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THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY,

INCLUDING
ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'MAGAZINE OF BOTANY AND ZOOLOGY,' AND OF
LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY
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VOL. IV.—SECOND SERIES.  
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“Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exulta; malè doctis et barbaris semper inimica fuit.”—
LINNÆUS.

. The sylvan powers
 Obey our summons; from their deepest dells
 The Dryads come, and throw their garlands wild
 And odorous branches at our feet; the Nymphs
 That press with nimble step the mountain thyme
 And purple heath-flower come not empty-handed,
 But scatter round ten thousand forms minute
 Of velvet moss or lichen, torn from rock
 Or rifted oak or cavern deep: the Naiads too
 Quit their loved native stream, from whose smooth face
 They crop the lily, and each sedge and rush
 That drinks the rippling tide: the frozen poles,
 Where peril waits the bold adventurer's tread,
 The burning sands of Borneo and Cayenne,
 All, all to us unlock their secret stores
 And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.



CONTENTS OF VOL. IV.

[SECOND SERIES.]

NUMBER XIX.

	Page
I. Account of a Ribbon Fish (<i>Gymnetrus</i>) taken off the coast of Northumberland. By ALBANY HANCOCK and DENNIS EMBLETON, M.D. (With two Plates.)	1
II. Ornithological Notes. By JOHN BLACKWALL, F.L.S.	18
III. A few remarks upon a species of Zoophyte discovered in the New Docks of Ipswich. By Mr. EDWIN GILES and Dr. W. B. CLARKE	26
IV. On <i>Odontites rubra</i> , Pers., and the allied forms, including a notice of a new species. By JOHN BALL, M.R.I.A.	28
V. Contributions to the Botany of South America. By JOHN MIERS, Esq., F.R.S., F.L.S.	31
VI. On the Identification of a Genus of Parasitic Hymenoptera. By J. O. WESTWOOD, F.L.S.	39
VII. Descriptions of <i>Aphides</i> . By FRANCIS WALKER, F.L.S.	41
VIII. On the Animal of <i>Kellia rubra</i> . By JOSHUA ALDER, Esq. ...	48
Proceedings of the Zoological Society	56—73
On the Development of the Purkinjean Corpuscle in Bone, by Dr. Leidy; Mode of Progression with Animals, by W. A. Pike; Descriptions of new species of the genera <i>Nyctale</i> , Brehm., and <i>Sycobius</i> , Vieill., by John Cassin; Description of a new species of Salamander from Upper California, by Edward Hallowell, M.D.; The Pine Tree of the Tenasserim Provinces, by the Rev. F. Mason; Description of a new <i>Helix</i> and <i>Streptaxis</i> , from the Collection of H. Cuming, Esq., by Dr. L. Pfeiffer; Meteorological Observations and Table	74—80

NUMBER XX.

IX. A descriptive Account of the Freshwater Sponges (genus *Spongilla*) in the Island of Bombay, with Observations on their Structure

	Page
and Development. By H. J. CARTER, Esq., Assistant Surgeon, Bombay Establishment. (With three Plates.)	81
X. Notice of a Bottle-nosed Dolphin (<i>Delphinus Tursio</i> , Fabr.) upon the Suffolk coast. By W. B. CLARKE, M.D.	100
XI. On Entozoa found in the Lungs of a Sheep. By JOHN GRAY SANDIE, M.D., and GEORGE PADLEY, Esq., Liverpool. (With a Plate.)	102
XII. The Musci and Hepaticæ of the Pyrenees. By RICHARD SPRUCE, Esq.	104
XIII. Remarks on the Growth of <i>Bambusa arundinacea</i> in the large Conservatory, Chatsworth. By Mr. ROBERT SCOTT	120
XIV. On the Identification of the Parasitic Genus of Insects, <i>Anthophorabia</i> . By GEORGE NEWPORT, Esq., F.R.S. & L.S.	122
XV. Descriptions of four new Asiatic species of the genus <i>Pupa</i> of Draparnaud. By W. H. BENSON, Esq.	125
XVI. On the Chemical Composition of the Fluid in the Ascidia of <i>Nepenthes</i> . By Dr. A. VOELCKER of Frankfort	128
XVII. Contributions to the Botany of South America. By JOHN MIERS, Esq., F.R.S., F.L.S.	136
XVIII. On the Animal of <i>Kellia rubra</i> . By W. CLARK, Esq.	142

Proceedings of the Zoological Society..... 146—152

The Effect of Iodine upon the Nectary, by Dr. R. Caspary; On the Intimate Structure of Articular Cartilage, by Dr. Leidy; Notice of an Excavating Cirripede, by A. Hancock, Esq.; On the Arrangement of the Areolar Sheath of Muscular Fasciculi and its relation to the Tendon, by Dr. Leidy; Meteorological Observations and Table..... 152—160

NUMBER XXI.

XIX. On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge. By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast	161
XX. On the Animals of <i>Cæcum trachea</i> and <i>C. glabrum</i> . By WILLIAM CLARK, Esq.	180
XXI. Contributions to the Botany of South America. By JOHN MIERS, Esq., F.R.S., F.L.S.	185
XXII. Characters of <i>Diplommatina</i> , a new genus of Terrestrial Mollusks belonging to the Family of <i>Carychiadæ</i> , and of a second species contained in it; also of a new species of <i>Carychium</i> inhabiting the Western Himalaya. By W. H. BENSON, Esq.	193
XXIII. Descriptions of <i>Aphides</i> . By FRANCIS WALKER, F.L.S. ...	195

CONTENTS.

v

	Page
Proceedings of the Botanical Society of Edinburgh ; Linnæan Society ; Zoological Society	202—225

Descriptions of Owls presumed to be undescribed, by John Cassin ; Descriptions of new Marine Shells, by T. A. Conrad ; Meteorological Observations and Table	225—232
--	---------

NUMBER XXII.

XXIV. Description of two new species of <i>Floscularia</i> , with remarks. By W. MURRAY DOBIE, M.D., F.B.S.E., Member of the Royal Medical and Clinical Societies of Edinburgh. (With a Plate.)	233
XXV. Observations on Mr. Hancock's paper on the Excavating Sponges. By JOHN MORRIS, F.G.S.	239
XXVI. On the Branchial Currents of the Bivalve Mollusca. By JOSHUA ALDER, Esq.	242
XXVII. Description of three new Genera and Species of Snakes. By J. E. GRAY, Esq.	246
XXVIII. Contributions to the Botany of South America. By JOHN MIERS, Esq., F.R.S., F.L.S.	248
XXIX. On the extinct and existing Bovine Animals of Scandinavia. By Prof. NILSSON of Lund	256
XXX. Observation of some of the Phases of Development of the <i>Trichodina pediculus</i> (?). By J. T. ARLIDGE, A.B., M.B. (Lond.), Member and Student in Anatomy of the Royal College of Surgeons. (With a Plate.)	269

New Books :—The Rudiments of Botany: a familiar Introduction to
the Study of Plants, by A. Henfrey, F.L.S. &c. 274

Proceedings of the Linnæan Society ; Zoological Society 275—296

On the Velvet-like Periostraca of <i>Trigona</i> , by J. E. Gray, Esq. ; The Tortoise-shell of Celebes ; Notice of some Mollusca recently taken by George Barlee, Esq., off Lerwick, by J. G. Jeffreys, Esq., F.R.S. ; Descriptions of new Freshwater Shells, by T. A. Conrad ; Meteorological Observations and Table	296—304
---	---------

NUMBER XXIII.

XXXI. Notice of the occurrence on the British coast of a Burrowing Barnacle belonging to a new Order of the Class <i>Cirripedia</i> . By ALBANY HANCOCK, Esq. (With two Plates.)	305
XXXII. Note on the genus <i>Siphonotreta</i> , with a description of a new Species. By JOHN MORRIS, F.G.S. (With a Plate.)	315

	Page
XXXIII. On the Animal of <i>Dentalium Tarentinum</i> . By WILLIAM CLARE, Esq.	321
XXXIV. On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge. By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast	330
XXXV. Supplementary Notices regarding the Dodo and its Kindred. Nos. 6, 7; 8. By H. E. STRICKLAND, M.A., F.G.S.	335
XXXVI. Reports on the Progress of Physiological Botany. No. 5. On the Phenomena accompanying the Germination of the Spores of Ferns. By ARTHUR HENFREY, F.L.S. &c.	339
XXXVII. On the extinct and existing Bovine Animals of Scandinavia. By Prof. NILSSON of Lund	349
XXXVIII. Observations on Mr. Morris's paper on the Excavating Sponges. By ALBANY HANCOCK, Esq.	355
XXXIX. Contributions to the Botany of South America. By JOHN MIERS, Esq., F.R.S., F.L.S.	357
 <i>New Books</i> :—Antiquités Celtiques et Antédiluviennes; Mémoire sur l'Industrie primitive et les Arts à leur origine, avec 80 planches représentant 1600 figures	 363
 Proceedings of the Linnæan Society; Zoological Society	 365—382
 <i>Gallinago Brehmi</i> ; Mr. William MacCalla; Meteorological Observations and Table	 382—384

NUMBER XXIV.

XL. On the Primrose-leaf Miner; with notice of a proposed new Genus, and characters of three Species of <i>Diptera</i> . By Mr. JAMES HARDY.....	385
XLI. On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge. By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast	392
XLII. On the extinct and existing Bovine Animals of Scandinavia. By Prof. NILSSON of Lund	415
XLIII. On two new species of Testaceous Mollusca. By WILLIAM CLARE, Esq.	424
XLIV. On the Botanical Productions of the Kingdom of Algiers, followed by a short notice of the supposed Manna of the Israelites. By GILES MUNBY, Esq.	426

	Page
XLV. Observations on the Synonymy of the genus <i>Nomada</i> of Fabricius, belonging to the family of Cuckoo or Parasitic Bees. By FREDERICK SMITH	436
<i>New Books</i> :—Principles of Scientific Botany ; or Botany as an Inductive Science, by Dr. M. J. Schleiden, Extraordinary Professor of Botany in the University of Jena. Translated by Edwin Lankester, M.D., F.R.S. &c.	442
Proceedings of the Zoological Society ; Botanical Society of Edinburgh.....	443—450
What is the best plan to be adopted for the destruction of the <i>Cossus ligniperda</i> and <i>Scolytus destructor</i>?, by C. J. Cox, M.D. ; Discovery of the wild state of Rye ; Presidency of the Linnæan Society ; On the pulverulent matter which covers the surface of the body of <i>Lixus</i> and other Insects ; Meteors ; Meteorological Observations and Table.....	451—455
Index	456

PLATES IN VOL. IV.

- PLATE I. } Anatomy of *Gymnetrus Banksii*.
II. }
III. } Freshwater Sponges of Bombay.
IV. }
V. }
V. B. Entozoa from the Lungs of a Sheep.
VI. New species of *Floscularia*.
VII. New species of *Siphonotreta*.—Development of *Trichodina pediculus*?
VIII. } *Alcippe lampas*.
IX. }
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ERRATA.

Page 162, 4 lines from top, for *Podopikumnus* read *Notopocorystes*.
——, 12 ———, for *Notopocorystes* read *Basinotopus*.

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

[SECOND SERIES.]

No. 21. SEPTEMBER 1849.

XIX.—*On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge.*
By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast.

THE class Crustacea having received less attention from British palæontologists than perhaps any other of similar importance, I have put together in the following pages a few observations I have been able to make on the examples in the collection of the University of Cambridge, as well as on a great number of specimens of the same species, for the most part finely preserved, lent me by various friends to render my observations as perfect as possible. I have given descriptions of some of the best-marked new species, also of some new genera; I have endeavoured to refer some others, hitherto improperly placed in recent genera, to the various fossil genera established by foreign writers for cognate forms, and have ventured a few suggestions on the classification and systematic position of some of the groups.

Class CRUSTACEA.

Ord. PODOPTHALMA. Tribe DECAPODA.

(*Brachyura.*)

Of this the most highly organized group of Crustacea, I believe the following genera have been quoted from British rocks without sufficient authority: viz. 1. *Zantho* (Leach); this has been quoted with doubt by Desmarest, Bronn, &c. from the London clay; I have ascertained that the crustacea referred to are of an extinct genus, more nearly related to *Pilumnus* than to *Zantho*, which I have named *Zanthopsis*. 2. *Orithya* (Fabr.): M. Deslongchamps referred with doubt a crustacean originally discovered by Sir Henry de la Beche in the greensand of Lyme Regis, to this recent genus of natatory *Brachyura*; I find however that the species referred to (*O. Labechii* of Desl. Mém. de la Soc. Linn.

Ann. & Mag. N. Hist. Ser. 2. Vol. iv.

11

de Normandie, Morris's Catalogue, &c.), and some similar forms from the gault, form a peculiar genus intermediate between *Homola* and *Corystes*, and belonging not to the *Brachyura* but to the *Anomura*, for which I have proposed the name *Podopilumnus*. 3. *Inachus*: Desmarest (Crust. Foss.), Morris (Catal.), and several other authors have quoted a species of this genus as found fossil in the London clay:—the figures and descriptions which I give below, from the abundance of perfect specimens which I have examined, leave no room for doubt that the fossil in question does not belong to the *Brachyura* but belongs to the *Anomura*, and forms a particular genus allied to *Notopus*, *Dorippe* and the like, to which I have given the name *Notopocorystes*. 4. *Corystes* (Latreille): the gault fossils referred to this genus in Morris's 'Catalogue' belong to the same Anomurous genus as the so-called *Orithya*.

Zanthopsis (M'Coy), n. g.

Gen. Char. Carapace suborbicular or transversely oval, gibbous, strongly arched from before backwards; gastric region very large, tumid, depressed in the middle towards the insertion

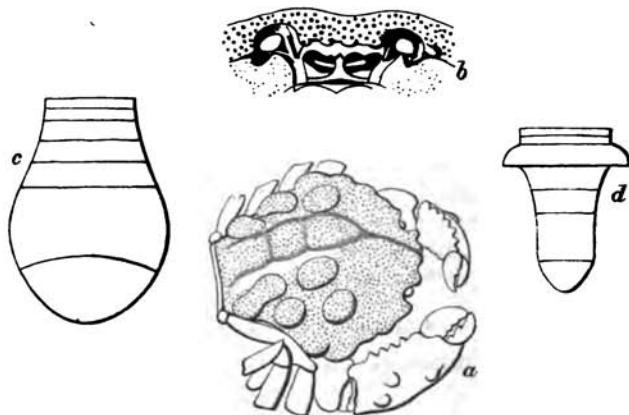


Diagram of the genus *Zanthopsis*.

- a. Entire animal as far as known; b, view of the front from below, showing the internal antennæ lodged in their transverse fossæ, and the position of the outer pair in the inner canthi of the orbits; c, abdomen of female, nat. size; d, ditto of male, nat. size.

of the *genital region*, which is very small, pentagonal, and not extending more than one-third the length of the carapace towards the front, generally divided by a transverse depression into two portions, the hinder of which is most prominent and equal in width to the *cardiac* and *intestinal regions*, which are longer than broad, and form together a tumid ridge of three

obtuse oblong nodules (defined by a hollow along each side smoother than the rest of the carapace); *branchial regions* with four large tubercles, two before and two behind, the inner posterior one elongate obliquely backwards and outwards; *front* four-lobed (including the prominent inner angle of the orbit); *orbits* large, the two lateral and the inferior angles prominent; *latero-anterior margin* with about three tubercles or spines on each side, the posterior pair largest, placed at the greatest width of the carapace, and in a line with the sulcus separating the genal and cardiac regions; *surface* minutely and closely pitted; *antennæ* as in *Zantho* (outer pair in the inner canthi of the orbits, inner pair in deep transverse fossæ beneath the front); *eyes* on very short peduncles; *tail* of seven distinct pieces in both sexes; *first pair of feet* forming robust, unequal chelæ; *hand* subcompressed, nodulated, with the upper and inner edge tuberculato-dentate; *fingers* short, with few large obtuse teeth; *four hind pair* moderate, subequal, slightly compressed, smooth.

The *Cancer Leachii* (Desm.) may be looked on as the type of this genus; it was referred to *Cancer* or *Zantho* by Desmarest (Consid. sur les Crust. fos.) and to *Cancer* by Milne-Edwards (Suites à Buffon), from the want probably of good specimens. It is nearer to *Zantho* by its tuberculated carapace, few tubercles on the latero-anterior margins, and position of the external antennæ at the inner canthi of the eyes, instead of between these and the front; but it differs in the great convexity of the carapace, and materially from both those genera in *both* sexes having seven separate joints in the tail, showing in this a closer relationship with *Pilumnus*, from which however the strong nodulation of the hind part of the carapace and its oval, vaulted form, as well as the quadrilobed front and great extent of the gastric region, distinguish it. I only know the genus from the London clay.

Zanthopsis nodosa (M'Coy).

Sp. Char. *Carapace* about one-seventh wider than long, very gibbous in the middle, sloping gradually to the sides, more rapidly towards the posterior margin, falling most rapidly and with an abrupt curve towards the front; anterior half broadly rounded, each antero-lateral margin with three large, obtusely rounded, nodular tubercles gradually diminishing towards the front; tubercles of the branchial regions very prominent as large obtuse nodules; *gastric region* tumid with a shallow depression along the middle; *genal region* small, prominent, strongly divided by a wide transverse depression, posterior half most prominent, obscurely bilobed; hollow space on each side of the mesial regional ridge remarkably smooth; *chelæ* of the male rather larger than of the female, the upper ridge of the right

(large) hand with six or seven conical tubercles, that of the left with about four, outer side of each hand with two very obscure small tubercles near the carpus, and one much larger but less distinct near the origin of the fingers; two blunt teeth on the inner edge of each finger; *tail* of the female broad ovate, of the male narrow hastate, terminal joint triangular, about $\frac{1}{3}$ th wider than long, penultimate joint the same length but a little wider, third joint much wider than the others, but shorter than the fourth or fifth. Length about 1 inch 9 lines, width 2 inches.

Common in the London clay of Sheppey.

(Col. University of Cambridge and Mr. Bowerbank.)

Zanthopsis bispinosa (M'Coy).

Sp. Char. *Carapace* transversely oval, about one-fifth wider than long, gently convex, two posterior pair of tubercles of the antero-lateral margin forming short, flattened, sharp spines, the anterior one forming a small, very obtusely angular projection; crest of the large hand with four or five tubercles, outer side with two strong elongate tubercles near the carpus, and one large obtuse one near the origin of the fingers; *tail* of the female broad oval, the last and the penultimate joint of equal length, the latter twice as wide as long, fifth joint half the length of the penultimate.

This is considerably wider and flatter than the *Z. nodosa*, and the tubercles on the branchial regions and those formed by the genital, cardiac and intestinal regions are much less prominent; the hollow space along each side of the ridge formed by the medial regions is punctured almost as strongly as the rest of the carapace; the tubercles on the ridge of the hand are fewer, but those on the outer side much more strongly marked; it is moreover easily distinguished by the two hind pair of tubercles of the antero-lateral margins forming depressed sharp spines in the one and large obtusely rounded nodules in the other. Length of carapace 1 inch 9 lines, width 2 inches 3 lines.

Common in the London clay of Sheppey.

(Col. University of Cambridge and Mr. Bowerbank.)

Zanthopsis unispinosa (M'Coy).

Sp. Char. *Carapace* suborbicular, length and width nearly equal, evenly gibbous, sloping almost equally to the front and to the back; tubercles of the branchial and medial regions nearly obsolete, flattened, obscurely defined; antero-lateral margin with the posterior tubercle on each side forming a strong, short, depressed triangular spine, the two anterior pair almost obsolete, each indicated by a faint wave in the margin. Length of carapace 1 inch 6 lines, width 1 inch 8 lines.

This rare species is distinguished from the common *Z. nodosa* and *Z. bispinosa* by its more uniform convexity and by the orbicular form produced by the length so nearly equaling the width, as well as the single, angular, pointed spine on each side. The different projections on the posterior half of the carapace are much less strongly marked than in the other species, though having the same form and position.

Rare in the London clay of Sheppey.

(Col. University of Cambridge.)

Of this genus (*Zanthopsis*) authors describe from the London clay at Sheppey the *Cancer Leachii* (Desm.), which from the imperfection of the specimen described originally (even the margins of the carapace being absent), I do not think it is possible to recognise with any certainty. Also belonging to it and from the same locality is the *Brachyurites hispidiformis* of Schlotheim (Nachtr. z. Petrefactenk. t. 1. f. 8), which for a wonder has escaped insertion in my friend Mr. Morris's elaborate 'Catalogue'; it has the exact form and strong nodulation of the *Z. nodosa*, but having the two posterior pair of spines even more produced and slender than in the *Z. bispinosa*.

Podopilumnus (M^cCoy), n. g.

Gen. Char. Carapace having the front and antero-lateral margins

forming a semielliptical curve, antero-lateral margins not compressed, tumid, obtusely rounded, with about three small spinose tubercles; front narrow, slightly projecting, deeply four-lobed (including the inner angles of the orbits), with a shallow furrow extending a short way on the back from the middle notch; orbits large, oval, lower margins denticulated, a small fissure in the under margin at the outer angle (and a doubtful trace of one in the upper margin); posterior lateral margin straight, longer than the anterior, converging towards the truncated base; posterior half of the carapace flat-

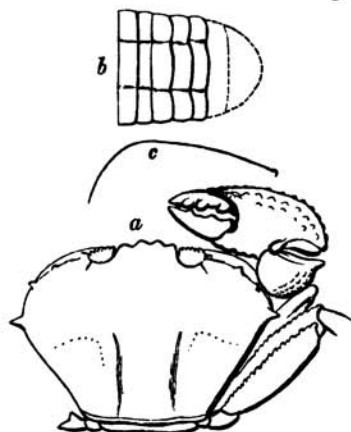


Diagram of the genus *Podopilumnus*.

a. Carapace, thighs and chelæ; b, abdomen of female, the two last dotted joints put in from their impressions on the breast-piece; c, profile of carapace showing the abrupt downward curve of the front.

posterior half of the carapace flat-

tened, anterior half abruptly sloped downwards towards the front; whole surface even and nearly smooth, the only regions defined are the cardiac and intestinal, which are marked by shallow furrows (*P. Peruvianus*); sides minutely granular; abdomen of the female broad oval (apparently of seven joints); four hinder pair of feet subequal, slightly compressed, very long, the thigh (or third joint) alone equaling the posterior lateral margin of the carapace in length; *chela* short and strong.

So far as the imperfection of the specimen allows of examination, the most striking difference between the present genus and the recent *Pilumnus* consists in the great proportional length of the legs, which are rather longer and more slender than those of the *Galene Natalensis* of Krauss (see his Südafrikanischen Crust. t. 1. f. 4), to which it bears some resemblance; the tail of the female is more ample, and the tumid rounding of the antero-lateral margins and their small uncompressed spines contrast strongly with the similar parts in the recent genus. The only two known species are the following, and the so-called *Portunus Peruvianus* figured by D'Orbigny in the geological volume of his great 'Voyage dans l'Amérique méridionale' (t. 6. f. 17), of uncertain origin, but which he suspected to have come from the cretaceous beds of the Cordillera; a view I think confirmed by the geological place of the second species of the genus, which therefore at present would seem confined to the cretaceous system, and is I believe the oldest of the genuine *Brachyura* known.

Podopilumnus Fittoni (M'Coy).

As this is the only accessible species of the genus, it will be sufficient, in addition to the above characters, to add the following particulars:—Length of carapace 1 inch 5 lines, width 1 inch 9 lines, general surface smooth, sides minutely granular; *hands* about 7 lines wide and 1 inch 1 line long, the obtusely keeled upper edge with five or six obtuse tubercles, the outer surface minutely shagreened and bearing three or four irregular longitudinal rows of small tubercles; *fingers* short, curved, rounded on the outer edge, and with three or four blunt teeth on the inner edge; *tail* $6\frac{1}{2}$ lines broad, only the five proximal joints preserved, but the fifth being about the same length as the fourth, it is probable the remaining two were distinct, it being generally at that part of the tail that ankylosis occurs in those genera which have less than the normal number of abdominal or tail segments.

Greensand of Lyme Regis.
(Col. University of Cambridge.)

(Anomura.)

Basinotopus (M'Coy), n. g.*

I propose this genus for the reception of a very common crustacean of the London clay at Sheppey, originally figured and

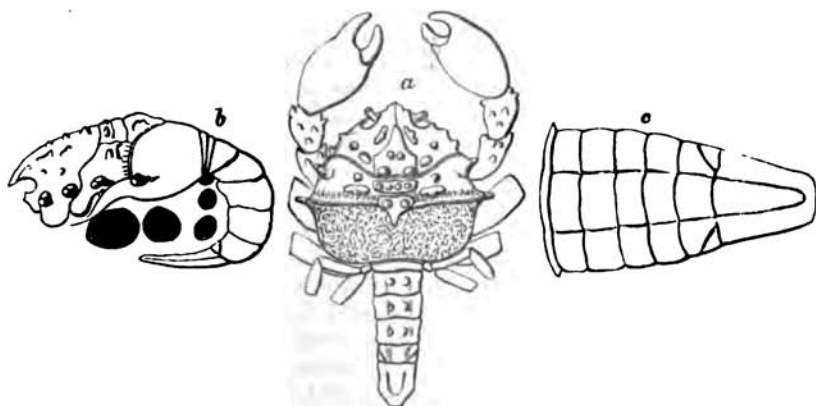


Diagram of the genus *Basinotopus* (nat. size).

- a. Male specimen seen from above; b, profile of female specimen showing the tumid pterygostomial region and the elevation of the two hinder pair of legs over the third pair; c, abdomen of female, showing the triangular intercalated pieces between the fifth and sixth joints.

described by Desmarest in his 'Histoire naturelle des Crustacés Fossiles' under the name of *Inachus Lamarckii*, but which I have ascertained, from the examination of numerous finely preserved specimens, not to belong to the genus *Inachus*, nor even to the Brachyurous division, but is truly Anomurous, retaining the little triangular plate between the fifth and sixth joints of the tail, indicating the presence of a caudal fin in the young, and also having the two hind pair of feet disproportionately small and elevated as in *Homola*, *Dorippe* and *Notopus*, &c., from all of which it differs in the large peculiar posterior or basal space behind all the other regions on the carapace (from which the genus derives its name), besides other less striking characters. As there is but one species known, which never has been very fully described, I subjoin a description comprising the generic and specific characters for the present.

* On recognizing at first the Anomurous nature of this fossil, I thought it might be the generic type named *Dromilites* by Dr. Milne-Edwards in the number of 'l'Institut' for August 1837 from Sheppey, but having lately had the pleasure of showing him the specimens, I find that though closely allied they are yet distinct.

Basinotopus Lamarckii (Desm. sp.).

Syn. *Inachus Lamarckii* (Desm.).

Carapace broad ovate, very slightly longer than wide, gibbous; *rostrum* short triangular, deeply channeled, bent downwards and with a small tooth on each side, a strong rough tubercle on each side of the base forming the inner angle of the orbits, another tubercle forms the outer angle, and from this to the level of the base of the cardiac region the margin bears four strong spinous tubercles; the *gastric region* extends half the length of the carapace, is strongly trilobed, the middle portion (corresponding to the so-called *genital region* of many crabs) tumid, subpentagonal, the pointed end extending to the level of the orbits; it bears one large rounded tubercle at each side of its base, and several irregular smaller ones between those and its apex; the lateral portions of the gastric region are less prominent and have an oblique ridge formed by the confluence of two or three tubercles parallel with the converging sides of the middle portion; below those near the nuchal* furrow is a large cleft tubercle, and sometimes between those and the orbit two or three small granules; a slight hollow separates the gastric from the small square *hepatic regions*, which correspond on each side to the two anterior marginal spines, each bears one tubercle in its middle; *pterygostomian regions* very tumid, mammillated; *branchial regions* very large, each divided about the middle by a strong, prominent transverse ridge extending from the cardiac region to the fourth (or last) great marginal spine; the anterior edge of this ridge is plicated, and the space between it and the nuchal furrow bears two tubercles, the anterior smallest; the large, peculiar basal space behind these ridges is continuous from side to side behind the intestinal region; it is closely pitted and rough with minute wrinkles; *genital region* forming a narrow transverse tuberculated ridge, its length being only one-fourth of its width, which equals that of the *cardiac region*, which is very gibbous, rotundato-quadrate, and bearing a large hemispherical tubercle on each side; *intestinal region* forming only a small mucro, imperfectly separated from the cardiac, and not extending more than half-way into the rough basal space towards the posterior margin; *abdomen* of six joints, in the male narrow, with nearly parallel sides, obscurely trilobed longitudinally, the first joint very

* I use this term to designate that most important and constant of all the furrows of the carapace—namely that which runs transversely across the back, forming the posterior boundary of the gastric and anterior hepatic regions; it is especially strong, and frequently the only furrow, in the carapace of the *Macrura*, and corresponds on the back to the line of separation between the cephalic and thoracic segments beneath—the *neck* as it were, whence the name.

small and smooth, second, third and fourth each with a pair of tubercles on the elevated middle portion, fifth smooth, with a small triangular piece (remains of the embryonic tail-fin) on each side between it and the sixth or last joint, which is subpentagonal and rather more than twice the length of the fifth; tail of the female broad ovate, smooth, trilobed; *anterior pair of feet* forming short robust chelæ, with scattered spinose tubercles; the others small and smooth, the two hinder pair abruptly smaller and elevated above the rest. Length of carapace 10 lines, width 9 lines.

Common in the London clay of Sheppey.

(Col. University of Cambridge and Mr. Bowerbank.)

Notopocorystes (M'Coy), n. g.

Etym. *vâros*, *dorsum*, *ποῦς*, *pes*, and *Corystes*.

Gen. Char. Carapace longer than broad, ovate, depressed, with scattered tubercles, anterior half broadly rounded and furnished with a few strong marginal teeth; posterior lateral margins acute, straight, rapidly converging towards the base, which is narrow and deeply emarginate; *front* forming a short triangular rostrum, depressed in the middle, and with a small mesial ridge; *orbits* large, transversely oval, complete below and above, with two longitudinal fissures in the upper margin; *gastric region* very large, rhomboidal, defined posteriorly by a strong obtusely angular nuchal furrow pointing backwards, slightly convex, extending nearly the width of the carapace, leaving a very small obscurely defined *hepatic region* on each side; *genital region* very small, about twice as wide as long, not dividing the gastric region; *cardiac region* moderately large, hexagonal, with a small deep lunate fossa on each side at its junction with the genital region; *intestinal region* narrow; *branchial regions* large, each divided by a shallow furrow proceeding from the base of the genital region to the lateral margin on each side, parallel with the nuchal furrow; *pterygostomian regions* very tumid; first pair of feet short, robust, didactyle spinulose; fifth pair of feet disproportionally small and elevated above the level of the others; *abdomen* of the male narrow (? six-jointed).



Back view and profile of *Notopocorystes*.

This little genus completes the chain of affinities between the recent genera *Homola* and *Corystes*, rendering the transition per-

fect from the *Anomura* to the *Brachyura*. In the general form of the carapace, of the rostrum, in the completeness and form of the orbits with the two fissures in their upper edge, it so exactly resembles *Corystes* as to have even deceived Dr. Leach, the first crustaceologist of his day (see Mantell's Geol. of Sussex, p. 97). I first suspected its anomurous nature from observing the faint sulcus dividing the branchial regions as we so commonly see in the short-tailed *Anomura*, and subsequently was gratified by the Woodwardian Inspectors with the sight of a little specimen of the *N. Mantelli* (M'Coy) in the old cabinet left by Woodward to the University of Cambridge, showing the chelæ and bases of all the feet, proving the posterior pair to be abruptly smaller than the preceding ones and elevated above them, and completely establishing the position of the genus: curiously enough, the entry of this specimen in Woodward's MS. Catalogue indicates the same analogy with the recent form which Dr. Leach pointed out so many years afterwards. This genus includes the "*Corystes*" of Leach and Mantell (Geol. Suss. p. 129. figs. 9 & 10), also the species figs. 13, 15, 16 of the same plate, and the "species of a new genus allied to *Arcania*," figs. 7, 8, 14 of the same plate, which is also the *Orithya Bechei* of Deslongchamps (Mém. de la Soc. Lin. de Normandie). Dr. Mantell in the above plate, fig. 15, shows a large joint in the abdomen below the fifth large one; the specimen of the tail which I have seen is broken before the end of the fifth joint, so that I have no independent authority for the sixth joint or its mode of junction with the fifth, or whether the supplementary side pieces occur between them.

Notopocorystes Mantelli (M'Coy).

Sp. Char. Greatest width of carapace (at base of gastric region) one-fifth less than the length; three strong teeth on the antero-lateral margin, the middle one largest, placed at the end of the nuchal sulcus, the lower one between the first and the end of the faint branchial sulcus, at the end of which a fourth small tooth is found; gastric region with a narrow mesial ridge from the rostrum bearing three small tubercles on its posterior half; each side of this region has a row of three tubercles running parallel with the gastric or nuchal furrow, the space between them being about equal to their distance from that furrow; behind the inner tubercles of each row is one rather smaller; the genital region bears one elongate tubercle in the middle; cardiac and intestinal regions with a mesial ridge, the former bearing two large and the latter two small tubercles; branchial regions with an obtuse boss close to their upper internal angle, and two equidistant tubercles on each side in an oblique line to the second marginal tooth close under the

nuchal sulcus; *pterygostomian regions* marked with large longitudinal furrows and a few rows of sharp granules; surface minutely granulated. Length from 9 lines to $1\frac{1}{4}$ inch.

I suspect that the figures in Mantell's 'Geology of Sussex,' t. 29. figs. 15 & 16, and possibly 9 & 10, may belong to this species, though rather more elongate than the specimens I have seen. The *N. Bechei* (Deslong. sp.) is broader, more quadrate, and has vertical rows of tubercles on the branchial regions. I have a sincere pleasure in dedicating this species to the indefatigable geologist, who in one of the earliest of his many valuable geological works, has given the only figures I believe extant of all the species of the genus.

Not uncommon in the greensand of Lyme Regis and in the gault of Folkestone.

(Col. University of Cambridge.)

Pagurus? platycheles (M'Coy).

Sp. Char. Hands nearly equal, very much compressed, broad ovate, width nearly three-fourths the length, the moveable finger little smaller than the other; *carpus* trigonal, not so long as wide; *surface* closely covered with very obtuse granules of unequal sizes. Length of left hand 10 lines, of right hand 8 lines; width of left hand 7 lines, of right 5 lines; length of *carpus* 4 lines, width nearly 5 lines.

One interesting specimen in the collection at Cambridge shows the two strong crustaceous hands *in situ*, while all trace of the body and abdomen have disappeared, which could scarcely have happened unless, as in the recent Hermit Crabs, those parts were almost membranous; close under the right hand is a clear sparry cavity apparently indicating the place occupied by the soft perishable abdomen. The granulation of the surface resembles that of an *Echinus*. The species is remarkable for the width and brevity of its hands and wrists.

Not uncommon in the great oolite of Minchinhampton.

In connection with the group *Anomura* I may say a few words on a crustacean described and named *Ammonicolax longimanus* by Mr. Pearce (see Annals for September 1842), which he supposed to form a new genus of Hermit Crabs inhabiting the *Ammonites*. It seemed to me very incautious to infer that the *Ammonicolax* lived in the *Ammonites* on no better ground apparently than their co-existence in the Oxford clay at Christian Malford, and on recently examining two authentic specimens presented by Mr. Pratt to the University collection at Cambridge, I found that so far from being *anomurous*, the species had a well-

developed abdomen, caudal fins, remarkably large false feet, and all the characters of the *Macrura*, being in fact clearly referrible to the genus *Mecochirus* of Germar, so abundant in the upper oolitic schists of Bavaria, though not hitherto recognised in Britain. The five internal processes mentioned on each side are merely the indications of the *apodemata* or internal partitions between the gills, and present no peculiarities. As the specific name *longimanus* would be peculiarly inappropriate when this interesting little crustacean is placed in its true genus (nearly all the species of which have longer hands), it might provisionally bear the name of *Mecochirus Pearcei*.

(*Macrura*.)

In this group we find several fossil crustacea referred to recent genera in British works, without, I believe, just reason:—thus in Morris's Catalogue we find *Palinurus Seurii* quoted from Leeds, Yorkshire;—if this muschelkalk fossil is found there, it should be placed in the Triassic genus *Pemphix*, formed many years ago for it by Von Meyer, it having no relation to *Palinurus*. The recent generic name *Astacus* has also been much used for fossils of various ages, but I have not yet seen or heard of the real occurrence of that genus in the fossil state; most of the species will be noticed below under their respective genera.

Eryon Barrovensis (M'Coy).

Sp. Char. Carapace subovate, about one-eighth broader than long near the truncated posterior margin; *lateral margins* set with short tooth-like spines, two narrow incisions on each side, the hind pair a little in front of the middle, inclosing between them on each side a short rotundato-quadrangle lobe; *front* narrowed, concavo-truncate, with the lateral angles slightly produced outwards; each of the *inner pair of antennæ* having their two setæ deeply divided, the outer one of each slightly longest, scale of the external antennæ large, the setæ scarcely thicker than those of the inner pair; *abdomen* exceeding the length of the carapace by only one-third the length of the outer tail-flaps, which latter are very broad and subquadrate at the end (resembling those of the *Eryon Hartmanni*); each of the segments except the first bears a large, oblong tubercle in the middle; *first pair of legs* robust, short, hand and carpus together nearly one-fourth less than the length of the middle of the carapace; *fingers* very slender, both pointed, of equal length, incurved at the tip, the moveable one most abruptly. Surface minutely granulated, with larger granules on the mesial ridge of the carapace. Length of carapace 2 inches, width 2 inches 2 lines; length of abdomen (to end of outer pair of

tail-flaps) 2 inches 2 lines ; length of hand 1 inch 3 lines, of carpus 4 lines, width of hand at middle $3\frac{1}{2}$ lines.

This is most allied to the only other liassic species which I am aware of, namely the *E. Hartmanni* of Herman von Meyer (see his "Beiträge zu Eryon" in the 18th vol. of the Nova Acta Acad. Cæs. Leop. Carol. &c.), from which it differs in its much shorter abdomen, a character which approximates it to the otherwise dissimilar *E. subpentagonus* (Münst.) and *E. arctiformis* (Schlot.) of the Kelheim and Solenhofen lithographic slates. In all the species described by Von Meyer and Münster the hand and carpus taken together equal or exceed the middle of the carapace in length ; this species is therefore most remarkably distinguished by the comparative shortness of its chelæ as well as their greater robustness.

Rare in the lias of Barrow-on-Soar.

(Col. University of Cambridge.)

Archæocarabus (M'Coy), n. g.

Etym. ἀρχαῖος, *antiquus*, and κάραβος, Aristotle's name for the *Palinurus* or spiny lobster.

Gen. Char. *External antennæ* very thick and long, the setæ of very short fimbriated joints ; *first pair of feet* much thicker than the others, the extremity of the penultimate joint dilated on its inner side to a broad, subtruncate, subcompressed hand as wide as the length of the curved terminal joint which is inflexed on it ; *four posterior pairs of legs* slender, compressed ; *carapace* semicylindrical, obtusely rounded above ; *nuchal furrow* very wide and deep, extending with a gentle backward curve across the carapace in front of the middle ; cephalic por-

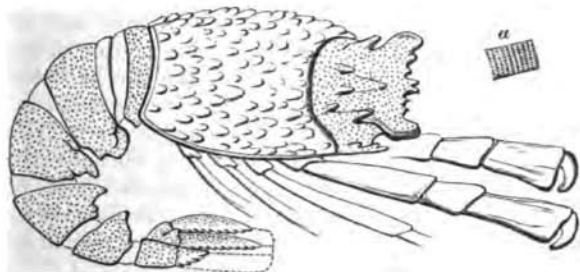


Diagram of *Archæocarabus*.

a. Portion of one of the outer antennæ.

tion depressed, front wide, subtruncate toothed, the lateral angles produced into large, flattened, slightly recurved spines over the eyes, shell below the orbits prolonged forwards into a thick spine ; *crust* excessively thin and fragile, covered with

coarse adpressed tubercles; *abdomen* very thick, rounded, nearly twice the length of the carapace, segments nearly smooth, punctured, their extremities broadly falcate; tail having the crustaceous portion at the outer margin of the base of the two outer pair of fins long, elliptical, strongly serrated on their inner edge.

In all the characters of generic importance which I have seen in these fossils, they approach the recent *Palinuri* or spiny lobsters, with the important exception of the structure of the first pair of feet, which in the recent genus are small, slender, and terminated by a simple point for walking only, forming a strong contrast with the present genus, in which they are powerful prehensile organs, much more robust than the other feet, broadly dilated towards the end, and terminated by a strong subcheliform claw. I only know the genus in the eocene tertiary strata.

Archæocarabus Bowerbanki (M'Coy).

Sp. Char. Carapace about 2 inches 4 lines long and 1 inch 9 lines wide, all behind the nuchal sulcus marked with large semioval flattened tubercles, their blunt apices directed forwards and encircled by a crescent of small pores; the largest tubercles are about the middle of the back, and have a few small ones irregularly placed in the intervals, towards the side-margins they become smaller and more equal; anterior or cephalic portion more nearly smooth, having only small, sharp, widely separated granules, one on each side of the middle near the base and one or two in the median line near the front much larger than the rest; front margin with about three denticles on each side between the middle and the broad compressed horn-like processes at the angles, from each of which latter a ridge extends backwards bearing two or three strong spines; the anterior prolongation of the cheeks beneath the orbit has also a row of a few large spines: *abdomen* to end of caudal fins nearly twice as long as the carapace, semicylindrical, nearly smooth, with few distant punctures, the ends of the first five segments abruptly narrowed, thickened and falcately curved backwards, sixth segment having articulated to each end the two thick, elliptical, crustaceous outer marginal supports of the two outer pair of tail-fins; they are about three times longer than wide, serrated on the inner edge: *first pair of feet* larger than the others, compressed, penultimate joint dilated towards the extremity into a flattened trigonal hand; *terminal joint* forming a strong, subcompressed, curved, moveable finger, as long as the truncated end of the preceding joint, to which it is opposed for prehension, the *arm* about as long as the *leg*

of the second pair; *carpus* about one-third the length of the arm and half the length of the hand, the width of which latter at top exceeds half its length; *three next pair of legs* compressed, gradually diminishing in size; fifth pair not seen. At about 2 inches from their bases the external antennæ are one-fourth of an inch in diameter.

I have great pleasure in dedicating this fine species to Mr. Bowerbank, who has done so much to illustrate the fossil botany and zoology of the London clay—his work on the former having almost created the subject; while the extraordinary extent and beauty of the collections which he has made of the other fossils of that formation are, I believe, quite unrivalled, and when fully published will demonstrate a richness in the fauna and flora of the eocene period in Britain for which few geologists are prepared. I have especially to record my obligations to him for sending me a large number of his choicest specimens of London-clay crustacea of those species which I informed him I was about describing from the Cambridge collection, but the specimens of which at my disposal did not fully exhibit all the characters of the species; and having mentioned my anxiety to render my descriptions of those as perfect as possible, without entering further on the extensive subject of the Crustacea of that formation.

The present species is usually found with the abdomen doubled close under the thorax, which latter is almost always crushed, owing to the fragile delicacy of the crust.

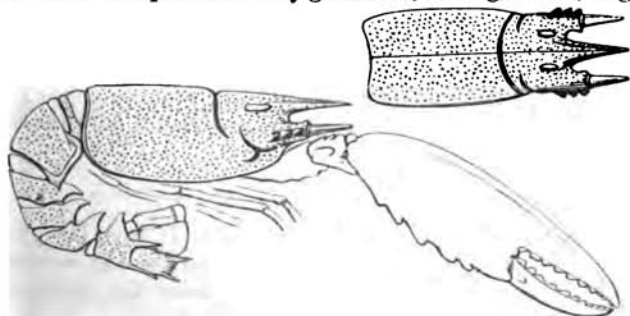
Rare in the London clay of Sheppey.

(Col. University of Cambridge and Mr. Bowerbank.)

Hoploparia (M'Coy), n. g.

Etym. ὅπλα, *arma*, and παρειά, *gena*.

Gen. Char. *Carapace* minutely granulose, oblong, tumid, slightly



Hoploparia.

compressed, a little deeper than wide, ending in front in a strong sharp rostrum, the sides of which are strongly carinate

and smooth, or with few very minute teeth; beneath the orbits the cheeks are prolonged forwards about half the length of the rostrum, and usually strongly keeled and spinose, forming a semicylindrical sheath over the base of the strong triangular scale of the origin of the outer antennæ, which reaches as far as the rostrum; *nuchal furrow* strongly marked across the middle of the back, but not reaching the marginal third of each side; *cheeks** impressed by a deep λ -shaped sulcus, one portion of which extends upwards nearly parallel with the nuchal furrow, the longer lower branch curves forward under the projecting part of the cheeks, and the shorter branch curves backwards under the end of the nuchal furrow; *abdomen* subcylindrical, smooth or slightly punctured, the second joint having broad, dilated quadrate ends, the third, fourth, and fifth terminating in triangular or broadly falcate extremities, the sixth having articulated to each end the two outer pairs of large trigonal tail-fins, the outer one on each side divided by a transverse suture rather less than one-third from the extremity; seventh joint (or middle flap of the tail) oblong, sides denticulated, extremity narrower than the base, and bearing a small spine at each corner; *first pair of legs* very long and thick, unequal, the larger claw with large blunt teeth, the more slender one with more numerous and equal smaller sharp teeth; the other legs slender.

In the general characters, so far as I have been able to ascertain them, these crustaceans coincide with the living genus *Homarus*, but are constantly distinguished by the sheath-like prolongation of the strongly ridged and spinose cheeks, the nearly smooth-sided rostrum, and the short distance which the nuchal furrow extends down the sides, as well as the separate λ -shaped cheek-furrow on each side, and the size of the antennary scale. There are several species common in the British eocene tertiary and cretaceous rocks, only one of which has yet been noticed, viz. the *Astacus longimanus* of G. Sowerby (Zoological Journal, vol. ii. tab. 17) from the greensand of Lyme Regis, which I find to belong to the present genus, and which should have the name *Hoploparia longimana* (Sow. sp.).

Hoploparia prismatica (M'Coy).

Sp. Char. *Carapace* (excluding the rostrum) $1\frac{1}{4}$ inch long, width 10 lines, subcylindrical behind, but having the section of a five-sided prism towards the front from the strong projection of the large, acutely angular cheek-ridges, which bear

* Or sides of the carapace immediately in front of each end of the nuchal furrow.

about three large sharp teeth each; *rostrum* large, deeply channeled in the middle, sides rising to very prominent keels minutely serrated towards the end, one elongate tubercle on each side of its base; *nuchal furrow* strong, ends curved forwards, but only extending about halfway from the middle of the back to the side margin; beneath and in front of each of its ends a very deeply marked λ -shaped sulcus; surface very closely and minutely granulated, punctured on the cardiac and intestinal region; ends of the abdominal segments broadly rounded with a small mucronate point directed backwards; the last two joints with rough transverse scale-like sculpturing, the others so finely granulated as to appear nearly smooth.

This species is remarkable for the size and prominence of its sharply angulated cheek-ridges; the surface, particularly of the abdomen, is more nearly smooth than in the other species which I have seen.

Common in the Speeton clay of Speeton, Yorkshire.

(Col. University of Cambridge.)

Hoploparia gammaroides (M'Coy).

Sp. Char. *Carapace* averaging from the orbit to the posterior side-margin $2\frac{3}{4}$ inches, depth $1\frac{1}{2}$ inch, minutely punctured on the middle of the back, coarsely squamoso-punctate on the gastric region, granulated on the sides, most strongly near the front lateral margins; *nuchal furrow* strong, but only reaching halfway down the sides, its middle portion equally distant from the edge of the orbit and posterior margin of the carapace, or slightly nearer the former; λ -shaped cheek-furrow deep; *rostrum* strongly bicarinate, with a ridge-like tubercle about two lines long on each side of its base, and one small tubercle at an equal distance below the first pair at the edge of the orbit; from a little behind the level of the orbit the cheek is elevated into a strong keel with about three large spinose tubercles, cheeks prolonged as a semicylindrical sheath to the outer antennæ half the length of the rostrum: *abdominal segments* very flat and smooth, the articular anterior portion scarcely convex, and the sulcus dividing it from the posterior portion not very strong, first segment closely punctured like the middle of the thorax, the dorsal portion of the others with the puncta slight and distant, flaps of the tail coarsely squamoso-punctate; *chela* very large, with a rude scale-like sculpturing of the surface, broad one having the hand as wide ($1\frac{1}{2}$ inch) as from the carpus to the base of the moveable finger, four large, short spines on the inner margin, moveable finger longer than from its base to the carpus; *carpus* with several thick short spines; smaller hand as long as

the great one, but about one-third less wide; other legs very slender (third and fourth pair about 3 lines wide), subcompressed, smooth.

This fine species much resembles our common recent lobster at first sight, and has as large or even more robust claws, but similarly armed: in by far the greater number of specimens the characteristic prolongation of the cheeks, with its spinose keel becoming fixed in the matrix, causes the entire front of the carapace from a little behind the rostrum to be broken off, and so leaving no trace of this part of the carapace, heightens the resemblance indicated by the specific name.

Common in the London clay of Sheppey.

(Col. University of Cambridge and Mr. Bowerbank.)

Hoploparia Belli (M'Coy).

Sp. Char. Carapace averaging from the orbit to the posterior side margin $1\frac{1}{2}$ inch, depth of side 9 lines, closely punctured on the middle of the back, and very closely and uniformly granulated over the sides; *nuchal furrow* considerably nearer the posterior margin of the carapace than the edge of the orbit (measured a little one side of the mesial line), its ends reach two-thirds of the way from the mesial line to the lateral margin; λ -like cheek-furrow strong; sheath-like prolongation of the cheeks obtusely rounded, the margins and lateral angles much inflexed, about half the length of the rostrum, two or three obtuse, undefined nodulations on the rounded prominence which extends backwards from its contracted carinate end towards the cheek-furrow; bayonet-shaped antennary scale narrow, extending as far as the tip of the rostrum; one blunt tubercle about twice its diameter from the median line on each side of the base of the rostrum, and another similar one at an equal distance below it on each side: *abdomen* thick, each segment having a gently convex smooth anterior articular portion divided by a strong deep furrow from the rest, which is flattened and very closely and strongly punctured; epimeral extremities of the first joint rudimentary, of the second broad, subquadrate, rounded on the anterior and external edges, subtruncate behind, with the angle forming a short spine, third, fourth, fifth and sixth terminating in broad triangular plates, slightly falcate, the sixth rather longer than the preceding ones, and having the posterior lateral angles produced backwards into a small spine on each side of the base of the seventh joint or middle tail-flap, which latter is subquadrate, its length and the width of the base being equal, narrowing towards the end, which is rounded and terminates at each angle in a small sharp spine; side margins thickened, minutely dentated: *first*

pair of legs closely scabroso-punctate; chelæ oval, very slender, about double the length of the carapace, not very unequal, greatest width about half the length from the base of the little finger to the carpus; section subrhomboidal, outer angle obtusely carinated, smooth, sides obtusely rounded in the middle, inner edge with two rows of about four large spiniform tubercles arched forwards; fingers about one-third longer than the base, equal, subcompressed, rounded, straight and of nearly equal width throughout, nearly smooth, with a raised line of very minute teeth on the inner edge; *carpus* small, section oval, scarce half the length from its tip to the base of the moveable finger, finely punctured, and with a few strong spines; *arm* compressed; the other legs slender and nearly smooth (third and fourth pair 1 line in diameter).

This species is much more common in the London clay than the *H. gammaroides* (M'Coy), which it resembles, although only half the length; it may be distinguished therefrom by the finer and more uniform granulation of the sides, the greater length of the *nuchal* furrow, and its being placed farther back towards the posterior margin; the cheeks, instead of being strongly carinated and spined, are only obtusely rounded and nodulated; the chelæ are more slender, and the segments of the abdomen differ in the present species, having the anterior smooth portion of each more convex and separated by a much deeper furrow from the posterior part, which in the *H. gammaroides* is closely punctate in the first segment only, the others being polished with comparatively slight distant puncta, while in the *H. Belli* the hinder parts of all the segments are equally rough with a coarse close-set punctuation.

I dedicate this species to Prof. Bell, from whose able pen we may one day expect an illustrated volume on all the crustacea of the London clay, for which I believe the most ample materials exist in metropolitan collections which will be at his disposal. Mr. Morris, in the preface to his Catalogue, mentions in the cabinet of Mr. Bowerbank alone, the perfectly astonishing number of twenty to thirty species from this formation. Upwards of a dozen beautifully perfect specimens of this species were most obligingly sent me by Mr. Wetherell, on our mutual friend Mr. Yates mentioning that I was about describing the species from the Cambridge specimens, but was very anxious to render my specific description complete by the inspection of more perfect specimens. Mr. Bowerbank also lent me charming specimens with the same object.

Common in the London clay of Sheppey, Hampstead, Bayswater, Primrose Hill, &c.

(Col. University of Cambridge, Mr. Bowerbank, Mr. Wetherell, &c.)

That there are no errors in these observations would be an undue assumption; for who, on such subjects and in the examination of these minute objects, can hope to escape from occasional error? I invite malacologists to offer their corrections, if I have differed on insufficient grounds from so eminent a naturalist as M. Deshayes; and I conclude with the evocation,

..... "Si quid novisti rectius istis,
Candidus imperti."

I am, Gentlemen, your most obedient servant,
WILLIAM CLARK.

P.S. I beg that the notice relative to the *Venus orbiculata* of Montagu, in my paper on the genus *Cæcum*, in the 'Annals' for August, may be considered as cancelled.

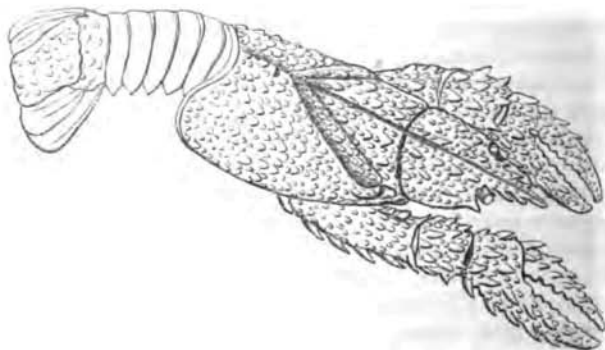
XXXIV.—On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge. By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast.

[Continued from p. 179.]

Enoploclytia (M'Coy), n. g.

Etym. *ἐνοπλος*, *armatus*, and *Clytia*.

Gen. Char. Carapace fusiform, back rounded, sides convex, gently compressed, posterior end slightly narrowed and deeply



Enoploclytia.

notched for the insertion of the abdomen, much contracted anteriorly, the front extended into a long, sharp-pointed depressed rostrum, the sides of which are armed with three or four strong spines; one strong spine over the upper external angle of the orbit; *eyes* on short, thick peduncles; *nuchal*

furrow strong, slightly arched backwards, the ends reaching each side margin at a point deeply notched by the abrupt narrowing of the margin from thence to the front; *branchial furrows* double, inclosing between them a narrow, pointed ridge on each side, which meets its opposite fellow at less than a right angle (each meets the midline of the back at an angle of about 40°) on a point of the back about halfway between the nuchal furrow and the posterior margin; *abdomen* (including the tail-fins) shorter than the carapace, segments very weak, slightly arched, their ends triangularly pointed (ends of the second one not dilated), sixth longer than the preceding ones, giving origin to the two broad, rotundato-trigonal pair of side-flaps of the tail, which are very large, thin, and undivided by transverse sutures; seventh segment (or middle tail-flap) subtrigonal, thicker than the others and tuberculated; *surface* of carapace, legs and chelæ covered with large spinose tubercles and intervening granules of very irregular size; *first pair of feet or chelæ* very large, subcompressed, fingers slender, with a row of large teeth on the inner edge, carpus very short, tumid, trigonal; *three next pair of legs* slender, compressed (? apparently terminated by a blunt, trigonal, simple claw); *fifth pair* not seen.

In the large, flattened, strongly toothed rostrum, rough spinose legs, the small size of the abdomen, with the general form of its little-arched, weak segments, and the undivided outer pair of tail laminæ, this genus approaches the recent *Galathæa* more than any other recent group, differing in its peculiar branchial furrows and ridges, meeting at an angle on the middle of the back, &c. The long, dentated rostrum, large, rough, spinose tuberculation of the carapace and chelæ easily distinguish those large cretaceous species from the diminutive genera *Clytia* and *Glyphæa* of the oolitic rocks with which they have been hitherto confounded. The type of the genus is the *Astacus Leachii* (Mant.), to which at least the figures marked f. 1 & 4. t. 29 of the 'Geology of Sussex' refer (some of the other figures possibly belonging to the *E. brevimana*, M'Coy). The *E. Leachii* is also well figured and described by Reuss in his 'Versteinerungen der böhm. Kreideformation,' and by Geinitz in his 'Char. der Schich. u. Pet. des sächsisch-böhmischen Kreidegebirges.' It is distinguished by the very long, straight, narrow fingers of the chelæ, which are nearly twice the length of the basal part of the hand, or from their base to the carpus, and set on their inner edge with a row of narrow cylindrical teeth their own length apart; the whole hand (or penultimate joint and moveable finger) nearly one-fourth longer than the carapace. A second species of large size and remarkable form occurs in the chalk of Burwell

and at Maidstone, several specimens of which I saw in the astonishingly beautiful collection of chalk fossils belonging to the Rev. Mr. Image, near Bury St. Edmunds: the hand in this species is much compressed as well as the carpus and arm, and all covered with large scattered curved spinose tubercles (largest on the outer and inner edges of the hand, carpus and arm) with an intermediate smaller tuberculation; the basal part of the hand is subrhomboidal, slightly longer than its width; carpus small, its greatest length and width equal, proximal end only half the size of the distal end, abruptly formed by a deep sinus in the proximal half of the inner margin (like that of the right arm of the recent *Callianassa subterranea*); penultimate or immoveable finger straight, rapidly tapering to an obtuse point, its length only equaling that of the hand from the base of the finger to the carpus; moveable or last finger a little longer, not tapering so rapidly, and incurved at the apex, each finger with a row of blunt hemispherical tubercular teeth less than their diameter apart. Average length of moveable finger 2 inches 6 lines, from thence to the carpus 1 inch 9 lines, width at base of fingers 1 inch 9 lines, width of carpus 1 inch 1 line, width at distal end 1 inch 3 lines. I have affixed the name of *Enoploclytia Imagei* to this, the largest and most interesting of the mesozoic Crustacea, to commemorate the zeal and taste of the amiable owner, whose exquisite collection of cretaceous fossils would, if more fully known, greatly increase our knowledge of the fossils of this period.

Enoploclytia brevimana (M'Coy).

Sp. Char. Carapace subcylindrical or slightly compressed, averaging $3\frac{1}{2}$ inches long and 1 inch 9 lines deep; rostrum strong, pointed, with three or four large pointed teeth on each side, margins of the orbits with strong spines; surface closely studded with small tubercles and large scattered spines; hands short ovate, length little more than the depth of one side of the carapace, length of the moveable finger about equal to, from its base to the carpus, and a little longer than, the width of the hand, both fingers incurved at the tip and set on the inner edge with a row of blunt hemispherical teeth half their diameter apart; carpus subtrigonal, a little longer than wide; arm compressed, about one-third longer than wide; surface of hand and carpus with many large, curved, spinose tubercles, and an intermediate, close, smaller tuberculation; length of moveable finger 1 inch 1 line, from thence to carpus 11 lines, width of hand 1 inch.

The very short small ovate hands easily distinguish this species from the other two.

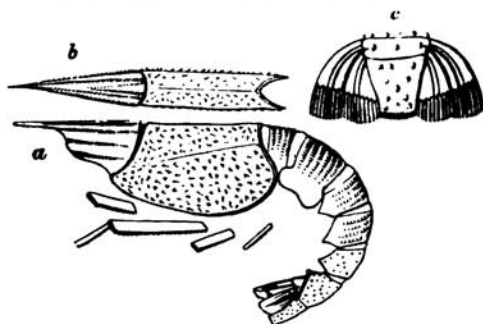
Common in the lower chalk of Cherry Hinton, near Cambridge.

(Col. University of Cambridge and Rev. T. Image.)

(Fam. *Thalassinidae*.)

Meyeria (M'Coy), n. g.

Gen. Char. Carapace strongly compressed laterally; nuchal furrow very deep, V-shaped, the lateral portions nearly straight,



Meyeria.

a. Side view. b. Carapace seen from above. c. Tail-flaps.

meeting on the back at an acute angle considerably in front of the middle, and extending to the lateral margins at a point deeply notched by the abrupt narrowing of the front from thence to the sharp rostrum: *branchial furrow* forming a nearly straight, delicate, impressed line from near the lower ends of the nuchal furrow to the middle of each side of the posterior margin (never meeting on the midline of the back); portion in front of the nuchal furrow with a few longitudinal, strong, denticulated ridges, rest of carapace rough with small pointed granules: *abdomen* semicylindrical, large, segments sculptured with rows of granules, the ends of the second joint dilated, quadrate, of the others subtrigonal, penultimate joint a little longer than the fifth, carrying the two outer pair of *tail-flaps*, which are strong, truncato-elliptical, with a mesial ridge, ends fimbriated, the outer one on each side divided by a transverse serrated suture about one-third from the end; middle tail-flap oblong, apex truncated, narrower than the base; *legs* slender, compressed, smooth, gradually diminishing in size from the first, the lower edge minutely serrated.

The *Astacus ornatus* (Phil.) is the type of this genus, which, from the great compression of the carapace, size of the abdomen, character and direction of the branchial furrows, &c., seems to

belong to the fossorial family in which I have placed it, the nearest analogue being perhaps the recent *Gebia* which burrows under the mud of Plymouth Sound: the fossils abounding in such a state of perfection in the fine Speeton clay that they must have lived in it and died in the exact spots we now find them, harmonizes with this view of approximating them to those similar little forms which live habitually buried in the mud. The substance of the crust, though very thin, and, in the following species especially, often showing signs of considerable flexibility, seems rather harder than in most of the fossorial types, and the strong fringe of stiff hairs at the end of the tail-pieces is in the fossil replaced by semi-membranous flaps, still however strongly sulcated. I have not seen the extremities of the feet; but if, as I suppose, the so-called *Crangon Magnevillei* of Deslongchamp (Mém. de la Soc. Lin. de Normandie, t. v.) belong to this genus, the four hinder pair of feet would terminate in simple pointed claws, and the first pair form subcheliform pincers, having the hand dilated and truncated at the extremity, which is toothed and has a small spiniform immoveable finger at one end, which is met by the slender moveable finger inflexed from the other end; this also agrees with the general type of the fossorial *Gebia*. The carapace may be distinguished from *Glyphæa* by the branchial furrow in it being very delicate and extending obliquely to the posterior margin without meeting its fellow of the opposite side, while in *Glyphæa* they are very strong and meet on the back from opposite sides at an acute angle, without reaching the posterior margin.

Meyeria magna (M'Coy).

Sp. Char. Carapace about $2\frac{1}{2}$ inches long and 1 inch 2 lines deep at the middle of the side; three strong tuberculated longitudinal ridges on each side of the cephalic part of the carapace; from about the middle of the deep nuchal furrow a row of small tubercles extends halfway to the posterior margin, and higher up (bordering the intestinal region) a similar row on each side extends from the posterior margin nearly halfway to the nuchal furrow; rest of the carapace covered with minute sharp granules, about four in a space of three lines at the middle of the sides; rostrum short, pointed; abdomen about $3\frac{1}{2}$ inches long, each segment with about four irregular, single, crowded rows of granules disposed longitudinally, the broad intervening spaces nearly smooth; a few irregular groups of granules on the extremities; the last segment granulated like the carapace; tail-flaps broad, rotundato-trigonal, finely fimbriated at the ends, each with a strong mesial ridge; transverse suture of the outer pair strongly marked, serrated;

legs subcompressed (section oval), smooth, the lower edge with a row of minute denticles directed forwards; third joint of the first pair nearly 4 lines wide, gradually decreasing to the fifth pair, the third joints of which are about 1 line wide.

Very abundant in the fine Fuller's earth of the "Lobster beds" of the lower greensand of Atherfield, Isle of Wight; also in the Speeton clay of Speeton, Yorkshire coast.

(Col. University of Cambridge.)

Note.—As the *Glyphæa rostrata* (Phil. sp.) (*Astacus rostratus*, id., Geol. York) has been referred by Herman von Meyer (Neue Gattungen fos. Krebse) and subsequent authors to the *G. Münsteri*, I may mention, that on comparing an authentic cast of that species with the English one, I find the latter fully distinguished, as a species, by the hind part of the thorax being much longer in proportion to the depth, even slightly exceeding in this respect the *G. pustulosa* (V. Mey.), which it exactly resembles in the character of its branchial furrows and their associated lobes, differing however from it and agreeing with the *G. Münsteri* in the abrupt notch-like narrowing of the margin in front of the nuchal furrow.

[To be continued.]

XXXV.—*Supplementary Notices regarding the Dodo and its Kindred*. Nos. 6, 7, 8. By H. E. STRICKLAND, M.A., F.G.S.

[Continued from vol. iii. p. 261.]

6. *On two additional bones of the Solitaire recently brought from Mauritius.*—We are indebted to the officers of the Royal Society of Arts and Sciences of Mauritius for a valuable contribution to Didine osteology. These gentlemen no sooner heard of the interest which the history of the Dodo had excited in Europe, than they undertook to search in Mauritius and the adjacent islands for such parts of the skeleton of these extinct birds as were wanting to complete our knowledge. Before proceeding to excavate the alluvions and caverns of those islands in quest of bones, they wisely commenced by searching the cabinets of their own museum. Two bones were here discovered, which tradition referred to the Dodo, and these precious specimens the Society, with the most praiseworthy liberality, have sent to Europe.

The bones now sent belong, not to the true Dodo, as was supposed by the Mauritian naturalists, but to that longer-legged species which inhabited the island of Rodriguez, and was denominated the Solitaire. They are both metatarsal bones, and consequently are so far only duplicates of portions of that bird which already existed in Europe. But from their superior state of preservation they supply some valuable information which was

(*R. acris, flore pleno albo*), and of the lesser spearwort (*R. Flammula*). Found by Mr. E. Doubleday in the leaves of the hart's-tongue (*Scolopendrium vulgare*). *Ent. Mag.* iii. 414, 415.

2. *Ph. albiceps*, Meig. vi. 194. Larva subcutaneous in the leaves of the cow-parsnep (*Heracleum Sphondylium*), and the field-thistle (*Cnicus arvensis*). Pupa-case black.
3. *Ph. Aquilegiae*, Hardy MSS. Nigricans; hypostomate sordide subflavo, proboscide alba; fronte flava; antennis palpisque nigris; thorace brevi, subrotundato, convexo, nigro-grisescente, subnitido, lineis dorsalibus longitudinalibus duabus obscuris ægre distinguendis, adumbrato; scutello concolore; abdomine griseo-nigricante, nitido, incisuris interdum stricte albescentibus; vitta laterali parva alba; ventre nigro; pedibus nigris, genubus perobscurius pallidis; halteribus albis; alis hyalinis, ad bases exalbidis, nervo transverso singulo. Long. corp. prope lin. 1.

The larva forms blotches in the leaves of the common columbine (*Aquilegia vulgaris*). It is closely allied to *Ph. albiceps*, but is darker, with the thorax shorter and rounder, and the white dashes before the wings not developed. The pupa-case is brown.

To these may be added others whose changes are still incomplete, found within the leaves of the bean (*Vicia Faba*), the burdock (*Arctium Lappa*), the field-thistle (*Cnicus arvensis*), the wild angelica (*Angelica sylvestris*), the red clover (*Trifolium pratense*), the red hemp nettle (*Galeopsis Tetrahit*), the climbing buckwheat (*Polygonum Convolvulus*), the quicken (*Triticum repens*), the meadow-sweet (*Spiræa Ulmaria*), and the kidney-vetch (*Anthyllis vulneraria*).

Penmanshiel, by Cockburnspath, Oct. 13, 1849.

XLI.—*On the Classification of some British Fossil Crustacea, with Notices of new Forms in the University Collection at Cambridge.* By FREDERICK M'COY, Professor of Geology and Mineralogy in Queen's College, Belfast.

[Continued from p. 335.]

Ord. EDRIOPHTHALMA.

(Trib. *Isopoda*.)

Archæoniscus Brodiei (M. Edw.).

As this interesting Wealden Crustacean (first I believe taken for an oolitic Trilobite) has not yet been fully described, the following notice may be acceptable:—

Char. Oval, moderately convex; *head* semicircular, the angles rounded, bearing two large oval or slightly reniform glo-merated masses of minute round *eyes*; *thoracic segments* seven, broad, slightly granulated, with obtusely rounded ends, each extremity having a long triangular facet on its anterior margin (to facilitate rolling into a ball); *abdomen* of five segments, the first three abruptly smaller than the thoracic rings, the fourth a little larger, and the fifth forming a semicircular caudal shield, rather smaller and more convex than the head, bearing along its middle a narrow, defined, semicylindrical axial lobe, its rounded termination not reaching much more than halfway to the margin, the anterior end extending a variable distance towards the thorax.

I have not seen any trace (after examining about fifty specimens) of the lateral notches in the caudal shield for the articulation of lateral appendages, which Dr. Milne-Edwards says he thinks he saw. The only known species averages 6 lines long and $3\frac{1}{2}$ lines wide.

(Col. University of Cambridge.)

Ord. ENTOMOSTRACA.

(Trib. *Pæcilopoda*.)

This group being distinguished from other Entomostraca by having crustaceous, didactyle, ambulatory thoracic feet as well as membranous, respiratory abdominal ones, is I think clearly the place for those remarkable genera, *Eurypterus* and *Pterygotus*; I cannot conceive why Dr. Burmeister should imagine the first of those genera to have no shell, and overlooking the didactyle structure of the larger crustaceous chelæ, &c., place it in his group *Palæada* (Dal.), which, as he observes (*Organiz. Trilob.*, Ray ed. p. 53), might be united with the *Phyllopoda*. The figure and description given by Römer of the American species of *Eurypterus* in his paper in Dunker and Von Meyer's 'Beiträge zur Naturgeschichte der Vorwelt,' powerfully favour this view of approximating the genus to *Limulus*. With regard to the second genus, *Pterygotus*, M. Agassiz having renounced his original opinion of its being a fish, has, in his work on the Fishes of the Old Red Sandstone, referred it to the Entomostraca without indicating any particular division. Some years before the appearance of the 'Poissons fossiles des vieux grès rouge,' I had an opportunity of examining some much more perfect examples of this Crustacean than are there figured, which were brought before the Geological Society of Dublin by Dr. Scouler under the name *Lepidocaris* (from the scale-like sculpturing of the cephalic shield)*, and except the enormous difference in size, and *perhaps*

* See Dr. Apjohn's President's Address.

a difference of superficial sculpturing, I see nothing in it different from *Eurypterus*; and when we bear in mind that the *Idothea* of Scouler* is avowedly a *Eurypterus*, I cannot see how *Pterygotus* is to be separated as a genus, at least on any better grounds than the above. The tribe *Pæcilopoda* might be resolved into two families: 1st, *Limulida*, having, besides the head, a second shield formed by the anchylosis of all the abdominal segments (*Limulus*); 2nd, *Eurypterida*, having all the abdominal segments distinctly separated (*Eurypterus*, *Pterygotus*, *Bellimurus*). The first division has not, I believe, been found lower than the oolites, the *Limuli* quoted by several British geologists from the coal-measures of Coalbrook Dale, &c. belonging clearly to the second division, and should rather be referred to *Bellimurus* of König.

Pterygotus leptodactylus (M'Coy).

Sp. Char. Large pincers having the hand about 5 lines wide, sculptured with fine short, irregularly flexuous, elevated lines; the penultimate or immoveable finger exceedingly slender, compressed, about 2 inches 10 lines long, and only 2 lines wide at base, gradually tapering to less than a line towards its obtuse point, nearly straight, or with a scarcely perceptible inward curvature; sides divided into ridges by three or four longitudinal furrows, thicker towards the back; last joint or *moveable finger* similar to the immoveable one, but rather smaller; inner edges of both fingers destitute of teeth or tubercles.

The pincers, instead of being excessively thick and strong, and armed with great teeth on the inner edge as in the *Pterygotus Anglicus* (Ag.), are perfectly unarmed, and so long and slender as possibly to indicate a separate subgenus, which might be named *Leptocheles* (λεπτός, *tenuis*, χηλή, *forceps*). It strikes me (judging from the figures) that the *Onchus Murchisoni* (Ag.) is not an Ichthyodorulite, but the long finger of the chelæ of this Crustacean,—the size, form and sculpturing agreeing very nearly—while the base presents no trace of the abrupt diminution for insertion into the flesh, which would occur in all true *Onchi*. In the same bed with the long chelæ was found a specimen of the terminal or moveable finger, and one perfect claw with both fingers *in situ* of a much shorter form than the other; the hand being about 3 lines wide, the penultimate immoveable finger about 1 inch long, and rapidly tapering from $2\frac{1}{2}$ lines wide at the base to the obtusely pointed apex; it is longitudinally sulcated like the longer one above described; the last joint or moveable finger is very different, being perfectly flat, triangular, 7 lines long, $1\frac{1}{2}$ line wide at base, and tapering rapidly to

* See Edinb. Journal of Science, vol. iii.

a point, the inner edge being straight and simple, the outer edge slightly convex. The hands of both kinds of chelæ are similarly sculptured with short, fine, sharp, irregularly curved, longitudinal plicæ, proving their identity, and that thus, like the recent *Pæcilopoda*, more than one pair of feet were didactyle.

In the fine olive schists (of the age of the Upper Ludlow rock) of Leintwardine.

(Col. University of Cambridge.)

Trib. *Phyllopoda* (= *Branchiopoda*, M. Edw.).

This tribe might be divided into the five following families, all having membranous feet:—

1. **DAPHNIADÆ** (= *Cladocera*). *Carapace* oval, compressed, the posterior portion bivalve, inclosing the body, the anterior end forming a separate beak-shaped hood for the head. *Eye* single, semicomound*. *Feet*, only four pair, foliaceous. *Antennæ*, first pair small; second pair very large, branched and bristled for swimming. (Type *Daphnia*, &c.)

The *Daphnia* ? *primæva* (M'Coy), Syn. Carb. Foss. Irel. t. 23. f. 5, is the only probable example of this family I know in the fossil state.

2. **BRANCHIPODIADÆ**. *Carapace* none, all the body-rings distinct and naked. (Type *Branchipus*.)

I know of no fossil example of this group.

3. **TRILOBITADÆ** (= *Palaæde*). Head and abdomen covered by separate dorsal shields, thoracic segments naked, separately moveable, generally trilobed by two longitudinal depressions. *Eyes* two, large, semicomound, or absent.

This very extensive group is only known in the fossil state, and apparently confined to the palæozoic rocks. I will offer some observations of detail below.

4. **APODIADÆ**. *Carapace* a semi-oval, horizontal shield, not covering the abdominal segments, which are distinct. *Eyes*, one simple and two large semicomound ones. *Feet*, about 60 pair. (Type *Apus*.)

The carboniferous genus *Dithyrocaris* is I think referrible to this group, though I have not yet detected the eyes. (See Syn. Carb. Foss. Irel. t. 23. f. 2.)

* I use this term to particularize that type of eye so common among the Entomostraca, in which a mass of minute eyes are covered by one simple, undivided, external cornea, being thus intermediate between the simple eye, and the true compound eye in which the external cornea is faceted, and divided into as many portions as there are eyes beneath.

5. LYMNADIADÆ. *Carapace* a vertical, bivalve, oblong shell inclosing the whole body. *Eyes* two, semicomound, either separate or united in one medial mass. *Feet* 20 to 30 pair. (Type *Lymnadia*, &c.)

(Fam. *Trilobitadæ*.)

Homologies of the 'cephalic shield' of Trilobites.—This has been less attended to than almost any part of their structure. The apparently anomalous nature of the facial suture has been spoken of by Burmeister, who saw no clue to its nature; the nature of the parts outside the eye-line, or 'wings' as they were called, has also been alluded to as inexplicable; while those who, comparing the Trilobites with *Branchipus*, supposed the body of the animal to occupy the axial lobe only, have expressed their astonishment at the eyes being placed on the lateral lobes, or 'cheeks.' When we bear in mind that the carapace of a crab, for instance, is a great backward prolongation of one of the rings of the head, and is quite distinct from the posterior cephalic and the thoracic segments which it covers, and which exist in a membranous state beneath it, we are prepared to admit, that though the segmental furrows on the glabella of many Trilobites indicate cephalic rings, they by no means prove the cephalic shield to be formed of the ankylosis of such rings, which may only exist below, *impressing* it like the various regions on the back of a crab. To determine of what rings it is composed, I started with the main characteristic of the first ring of all Crustacea, which is, to bear the eyes when they are present; the second and third bear the antennæ, and the remainder of the cephalic rings bear the parts of the mouth. The eyes of Trilobites, when they exist, are always connected with the piece anterior and external to the eye-line; this piece is usually continuous from side to side at the front margin, and I think is probably the first or ophthalmic ring; its lateral portions produced backwards, and bearing its peculiar appendages, the eyes, with it: every ring being theoretically divisible into six pieces, affords an explanation of the suture which sometimes separates the two parts in front, and even of the rostral shield of *Calymene* (if it belongs to this ring). On this view the facial suture becomes at once intelligible as the line of separation between the first and second cephalic rings, analogous to the divisional line between one thoracic ring and another. The piece within and behind the eye-line should on this supposition be the second or antennary ring; and as remarkably supporting this, I must refer to p. 42 of my 'Synopsis of the Silurian Fossils of Ireland,' where I announced the discovery of the remains of antennæ, as a deep pore on each side of the

front of the glabella, in the furrow which surrounds it, and in which, when clear of matrix, I have observed them in *Trinuclerus*, *Acidaspis*, *Calymene*, *Ampyx*, *Griffithides*, &c. We would thus have the cephalic shield of Trilobites composed of an extension of the two first cephalic rings. The protuberance called the glabella probably contains the stomach, which is always in Crustacea large and over the mouth; the segmental furrows indicating the rings which bear the parts of the mouth.

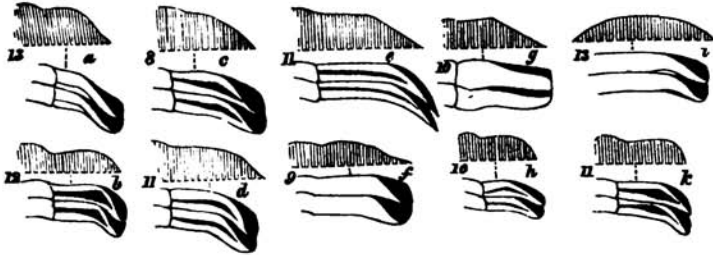
After much labour in investigating the characters of Trilobites, I venture to propose the following classification of the group, founded in the first instance on a consideration of the variations in structure of the *pleuræ* or lateral portions of the thoracic segments, which I find to afford definite characters, easily found in all moderately well-preserved specimens. The two principal methods hitherto proposed fall far short of a natural or satisfactory classification;—that of Dr. Burmeister taking as the principle of division, the presence or absence of the power of rolling into a ball; and Hawle and Corda resting their great divisions on the integrity or denticulation of the edge of the pygidium. The latter I believe to be of only specific importance; and the former, though of imperfect application as stated by the author, becomes included in the following arrangement. An extended examination of the subject will show that Quenstedt, &c. cannot be followed in the attempt to base the primary divisions on the *number* of the thoracic segments—I have satisfied myself at least that that character loses among the Entomostraca the importance which it bears among the other Crustaceans, and that in the present family it is only of subgeneric value. In the following remarks I introduce two new terms—“*facet*” for the smooth, flat, triangular space at the extremity of the anterior margin of the *pleuræ* of certain Trilobites—and “*pleural groove*” for the shallow sulcus which extends from the axis a variable distance towards the extremity of each of the *pleuræ*;—it is to the under side of this latter, as suggested by Burmeister, that the gill-feet were probably attached*. To facilitate the appreciation of those characters, I subjoin sketches of the *pleuræ* of the more important genera, as the needful information is not given in the greater number of figures and descriptions of Trilobites hitherto published; the numerals prefixed to each figure indicate the number of thoracic segments in each genus.

I propose dividing the family of Trilobites into the five following subfamilies:—1. *Asaphinæ*; 2. *Paradoxinæ*; 3. *Ogyginæ*;

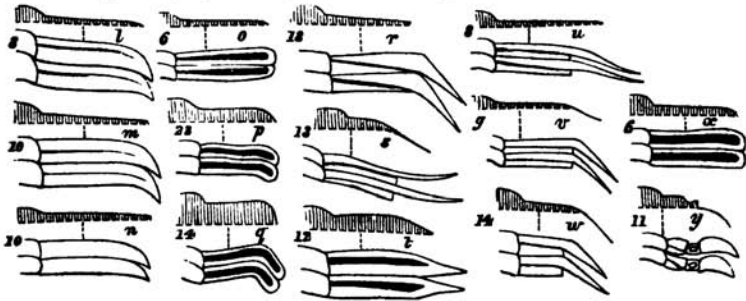
* The term ‘*fulcrum*,’ as sometimes applied to a point on the anterior edge of the *pleuræ*, clearly conveys a false mechanical notion, besides being synonymous with the already current term ‘*knee*’ used by Pander and Portlock.

Faceted pleuræ of Trilobites.

a, Calymene; b, Ellipsocephalus; c, Asaphus; d, Phacops; e, Odontochile;
f, Dysplanus; g, Illænus; h, Forbesia; i, Homalonotus; k, Trimeroccephalus.

*Non-faceted pleuræ of Trilobites.*

l, Ogygia; m, Lichas; n, Bronteus; o, Ampyx; p, Harpes; q, Conocephalus;
r, Paradoxides; s, Zethus; t, Cryphæus; u, Acidaspis; v, Stau-rocephalus; w, Olenus; x, Trinucleus; y, Ceraurus.



4. *Harpedina*; 5. *Agnostina*. The British genera would arrange themselves as follows, and where the value of any of the groups was not previously settled, I have added a few explanatory words.

1st Subfam. ASAPHINÆ.

Pleuræ bent down at the ends, each with a distinct trigonal facet at the anterior edge.

These are the most perfectly organized Trilobites; they have a compact ovate form, and from the deflexion of the margin are of considerable depth; they all, I believe, have the power of rolling into a ball, and are the only Trilobites having the triangular facets at the anterior edges of the ends of the pleuræ. The following are British genera and subgenera:—

Gen. 1. PHACOPS (*in a wider sense than Emmerich*). Lateral cephalic angles prolonged backwards; glabella wider in front than at base; sides with three large segmental furrows; eyes

largely faceted; facial suture cutting the lateral cephalic margin in front of the angles; eleven thoracic segments.

Subgen. 1. *Phacops* (Em.). Pygidium with eight to twelve joints in the axis; hypostome simple.

Subgen. 2. *Odontochile** (H. & C.). Pygidium with twelve to twenty-two joints in axis; hypostome dentated.

Subgen. ? 3. *Chasmops* (M'Coy). Eyes small, "hiant;" middle pair of lateral glabellar lobes obsolete.

Subgen. 4. *Portlockia* (M'Coy). Two anterior pair of lateral glabellar lobes obsolete; lateral cephalic angles rounded.

2. CALYMENE (in a wider sense than *Brongniart*). Lateral cephalic angles not prolonged, exactly bisected by the facial suture; eyes small, "hiant;" glabella narrower in front than at base; thirteen thoracic segments.

Subgen. 1. *Calymene* (Br.). Axis of body strongly defined from the lateral lobes; three segmental furrows to each side of glabella.

Subgen. 2. *Homalopotus* (König). Axis not defined from lateral lobes; no segmental furrows to glabella.

3. TRIMEROCEPHALUS (M'Coy†). General character of *Portlockia*, but without eyes or facial sutures.

4. ASAPHUS (in a wider sense than *Brong.*). Cephalic and caudal shields nearly equal; external cornea thick, smooth; facial suture cuts the posterior margin within the angles; eight thoracic segments.

Subgen. 1. *Asaphus* (as restricted to the type of *A. cornigerus*, not British) = *Hemicrypturus* (Gr.).

Subgen. 2. *Isotelus* (DeKay).

Subgen. 3. *Basilicus* (Salt.). General character of *Isotelus*, but with many simple segmental furrows to pygidium.

5. ILLÆNUS (Dal.). Head and tail nearly alike, axial furrows only indenting their margins; facial suture cutting the posterior margin; pleuræ with long, narrow, obscure facets and no pleural grooves.

Subgen. 1. *Illænus* (Dal.). Ten thoracic segments, lateral cephalic angles rounded.

Subgen. 2. *Bumastus* (Murch.). Resembling *Illænus*, but the thorax not trilobed.

Subgen. 3. *Dysplanus* (Burm.). Like *Illænus*, but cephalic angles prolonged and only nine thoracic segments.

6. FORBESTIA (M'Coy). Glabella distinct; facial suture cutting the middle of posterior margin; pygidium with articulated axis

* *Dalmanina* of Emmerich, not of Robineau-Desvoidy.

† For characters see below.

and duplicate lateral furrows; thoracic segments ten, pleural grooves slightly oblique, facets large.

Subgen. 1. *Forbesia* (M'Coy) = *Æonia*, Burm. Cephalic angles produced; glabella with three pair of segmental furrows; ends of neck-segment forming large tubercles.

Subgen. 2. *Prætus* (Stein.). Cephalic angles not produced; no segmental furrows to glabella.

7. PHILLIPSIA (Portk., extended). General character of *Forbesia*, but only nine thoracic segments. (Carboniferous.)

Subgen. 1. *Phillipsia* (Portk.). Base of glabella wide, sides with three segmental furrows.

Subgen. 2. *Griffithides* (Portk.). Base of glabella contracted, sides without segmental furrows.

2nd Subfam. PARADOXINÆ.

Head large; pygidium diminutive; thorax long; pleuræ flat, not bent down at the end, terminating in long spines; pleural grooves straight; no facets.

An easily recognized group of long-bodied, flat Trilobites with large heads, the angles of which and the ends of the pleuræ are produced backwards into sharp spines. None of these can roll into a ball.

1. PARADOXIDES (not British).

Subgen. 1. *Olenus* (Dal.). Fourteen thoracic segments; pygidium small, with entire margin.

2. CERAURUS* (Green, emended by Hall). Glabella cylindrical, reaching the front margin, with three pair of segmental furrows; facial suture cutting the outer margin considerably in front of the angles; eleven thoracic segments; pleuræ each with a short oblique pleural groove dividing its tumid origin, ends flat, falcate; pygidium moderate, the margin with six or eight thick spines; cephalic angles prolonged.

3. CRYPHÆUS (Green) = ? *Eccoptochile* (Hawle and Corda). Head as in *Ceraurus*; twelve thoracic segments; pleuræ wide, divided by a long mesial pleural furrow not reaching the margin; ends thickened and each extended in a slender spine; pygidium of three thin flat lobes on each side.

4. SPHÆREXOCHUS (Beyrich). Glabella hemispherical; posterior pair of segmental furrows very large, circular, two anterior pair rudimentary or absent; lateral angles rounded, divided

* *Chirurus* (Beyrich) is I think certainly a synonym of this genus; the recently published figures by Hall (Palæontology of New York), of Green's original specimen of *Ceraurus*, showing all the characters of the Bohemian genus.

by the facial suture; eleven thoracic segments; pleuræ simple, obtuse; pygidium as in *Ceraurus*.

5. *ACIDASPIS* (Murch.) = *Odontopleura* (Em.).
6. *STAUROCEPHALUS* (Bor.*).
7. *REMOPLEURIDES* (Portk.†).
8. *ZETHUS* † (Pand., as defined by Volborth) = *Cybele* (Lovèn) + *Atractopyge* (Hawle and Corda).

3rd Subfam. OGYGINÆ.

Body flat, broad oval; thorax about as long as the head; pleuræ flat, falcate, with a pleural groove not reaching the margin; ends not bent down, nor produced into spines; no facets; pygidium nearly as large as the head.

This group would include (so far as I know) all flat-sided Trilobites not entering into the *Paradoxinae*, but, unlike them, the body is wide and short, the pygidium instead of being diminutive is nearly as large as the head, and the segments are remarkably few and never extend into spines. The eyes are small or absent.

1. *TRINUCLEUS* (Murch.). Head surrounded by a wide, pitted margin; six body-rings; no eyes, cheeks not diagonally cut by the eye-line.

Subgen. 1. *Tetrapsellium* (H. & C.). Only four body-rings.

2. *TRETASPIS* (M'Coy). Resembling *Trinucleus*, but the cheeks divided by a diagonal eye-line, and with an ocular tubercle in the middle; five body-rings. (See description below.)

3. *AMPYX* (Dal.).

4. *OGYDIA* (Brong.).

Subgen. 1. *Barrandia* (M'Coy). (For characters, see below.)

5. *BRONTEUS* (Gold.).

6. *LICHAS* (Dal.).

Subgen. 1. *Trochurus* (Bar.).

Subgen. 2. *Acanthopyge* (H. & C.).

4th Subfam. HARPEDINÆ.

Head large; pygidium very small; body long, rapidly tapering; pleuræ abruptly bent down and obtuse at the ends; no facets.

* I have recently noted the *S. Murchisoni* in the Rhiwlas limestone.

† I suspect the thoracic segments in this genus are only six to eight in number, terminating at the long spines of the *R. laterispinifer* and *R. dorso-spinifer* (Portk.), which I think probably mark the origins of the pygidium; but not having access now to perfect specimens of those rare Trilobites, I can only offer these remarks as suggestions founded on analogy.

‡ The genus *Encrinurus* seems closely allied in many respects to *Zethus*, but differs by its simple, obtuse, thoracic segments; not however being quite sure of the structure of those latter, I am unwilling to assign the genus a place in the system.

1. HARPES (Gold.).
- ? 2. HARPIDELLA (M'Coy). See below.
- ? 3. AMPHION* (Pand.).

5th Subfam. AGNOSTINÆ.

Minute, blind; only two thoracic segments; head and abdomen covered by nearly equal and similar rotundato-quadrate shields.

This subfamily includes both the families *Phalacromides* and *Battoides* of Hawle and Corda, distinguished solely by the serration or smoothness of the margin of the tail,—a point in my mind of generic value at most.

From the absence of eyes, and the very slight powers of locomotion argued by so small a number of thoracic, feet-bearing, rings, it occurs to me that the *Agnostina* may hold the same position among the Trilobites that the *Suctorina* do among the Crustacea generally; that group being similarly distinguished from its allies by the want of eyes, few body-rings, little or no powers of locomotion, and abnormally and variously shaped bodies; being parasitic generally on fish. *Bophyrus*, the analogous group among the Isopod Crustacea, is always parasitic on the gills of the larger Crustacea, under their carapace; and such I strongly suspect were the habits and mode of life of the *Agnosti*, living in all probability attached to the gill-feet on the under side of Trilobites, some of the largest known species of which accompany those little animals.

1. TRINODUS † (M'Coy) = *Arthrorachis* (Hawle and Corda).
2. AGNOSTUS (? British).

Subgen. 1. *Diplorhina* ‡ (H. & C.).

* This genus and *Encrinurus* present some points of analogy, and may serve to indicate the passage from this subfamily to the *Paradoxina* by means of *Zethus*, but I unfortunately cannot refer to any specimens of the body-rings of either *Amphion* or *Encrinurus* at present, and have therefore some uncertainty about them. I may here remark on the great apparent inequality of extent or numerical value of the five groups into which I have distributed the great family of Trilobites, that it results chiefly from a peculiarity of geographical distribution, and in great measure disappears when the large number of recently described foreign genera are included: thus the *Harpedinæ* and *Paradoxinæ*, which seem so meagrely represented in the above list of British genera, acquire a prodigious development in the Silurian rocks of Bohemia.

† I originally defined this genus in 1846 in my 'Synopsis of the Silurian Fossils of Ireland,' and pointed out its differences from *Agnostus*; subsequently Hawle and Corda have figured and described the group under the title of *Arthrorachis* in their 'Prodrom.' on Bohemian Trilobites, without knowledge of what I had done, also pointing out its obvious differences from *Agnostus* (or *Battus*).

‡ I have noticed the *Diplorhina triplicata* in the black Llandeilo shale of Builth.

(Descriptions of new genera and species of Trilobites.)

Chasmops (M'Coy), n. g.

Etym. χάσμα, *hiatus*, and ὄψ, *oculus*.

Gen. Char. Cephalic shield subsemicircular, lateral angles produced backwards in triangular spines; *glabella* large, clavate, frontal portion very wide, transversely oval, only two distinct pairs of lateral segmental lobes, the anterior pair very large triangular, posterior pair small, middle pair obsolete or reduced to a minute tubercle; neck-segment strong: *cheeks* small triangular: *eyes* small, rounded, "hiant," corresponding in height to the middle portion of the first lateral lobe of the *glabella*; eye-line encircles the front of the *glabella* close to the margin, descends with an inward inclination to the eye, extending from behind the eye directly outwards to the lateral margin, which it cuts considerably in advance of the angles; *thorax* of eleven joints (*fid. Eichwald*); *pygidium* obtusely rounded, posterior margin deflected, anterior margin wider than the posterior; axis of about ten ribs, lateral ribs about two less, duplex.



Cephalic shield of
Chasmops.

The *Calymene Odini* of Eichwald may be looked upon as the type of this genus. It differs from *Calymene* in the *glabella* being so much wider in front than at the base, in the anterior lateral lobes being largest, in having but eleven (?) body-segments, and in its eye-line cutting the external margin in front of the angles, agreeing only in the structure of the eyes; these differences become agreements when compared with *Phacops*, from which it differs in the structure of the eyes. Of those organs in the present genus and in *Calymene* nothing is known beyond that they were of so tender and delicate a nature as readily to fall out after death, and are never found in the fossil state, their position being indicated by a hole, roughly filled by the matrix, forming the "hiant" eyes of systematists; in *Phacops*, on the contrary, the cornea is of extraordinary strength, and so firmly united to the rest of the cephalic shield, that no matter how much crushed the specimens may be, the eye always remains, and from its constant presence, coarse reticulation and large lenses, gives an appropriate name to the genus, and one which is in antagonism with that I have adopted for the present group: *Chasmops* differs besides from both those genera in the almost complete suppression of the middle pair of segmental lobes of the *glabella*.

Trimerocephalus (M'Coy).

Etym. *τριμερής*, *tripartitus*, and *κεφαλή*, *caput*.

Gen. Char. Elongate ovate: *cephalic shield* semicircular, with the lateral angles obtusely rounded: *glabella* very broad, gently convex, widely rounded and touching the margin in front; sides straight, converging to the narrow base; neck-furrow strong, and one fine, directly transverse, segmental furrow a little above it across the base of the glabella; *cheeks* smaller than the glabella, triangular, evenly convex, without eyes or facial sutures; *limb* almost wanting in front of the glabella, forming a narrow margin to the cheeks, and being rounded at the lateral angles forms the thick posterior margin of the shield and neck-segment; *thorax* of eleven joints, lateral lobes



Trimerocephalus. wider than the axis, bent down at their margin; each of the axial segments with a strong tubercle at each end; *pleura* of equal width throughout, blunt at their ends, which are bent downwards and a little backwards, each marked along the middle by a pleural groove, angularly bent backwards about the middle, but not reaching the margin; trigonal facets small, narrow; *pygidium* small, obtusely rounded, entire, axial lobe distinctly rounded with about four or five segmental furrows; lateral lobes with about five flattened segments, each divided by a furrow.

This genus has been confounded by Count Münster, in his 'Beiträge zur Petrefactenkunde' for 1842 (only knowing the head), with *Trinucleus*, from which the structure of the body and tail, as well as the absence of the punctured border of the head, remove it very far; and it has been referred by Prof. Phillips (Palæozoic Fossils) to *Calymene*, from which the form of its cephalic shield and glabella, want of eyes and facial suture, and the different number of the body-segments, will I think sufficiently distinguish it.

I only know the genus in the Devonian rocks, the type being the *Trinucleus lævis* of Münster (*Calymene lævis*, Phil. Pal. Foss., not of Münster, whose *Calymene lævis* is a true *Portlockia*, M'Coy). It is perhaps most allied to *Ellipsocephalus* of Zenker, which has however twelve body-rings, eyes at the sides of the cheeks, a glabella pointed in front, and a little pygidium without segmental furrows.

Ilænus latus (M'Coy).

Sp. Char. *Cephalic shield* more than twice as wide as long, mo-

derately gibbous towards the base, but about one-half of the front arched over to a vertical position (or at right angles to the basal portion or plane of the body); *axal furrows* considerably less than half the length of the head, width of the included space, or glabella, equal to two-thirds the length of the head; *eyes* small, near the lateral angles, their own length in front of the posterior margin, two-thirds the width of the glabella distant from the axal furrows. Length of head 10 lines, width 1 inch 9 lines.

This is only likely to be confounded with the *I. crassicauda* (Dal.), from Gothland specimens of which it differs by the greater width of the head and less depth of the deflected front, and most remarkably by the very small size of the cheeks, resulting from the eyes being removed almost to the lateral angles; in the *I. crassicauda* they are only half the width of the glabella distant from the axal furrow, and the portion of the cheeks from the eye to the lateral angles is nearly one-third more than from the eye to the axal furrow, while in the present species the cheek beyond the eye is little more than half the width of from thence to the sides of the glabella. Heads of the *Dysplanus centrotus* (Dal.) sp. differ in their much greater proportional length.

In the Lower Silurian limestone of Wray quarry, Upper Tweed. (Col. University of Cambridge.)

Isotelus affinis (M'Coy).

Ref. *Isot. gigas*, *I. planus*, and *I. Powisii* of Portk. Geol. Rep. (omit synonyms) t. 6. f. 1, and t. 9. f. 2 & 3.

Sp. Char. Axis of the body only slightly exceeding the pleuræ in width; *pleuræ* gently arched downwards at a very obtuse angle from about halfway between the axis and the extremity; a large pleural furrow reaches from the axis to about one-third of the truncated extremity of each; *pygidium* flattened, semi-elliptical, or slightly trigonal from the straightness of the sides; axis narrow, sharply defined, gently convex, reaching as far as the concave space round the margin.

In general proportions this resembles the *Isotelus gigas* (DeKay), from all the varieties of which it is distinguished, when specimens of the same size are compared, by the much greater flatness or depression of all its parts, the long, narrow, sharply defined axal lobe of the pygidium, and the much greater length of the pleural groove of the pleuræ (nearly double that of the *I. gigas*), as well as the distance of the knee from the axis, and slight degree of deflection of the pleuræ (being bent nearly at right angles at one-third from the axis in *I. gigas*). The pygidium differs from that of the *I. Powisii* (Murch. sp.) by the absence of all seg-

mental furrows, except the first, on the lateral lobes, and by the more pointed outline and narrow margin.

Not uncommon in a Lower Silurian schist over the iron-works at Tremadoc; very similar in appearance to that at Pomeroy, co. Tyrone, which afforded the species to Col. Portlock.

(Col. University of Cambridge.)

Griffithides meso-tuberculatus (M'Coy).

Sp. Char. *Cephalothorax* 10 lines wide; *glabella* widely pyriform, broadly rounded in front, gently convex and narrowing posteriorly with concave sides, very minutely granulated, length 5 lines, width 4 lines; *cheeks* triangular, flat, smooth; *eyes* large, reniform, very minutely reticulated, with a large convex eye-lobe * connected with the base of the glabella by a small, oblique, oval nucleus; *limb* broad, convex, with nine or ten imbricating striæ, two-thirds concealed in front of the glabella, ending posteriorly in acute spines as long as the glabella; neck-segment broad; *pygidium* 6 lines long and $7\frac{1}{2}$ lines wide; axal lobe 2 lines wide, cylindrical, slightly tapering, of sixteen rings, each ornamented with about ten lengthened oval tubercles; lateral lobes depressed, of ten broad, flat divisions, each having a fine impressed line running close to its posterior margin, smooth to the naked eye, but with a strong glass one or two rows of minute crowded granules are seen; margin wide.

The axal lobe of the pygidium being strongly tuberculated and the lateral lobes nearly smooth, distinguish the species from all other carboniferous Trilobites I know of. It is allied to the *G. calcaratus* (M'Coy) and *G. longispinus* (Portk.).

Common in the shales of the carboniferous limestone of Derbyshire.

(Col. University of Cambridge.)

Cryphæus Sedgwickii (M'Coy).

Sp. Char. *Cephalic shield* subsemicircular; *glabella* slightly clavate, smooth, three segmental furrows on each side, the posterior pair longest, turning backwards and inwards nearly to the neck-furrow, inclosing a triangular space on each side longer than wide, the width rather less than that of the undivided portion of the glabella between their bases, the two anterior pair of furrows shorter; *cheeks* broad, gently convex, closely and coarsely pitted; *thorax*, *axal lobe* very convex, narrow, slightly tapering, nearly parallel-sided, smooth, of twelve seg-

* *Eye-lobe* seems preferable to *eye-lid* for the lobe covering the inner and upper aspect of the eye.

ments, three similar ones belong to the pygidium, the terminal one being obtusely trigonal; the side lobes are flattened, and more than double the width of the axial lobe; *pleura* nearly straight, narrow, and for the greater part of their length flattened, and having a broad, nearly mesial pleural sulcus deeply punctured like the cheeks, dividing each into two parts, the posterior largest and forming a thick, smooth, rounded ridge, bent down and a little backwards in the distal third of its length, swelling to a thick narrow ridge in the middle, the sides and extremity expanding into a broad, thin, foliaceous appendage; the pygidium terminates in six broad ovate, leaf-like, semimembranous flaps. Length of thorax and pygidium 2 inches 2 lines, width 2 inches 3 lines, width of axial lobe 6 lines.

This magnificent Trilobite can only be confounded with the *Eccoptochile clavigera* (Beyrich sp.), from which it is distinguished by the much greater width of the lateral lobes of the thorax, and the thin, flat, leaf-like appendages of the pygidium, which in that species resemble thick pear-shaped clubs. A comparison with the old description and casts published by Green induces me to place this Trilobite in his little-known genus *Cryphaeus*, and to doubt very much the propriety of separating *Eccoptochile* of Hawle and Corda from it, the only difference being the thickness of the marginal appendage in the Bohemian genus.

The nearly entire specimen described was collected by Prof. Sedgwick from the Wenlock shale two miles north of Builth.

(Col. University of Cambridge.)

Ceraurus octo-lobatus (M'Coy).

Sp. Char. *Pygidium* transversely elliptical, twice as wide as long, two first rings of the axis narrow, distinct, third or terminal one large, terminating in four flattened elliptically pointed lobes; two rather larger similar lobes on each side. Length $2\frac{1}{2}$ lines.

This curious little species differs from all of this and the allied genera in having the terminal segment of the pygidium quadri-lobate, so that the margin of the pygidium exhibits eight marginal pointed lobes in all.

It is figured in the 'Memoirs of the Geol. Survey' from Sholes Hook, under the same reference as the cephalic shields there called *Sphaerexochus juvenis* (Salter)*, but not alluded to in the text.

In the limestone of Rhiwlas.

(Col. University of Cambridge.)

* Corrected to *S. clavifrons* (Dal.) in the list of plates prefixed to the same work.

Cerurus Williamsii (M'Coy).

Sp. Char. *Cephalothorax* semielliptical, length rather more than half the width; *glabella* semicylindrical, gibbous, rounded in front, with nearly parallel sides, three nearly equidistant, curved, segmental furrows on each side, the basal pair nearly confluent at their ends with the neck-furrow, inclosing a tumid ovate space on each side, separated by an undivided space about one-fourth of the width of the *glabella*; *thorax* twice the length of the *glabella*, axial segments large, two-thirds the width of the *pleuræ*, each of which has a very large, diagonally cleft, oblong tubercle at its origin, beyond which there is a neck-like contraction of the margin, followed at one-third from the axis by a hemispherical tubercle about half its diameter distant from the first, beyond which the distal two-thirds of each *pleura* is falciformly dilated into a thin, flat, fin-like appendage, the anterior margin of which is very convex, posterior margin slightly concave, extremity pointed; *pygidium* small, the six marginal spines small, all extending to about the same distance backwards, the anterior pairs therefore longest; they are thick, triangular, and three or four times wider than the others. Length of entire animal 1 inch 4 lines, of *glabella* 5 lines, width about 9 lines.

The disconnected, broadly falcate, paddle-shaped *pleuræ* help to distinguish this beautiful little species, which by its narrow elongate form resembles a *Remopleurides*. One entire specimen collected from the schists at Golen Goed, Myddfai, by Mr. Williams of Llandovery, and presented to Prof. Sedgwick by him.

(Col. University of Cambridge.)

Ogygia radians (M'Coy).

Sp. Char. *Pygidium* nearly semicircular, slightly convex; axis conical, undefined at the end, having three narrow segmental furrows at the anterior end, lateral lobes with three broad radiating ribs faintly divided at their axial ends by a small pleural furrow; margin tumid, entire. Length 4 lines, width 7 lines.

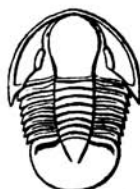
I provisionally give this name to a small *pygidium* not unlike that of the *Barrandia Cordai*, but, from the duplicate lateral furrows, belonging more probably to *Ogygia*; probably confirmatory of this view I observe in the 2nd Decade of the 'Geol. Surv.' t. 7. f. 5. a small eight-jointed true *Ogygia* from Builth, having the *pygidium* almost identical with the present species, if, as I suspect, the duplicating furrows have been accidentally omitted (the figure alluded to is given as the probable young of the *Ogygia dilatata* (Phil.), a trilobite which has not been found at Builth, but abounds in the schist at Waterford).

Not uncommon in the black Wenlock shale of Pen Cerrig, Bulth.

(Col. University of Cambridge.)

Barrandia (M'Coy), n. g.

Gen. Char. Body ovate, depressed; *cephalic shield* semicircular, with the lateral angles produced backwards into short spines; *glabella* widely clavate, the axial furrow strong and nearly parallel at the base, becoming obsolete towards the front; *eyes* large, narrow, reniform; *eye-line* behind the eye cutting the posterior margin about the middle, in front of the eyes arching forwards, first outwards and then inwards; *thorax* of seven segments; *axis* convex, nearly as wide as the pleuræ, tapering towards the pygidium; *pleuræ* flat, their ends slightly falcate and bent backwards, no facets, a slightly oblique submesial pleural furrow not quite reaching the end; *pygidium* semicircular, entire, having very few simple segmental furrows placed near the anterior margin (one to three in number); *axis* short, having one to three small segmental furrows.



Barrandia.

This I conceive to be a subgenus of *Ogygia*, from which it differs in its fewer thoracic segments, and having but very few and simple ribs to the tail. The genus agrees with the description given by Hawle and Corda of their genus *Alceste*, with the exception of this having seven thoracic rings and that having but four; it is remarkable that *Alceste* is figured by those authors with three segmental furrows to the pygidium, while this has only one, making the *total* number of segments visible the same in both; the number of the pygidial segments is however of course liable to vary with the species, while the thoracic ones are supposed to be constant. I know but one species, the following*.

Barrandia Cordai (M'Coy).

Sp. Char. Length one-fourth more than the width, length of

* Since the above was written Mr. Salter has figured (2nd Decad. Geol. Surv. pl. 7. f. 4) a species of this genus, with three segments to the pygidium, which he gives without any apparent reason as the young of an Irish species of *Ogygia* (*O. dilatata*, Phil., *O. Portlocki*, Salt.). My reasons for dissenting from this view are, 1st, it is contrary to analogy of other allied Trilobites to suppose that the young and adult differ in the number of their thoracic segments; 2nd, in the Cambridge collection, specimens of the *Ogygia Buchi*, half an inch wide, have exactly the same number of segments and other characters as an adult six inches long; 3rd, the supposed young has only been found at Bulth, where the Irish species, his supposed adult thereof, has never been found, being only known in the schists at Waterford, where it abounds, but where the supposed young have not occurred.

head, thorax and pygidium almost equal; *cephalic shield* slightly more than twice as wide as long, lateral angles very short; *eyes* half their length from the axial furrow; *pygidium* depressed, length rather more than half the width, axis two-thirds the length, conical, segmental furrows one on each side, obtuse. Length 11 lines.

Black Wenlock shale of Builth.
(Col. University of Cambridge.)

Ampyx latus (M'Coy).

Sp. Char. Entire animal transversely ovate, length one-fifth less than the width; *cephalic shield* smooth, front margin regularly curved, width three-fifths the length; *glabella* moderately tumid, pyriform, having a narrow vertically elongate (? ocular) swelling close to the middle third of each side, and two short, minute segmental furrows at each side of the narrow base; *thoracic segments* five, pleuræ of each side twice the width of the axial lobe; *pygidium* very obtusely and regularly rounded, four times wider than long, axis with about seventeen minute segmental furrows, sides with about eight. Length of entire animal $3\frac{1}{2}$ lines.

This rare species is most allied to the *A. parvulus* (Forb.) and the *A. nasutus* (Dal.), from both which the perfect animal is easily known by its transversely oval form; the regular curvature and great width of the cephalic and pygidial shields easily distinguish those parts when found separate; the latter agrees nearly in form with that of the *A. parvulus*, from which it differs equally with the former in all the other characters of cephalic shield, &c.

Rare in the black Wenlock shale three miles north of Builth.
(Col. University of Cambridge.)

Tretaspis (M'Coy), n. g.

Gen. Char. General characters of *Trinucleus*, but having only five body-rings, the base of the glabella having two short segmental furrows at each side, and the cheeks being traversed diagonally by a nearly straight eye-line, extending on each side from the junction of the cheeks and glabella in front, towards the lateral angles cutting the posterior margin a little within the angles, and usually exhibiting a small ocular (?) tubercle in the middle. Types of the genus *Trinucleus seticornis* (His.) sp., *T. Bucklandi* (Bar.), &c.



Tretaspis.
Cephalic shield showing the eyes and diagonal facial sutures.

In my 'Synopsis of the Silurian Fossils of Ireland' I pointed

out the course of the eye-line in this genus, which separates it at once from *Trinucleus*, and renders it probable that the small tubercle in the middle of the cheeks in the *T. seticornis*, *T. fimbriatus*, &c. are true eyes. The furrows at the base of the glabella also are distinctive for the genus*.

Trinucleus gibbifrons (M'Coy).

Sp. Char. *Cephalic shield* nearly semicircular, length rather more than one-third of the width; *glabella* pyriform, rounded in front, gradually narrowing towards the base, compressed, exceedingly gibbous, its height above the cheeks nearly equaling its width; on each side of the neck-furrow (in casts) there is a deep puncture and another similar a little in front of it, a small spine on the middle of the neck-furrow; *cheeks* spherical triangles, height and width about equal, moderately convex; border of moderate width, three rows of punctures in front of the glabella, and five rows in front of the cheeks, more numerous at the sides, generally connected in front by radiating furrows, forming an imperfect fimbriation. Usual length of cephalic shield 3 lines. Surface very minutely granulated.

This very common species is figured without a name by Col. Portlock (Geol. Rep. pl. 1 B. f. 13 & 14). The fine granulation of the lobes of the head, and the extreme prominence of the gradually narrowing, pyriform, compressed glabella, separate this at once from either the *T. Caractaci* or *T. latus*, with which it seems to have been confounded; it is wider than the former, less so than the latter. From the two little punctures on each side of the base of the glabella, this strongly approximates the *T. scyllarus* (His.) as distinguished from *T. seticornis*; but although with abundance of specimens I cannot find an ocular tubercle or eye-line in the midst of the cheeks as in *Tretaspis*, to which those species belong; those punctures indicate no doubt the existence of the muscles of the jaws and their appropriate rings, but are not extended into transverse segmental furrows as in those last-named species; in the radiation of the border and number of rows of pores in front it approaches slightly the *T. radiatus* (Murch.), but is distinguished by the head being rounded, the

* The statement of Mr. Salter (Mem. of the Geol. Surv. vol. ii. pt. 1. p. 335), speaking of Hawle and Corda's work, that "*Tetrapsellium* is distinguished from *Trinucleus* solely by a swelling in the axal furrow of the head; it is almost identical else with *T. seticornis*"—might mislead the English reader with the idea that the present genus was identical with *Tetrapsellium*; the fact is however, in his stricture on the Bohemian authors, Mr. Salter seems to have overlooked the grand character of their genus, namely its having but four body-rings ("vier Leibringe," H. & C. Monog. p. 42. 8th line); it agrees otherwise with the common type of *Trinucleus*.

cheeks wider, and the border not being more than half the depth, as well as being by no means so distinctly radiated.

Common in the lower Silurian limestone of Golden Grove; the schists of Tre Gil; and Caradoc sandstone of Alt y Anker, Meifod; also at Pen y Craig. A variety with a shorter shield, the lobes of which are more spherical, perhaps from pressure, occurs in the black Wenlock shale three miles north of Builth.

(Col. University of Cambridge.)

Harpidella (M'Coy), n. g.

Gen. Char. *Cephalic shield* subtrigonal, surrounded by a thick, narrow, flattened border; sides nearly vertical, compressed; *cheeks* entirely surrounding the glabella in front, forming there a narrow tumid border, widening backwards as they descend into tumid, broad, triangular, nearly vertical wings, having large prominent eyes near the middle of their posterior margin, and from them on each side an obscure impressed line extends upwards and inwards to about the first third of the glabella (perhaps indicating the *eye-line*); *glabella* very convex, semielliptical, obtusely rounded in front, surrounded by a strong defining sulcus; two segmental furrows on each side, the first very strong, curving, from about the middle of the sides of the glabella, inwards and backwards into the neck-furrow, so as to include a large tumid ovate lobe on each side; a little above this, the very short and faintly marked anterior segmental furrow curves in the same direction; *surface* granulated. (Type of the genus *Harpes*? *megalops*, M'Coy, Syn. Sil. Fos. Irel. t. 4. f. 5.)

The head alone of this genus is known, which differs from *Harpes* (Gold.) in its small size, narrow unpunctured rim, absence of the ocular tubercle on the anterior part of the cheeks, great size and basal position of the eyes, &c.

(Fam. *Lymnadiadae*.)

Ceratiocaris (M'Coy), n. g.

Etym. *κεράτιον*, *siliqua*, and *καρίς*, *squilla*.

Gen. Char. *Carapace* bivalve, the dorsal line simply angulated (? undivided), with a slight furrow beneath it on each side; sides semielliptical, much elongated from before backwards, evenly convex, ventral margin gently convex, posterior end abruptly truncated obliquely; on each side near the anterior end considerably below the hinge-line is an ocular (?) spot, sometimes raised and distinct, in some spe-



Ceratiocaris.

a. The ocular spot.

cies flat; surface marked with fine, imbricated striæ, obliquely longitudinal.

In their pod-like form some of the species resemble such shells as *Solenocurtus* and *Solenimya*, except in the abrupt truncation of the posterior end; others resemble the Crustacean genus *Dithyrocaris*, with which I think their affinity lies, though they differ in form and want the peculiar ridges of that group. I conceive they were phyllopodous Crustaceans allied to *Lymnadia*; the peculiar texture and kind of lineation of the surface resemble what we find in Crustacea allied to *Apus* rather than in Mollusca; the general pod-like form, large size, and posterior truncation separate them from any of the large species of *Cythere* or *Cypridinia*, and the two ocular spots separate them from all others. I suspect from some of the specimens that the two sides meet along the dorsal line at an angle of 45° , with probably little power of motion. The ocular spots even when flat may generally be recognized with care from the difference in their mineralization; they are often dark-coloured as if retaining some of their pigment, and have a slightly granular aspect, corresponding in fact very closely, both in position on the shell and in apparent structure, with the double-eyed *Cypridinia* of the Indian Ocean. In one species there is a short sulcus extending on each side from the medial line behind the eye obliquely backwards and outwards, reminding us of the perhaps somewhat similar nuchal furrow of *Apus*. I only know the genus in the upper Silurian rocks.

Ceratiocaris solenoides (M'Coy).

Sp. Char. Sides meeting along the back at an acute angle, each being nearly four times longer than wide, the ventral margin nearly straight and parallel with the dorsal line; anterior end narrowed and truncate obliquely forwards and outwards from the dorsal line; posterior end scarcely narrowed, truncated obliquely backwards and outwards; valves evenly convex, the edge slightly thickened; *ocular spot* a little depressed, close to about the middle of the truncated anterior margin; from the internal (dorsal) anterior angles a small furrow extends a little way obliquely backwards and outwards; oblique longitudinal striæ very close and fine; *eyes* two-thirds of a line in diameter; width of each side from dorsal to opposite margin $5\frac{1}{2}$ lines.

This much resembles a little *Solen* in form. The ocular spot is generally dark-coloured.

Common in the Upper Ludlow rock of Benson Knot.

(Col. University of Cambridge.)

Ceratiocaris ellipticus (M'Coy).

Sp. Char. Each side longitudinally elliptical, evenly convex,

about twice and a half longer than wide, greatest width of the side and curvature of the margin about one-third from the anterior end, which is elliptically pointed; posterior end obtusely rounded, the oblique truncation nearly effaced; ventral margin convex; ocular spot elevated like a small tubercle, twice its diameter from the dorsal line, and about one-fourth the length from the anterior end; I believe the striæ of the surface have the direction usual in the genus, but they are very delicate. Length 1 inch 3 lines, greatest width of the sides 6 lines.

The elliptical form, prominence of the eye-spot, and its distance from the anterior end, mark the species well.

Rare in the Upper Ludlow rock of Benson Knot.
(Col. University of Cambridge.)

Cytheropsis (M'Coy).

Syn. *Cytherina* (Burm., not of Lamarck).

I provisionally propose this name for the little bean-shaped bivalve Entomostraca of the palæozoic rocks, which were formerly referred by myself and others to *Cythere*, but which Dr. Burmeister suggests should rather be referred to the *Phyllopoda*. As apparently the same forms of carapace exist both in the *Phyllopoda* and *Lophyropoda*, it is clearly more logical to refer those fossils to the former group, which we believe to have abounded at the palæozoic period, than, by placing them with the analogous types of the *Lophyropoda*, to quote the occurrence of that tribe at those early periods without sufficient reason.

In M. Bosquet's memoir on the Entomostraca of the Maëstricht Chalk, he proposes to refer all the ornamented species which I have described and figured in my Synopsis of the Mountain Limestone Fossils of Ireland, to the recent genus *Cypridina*; this I suppose is on the supposition that the tubercles represent the lateral eyes of that genus; but though the eyes were possibly lateral also in the fossil group, there is no evidence of the fact, nor reason for supposing they were not similarly placed in the plain ones; I therefore think the plain and ornamented species should not be divided, and for the above reason think they are both better placed with the Phyllopodes. It is singular that Prof. Burmeister, in establishing this genus and stating that the palæozoic limestones contained the only representatives of it, should have applied to them the Lamarckian name *Cytherina*, which is a mere *double emploi* of Latreille's recent genus *Cythere*. The carboniferous genus *Bairdia* (M'Coy) is distinguished from the above by its attenuated recurved extremities.