

Fig. 11. *Ilyarachna crozetensis*. A. Pleopod 2 male. B. Pleopod 3 male.

segment; third segment with two elongate terminal fringed spines; incisor rounded-truncate; lacinia obliquely truncate; ten spines in spine row; molar with three or four small distal spines and three fringed setae. Maxillipedal endite with numerous elongate simple and fringed setae plus several expanded fringed spines, seven coupling hooks; epipod broadly oval, reaching beyond second palpal segment. Pereopod 1 dactylus one-quarter length of propodus; latter tapering distally; carpus equal in length to propodus, ventral margin slightly concave, with row of simple setae; ischium with two spines on dorsal margin; four or five spines on distal margin of basis; carpus with spinose process. Pereopod 5 dactylus equal in length to propodus, carpus expanded, broader proximally than distally. Operculum in female distally rounded, median longitudinal ridge bearing row of short spine-setae. Pleopod 1 male strongly

arched, outer lobes of apex parallel, distally rounded; inner lobes considerably shorter than outer, bearing several short and long setae. Uropodal basis elongate-rectangular; single ramus present.

Material

Holotype PM. Is. 1017, 1 male TL 5,6 mm, 60/DC.248 west of Île aux Cochons, 245–250 m.

Paratype PM. Is. 1018, 1 female damaged, 60/DC.248 west of Île aux Cochons, 245–250 m.

Paratype PM. Is. 1018, 1 female TL 8,0 mm, 46/CP.204 between Île de la Possession and Île aux Cochons, 375–440 m.

Paratype SAM-A16772, 1 female TL 8,1 mm, 57/DC.241 north-west of Île aux Cochons, 195–200 m.

Paratypes USNM 173120, 2 female TL 8,1 mm 8,4 mm, 64/DC.268 west of Île aux Cochons, 900–930 m.

Remarks

The present species from the vicinity of the Crozet Islands is a member of the *Ilyarachna antarctica-nordenstami-kermadecensis* complex of species. Wolff (1962: 103) used a series of twenty-one characters in separating these species which previously had been regarded as the single species, *I. antarctica* Vanhöffen. The present material has been examined for these twenty-one characters in an attempt to establish its distinctness. Table 1 shows the distribution of these characters amongst the four species involved.

From Table 1 it is obvious that the present species has features in common with all three described species as well as features of its own, and for these reasons, a new species is erected. More material from an even wider range of localities would help to dispel the doubt that a single widespread and variable species is involved here.

Etymology

The specific name derives from the island group in which vicinity the specimens were collected.

Family **Munnidae**

Paramunna foresti Carvacho

Fig. 12

Paramunna foresti Carvacho, 1977: 180, fig. 2.

Previous records

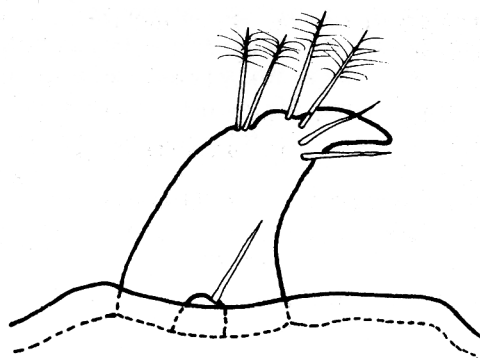
Off Kerguelen Island, 32 m.

TABLE 1

Distribution of 21 characters amongst four species of *Ilyarachna*.

	<i>crozetensis</i>	<i>antarctica</i>	<i>kermadecensis</i>	<i>nordenstami</i>
Lateral corners of pereonite 1: with rounded process	+	+	+	—
Lateral corners of pereonite 3: with small pointed process	+	+	+	—
Coxal plates of pereopods 1 and 2: with process	+	+	+	—
♀ Operculum: keel with spines	+	+	+	—
Dorsal surface of pleotelson: furrows indistinct	+	+	+	+
Pereonite 5: as broad as 2	+	—	+	+
Pereopod 1 carpus: few simple setae	+	+	—	+
♀ Antennule: broadest at base	+	—	—	+
Segment 2: half length of 1	+	—	—	—
Segment 3: about five-twelfths of 1	+	+	—	—
Flagellum: 9 articles	+	—	—	+
♂ Antennule: Flagellum 22 articles	+	—	—	—
Mandible: apex blunt	+	—	+	—
10 spines in row	+	—	—	—
Palpal segment 2 about twice length of 1 or 3	+	—	—	+
Maxillipedal epipod: reaching fourth palpal segment	+	—	+	—
Coupling hooks: 7	+	—	—	—
Pereopod 1 ischium: 2 spines	+	—	—	—
Pereopods 5-7: dactylus as long as propodus	+	—	—	—
Pleopod 1 ♂: outer lobes straight	+	—	+	—

+ denotes presence of character.

Fig. 12. *Paramunna foresti*, uropod.

Remarks

Carvacho (1977) shows the unusual hook-like uropods of this species in his figure of the entire animal, but does not mention them in the description. The uropods, which consist of a large, setiferous apically hooked ramus and a very reduced dorsal ramus, appear to be unique in *Paramunna* and are figured here in detail.

Paramunna kerguelensis Vanhöffen

Paramunna kerguelensis Vanhöffen, 1914: 574, fig. 105. Menzies, 1962: 47, fig. 7.

Previous records

Off Kerguelen Island; southern Chile.

Remarks

The present material agrees well with both Menzies's and Vanhöffen's descriptions; however, neither author figures short spines on lateral pereonite margins. These are part of a brittle hyaline margin and may either vary in number, or be broken or worn off. Menzies notes the apparent lack of a mandibular palp; a 3-segmented palp is present but appears to be easily broken off.

Beddard (1886) mentions five specimens of *Neasellus kerguelensis* in addition to the type, taken from sponges at about 1 200 m. Examination of the slide of these specimens (BM.89.4.27.50) shows them to be specimens of *Paramunna kerguelensis*.

ZOOGEOGRAPHIC COMMENTS

The position of Marion and Prince Edward Islands, and the Crozet Islands within the Antarctic-Subantarctic zoogeographic complex has been the subject of some debate. With relatively sparse collecting in the area, faunal affinities tend to be expressed in terms of separate animal groups, an inevitable situation until comprehensive collections are made for any single area. By examining the affinities of just the Isopoda, a partial picture emerges.

Kussakin (1967) lists sixteen species of Isopoda from the Prince Edward-Crozet group and records these as two separate categories in a series of twelve Antarctic-Subantarctic regions. He further suggests, in light of the high percentage of species common to the three island groups under discussion, that the Prince Edward-Crozet group be united with Kerguelen and Macquarie Islands in a single biogeographic category above the 'province' level.

Ekman (1953), in reviewing antarctic zoogeography, mentioned that earlier investigations grouped Prince Edward, Marion, and the Crozet Islands with Kerguelen, Macquarie and Heard Islands, sometimes to be included in the Antarctic Province. Ekman, however, felt it more informative to examine Kerguelen separately. On the basis of the fish and echinoderm fauna, Ekman (1953: 219) came to regard Kerguelen as lying in a transitional and mixed region.

Briggs (1974) included in his Kerguelen Province, McDonald, Heard, Marion, Prince Edward, and Crozet Islands. This Kerguelen Province shows a high degree of endemism (66% for shore fishes, 26% for Holothuria, 55% for sea-urchins, 30% for ascidians). Briggs concluded that it is possible that the Prince Edward-Marion and Crozet group constitutes a separate province within the region.

Turning to the present collection of isopods, the number of species recorded from Marion-Prince Edward and Crozet Islands has been increased from 22 to 38 (see Table 2). 6 species are known only from Prince Edward-Crozet, i.e. the 4 new species described here, plus Cleret's 2 asellote species, while 5 species are recorded from Prince Edward-Crozet and Kerguelen Islands only (giving a 25% endemism, and admitting the probability that the four new species could have a wider range). Of these, the pseudidotheid *Arcturides cornutus* (= *A. tribulus* and *A. acuminatus*), which appears from sample size to be abundant, is considered one of the most significant elements of the fauna. Nineteen species are common to both island groups as well as occurring in other areas. Eleven species (34%) occur at both Prince Edward-Crozet and the Antarctic; only thirteen species (36%) from Prince Edward-Crozet have a widespread austral distribution (both in and out of the Antarctic coastal areas). Two species (6%) are known from Prince Edward-Crozet and South America only.

Four species, viz. *Aega semicarinata*, *Acanthomunna spinipes*, *Dynamanella huttoni*, and *Iais pubescens*, have been recorded from South Africa. *A. semicarinata*, being an opportunist fish parasite, has a fairly wide austral distribution, while *A. spinipes* has been recorded off Natal in 550-680 m, i.e. in South Indian Ocean Central water (Kensley 1978). *D. huttoni* is known intertidally from Lüderitz to Natal, as well as Auckland and Campbell Islands, while *I. pubescens* occurs commensally on a range of larger sphaeromatid isopods from all the Subantarctic islands.

From this mixture of several faunal components it would seem that Andriashev's (1959) term Kerguelen Transitional Province, which would include Prince Edward, Marion, Crozet, and Kerguelen Islands, is the most accurate with regard to the isopod fauna, and is to be preferred to the simpler Kerguelen Province of Knox (1960, 1963) and Powell (1962).

Kussakin lists 48 species of isopods from Kerguelen Islands, to which Carvacho (1977) has added 4 more. The total number of isopod species from the Kerguelen Transitional Province now stands at 61 and the Prince Edward-Crozet fauna of 38 species represents 62% of that total. In view of this relatively even spread of the faunal components of the Prince Edward-Crozet isopods (11 species widespread Antarctic-Subantarctic, 11 species from the Antarctic, 2 from South America, 9 species in common with Kerguelen), it would seem unjustifiable to follow Briggs's suggestion (1974: 177) that the Prince Edward-Marion-Crozet group constitutes a separate province.

TABLE 2

Isopod species recorded from Crozet, Prince Edward, and Marion Islands, with distribution in the geographic categories as given by Kussakin (1967, table 1).

Antarctica											
	Pacific Sector	Indian Sector	Atlantic Sector	South Georgia Marion/Prince Edward Crozet Is.	Kerguelen Is.	Macquarie Is.	Falkland Is.	Tierra del Fuego	Coast of Argentina	Coast of Chile	Auckland Is./Campbell Is.
<i>Acanthomunna spinipes</i>					X						
<i>Aega falklandica</i>					X		X				
<i>Aega semicarinata</i>					X	X	X	X		X	
<i>Antarcturus aculeatus</i>					X				X		
<i>Antarcturus furcatus furcatus</i>	X	X	X	X	X						
<i>Antarcturus spinosus</i>		X			X						
<i>Antias bicornis</i>					X						
<i>Arcturides cornutus</i>					X	X					
<i>Astacilla marionis</i>					X	X					
<i>Bathygnathia porca</i>					X						
<i>Cassinopsis emarginata</i>				X	X	X	X	X	X	X	
<i>Cirolana nitida</i>					X	X					
<i>Colanthura pingouin</i>					X						
<i>Coulmannia frigida</i>	X	X			X						
<i>Dynamanella eatoni</i>				X	X		X	X		X	
<i>Dynamanella huttoni</i>					X						
<i>Echinozone cf. spicata</i>	X	X			X						
<i>Euneognathia gigas</i>	X	X	X		X	X					
<i>Euwallentinia darwini</i>					X	X	X	X	X	X	
<i>Exosphaeroma gigas</i>					X	X	X	X	X	X	X
<i>Gnathia antarctica</i>	X	X	X	X	X	X		X	X	X	
<i>Iais pubescens</i>					X	X	X	X	X	X	X
<i>Ilyarachna crozetensis</i>					X						
<i>Ilyarachna nordenstami</i>				X	X						
<i>Jaeropsis curvicornis</i>					X		X	X	X		
<i>Jaeropsis marionis</i>					X	X					
<i>Microarcturus hirticornis</i>		X	X		X						
<i>Munna instructa</i>					X						
<i>Munna neglecta</i>	X	X	X	X	X		X				
<i>Munneurycope murrayi</i>					X						
<i>Munnopsis australis</i>			X		X						
<i>Notasellus sarsi</i>	X	X	X	X	X	X	X		X		
<i>Paramunna foresti</i>					X	X					
<i>Paramunna kerguelensis</i>					X	X		X			
<i>Paranthura possessia</i>					X						
<i>Serolis cornuta</i>		X	X	X	X	X					
<i>Serolis latifrons</i>					X	X					X
<i>Serolis septemcarinata</i>				X	X	X			X		

ACKNOWLEDGEMENTS

My sincere thanks are due to Dr Patrick Arnaud of the Station Marine D'Endoume et Centre D'Océanographie Marseille, for making this collection available to me and for supplying collection data; to Dr Roger Lincoln and Miss Joan Ellis of the British Museum (Nat. Hist.) for the loan of *Challenger* types and other material and for their hospitality while working there; and to Dr T. E. Bowman of the Smithsonian Institution, for reading the manuscript and for his comments and criticisms. Logistic and financial support of Terres Australes et Antarctiques Française (Paris) in the collecting of the samples is gratefully acknowledged.

REFERENCES

- AMAR, R. & ROMAN, M. L. 1974. Invertébrés marins des XII^e et XV^e Expéditions Antarctiques Françaises en Terre Adélie. 14. Tanaïdes et Isopodes. *Tethys* 5: 561-599.
- ANDRIASHEV, A. P. 1959. Ichthyological investigations of Soviet Antarctic Expedition (1955-1958) and zoogeography of the Antarctic waters. *Int. Oceanog. Congr. Preprints, Am. Ass. Advmt Sci.*: 129-130.
- BEDDARD, F. A. 1884. Report on the Isopoda collected by H.M.S. *Challenger* during the years 1873-76. Part 1. The Genus *Serolis*. *Rep. Voy. Challenger* 33: 1-85.
- BEDDARD, F. A. 1886. Report on the Isopoda collected by H.M.S. *Challenger* during the years 1873-76. Part 2. *Rep. Voy. Challenger* 17: 1-178.
- BIRSTEIN, Y. A. 1963. [English translation, 1973.] *Deep-water isopods (Crustacea, Isopoda) of the north-western part of the Pacific Ocean*. Moscow: Izd-vo Akademii Nauk SSSR.
- BRIGGS, J. C. 1974. *Marine Zoogeography*. New York: McGraw-Hill.
- CARVACHO, A. 1977. Sur une importante collection d'isopodes des Îles Kerguelen. *CNFRA, Paris* 42: 173-191.
- CLERET, J. J. 1971. Deux espèces nouvelles d'isopodes asellotes à l'Île Marion. In: VAN ZINDEREN BAKKER, E. M., WINTERBOTTOM, J. M. & DYER, R. A. eds. *Marion and Prince Edward Islands. Report on the South African Biological and Geological Expedition 1965-1966*. Cape Town: Balkema.
- CUNNINGHAM, R. O. 1871. Notes on the reptiles, Amphibia, Fishes, Mollusca, and Crustacea obtained during the voyage of H.M.S. *Nassau* in the years 1866-1869. *Trans Linn. Soc. Lond.* 27: 465-502.
- DE VILLIERS, A. F. 1976. Littoral ecology of Marion and Prince Edward Islands (Southern Ocean). *S. Afr. J. antarct. Res. suppl.* 1: 1-40.
- EKMAN, S. 1953. *Zoogeography of the Sea*. London: Sidgwick & Jackson.
- FULLER, N. R. 1967. A preliminary report on the littoral ecology of Marion and Prince Edward Islands. *S. Afr. J. Sci.* 63: 248-252.
- HALE, H. M. 1937. Isopoda and Tanaidacea. *Scient. Rep. Australas. Antarct. Exped. (C)* 2 (2): 1-45.
- HALE, H. M. 1946. Isopoda-Valvifera. *Rep. B.A.N.Z. antarct. Res. Exped. 1929-1931 (B)* 5: 161-212.
- HALE, H. M. 1952. Isopoda. Families Cymothoidae and Serolidae. *Rep. B.A.N.Z. antarct. Res. Exped. 1929-1931. (B)* 6: 21-36.
- HODGSON, T. V. 1910. Crustacea. IX. Isopoda. *Nat. Antarct. Exped. 1901-1904. Nat. Hist.* 5 (9): 1-77.
- KENSLEY, B. F. 1975a. Marine Isopoda from the continental shelf of South Africa. *Ann. S. Afr. Mus.* 67: 35-89.
- KENSLEY, B. F. 1975b. Five species of *Jaeropsis* from the southern Indian Ocean. (Crustacea, Isopoda, Asellota). *Ann. S. Afr. Mus.* 67: 367-380.
- KENSLEY, B. F. 1978. The South African Museum's *Meiring Naude* Cruises. Part 7. Marine Isopoda. *Ann. S. Afr. Mus.* 74: 125-157.

- KNOX, G. A. 1960. Littoral ecology and biogeography of the southern oceans. *Proc. R. Soc. (B)* **152**: 577-624.
- KNOX, G. A. 1963. The biogeography and intertidal ecology of the Australasian coast. *Oceanography mar. Biol.* **1**: 341-404.
- KUSSAKIN, O. G. 1967. [English translation 1968.] Fauna of Isopoda and Tanaidacea in the coastal zones of the Antarctic and Subantarctic waters. *Biol. Repts Sov. Antarct. Exped.* 1955-1958. **3**: 220-389.
- MENZIES, R. J. 1962. The zoogeography, ecology, and systematics of the Chilean marine isopods. *Acta Univ. lund.* (2) **57**: 1-162.
- MIERS, E. J. 1875a. Description of three additional species of Crustacea from Kerguelen's Island and Crozet Island with remarks upon the genus *Paramoera*. *Ann. Mag. nat. Hist.* (4) **15**: 115-118.
- MIERS, E. J. 1875b. Description of new species of Crustacea (and Pycnogonida) collected at Kerguelen's Island by the Rev. A. E. Eaton. *Ann. Mag. nat. Hist.* (4) **16**: 73-76.
- MIERS, E. J. 1879. Crustacea. In: An account of the petrological botanical, and zoological collections made in Kerguelen's Land and Rodriguez, during the Transit of Venus Expeditions. *Phil. Trans R. Soc.* **168**: 200-214.
- MONOD, T. 1926. Tanaidaces, Isopodes et Amphipodes. *Result. Voyage S.Y. Belgica* 1897-1899: 1-67.
- MONOD, T. 1931. Tanaidaces et Isopodes subantarctiques de la collection Kohl-Larsen du Senckenberg Museum. *Senckenbergiana* **13**: 10-30.
- MOREIRA, P. S. 1977. A new deep sea species of *Bathygnaethia* (Isopoda, Gnathiidea) from the western south Atlantic Ocean. *Bolm Inst. Oceanogr. S Paulo* **26**: 11-19.
- NORDENSTAM, A. 1933. Marine Isopoda of the families Serolidae, Idotheidae, Pseudidotheidae, Arcturidae, Parasellidae, and Stenetriidae mainly from the South Atlantic. *Further zool. Results Swed. Antarct. Exped.* **3**: 1-284.
- OHLIN, A. 1901. Isopoda from Tierra del Fuego and Patagonia. *Wiss. Ergebn. schwed. Exped. Magellansland* **2**: 261-306.
- PFEFFER, G. 1887. Die Krebse von Sud-Georgien nach des Ausbeute der Deutschen Station 1882-83. *Jahrb. wiss. Anst. Hamburg* **4**: 1-110.
- POWELL, A. W. B. 1962. *Shells of New Zealand*. 4th ed. Christchurch: Whitcomb & Tombs.
- RICHARDSON, H. 1909. Some new isopods of the Family Gnathiidae from the Atlantic coast of North America. *Proc. U.S. natn. Mus.* **35**: 483-488.
- SCHULTZ, G. A. 1976. Species of asellotes (Isopoda: Paraselloidea) from Anvers Island, Antarctica. In: Biology of the Antarctic Seas VI. *Antarctic Res. Ser. Wash.* **26**: 1-35.
- SHEPPARD, E. M. 1957. Isopoda Crustacea Part II. The suborder Valvifera. Families: Idoteidae, Pseudidotheidae and Xenarcturidae Fam. N. *Discovery Repts* **29**: 141-198.
- SMITH, S. I. 1876. Crustaceans. In: KIDDER, J. H. Contributions to the Natural History of Kerguelen Island, made in connection with the U.S. Transit of Venus Expedition 1874-1875. *Bull. U.S. nat. Mus.* **3**: 57-64.
- STEPHENSON, K. 1947. Tanaidacea, Isopoda, Amphipoda, and Pycnogonida. *Scient. Results Norw. Antarct. Exped.* 1927-1928 **27**: 1-90.
- STUDER, T. 1879. Beitrage zur Kenntniss niederer Thiere von Kerguelensland. Die Arten der Gattung *Serolis* von Kerguelensland. *Arch. Naturgesch.* **45**: 19-34.
- STUDER, T. 1882. Über eine neue art *Arcturus* und eine neue Gattung der Idotheiden. *Sber. Ges. naturf. Freunde Berl.* **1882**: 56-58.
- STUDER, T. 1884. Isopoden gesammelt während der Reise S.M.S. *Gazelle* um die Erde 1874-1876. *Abh. preuss. Akad. Wiss.* **1883**: 1-28.
- STUDER, T. 1889. *Die Forschungsreise S.M.S. Gazelle, 1874-bis 1876. Zoologie und Geologie* **3**. Berlin: E. S. Mittler u. Sohn.
- TATTERSALL, W. M. 1921. Crustacea. Part 6. Tanaidacea and Isopoda. *Br. Antarct. Terra Nova Exped 1910 (zool.)* **3**: 191-258.
- VANHÖFFEN, E. 1914. Die Isopoden der Deutschen Sudpolar-Expedition 1901-1903. *Dt. Südpol.-Exped.* **14**: 447-598.
- WOLFF, T. 1962. The systematics and biology of bathyal and abyssal Isopoda Asellota. *Galathea Rep.* **6**: 1-320.

ABBREVIATIONS

BM	British Museum (Natural History)
C	cephalon
CC	shrimp trap
CL	king crab trap
CP	beam trawl
DC	Charcot dredge
juv.	juvenile(s)
ovig.	ovigerous
PM	Paris Museum
RK	Reineck corer
SAM	South African Museum
TL	total length
USNM	United States National Museum