

up to 0.3 m above. [C.061.E.—“speckled sphaeromids”.] Coll. J. F. C. Morgans.

Exosphaeroma planulum
[122] (11 Jul. 1965) Christchurch. Heathcote-Avon Estuary. Wooden post above MTL. Coll. K. P. Jansen.

Pseudosphaeroma campbellensis
[123] (9 Feb. 1967) Christchurch. Heathcote-Avon Estuary. Among mussels on jetty. Coll. K. P. Jansen.

Pseudosphaeroma campbellensis
[124] (3 Apr. 1967) As [123].

Pseudosphaeroma campbellensis
[125] (19 May 1966) Matheson's Bay, near Leigh, Auckland, east coast. From LMTL. Coll. K. P. Jansen.

Isocladus dulciculus
[126] (1967) Hatfields Beach, near Auckland, east coast. Coll. K. P. Jansen.

Exosphaeroma planulum, *Isocladus armatus*, *Sphaeroma quoyanum*

[127] Dargaville. From LMTL, exposed sandy beach. Coll. R. Murray.

Isocladus reconditus

John Graham Collection

[128] (Aug. 1960) On *Pectinura maculata*. 15 fm (27 m).

Cassidina typa
[129] (Jun. 1963) Z1. [=“Intertidal rocks, exposed at low tide, north and south of the Kakanui River mouth and those around Cape Wanbrow, the intervening beaches and the Oamaru Harbour”—Graham 1962]

Exosphaeroma obtusum
[130] (Aug. 1963) Z1 A. Oamaru Harbour.

Cilicæa caniculata
[131] (Sep. 1963) Z1. Cape Wanbrow, Oamaru.
Cymodoceella egregia, *Dynamenella huttoni*, *Exosphaeroma obtusum*, *Isocladus calcareus*

Portobello Marine Biological Station

[132] (2 Aug. 1953) Little Papanui. Coll. E. J. Batham.

Isocladus calcareus
[133] (2 Sep. 1953) Portobello Marine Station jetty, with light. Coll. E. J. Batham.

Cilicæa caniculata, *Isocladus spiculatus*
[134] (25 Jan. 1960) Sta.D. Doubtful Sound. Shaded shore, rock, lower intertidal. Coll. E. J. Batham.

Exosphaeroma obtusum

N.Z. Geological Survey

[135] (1 Aug. 1950) Island Bay. Dredged, considerable depth.

Cilicæa tasmanensis

National Museum of Victoria, Australia

[136] (Dec. 1959) Garden Cove, Macquarie Island.

Exosphaeroma gigas

Chilton Collection, Canterbury Museum

[137] (Nov. 1915) Cuvier I. Coll. P. W. Grenfell.

Amphoroidea falcifer, *Scutuloidea maculata*
[138] Takapuna, Auckland. Coll. R. M. Laing.
Dynamenella cordiforaminalis, *Dynamenoides vulcanata*

[139] Auckland. ‘Juvenile’ *I. armatus*. Suter Collection.
Exosphaeroma chilensis, *E. obtusum*, *Isocladus armatus*, *I. dulciculus*

[140] (Nov. 1907) Campbell I. Taken on shore at mouth of a small freshwater stream.

Pseudosphaeroma campbellensis
[141] Halfmoon Bay, Stewart I. Coll. W. R. B. Oliver. No. 105.

Pseudosphaeroma campbellensis
[142] Golden Bay, Stewart I. Coll. W. R. B. Oliver. No. 93.

Pseudosphaeroma campbellensis
[143] Lyttelton. H. Suter Collection. CM1.

Scutuloidea maculata
[144] Sumner, N.Z. Coll. H. Suter. CM2.

Scutuloidea maculata
[145] (Nov. 1918) Cape Maria van Diemen. Coll. T. B. Smith. CM3.

Scutuloidea maculata
[146] (16 Nov. 1906) Lyttelton, N.Z. Coll. C. Chilton. CM4.

Scutuloidea maculata
[147] Tauranga, N.Z. Coll. W. R. B. Oliver. No. 259. CM5.

Scutuloidea maculata
[148] (4 Apr. 1920) Tauranga. On *Pterocladia lucida*. Coll. W. R. B. Oliver. CM6.

Scutuloidea maculata
[149] Lyttelton, N.Z. CM7.

Dynamenella cordiforaminalis
[150] Lyttelton, N.Z. Jar 211. CM8.

Dynamenella cordiforaminalis
[151] (14 Jun. 1923) Lyttelton Harbour. Coll. E. W. Bennett. CM9.

Dynamenella cordiforaminalis

British Museum (BM) Collection

[152] Rendezvous Cove, Auckland Is. 43-70. Presented by Lt. Smith, *Erebus*, during Antarctic voyage. [Material seen by Miers (1876)]

Exosphaeroma gigas
[153] Auckland Is. S6.56.

Exosphaeroma obtusum
[154] Stewart I., N.Z. Presented by Miss A. Lysaght 1949. 1955. 10. 20. 8-10.

Exosphaeroma obtusum
[155] Takapuna Beach, Auckland. Suter Collection. 99. 7-18. 9-11.

Exosphaeroma chilensis
[156] “New Zealand”. 52-43. (“Co-types”).

Cymodoce convexa
[157] “New Zealand”. 50-53. (“Type”).

Cymodoce granulata

Terra Nova (TN) Collections

TN Sta.96 3 Aug. 1911 11.3 km E of North Cape, N.Z. Depth 128 m. Agassiz trawl.

Cymodoce hodgsoni
TN Sta.133 30 Aug. 1911 Spirits Bay, near North Cape. Depth 20 m. Plankton.

Exosphaeroma obtusum, *E. falcatum*
TN Sta.135 1 Sep. 1911 Spirits Bay, near North Cape. Depth 3 m. Plankton.

Exosphaeroma obtusum
TN Sta.136 2 Sep. 1911 Spirits Bay, near North Cape. Surface.

Exosphaeroma obtusum

**Victoria University of Wellington Zoology Department
(VUZ, VUC)**

Collection No. 83 (Sta.JUG). 41°42.3'S, 175°9'E (7 Feb. 1957). Depth c.550 fm (c.1 000 m). Mud, shell, rock, gravel. Beam trawl fished on bottom.

Cymodopsis impudica

Collection No. 98 (Sta.COM/N) 41°33'S, 174°50'E (29 Aug. 1957). Depth c.150 fm (c.275 m). Shell, sand, stones. Beam trawl fished on bottom.

Cassidina typa

Collection No. 99 (Sta.DOJ) 41°34.30'S, 174°43.30'E (29 Aug. 1957). Depth c.150 fm (c.275 m). Shell, sand, stones. Beam trawl fished on bottom.

Cassidina typa

Collection No. 101 (Sta.GOP) 41°38'S, 174°53.30'E (29 Aug. 1957). Depth c.550 fm (c.1 000 m). Mud. Beam trawl fished on bottom.

Cassidina typa

Chatham Islands 1954 Expedition (CI)

Sta.9 (25 Jan. 1954) Glory Bay, Pitt I. Shore collection.

Dynamenella huttoni, *Isocladus armatus*

Sta.11 (26 Jan. 1954) Owenga. Shore collection.

Dynamenella huttoni, *Dynamenopsis varicolor*, *Exosphaeroma chilensis*, *E. obtusum*, *Isocladus armatus*

Sta.12 (26 Jan. 1954). Owenga. Hand net.

Amphoroidea falcifer, *A. longipes*, *A. media*, *Dynamenopsis varicolor*, *Exosphaeroma obtusum*, *Isocladus dulciculus*, *Scutuloidea maculata*

Sta.16 (27 Jan. 1954) Kaingaroa. Shore collection.

Dynamenopsis varicolor, *Exosphaeroma obtusum*, *Isocladus calcareus*, *I. inaccuratus*

Sta.19 (28 Jan. 1954) 43°38.2'S, 176°38'E. Rocky bottom, large dredge. 46 m.

Amphoroidea media, *Cilicæa caniculata*

Sta.22 (29 Jan. 1954) The Sisters. Shore collection.

Dynamenella cordiforaminalis, *Dynamenopsis varicolor*, *Isocladus inaccuratus*

Sta.25 (29 Jan. 1954) Waitangi Wharf. Shore collection.

Amphoroidea falcifer

Sta.26 (30 Jan. 1954) Waitangi. Shore collection.

Dynamenella huttoni

Sta.47 (7 Feb. 1954) Kaingaroa. Hand net.

Amphoroidea falcifer, *A. media*, *Dynamenopsis varicolor*

Sta.48 (8 Feb. 1954) Port Hutt. Shore collection.

Amphoroidea falcifer, *Dynamenella huttoni*

Sta.49 (8 Feb. 1954) Port Hutt. Shore collection.

Amphoroidea longipes, *Cilicæa caniculata*

Sta.52 (10 Feb. 1954) 44°04'S, 178°04'W. Fine green sandy mud. Large dredge. 476 m.

Cilicæa caniculata

Sta.59 (11 Feb. 1954) 43°38'S, 177°19'E. Fine green sandy mud. Large dredge. 531 m.

Cilicæa caniculata

Copenhagen Museum Collections (COP.)

Cop. 1 Three Kings. Depth 119 m.

Cilicæa dolorosa

Cop. 2 Cape Maria van Diemen. 16.1 km NW.

Cilicæa caniculata

Cop. 3 Cape Maria van Diemen.

Amphoroidea longipes, *Dynamenella huttoni*, *Scutuloidea maculata*

Cop. 4 North Cape.

Cymodopsis montis, *Dynamenopsis varicolor*, *Exosphaeroma obtusum*, *Isocladus dulciculus*

Cop. 5 Cape Brett.

Dynamenella cordiforaminalis, *D. hirsuta*, *D. huttoni*, *D. mortenseni*, *Dynamenopsis varicolor*

Cop. 6 Bay of Islands.

Cilicæa caniculata, *Cymodocella capra*, *Dynamenoides decima*, *Isocladus armatus*

Cop. 7 (29 Nov 1914) Little Barrier I. Depth 55 m. Coll. Mortensen's Expedition.

Cilicæa angustispinata, *Cymodoce hodgsoni*, *C. iocosa*

Cop. 8 Colville Channel. Depth 55 m. Sand.

Cymodoce hodgsoni

Cop. 9 Hauraki Gulf, 18 m.

Cilicæa angustispinata

Cop.10 North Channel, Kawau Is, Hauraki Gulf. 18 m.

Cilicæa angustispinata

Cop.11 Auckland, Ponui I.

Isocladus dulciculus

Cop.12 Puhoi Rock, Hauraki Gulf.

Dynamenella huttoni

Cop.13 Cape Kidnappers.

Isocladus armatus

Cop.14 Mahia Peninsula.

Exosphaeroma obtusum

Cop.15 Plimmerton.

Exosphaeroma obtusum

Cop.16 Wellington Harbour. Depth 9–18 m.

Cassidina typa

Cop.17 Island Bay, Wellington.

Cilicæa caniculata

Cop.18 Akaroa.

Isocladus armatus

Cop.19 Lyttelton Harbour.

Cilicæa caniculata

Cop.20 Stewart I., Pegasus Bay.

Exosphaeroma obtusum

Cop.21 Stewart Is., Halfmoon Bay.

Cilicæa caniculata, *Isocladus calcareus*

Cop.22 Auckland I., Carnley Harbour.

Isocladus calcareus

Cop.23 (15 Aug. 1938) New Plymouth. Coll. P. Heegard.

Dynamenella condita

"Galathea" Stations (GAL.)

Gal.581 (30 Dec. 1951) Perseverance Harbour, Campbell I. 52°33'S, 169°08'E. Dip net, lantern light. Depth 30 m.

Exosphaeroma obtusum

Gal.594 (4 Jan. 1952) Off Perseverance Harbour, Campbell I. 52°33'S, 169°10'E. Oyster dredge. Mud with sand, shells, and stones. Surface temp. 8.6°C, bottom temp. 8.3°C. Depth 46 m.

Cymodoce australis

Gal.595 (4 Jan. 1952) Perseverance Harbour, Campbell I. 52°33'S, 169°09'E. Rectangular dredge, 100 × 30 cm. Mud with sand, shells, and stones. Surface temp. 8.6°C. Depth 43 m.

Cymodoce australis

Gal.597 (9 Jan. 1952) Portobello, Otago Harbour. 45°47'S, 169°30'E. Tidal zone, hand collecting. Rocks and stones.

Isocladus armatus

Gal.604 (16 Jan. 1952) Stony shore, Harrison Cove, Milford Sound. 44°37'S, 167°55'E. Tidal zone, hand collecting. Stones. pH=5.2–5.5

Pseudosphaeroma campbellensis

Gal.644 (1 Feb. 1952) Horuhoru I. Hauraki Gulf. 36°43'S, 175°10'E. Hand collecting, rock pools.

Dynamenella cordiforaminalis, *Dynamenopsis varicolor*

Gal.667 (27 Feb. 1952) Takapuna Bay, near Auckland. 36°47'S, 174°47'E. Tidal zone, hand collecting. Sand and rocks.

Isocladus armatus

SYSTEMATICS

Since there is no one modern work which encompasses all of the Isopoda and evaluates the many and varied groupings used in the past—tribes, subtribes, sections, groups, series, and so on—we have tried in the series of which this work is part to develop a unified classification which retains as far as possible the acceptable groupings of past workers, but translated into modern units. For example, we have included such groupings as Hansen's section *Monolistrini*, which we have treated as a subtribe. While this particular example may appear superfluous in the present context, since only one genus and species is concerned, its value should be more evident in the wider context of a unified and uniform systematic ranking within the Isopoda as a whole.

ORDER ISOPODA

Never a distinct carapace. Body usually dorsoventrally flattened, divided into head, pereon, and pleon. First thoracic somite always completely fused with head, its appendages modified into maxillipeds. Pereon of seven free somites (pereonites 1-7), the first and sometimes the second of which may be immovably fused to the head. Pleon of six somites, some of which may be coalesced and not obvious. Telson usually fused with sixth pleon somite, so only five pleonites plus telson segment or "pleotelson" are apparent. Eyes, when present, never on movable stalks but sessile or elevated on immobile head processes. First antenna almost always lacks accessory flagellum; accessory flagellum sometimes present on second antenna.

Mandibles, two pairs of maxillae, and maxillipeds present, often modified in accordance with habits.

Pereonites 1-7 each have a pair of pereopods or legs, often all alike, ambulatory or subprehensile, or variously modified. The coxae are commonly expanded into plates which are generally fused with, and form a lateral expansion of, the pereonites; their junction with the body is often indicated by a suture on pereonites 2-7 but rarely on free pereonite 1.

The pleon has five pairs of pleopods; typically each pleopod has two broad, lamellate branchial rami. In the male, the second pair are commonly modified as sexual appendages, and in some groups the first pair is so modified also.

Monod (1922) proposed a classification of the Isopoda into two sub-divisions: Decempedes, with one group only, the Gnathiidea; and Quatuordecempedes, with seven groups—Anthuridea, Asellota, Valvifera, Flabellifera, Epicaridea, Oniscoidea, and Phreatoicoidea. This classification into eight groups or suborders was accepted by Wolff (1962). However, Laing (1961) put forward a case for similar status for the Microcerberidea, previously regarded as a subfamily of the Anthuridae (Chappuis & Delamare 1954: 130-1).

Grüner (1965) has accepted this, and lists nine tribes (as suborders).

Menzies (1962a, b), however, treated the Anthuroidea as a subtribe of the Flabellifera, along with the Seroloidea and the Cirolanoidea, and—one may infer—regards the microcerberids as part of the Anthuroidea.

Kusakin (1969) includes a suborder Tyloidea, which is derived from the Oniscoidea, for the family Tylidae. (We have not distinguished Tyloidea in our key to the infraorder.)

In this work we intended to accept the Menzies scheme, treating Anthuroidea as a superfamily of Flabellifera and, for the reasons given by Lang, to accept the microcerberids as an equivalent superfamily. However, we found the difficulties of incorporating them into the Flabellifera sufficiently deterrent, and the differences sufficiently significant, to persuade us to follow Grüner in giving Anthuroidea and Microcerberidea equal ranking with the Flabellifera as "far from a homogeneous group".

We have also accepted Monod's original terms Decempedes and Quatuordecempedes, since they are the names originally given and we saw no valid reason for rejecting or amending them. Some may, however, consider them unnecessary.

It has been customary to refer to the major sub-divisions within the Isopoda as suborders, but Monod's 1922 classification pre-empted the term suborder for the higher categories, Decempedes and Quatuordecempedes. For this reason, Menzies (1962a, b) and Wolff (1962) both use the term "Tribe". Thus:

Suborder Quatuordecempedes
Tribe Flabellifera
Subtribe Cirolanoidea
Family Sphaeromatidae

However, the International Code of Zoological Nomenclature (1961, 1964) now specifically defines a tribe as a category of the family-group subordinate to subfamily. (Blackwelder (1967: 448) comments that "tribe has also been used above the family-group levels but such as is now prohibited by the Code".)

In recent publications on Decapoda, Holthuis (e.g., 1967) uses the structure:

Suborder
Supersection
Section
Superfamily

A possible hierarchy suggested to us for the Isopoda would be:

Suborder
Section
Superfamily
Family

KEY TO MAJOR DIVISIONS OF ISOPODA
(FIGS 3-15)

1. Adults with five free thoracic somites and five pairs (2nd-6th) of normal legs, the first modified and the seventh absent; juvenile ('praniza') parasitic on fish
..... Suborder DECEMPEDES: (Gnathiidea)
 - Adults with seven free thoracic segments and normally seven pairs of legs ... (Suborder QUATUORDECEMPEDES) 2
2. Uropods lateral or ventral (hinged to sides to pleotelson or folding under it) 3
 - Uropods terminal (attached to or near end of pleotelson), usually cylindrical ('styliform') or entirely absent 5
3. Uropods and pleotelson together forming a tail fan; pleopods for the most part of the swimming type 4
 - Uropods not forming a tail fan with the pleotelson but modified as a pair of covers folding under the abdomen and enclosing the pleopods Infraorder VALVIFERA
4. Body elongated and approximately cylindrical; telson and last pleonite not fused; uropod outer ramus generally arching medially over the pleotelson
..... Infraorder ANTHURIDEA
- Body dorsoventrally flattened or at most semi-cylindrical; telson fused with last pleonite; both rami of uropod lie horizontally Infraorder FLABELLIFERA
5. Aquatic or interstitial species; pleopods not modified for air-breathing 6
 - Terrestrial, leafmould, inland, or littoral species; pleopods modified for air-breathing Infraorder ONISCOIDEA
6. Pleopods generally covered by a thin opercular plate (the modified first pair of pleopods) Infraorder ASELOTA
 - Pleopods never covered by an operculum 7
7. Free-living fresh water species, body more-or-less compressed, amphipod-like Infraorder PHREATOICIDEA
 - Parasitic or interstitial species; body depressed dorsoventrally or cylindrically, not amphipod-like 8
8. Parasitic species; body depressed (flattened from above as though trodden on); parasitic on other Crustacea but with free-swimming larval forms; legs, when present, subchelate, prehensile Infraorder EPICARIDEA
 - Interstitial species; body cylindrical; only pereopod 1 subchelate Infraorder MICRO CERBERIDEA

Fig. 3. GNATHIIDEA: Generalised male gnathiidean. (After Monod, 1926, fig. 114).

Fig. 4. VALVIFERA: *Paridotea unguolata* (Pallas), a 38 mm male idoteid from Dunedin.

Fig. 5. VALVIFERA: *Pseudarcturella chiltoni* Tattersall, an arcturid from off North Cape, redrawn from the 4.5 mm type by Hurley.

Fig. 6. ANTHURIDEA: an 8 mm specimen (probably *Paranthura punctata* (Stimpson)) from New Zealand showing the characteristic tail fan.

Fig. 7. FLABELLIFERA: *Serolis bromleyana* Stühm, a 26 mm specimen from the Chatham Rise.

Fig. 8. FLABELLIFERA: *Exosphaeroma obtusum* Dana, a 15.5 mm specimen from Auckland Island.

Fig. 9. ONISCOIDEA: *Actaecia euchroa* Dana, a 6.5 mm male from Raglan Harbour.

Fig. 10. ANTHURIDEA: *Cruregens fontanus* Chilton, an 11.5 mm specimen from a well at Eyreton, New Zealand.

Fig. 11. ASELOTA: *Jaeropsis* sp. from Island Bay, a 3 mm specimen from under stones.

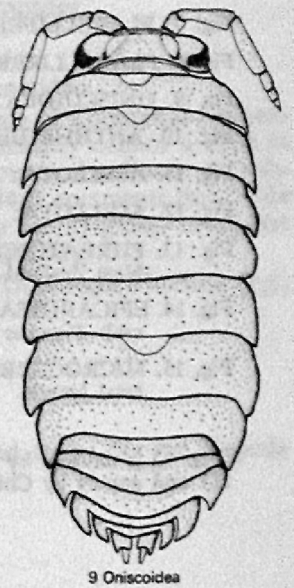
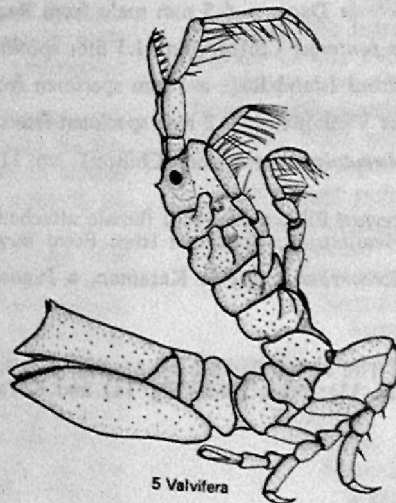
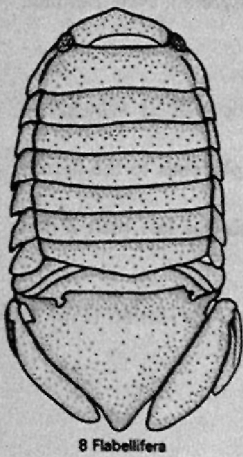
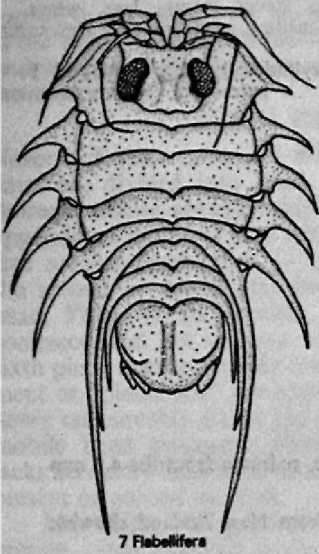
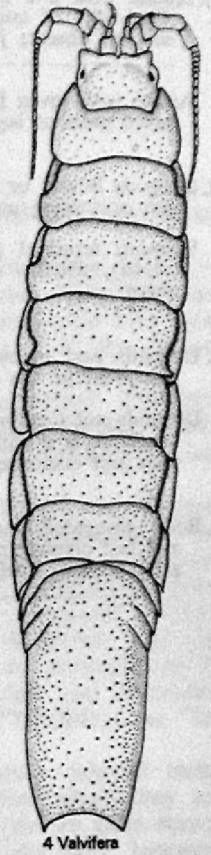
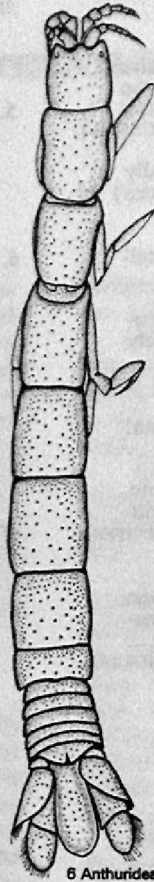
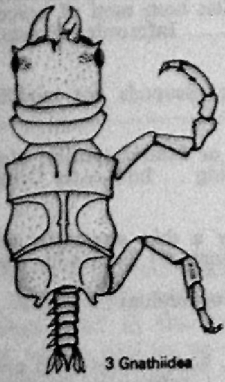
Fig. 12. ASELOTA: *Antias hispidus* Vanhöffen, a n 8 mm specimen from Auckland Island.

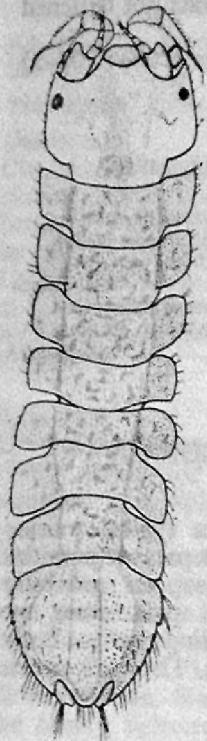
Fig. 13. PHREATOICIDEA: *Neophreatoicus assimilis* (Chilton), an 11 mm female from a well at Winchester, New Zealand.

Fig. 14. EPICARIDEA: *Athelges lacertosi* Pike, a 16.4 mm female attached ventrally between pleopods to the hermit crab *Pagurus lacertosus* (Henderson). Specimen from Petre Bay, Chatham Islands.

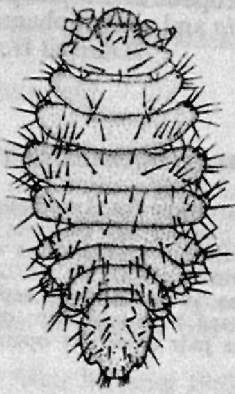
Fig. 15. MICRO CERBERIDEA: *Microcerberus stygius* Karaman, a Jugoslavian phreatic species of less than 2 mm total length.

(Fig. 12 is entirely by D. E. Hurley. The remainder are by Mrs G. Crook from pencil originals by Hurley (Figs 4-11) and papers by Chilton, 1894 (Fig. 13); Pike, 1961 (Fig. 14) and Karaman, 1933 (Fig. 15)).

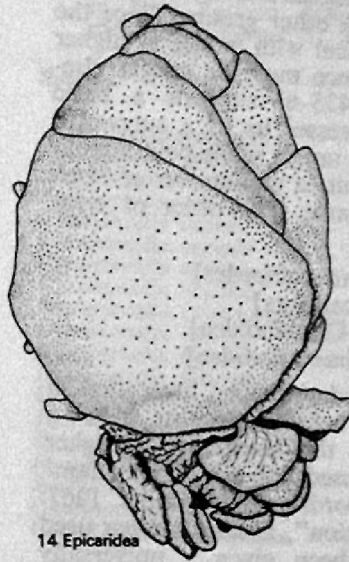




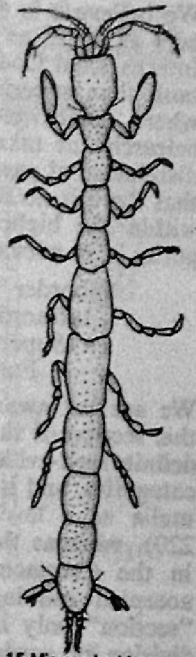
11 Asellota



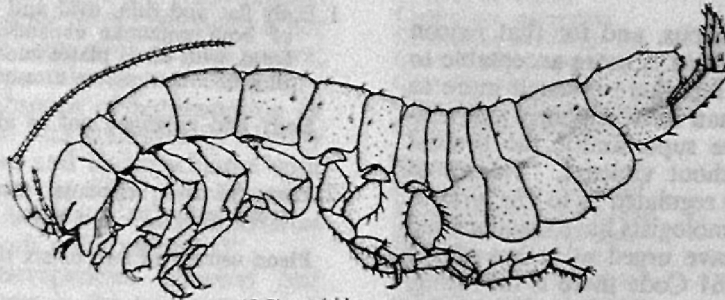
12 Asellota



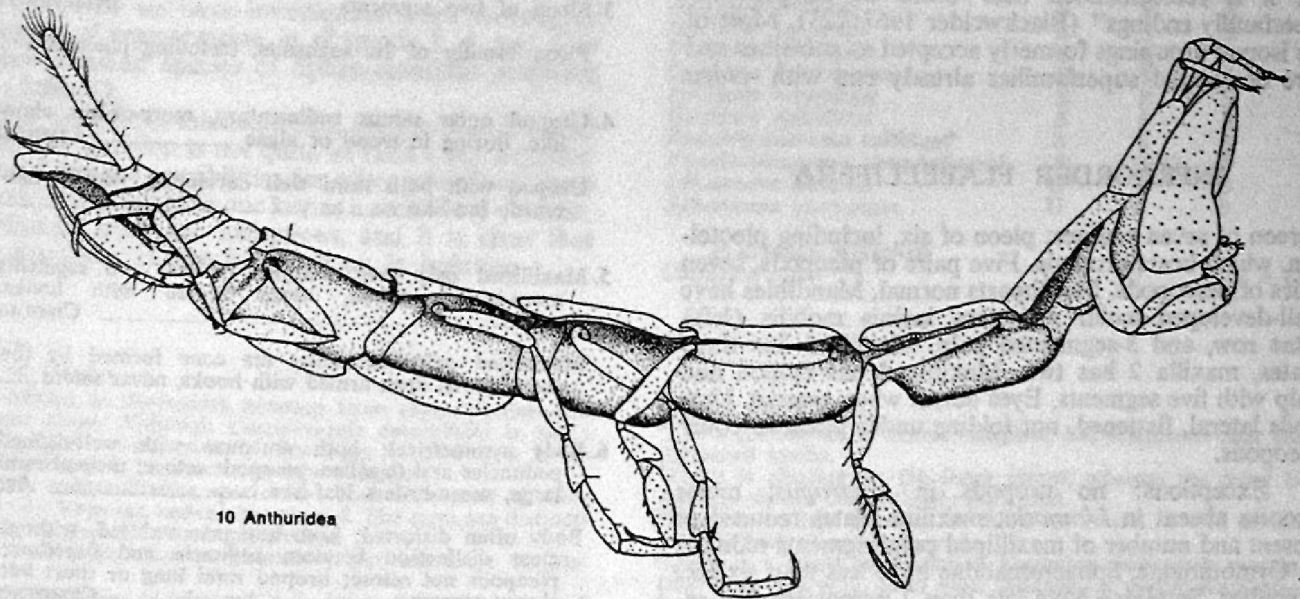
14 Epicaridea



15 Microcerberidea



13 Phreatoicidea



10 Anthuridea