, 318
 Periscyphis sp., 318
 Phalloniscus, 176
 anomalus, 176, 177

 Philiscia (*Philoscia*), 111, 113
 ammala (*Philoscia anomala*), 176
 Philoscia, 111, etc.
 angusta (*Pseudophiloscia* a.), 179
 angustata, 134, 135
 anomala (*Phalloniscus anomalus*), 176
 baldonii, 163
 bermudense (*P. bermudensis*), 175
 bermudensis, 175
 bilineata, 135
 brevicornis, 137
 briani, 161, 162
 bucculenta (*Deto* b.), 98
 couchii, 175
 culebrae, 168, 169, 170, 143
 culebroides, 171
 debilis (*P. variegata*), 118, 122
 demerarae, 155, 156
 diminuta, 157
 gatunensis, 158, 159
 geiseri, new species, 117
 incerta, 151, 152
 inquilina, new species, 147, 148
 kartaboana, new species, 143, 144, 145
 langi, new species, 164, 165
 maculata, 138, 143
 mineri, new species, 125, 123
 minutissima (*Porcellionides minutissimus*), 250
 mirifica, 126, 127
 moneaguensis, new species, 152, 153
 muscorum, 113, 16, 114, 115, 118, 236
 muscorum var. *sylvestris*, 115, 116
 nigricans, 137
 nitida, 123, 118, 124, 140
 nomae, 174
 offersii, 130, 131, 140
 omissa, new species, 140, 141, 142
 paraguayana, new species, 139
 paulensis, 160
 pauper, 132, 133
 pearsei, new species, 166
 picta, 129
 richardsonae, 172, 173
 richmondii, 149, 150

- roraimae, new species, 145, 146
 sellowii, 136
 seriepunctata, 147
 spinosa, 167
 tuberculata (Porcellio scaber), 226
 variegata, 118, 119, 120
 villosa, 133, 134
 vittata, 115, 116
 walkeri, 153, 154
 williamsi (P. culebroides), 171
 Philoscia "non encore décrite," DOLL-
 RUS, 1890, p. 67 (P. variegata)
 Philoscia sp., ALLEE, 1926, pp. 448, 453
 (probably = P. variegata)
 Philougria, 118
 nitida (Philoscia n.), 118
 Platyarthrus, 195
 simoni (Trichorhina s.), 195
 Pleurotracheata, superfamily, 94
 Pogonolia, 61
 muscorum, 61
 platycephala (Ligia p.), 61
 simoni (Ligia s.), 63
 Porcellio, 226
 advena (Porcellionides a.), 247
 aztecus (P. laevis), 229
 brunneus (Porcellionides b.), 250
 cayennensis, 227
 chilensis DANA (Porcellionides c.),
 246
 chilensis NICOLET (probably = P. lae-
 vis), 230, 246
 cinerascens (P. laevis), 229
 convexus (Cylisticus c.), 259
 cotillae (P. laevis), 229
 cotillai (P. cotillae), 229
 cristatus (Nagara cristata), 257
 cubensis (P. laevis), 229
 dubius (P. laevis), 229
 flavo-vittata (Porcellionides pruino-
 sus), 238
 flavo-vittatus (Porcellionides pruino-
 sus), 238
 formosus STUXBERG (probably = P.
 laevis), 230
 formosus ARANGELI (Porcellion-
 ides virgatus), 242
 fuegiensis (Porcellionides f.), 249
 gayi (probably = P. laevis), 230
 gemmaulatus (P. scaber), 226
 glaber (probably = Cylisticus con-
 vexus), 259
 glaber var. confluentus (Cylisticus
 convexus), 259
 granarus, 234
 granurus (P. granarus), 234
 immaculatus (Porcellionides pruino-
 sus), 238
 interruptus HELLER (probably = P.
 laevis), 230
 interruptus KOCH, 230
 jelskii, 239
 laevis LATREILLE, 229, 231
 laevis GOULD (probably = Cylisti-
 cus convexus), 259
 liliputanus, 235
 limatus (Oniscus asellus), 183
 limatus var. dorsalis (see P. lima-
 tus), 183
 limatus var. lateralis (see P. lima-
 tus), 183
 limatus var. limbalis (see P. lima-
 tus), 183
 limatus var. marginatus (see P.
 limatus), 183
 limatus var. multiguttatus (see P.
 limatus), 183
 maculicornis (Porcellionides pruino-
 sus), 238
 melanocephalus (P. spinicornis), 233
 mexicanus (P. laevis), 229
 mixtus (P. spinicornis), 232
 modestus, 212
 montezumae (P. scaber), 226
 niger (P. scaber), 226
 nigra (P. scaber), 226
 parvicornis (P. laevis), 230
 pictus (P. spinicornis), 232
 poeyi (P. laevis), 230
 pruinus (Porcellionides p.), 238
 pubescens, 234
 pulcher (probably = P. laevis), 230
 quadriseriatus, 236
 rathkei (Tracheoniscus r.) 262
 scaber, 226, 227, 228, 9, 10, 12
 scaber var. americanus, 229

- scaber* var. *marginata* (var. *marginatus*), 228
scaber var. *marginatus*, 229
scaber var. *marmoratus*, 228, 229
sexfasciatus (*Porcellionides* s.), 240, 241
spinicornis, 232, 233
sumichrasti (*P. laevis*), 230
trilineatus (*Tracheoniscus rathkei*), 262
trilipatanus (*P. liliputanus*), 235
triliputanus (*P. liliputanus*), 235
vittatus (*Tracheoniscus rathkei*), 262
- Porcellionidae**, 106
Porcellionides, 238
advena, 247, 248
bermudezi, 252
brunneus, 250
chilensis, 246, 247
flavo-vittatus (*P. pruinosis*), 238
fuegiensis, 249
habanensis, new species, 244
jelskii (perhaps = *P. pruinosis*), 239
minutissimus, 250, 251
mulaiki, 522, 523
pruinosis, 238, 227, 239, 241, 252
saussurei, 245, 246
sexfasciatus, 240, 241
virgatus, 241, 242, 523
- Probopyrus**, 485
bithynis, 485, 486, 487, 488
bithynis floridensis, 488
bithynis var. *gigas*, 485
floridensis, 488
floridensis var. *gigas* (*P. bithynis*), 485
meekei (*P. bithynis*), 486
oviformis, 489
panamensis (*P. bithynis*), 486, 488
pandalicola, 489
Probopyrus sp. (*P. bithynis*), 486
Proporcellio, 235, 242, 244
formosus, 242
quadriseriatus, 236
- Protrichoniscus**, 510
heroldi, 510, 511
Pseudarmadillo, 318
busecki, 324, 325
cacahuamilpensis (*Cubaris* c.), 396
carinulatus, 320, 321
dollfusi, 322, 321
gillianus, 323, 324
welchi, 322
- Pseudophiloscia**, 178
angusta, 179, 180
inflexa, 178, 179
- Reductoniscus**, 378
tuberosus (*Cubaris tuberosa*), 377
- Rhinoryctes mirabilis** (*Alloniscus* m.), 217
- Rhyscotinae**, 264
Rhyscotus, 264, 265
albidemaculatus, 272, 265
ciferrii, 268, 265
cubensis, 267, 269
jacksoni, 273, 265, 274
laxus, 269, 265, 270
nasutus, 271, 265
orthonedae (*R. ortonedae*), 266
ortonedae, 266, 265, 267
parallelus, 265, 266
sphaerocephalus, 271, 265
texensis, 274, 265, 275
turgifrons, 272
- Rostrophiloscia**, 517
dominicana, 517
- Scleropactes**, 283
cavifrons, 292
concinus, 284
estherae, 291
incicus, 285
peruvianus (*Sphaeroniscus* p.), 302
senex (*Sphaeroniscus* s.), 302
tatei, new species, 288, 289
tristani, 289, 290
zeteki, 285, 286, 287
- Scyphacella**, 95
arenicola, 96
- Scyphacidae**, 95
Slaeroniscus, 303
granulatus (*Sphaeroniscus* g.), 303
- Spaeroniscus**, 301
colombiensis (*Sphaeroniscus* c.), 301
- Sphaeroma**, 446
destructor (*S. terebrans*), 447

- dugesi (*Exosphaeroma* d.), 449
 oregonensis (*Exosphaeroma* o.), 450
 tenebrans (*S. terebrans*), 447
 terebrans, 447, 448
 thermophilum (*Exosphaeroma* t.), 450
Sphaeromidae, 446, 512
Sphaeroniscus, 294
 cacahuamilpensis (*Cubaris* c.), 396
 colombiensis, 301
 flavomaculatus, 295
 frontalis, 296
 gaigei, 304, 305
 granulatus, 303, 304
 guianensis, new species, 297, 298, 300
 intrusus, *nomen nudum*, 305
 peruvianus, 302
 portoricensis, 296, 297
 senex, 302
 tukeitanus, new species, 300
Sphaeroniscus sp. ALLEE, 1926, p. 448, etc. (*Scleropactes zeteki*), 288
Sphaeroniscus sp. DOLLFUS, 1896*b*; VAN NAME, 1926, p. 3 (*Scleropactes zeteki*), 305, 288
Sphaeroniscus sp. DOLLFUS, 1893*a*, 305
Sphaeroniscus sp. JACKSON, 1928*a* (*intrusus*), 305
Spherarmadillo, 293
 schwarzi, 293
Spherillo, 395
 affinis (*Cubaris* a.), 395
Spiloniscus, 78
 pygmaeus, 80
Stenomacrus, 272
 turgifrons (*Rhyscotus* t.), 272
Stenophiloscia, 167
Styloniscus, 67
 gracilis (*Ligidium gracile*), 67
 magellanicus (*Trichoniscus* m.), 82
Stymphalus, 66, 67
 dilatatus, 66
Synuropus, 222
 granulatus, 222, 223

Tanaidacea, suborder or order, 417
Tanaidea, 417
 fluviatilis, 418, 419
Telotha, 435
 henselii, 435, 436
 lunaris, 438
Trachelipus (*Tracheoniscus*), 261
 rathkei (*Tracheoniscus* r.), 262
Tracheoniscus, 261, 306
 rathkei, 262, 260
 rathkii (*T. rathkei*), 262
Trichoniscidae, 77, 509
Trichoniscinae, 77
Trichoniscus, 77
 arenicola (*Scyphacella* a.), 96
 caelebs, 78
 demiverge (*T. demivirgo*), 78, 79
 demivirgo, 78
 halophilus, 88
 magellanicus, 82
 monocellatus (*Oligoniscus* m.), 91
 murrayi, 84
 nearcticus, 509
 papillicornis (*Detonella* p.), 100
 pseudopusillus, 81
 pusillus (*T. demivirgo*), 78, 80
 pygmaeus, 80
 riquieri, 85
 stebbingi, 86
 verrucosus (*T. magellanicus*), 82, 83
Trichorhina, 188
 ambigua, 198
 barbouri, 190, 191
 bequaerti, new species, 206, 207, 208
 giannelli (*T. giannellii*), 205
 isthmica, 203, 204
 marianii, 199
 papillosa, 196
 pittieri, 200
 quisquiliarum, 194, 195
 simoni, 195, 196
 thermophila, 192, 194
 tomentosa, 193, 192, 194
Troglophiloscia, 180
 silvestrii, 182, 181
Tylidae, 408
Tylos, 408, 416
 insularis, new species, 412, 413

- latreillei, 409, 410, 412, 414
- latreilli (T. latreillei), 409
- neozelanicus, 416
- niveus, 414
- punctatus, 410, 411, 412
- spinulosus, 415
- Tylus (Tylos), 415
 - spinulosus (Tylos s.), 415
- Uropodias, 277, 279
 - bermudensis (Armadillidium vulgare), 277, 279
- Valvifera, suborder, 451
- Venezillo, 328, 329, 330, 346, 518
 - clausus (Cubaris clausa), 345
 - schultzei (Cubaris s.), 518
- Vinneta, 97

