ANNALS OF THE
SOUTH AFRICAN MUSEUM

VOLUME XLIII

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LIST OF CONTRIBUTORS

NEW GENERIC NAMES PROPOSED IN THIS VOLUME

Cypsiphimedia	(Acanthonotozomatidae)
Ilyograpsus	(Grapsidae)
Miophrixus	(Bopyridae)

LIST OF GENERA

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PART I, *containing:—*

1. *Additions to the Fauna-list of South African Crustacea and Pycnogonida.* By K. H. Barnard. (With fifty-three text-figures.)

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1. *Additions to the Fauna-list of South African Crustacea and Pycnogonida.* By K. H. Barnard. (With fifty-three text-figures.)

This paper forms an appendix to previous papers on South African Crustacea and Pycnogonida. The additions are mainly the results of intensive collecting by the University of Cape Town Ecological Survey (U.C.T.) carried out by the Zoology Department under the direction of Professor J. H. Day; and by the Zoology Department of the University of the Witwatersrand (U.W.). The former has extended the survey of the estuaries of the Union of South Africa to that of Inhambane, Portuguese East Africa; and the latter has operated from the Marine Biological Station on Inhaca Island, Delagoa Bay.

As might be expected several interesting new records have been collected, but it is quite certain that many more will be added in the future. The marine fauna of Portuguese East Africa has not yet been thoroughly investigated; nor in fact has that of the Union of South Africa.

I wish to express my thanks to Professor Day and his team of enthusiasts (U.C.T.), and to Mrs. M. Kalk (U.W.) for submitting these collections for identification; and for presenting to the South African Museum duplicates of the species not represented in its collections.

A full list of the species collected is not given, only notable additions to the localities which extend the already known distribution of the respective species, new records, and new species.

The employment of new methods of collecting usually produces abundant, and often surprising, results. The University of Cape Town has recently adopted 'Operation Frogman' for investigating the shallow-water fauna of False Bay. Mr. J. F. C. Morgans, a member of Professor Day's staff, has pioneered this method in South Africa, and has demonstrated its advantages over the old-fashioned 'naturalist's dredge'. Many of the following records and discoveries are due to his enthusiasm for submarine collecting.

In some cases species, hitherto considered rare, have been found to be plentiful when their particular habitat has been discovered. For example, in the course of an investigation into the species of *Patella* living on the Cape coast (Koch, H. J., 1949, *Ann. Natal Mus.*, xi, 3, p. 491), the Isopod *Dyna-*

menella australis Rich. and the Amphipod *Calliopiella michaelseni* Schell. were found in abundance under the shells of these molluscs.

The following papers containing references to the South African Crustacean fauna have appeared in recent years.

Barnard, K. H. 1951. *Ann. Mag. Nat. Hist.* (12), iv, pp. 698–709, figs. (Isopoda and Amphipoda).
——. 1952. *Trans. Roy. Soc. S. Afr.*, xxxiii, pp. 279–82, figs. (*Grandidierella* species).
——. 1954. *Ann. Mus. Congo. Tervuren*, 4to, zool. 1, pp. 120–131, figs. (Decapoda, Isopoda, Amphipoda).
——. 1954*b*. *Mem. Inst. Sci. Madagascar.* A. ix. pp. 95-104, figs. (Decapoda).
——. 1955*a*. *Ann. Natal Mus.*, xiii, 2, p. 247 (record of a Cirripede).
——. 1955*b*. *Ann. Natal Mus.*, xiii, 2, p. 249 (a new freshwater Isopod).
Capart, A. 1951. *Exp. océanogr. Belge*, III, 1, pp. 1–205, figs. (Brachyura).
Forest, J. 1951. *Bull. Soc. zool. Fr.*, lxxvi, p. 83 (*Calcinus*).
——. 1954. *Ann. S. Afr. Mus.*, xli, 4, pp. 159–213, figs. (*Paguristes*).
Holthuis, L. B. 1950. *Siboga Exp. monogr.*, xxxix, a, 9, pp. 1–126, figs. (*Palaemoninae*).
——. 1951. *Atlantide Rep. No.* 2, pp. 7–187, figs. (Caridea).
——. 1952. *Siboga Exp. monogr.*, xxxix, a, 10, pp. 1–254, figs. (*Pontoniinae*).
——. 1952. *Exp. océanogr. Belge*, III, 2, pp. 1–88, figs. (Macrura).
Reid, D. M. 1951. *Atlantide Rep. No.* 2, pp. 189–291, figs. (Amphipoda).
Ruffo, S. 1947. *Mem. Mus. Civ. Verona.* I. pp. 113–30. figs. (Amphipoda).
——. 1953. *Rev. Zool. Bot. Afr.* xlvii. pp. 120–36. figs. (Amphipoda).

The following new genera and new species are described in the present paper.

DECAPODA. *Menaethiops natalensis* and *delagoae*, *Paracleistostoma fossula*, *Ilyograpsus* (n.g. Grapsidae), *I. rhizophorae*, *Xenophthalmodes brachyphallus*, *Ebalia pondoensis* (*tuberculata* Brnrd. 1950 non Miers 1881) and *agglomus*, *Porcellana delagoae*, *Acetes natalensis*, *Alpheus bullatus*.

ISOPODA. *Paranthura latipes*, *Cirolana imposita*, *pilula*, and *capitella*, *Conilorpheus blandus*, *Corallana furcilla*, *Isocladus otion* and *mimetes*, *Sphaeramene microtylotos*, *Cymodoce lis* and *alis*, *Paracilicaea teretron* and *clavus*, *Artopoles capensis*, *Ianiropsis bisbidens*, *Athelges caudalis*, *Miophrixus* (n.g. Bopyridae), *M. latreutidis*.

AMPHIPODA. *Euonyx conicurus*, *Tryphosa normalis* and *africana*, *Urothoe serrulidactylus*, *pinnata* and *pinnata* var. *femoralis*, *Cypsiphimedia* (n.g. Acanthonotozomatidae), *C. gibba*, *Melita machaera*, *Afrochiltonia* (n.g. Talitridae) for *Chiltonia capensis* Brnrd. 1916, *Lembos teleporus*, *Unciollela foveolata*.

COPEPODA. *Chondracanthus colligens*, *Brachiella supplicans*.

PYCNOGONIDA. *Propallene similis*, *Pallenoides proboscideum*.

RECORDS OF ADDITIONAL SPECIES AND NEW LOCALITIES

DECAPODA

Macropodia rostrata (Linn.). Zwartkops estuary, Port Elizabeth; Bushmans River mouth (Alexandria-Bathurst Division) (U.C.T.). Barnard 1954.
Achaeus lacertosus Stmpsn. Inhambane, Portuguese East Africa (U.C.T.).
Inachus angolensis Capart 1951. 0°–16° 30′ S.
Inachus dorsettensis (Penn.). False Bay, 40 fms. (U.C.T.).
Menaethius monoceros (Latr.). Durban Bay (U.C.T.).
Naxioides hirta M. Edw. Inhambane (U.C.T.).
Platylambrus quemvis Stebb. Inhambane (U.C.T.).
Eumedonus granulosus MacGilch. Delagoa Bay (U.W.). Barnard 1954*b*.
Hymenosoma orbiculare Desm. Delagoa Bay (U.W.); Inhambane (U.C.T.).
Dotilla fenestrata Hilg. Keiskama River mouth, and Breede River mouth (U.C.T.). Barnard 1954.
Cleistostoma edwardsii McLeay. West coast: Saldanha Bay. South coast: mouths of Sundays River, Bushmans River, Keiskama River, Bashee River (U.C.T.). Barnard 1954.
Cleistostoma algoense Brnrd. 1954. West coast: Saldanha Bay. South coast: mouths of Breede River, Great Brak River, Knysna, Zwartkops River, Bushmans River (U.C.T.).
Tylodiplax blephariskios (Stebb.). Durban Bay and St. Lucia Bay (U.C.T.). Barnard 1954. Inhambane (U.C.T.). See *infra* fig. 7*f*.
Cardisoma carnifex (Herbst). Richards Bay (U.C.T.). Barnard 1954.
Pachygrapsus plicatus (M. Edw.). Delagoa Bay (U.W.).
Varuna litterata (Fabr.). Port St. Johns (U.C.T.). Barnard 1954.
Varuna tomentosa Pfeff. Port Edward, Umtamvuna River, 300 yards from mouth (U.C.T.). Barnard 1954.
Pseudograpsus erythraeus Kossm. Delagoa Bay (U.W.).
Sesarma longipes Krauss. Inhambane (U.C.T.).
Sesarma meinerti de Man. Beira (Chace, 1953); Delagoa Bay (U.W.).
Sesarma catenata Ortm. Mouths of Bushmans River, Sundays River, Zwartkops River, and Breede River. The last is the most westerly locality hitherto recorded. Barnard, 1954.
Sesarma elongata M. Edw. Inhambane (U.C.T.).
Portumnus mcleayi Brnrd. Angola, 9° S. (Capart, 1951). Barnard, 1954.
Ovalipes punctulatus de Haan. Walfish Bay (Capart, 1951). Tristan d'Acunha (♂ 60 × 77 mm. S. Afr. Mus.).
Portunus tuberculatus Roux. Barnard 1950 as *Elliptodactylus rugosus* Doflein. Atlantic, southwards to 26° S. (Capart, 1951). Barnard, 1954.
Monomia gladiator (Fabr.). Inhambane (U.C.T.).
Cycloachelous granulatus (M. Edw.). Durban Bay (U.C.T.). Barnard, 1954.
Thalamita integra Dana. Durban Bay and Inhambane (U.C.T.).
Thalamita investigatoris Alcock. Durban Bay (U.C.T.). Barnard, 1954.
Panopeus africanus M. Edw. Durban Bay (U.C.T.). Barnard, 1954.
Zozymodes xanthoides (Krauss). Delagoa Bay (U.W.).
Chlorodopsis pilumnoides (White). Delagoa Bay (U.W.).
Phymodius ungulatus (M. Edw.). Delagoa Bay (U.W.).
Phymodius monticulosus (Dana). Durban Bay (U.C.T.).
Xantho hydrophilus = *exaratus* (M. Edw.).
(?) *Halimede delagoae* Brnrd. 1954. Portuguese East Africa (Lourenço Marques Museum).

Lybia plumosa Brnrd. Durban Bay (U.C.T.); Delagoa Bay (U.W.). Barnard, 1954. See *infra* fig. 13*d*.

Eurüppellia annulipes (M. Edw.). Kosi Bay and St. Lucia Bay (U.C.T.). Barnard, 1954. Delagoa Bay (U.W.).

Pseudozius caystrus (Ad. & White). St. Lucia Bay (U.C.T.).

Pilumnoides perlatus (Poeppig). Walfish Bay (Capart, 1951). Barnard, 1954.

Epixanthus frontalis (M. Edw.). Kosi Bay and Inhambane (U.C.T.).

Pilumnus hirsutus Stmpsn. var. (Barnard, 1950, p. 265). Saldanha Bay (U.C.T.). Barnard, 1954.

Parapilumnus pisifer (McLeay). Delagoa Bay (U.W.).

Goneplax angulata (Pennant). See Barnard, 1954.

Eucrate sulcatifrons (Stmpsn). Delagoa Bay (U.W.).

Typhlocarcinus sp. ♀♀ only. Inhambane (U.C.T.).

Thaumastoplax spiralis Brnrd. Estuaries of Great Brak River (Mossel Bay) and Zwartkops River (Algoa Bay), in Echiuroid burrows; Durban Bay (U.C.T.). Barnard, 1954.

Nautilocorystes ocellata (Gray). Walfish Bay (Capart, 1951). Barnard, 1954.

Conchoecetes artificiosus (Fabr.). Inhambane (U.C.T.).

Dromidia dissothrix Brnrd. False Bay, 11–12 metres (U.C.T.). Barnard, 1954.

Calappa japonica Ortmann. Kentani coast (S. Afr. Mus.). Barnard, 1954.

Calappa gallus (Herbst). Inhambane (U.C.T.).

Ebalia tuberculata Miers. See Capart, 1951 and Barnard, 1954. Capart considers that the specimens assigned by me in 1950 to Miers's species represent a different, perhaps new, species. Since then Dr. Monod has sent me West African specimens undoubtedly referable to *tuberculata*, which prove that *barnardi* is a synonym of Miers's species. For the former, therefore, I propose the name *pondoensis* n. sp. (Pondoland coast).

Leucosia marmorea Bell. Inhambane (U.C.T.).

Dorippe lanata (Linn.). Delagoa Bay (U.W.).

Emerita austroafricana Schmitt. Occurs as far south as the Kentani coast. Barnard, 1954. I have recently seen specimens from the west coast of Madagascar (Madagascar Institute).

Paguristes spp. See Forest, 1954.

Aniculus aniculus (Fabr.). Delagoa Bay (U.W.).

Troglopagurus jousseaumii Bouvier. Delagoa Bay (U.W.).

Clibanarius clibanarius (Herbst). Inhambane (U.C.T.).

Clibanarius padavensis de Man. Durban Bay and Inhambane (U.C.T.).

Clibanarius longitarsus (de Haan). Richards Bay and Inhambane (U.C.T.); Delagoa Bay (U.W.).

Diogenes custos (Fabr.). Delagoa Bay (U.W.); Inhambane (U.C.T.).

Diogenes avarus Heller. Delagoa Bay (U.W.); Inhambane (U.C.T.).

Diogenes costatus Hend. Inhambane (U.C.T.).

Diogenes senex Heller. Delagoa Bay (U.W.); Inhambane (U.C.T.).

Spiropagurus spirifer (de Haan). Inhambane (U.C.T.).

Pachycheles natalensis Krauss. Delagoa Bay (U.W.).

Polyonyx sp. In *Chaetopterus* tubes, Durban Bay (U.C.T.).

Callianassa rotundicauda Stebb. Saldanha Bay, and Durban Bay (U.C.T.).

Upogebia africana (Ortm.). West coast : Saldanha Bay (U.C.T.); South coast: mouth of Keiskama River and Sundays River (U.C.T.). Barnard, 1954.

Upogebia africana var. (Barnard, 1950, p. 520). Inhambane (U.C.T.).

Upogebia assisi Brnrd. False Bay, 10 fms. (U.C.T.).
Upogebia savignyi Strahl. False Bay, 8 metres (U.C.T.); Delagoa Bay (U.W.).
Scyllarides elisabethae (Ortm.). Off Inhambane (Lourenço Marques Museum).
Penaeopsis hilarulus de Man. Delagoa Bay (U.W.); Inhambane (U.C.T.).
Acetes erythraeus Nobili. Durban Bay (U.C.T.).
Leucifer penicillifer Hansen. Durban Bay (U.C.T.).
Caridina africana Kingsley. Inhambane (U.C.T.).
Latreutes mucronatus (Stmpsn.). Barnard, 1950, p. 706: for '135 mm.' read 13·5 mm. Durban Bay (U.C.T.).
Latreutes pygmaeus Nobili. Inhambane (U.C.T.).
Angasia armata (Paulson). Inhambane (U.C.T.).
Hippolysmata vittata Stmpsn. Inhambane (U.C.T.); Delagoa Bay (U.W.).
Ogyrides saldanhae Brnrd. Walfish Bay, up to 32 mm. in length (Holthuis, 1952). Table Bay (R. W. Rand, Guano Islands Administration, 1955).
Betaeus jucunda Brnrd. Mouths of Bashee River, Bushmans River, Zwartkops River, and Breede River (U.C.T.). Barnard, 1954.
Athanas cf. *minikoensis* Cout. Delagoa Bay (U.W.).
Palaemon in Barnard, 1950 = *Macrobrachium*; and *Leander* ibid. = *Palaemon*, subgen. *Paleander* and *Palaemon.*
'Palaemon' *sundaicus* and *delagoae* = *M. equidens* (Dana).
'Palaemon' *dolichodactylus* = *M. scabriculum* (Heller). See Holthuis, 1950.
'Leander' *Palaemon concinnus* Dana. Umkomaas and Durban Bay (U.C.T.). Barnard, 1954. Delagoa Bay (U.W.).
Anchistus inermis (Miers) = *custos* (Forskal.). Holthuis, 1952.
'Palaemonetes' *natalensis* Stebb. is considered to belong to the genus *Periclymenaeus* by Holthuis, 1952.
Paranchistus ornatus Holthuis 1952. Mozambique.
Harpilius a subgen. of *Periclymenes. H. depressus* and *beaupresii* placed in gen. *Harpiliopsis*. Holthuis, 1952.
Jocaste n.g. for *Coralliocaris lucina.* Holthuis, 1952.

TANAIDACEA

Leptochelia savignyi (Kröyer). Inhambane (U.C.T.).

ISOPODA

Cyathura estuaria Brnrd. St. Lucia Bay (U.C.T.).
Panathura serricauda Brnrd. Saldanha Bay (U.C.T.).
Exanthura macrura Brnrd. Lamberts Bay (U.C.T.).
Apanthura dubia Brnrd. East London (U.C.T.).
Mesanthura catenula (Stmpsn.). East London (U.C.T.).
Haliophasma pseudocarinata Brnrd. False Bay and Algoa Bay (U.C.T.).
Eurydice longicornis (Studer). Olifants River mouth and Saldanha (U.C.T.); Zwartkops estuary, Algoa Bay (Macnae, Rhodes Univ.).
Pontogeloides latipes Brnrd. Saldanha Bay, Durban Bay, Kosi Bay, and Inhambane (U.C.T.).
Cirolana undulata Brnrd. Various localities from Port Nolloth to East London (U.C.T.).
Cirolana bovina Brnrd. East London (U.C.T.).
Cirolana saldanhae Brnrd. 1951. Saldanha Bay (U.C.T.).
Cirolana cingulata Brnrd. Off Umkomaas (Natal), 40 fms. (S. Afr. Mus.); Arniston and Algoa Bay (U.C.T.). See also *infra* p. 53.
Aega monilis Brnrd. Saldanha Bay area (Fisheries Survey).
Nerocila trichiura (Miers). Durban, on *Exocoetus* (S. Afr. Mus.).

Livoneca raynaudi M. Edw. Durban, on a wrasse (S. Afr. Mus.).

Irona melanosticta Sch. & M. Durban, on *Tylosurus* (S. Afr. Mus.); Delagoa Bay, on *Tylosurus* (U.W.).

Sphaeroma serratum (Fabr.). Durban Bay (U.C.T.). Barnard, 1951. Delagoa Bay (U.W.).

Sphaeroma walkeri Stebb. Durban and Inhambane (U.C.T.).

Exosphaeroma planum Brnrd. Various localities from Port Nolloth to Jeffreys Bay (U.C.T.).

Exosphaeroma porrectum Brnrd. Lamberts Bay, Saldanha Bay, and Port Elizabeth (U.C.T.).

Exosphaeroma pallidum Brnrd. Saldanha Bay (U.C.T.).

Exosphaeroma estuarium Brnrd. 1951. Umkomaas, Natal (U.C.T.).

Pseudosphaeroma barnardi Monod. Hermanus, Wilderness (George Division) and Knysna (U.C.T.). Barnard, 1951.

Sphaeromene polytylotos Brnrd. Lüderitzbucht (S. Afr. Mus.); Port Nolloth (U.C.T.).

Dies monodi Brnrd. 1951. Bashee River, Port St. Johns, Umkomaas, and Kosi Bay (U.C.T.). See also *infra* p. 72.

Dynamenella australis Rich. Paternoster Bay and Danger Point (U.C.T.). Occurs under the shells of *Patella*.

Cymodocella sublevis Brnrd. Saldanha Bay, Plettenberg Bay, and East London (U.C.T.).

Cymodocella pustulata Brnrd. Saldanha Bay, Still Bay, and East London (U.C.T.).

Cymodocella magna Brnrd. 1954. Groen River (south of Port Nolloth) (U.C.T.).

Cymodocella eutylos Brnrd. 1954. Mossel Bay, Jeffreys Bay, and Kleinmond (Bathurst Division) (U.C.T.).

Idotea ziczac Brnrd. 1951. Saldanha Bay, and False Bay, 8 fms. (U.C.T.).

Paridotea reticulata Brnrd. Port Nolloth and Lamberts Bay (U.C.T.).

Paridotea rubra Brnrd. Port Nolloth, Lamberts Bay, and East London (U.C.T.).

Paridotea fucicola Brnrd. Port Nolloth, Still Bay, and Cape Infanta (U.C.T.).

Idarcturus platysoma Brnrd. Paternoster Bay (U.C.T.).

Arcturella corniger (Stebb.). One ♀, Morumbane, Inhambane (U.C.T.).

Antias uncinatus Vanh. Saldanha Bay (U.C.T.). Originally described from Simonstown.

Stenetrium crassimanus Brnrd. Plettenberg Bay and Quolora (U.C.T.).

Stenetrium diazi Brnrd. Plettenberg Bay (U.C.T.).

Janira capensis Brnrd. Lamberts Bay, Saldanha Bay, False Bay, and Knysna (U.C.T.).

Janira exstans Brnrd. Saldanha Bay, and East London (U.C.T.).

Ianiropsis palpalis Brnrd. Various localities from False Bay to East London (U.C.T.).

Iais pubescens (Dana). Durban, on *Sphaeroma walkeri*; and Inhambane, on Sphaeromids (U.C.T.).

Protojanira perbrincki Brnrd. 1955*b*. Natal and Zululand, freshwater. Peraeopod 1 of ♀ resembles that of ♂.

Alloniscus pigmentatus B-L. Inhambane (U.C.T.).

AMPHIPODA

Microlysias xenokeras Stebb. False Bay (U.C.T.).

Ampelisca diadema (Costa). Saldanha Bay (U.C.T.).

Leucothoe spinicarpa (Abildg.). Portuguese East Africa (S. Afr. Mus.).

Leucothoe richiardii Less. Saldanha Bay and False Bay (U.C.T.).

Stenothoe gallensis Wlkr. Knysna (U.C.T.).

Stenothoe assimilis Chevr. = *valida* Dana.

Temnophlias capensis Brnrd. Buffels River mouth (south of Port Nolloth) to Still Bay (U.C.T.). Barnard, 1954.

Temnophlias hystrix Brnrd. 1954. Hondeklip Bay (west coast), Cape Hangklip (south coast) (U.C.T.).

Palinnotus natalensis Brnrd. Port Shepstone and Richmond (Natal) (U.C.T.).

Colomastix pusilla Grube. Saldanha Bay (U.C.T.).

Perioculodes longimanus (B. & W.). Saldanha Bay (U.C.T.).

Synchelidium haplocheles (Grube). Inhambane (U.C.T.). Recorded by Walker 1904 from Ceylon as *brevicarpa* B. & W.

Calliopiella michaelseni Schell. Saldanha Bay and False Bay (U.C.T.). Occurs under the shells of *Patella* harmonizing in colour (mauve) with the animal's foot.

Nototropis guttatus (Costa). Olifants River mouth (U.C.T.). Recorded from the Mediterranean, Canaries, and Senegal.

Paramoera capensis (Dana). Various localities from Port Nolloth to Natal (U.C.T.).

Eriopisa chilkensis (Chilton). Knysna, and St. Lucia Bay (U.C.T.). Barnard, 1951.

Megaluropus agilis Hoek. Saldanha Bay (U.C.T.).

Melita zeylanica Stebb. Various localities from Olifants River mouth (west coast) to Inhambane (U.C.T.).

Melita fresnelii (Aud.). Inhambane (U.C.T.).

Maera subcarinata (Hasw.). Algoa Bay (U.C.T.).

Dexamine spiniventris (Costa). Saldanha Bay (U.C.T.).

Paradexamine pacifica (Thomson). False Bay (U.C.T.). See Barnard, 1930, '*Terra Nova*' *Rep.*, viii, 4, p. 389, figs.

Polycheria atolli Wlkr. Lamberts Bay, and Algoa Bay (U.C.T.).

Talorchestia ancheidos Brnrd. Inhambane (U.C.T.).

Talorchestia inaequalipes Brnrd. 1951. Saldanha Bay (U.C.T.).

Parorchestia notabilis Brnrd. 1935. Inhambane (U.C.T.). Originally described from Cochin State, India.

Hyale maroubrae Stebb. Knysna (U.C.T.).

Hyale saldanha Chilton. Port Elizabeth (U.C.T.).

Hyale grandicornis (Kröyer). Various localities from Lamberts Bay to Natal (U.C.T.). See also *infra* p. 93, fig. 46.

Grandidierella bonnieri Stebb. Durban, and Inhambane (U.C.T.).

Grandidierella chelata Brnrd. 1951. Port St. Johns and Bashee River mouth (U.C.T.).

Grandidierella lutosa Brnrd. 1952. Hermanus (U.C.T.); Kleinmond (Bathurst Division) (Rhodes Univ. Zool. Dept.).

Lembos jassopsis Brnrd. 1951. Saldanha Bay (U.C.T.).

Lembos podoceroides Wlkr. Inhambane (U.C.T.). Recorded from Ceylon, Maldives, Red Sea, Paumotu Archipelago.

Eurystheus semidentatus Brnrd. Algoa Bay (U.C.T.).

Cheiriphotis megacheles (Giles). Saldanha Bay, False Bay and Algoa Bay (U.C.T.).

Chevalia aviculae Wlkr. Inhambane (U.C.T.).

Ampithoe ramondi Aud. Inhambane (U.C.T.).

Cymadusa australis (Brnrd.). Paternoster Bay and False Bay (U.C.T.). Delagoa Bay (U.W.).

Erichthonius brasiliensis (Dana). Delagoa Bay (U.W.).
Cerapus abditus Templ. False Bay, Algoa Bay, and Inhambane (U.C.T.).
Siphonoecetes orientalis Wlkr. Inhambane (U.C.T.). Delagoa Bay (U.W.).
Siphonoecetes dellavallei Stebb. St. Helena Bay and False Bay (U.C.T.).
Pseudoprotella phasma (Montagu). 29° 16′ S., 14° 48′ E. s.s. '*Africana*' (per U.C.T.).
Metaprotella haswelliana (Mayer)
var. *taprobanica* Mayer. Inhambane (U.C.T.).

STOMATOPODA

Conchoderma hunteri (Owen). Natal, on jellyfish. Barnard, 1955*a*.
Poecilasma (*Temnaspis*) *amygdalum* Auriv. Delagoa Bay, on Palinurid (U.W.).

COPEPODA PARASITICA

Caligus pelamydis Kröyer. False Bay, on snoek, *Thyrsites atun*; Table Bay, on *Trigla capensis* (U.C.T.).
Caligus lunatus Wilson, 1928. False Bay, on *Seriola lalandei* (U.C.T.). Previously recorded from Red Sea, on *Seriola aurovittata* (Wilson).
Caligus coryphaenae St. & L. Table Bay, on a shark (U.C.T.).
Caligus rapax M. Edw. Table Bay, on *Merluccius capensis* and *Trachurus trachurus* (U.C.T.).
Caligus mauritanicus Brian 1924. False Bay, on *Pomatomus saltator* (U.C.T.).
Caligus (?) *bonito* Wilson 1905. False Bay, on *Sarda sarda*. ♂ only; record should be checked on ♀ material (U.C.T.).
Caligus zei Norm. & Scott 1906. False Bay, on *Thyrsites atun*. Agrees with the description, but a check on further material is desirable (U.C.T.).
Caligus brevicaudatus A. Scott 1901. Table Bay, on *Trigla capensis* (U.C.T.).
Caligus labracis T. Scott 1902. Table Bay, on *Clinus superciliosus* (U.C.T.).
Pennella exocoeti (Holten). Length 40 mm. On *Exocoetus*. (Fish. Research Ship 'Africana II', 1951.)
Charopinus ramosus Kröyer. Table Bay, on a skate (U.C.T.).
Clavellisa scombri (Kurz). Table Bay, on gills of *Scomber colias* (*japonicus*) (U.C.T.).
Parabrachiella insidiosa (Heller). Table Bay, on *Merluccius capensis* (U.C.T.). *P. australis* Wilson (see: Barnard, *Ann. S. Afr. Mus.*, xli, p. 298, 1955) should probably be made a synonym.

DECAPODA

Fam. INACHIDAE

Gen. *Paratymolus* Miers

1879. Miers, *Proc. Zool. Soc. Lond.*, p. 45.
1880. Haswell, *Ann. Mag. Nat. Hist* (5), v. p. 302.
1882. id., *Cat. Austral. Crust.*, p. 142.
1884. Miers, *Zool. H.M.S. 'Alert', Crust.*, p. 261.
1893. Ortmann, *Zool. Jahrb. Syst.*, vii, p. 34.
1895. Alcock, *J. Asiat. Soc. Bengal*, lxiv, p. 173.
1929. Balss, *Denkschr. Ak. Wiss. Wien.*, cii, p. 3 (placed in group *Camposcioidea*).

Carapace ovoid or subpentagonal, convex, anterior third declivous. Rostrum prominent but short, apically bifid, dorsally grooved. Eye-stalks fairly long, straight, movable but not retractile, cornea subglobular, scarcely oblique; orbits incomplete ventrally. Ant. 1 folding longitudinally, sockets separated by a septum. Ant. 2 peduncle slender, basal joint short. Mxp. 3 suboperculiform, flagellum well developed. Chelipeds (♀) short, wrist with strong upstanding spine. Legs not elongate, dactyls slender, nearly straight. Genital openings of ♀ sternal. Abdomen ♂ 5-segmented, ♀ 7-segmented.

Differs from *Achaeus* in the short basal joint of ant. 2, less oblique and more globular cornea, and short legs.

Paratymolus pubescens Miers

Figs. 1, 2.

1879. Miers, loc. cit., p. 45, pl. 2, fig. 6.
1880. Haswell, loc. cit., p. 303, pl. 16, figs. 1, 2 (*bituberculatus*).
1882. id., loc. cit., p. 142 (*bituberculatus*).
1893. Ortmann, loc. cit., p. 35, pl. 3, fig. 2 (ventral view rostrum and mxp. 3).
1910. Rathbun, *Vid. Selskr. Skr. Copenhagen* (7), v. p. 317.

All exposed surfaces of carapace and appendages covered with a close velvety 'pubescence' (see Remarks). Carapace pentagonal; posterior two-thirds nearly flat, anterior third declivous. Rostrum short, broadly triangular, dorsally grooved, apically bifid, lobes rounded. A supraorbital tooth. Antero-lateral margin sharply bidentate, hinder tooth the larger, forming the angle between antero- and postero-lateral margins; postero-lateral margin fading out posteriorly on the dorsal surface, with 2 inconspicuous tubercles; lateral margin (as seen in dorsal view) with a conical tooth on the branchial region. Dorsal surface with 2 conical projections in front of the gastric region, and a median rounded inconspicuous hump on the cardiac-intestinal regions. Lower margin of carapace with feebly plumose setae in front, followed by closely set straight, tubular setae.

Basal joint of ant. 2 short, 2nd joint longer, 3rd longer than 2nd, clavate setae on lower margin of 2nd joint, and on lower and upper margins of 3rd joint, those on lower margin of 3rd joint especially long; flagellum about equal to last 2 peduncular joints, with a few long setae. Eye-stalks short, cornea subglobular, a short clavate seta on anterior apex of stalk at base of cornea. Mxp. 3 external surface of 3rd and 4th joints and exopod with 'pubescence'.

Cheliped with 'pubescence', anterior margin of arm with 4 clavate setae, the strong acute process of the wrist with large clavate setae on posterior margin, smaller ones on anterior margin, hand and fingers also with clavate setae, cutting edges of finger and thumb with several small denticles, stronger on thumb than on finger, and numerous short simple and longer clavate setae.

All legs of all specimens detached; the longer ones being presumably the anterior ones. Dactylus longer than preceding joint, with 3 or 4 retrorse denticles, the middle one the largest; a series (5–6) of long clavate setae on both anterior and posterior surfaces.

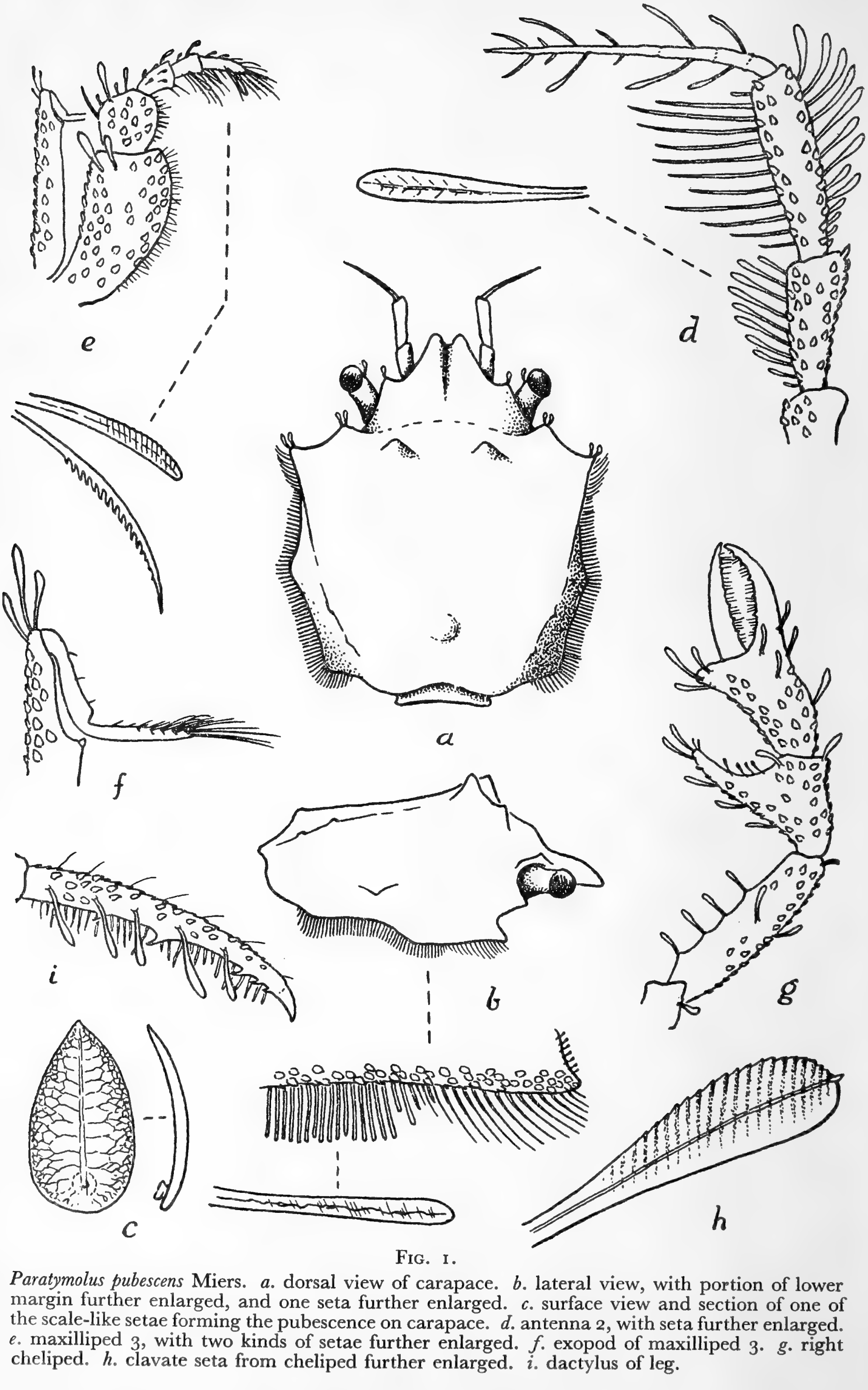

FIG. 1.

Paratymolus pubescens Miers. *a.* dorsal view of carapace. *b.* lateral view, with portion of lower margin further enlarged, and one seta further enlarged. *c.* surface view and section of one of the scale-like setae forming the pubescence on carapace. *d.* antenna 2, with seta further enlarged. *e.* maxilliped 3, with two kinds of setae further enlarged. *f.* exopod of maxilliped 3. *g.* right cheliped. *h.* clavate seta from cheliped further enlarged. *i.* dactylus of leg.

Pleopod 1 ♂: the basal joints of the two appendages are fused to form a transverse plate, to which the separate distal joints are articulated. The latter very stout, especially the posterior flange of the seminal channel proximally; apex curved outwards, thickly setose. Pleopod 2: the two appendages are separate and normal in shape.

Length ovig. ♀ 6·5, breadth 5·5 mm. As preserved, pinky-brown, eyes maroon.

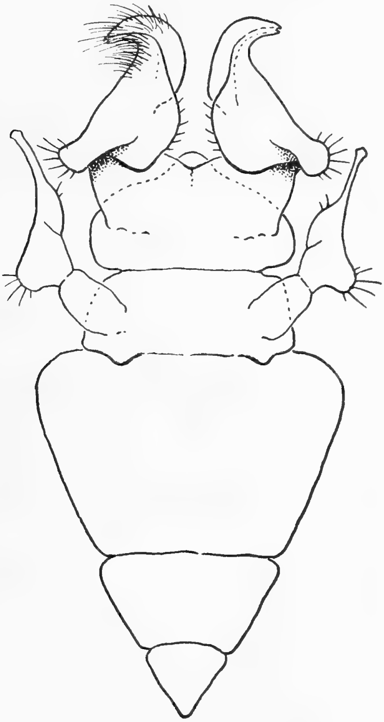

Fig. 2.

Paratymolus pubescens Miers. Sternal view of ♂ abdomen with 1st (fused) and 2nd pleopods (apical setae omitted on left pleopod 1).

Locality. Inhambane, Portuguese East Africa. 1 ♂, 2 ovig. ♀♀, 2 immature, in Zostera beds (U.C.T. Jan. and July 1954).

Distribution. Japanese Seas, Siam (*pubescens*); Queensland (*bituberculatus*).

Remarks. The 'pubescence' would be better described as a 'lepidosis', the setae being flattened and broadly ovate, and more or less imbricate.

These specimens correspond so closely with the descriptions and figures of Miers's *pubescens* and Haswell's *bituberculatus*, and Alcock's *hastatus*, that there seems no justification for a n. sp. They have broader shoulders than in Miers's and Alcock's figures, thus corresponding better with Haswell's figure. The upper distal apex of the hand is more prominent than in Miers's figure, but less prominent than in Haswell's, approximately as in Alcock's figure. The 4 small teeth on posterior border of the arm, mentioned by Haswell, are not present; whereas the 4 conspicuous clavate setae on the anterior margin apparently were not present in Haswell's specimen, but are shown in Alcock's figure.

Alcock's *hastatus* apparently is more tuberculate than either Miers's or Haswell's or the present specimens, but I think it should be regarded as synonymous.

The size of the plate formed by the fusion of the coxopodites (Cochran 1935) or 'bridge' joining the protopodites (Flipse, 1930) of the 1st pleopods is remarkable.

Fam. ACANTHONYCHIDAE

Gen. *Antilibinia* McLeay

1950. Barnard, loc. cit., p. 36, fig. 7*c*, *d*.

Through the kindness of Dr. H. B. S. Cooke (Geology Dept. Witwatersrand University) the Museum has received a fine ovigerous ♀ of *A. smithii* McLeay from the coast of Pondoland, measuring 62 × 57 mm.

This specimen confirms Krauss's statement and figures that there are seven abdominal segments in both sexes.

Gen. *Menaethiops* Alcock

1950. Barnard, loc. cit., p. 38.

Two dozen specimens of this genus have been examined. They appear to belong to three species. One is *fascicularis*, but the other two cannot easily be assigned to any species recorded from the western Indian Ocean, viz. *brevicornis* M. Edw. 1868, *acutifrons* M. Edw. 1868, *bicornis* Alcock 1895, and Lenz 1905, *nodulosa* Nobili 1905, *corniculata* Klunz. 1906, and *contiguicornis* Klunz. 1906. The descriptions of these species make no mention of some characters which appear to be of specific value. Two n. spp. are therefore instituted, with local names.

The validity of these three species may appear doubtful because of the overlap in distribution. Twenty-four is a very small number of specimens; gradations may later be collected; but on the available evidence they cannot be referred to only one species. The sternal sculpture in the ♂ may not prove to distinguish all the species of this genus, but it is very distinctive in two of the present species.

Menaethiops fascicularis (Krauss)

Fig. 3*a*–*c*.

1929. Balss, *Denkschr. Ak. Wiss. Wien.*, cii, p. 9, fig. 3.
1950. Barnard, loc. cit., p. 39, fig. 8.

This species is well characterized by the absence of a projecting anterior corner on the supraorbital margin, which passes in a sinuous curve into the rostral prong. Suborbital margin denticulate. Outer apex of basal joint of ant. 2 strongly produced. The distal margin of the basal joint, adjoining the insertion of the following joint, is nodulose or crenulate, and these crenulations continue on a short longitudinal ridge in the middle of the basal joint. The rim of the antennulary socket is also crenulate. These crenulations are particularly distinct in the Delagoa Bay 6 mm. ♀. The postocular tooth (hind corner of the supraorbital margin) is nearly linear or narrowly triangular, serrulate (at least on hind margin). A slight swelling on ocular peduncle, but no definite spine.

The sternite between the chelipeds is smooth, polished, and concave in front of a transverse series of inconspicuous granules, behind which the surface is covered with impressed punctae. The other sternites are also punctate, without any granules.

The above characters are constant in 3 ♂♂ (6–7 mm.) and (except the sternite) in two non-ovigerous ♀♀ (4·5 and 6 mm.).

Additional locality. Delagoa Bay. 1 non-ovig. ♀ (6 mm.). (U.W.)

Menaethiops natalensis n. sp.

Fig. 3*d–f*.

In general similar to *fascicularis*, but rostral prongs a little longer. Supraorbital margin with well-marked acute anterior projection; postocular tooth serrulate as in *fascicularis*, but larger and more triangular, though not always as broadly triangular as here figured. Suborbital margin very feebly (if at all) denticulate, usually nearly straight, but sometimes convex in the middle. Outer apex of basal joint of ant. 2 not strongly produced (but somewhat variable). Rim of the antennulary socket feebly crenulate, but no ridge on the basal joint of ant. 2. A well-marked spine on ocular peduncle.

Sternite between chelipeds polished in front and punctate behind with a scarcely perceptible ridge between the two areas. Other sternites punctate, without granules.

Pleopod 1 ♂ as in *fascicularis*.

Length 10 mm.

Localities. Umpangazi (Impengazi), Natal. 1 ♂ (U.C.T); Delagoa Bay. 2 ♂♂ (7 mm.) 5 ovig. ♀♀ (7–10 mm.) 9 immature (4–7 mm.) (U.W.)

Remarks. In one specimen the right anterior corner of the supraorbital margin is rather strong and curved outwards, approximating to *delagoae*. In two other specimens the anterior corner on one side (right or left) is bevelled off as in *fascicularis*.

M. Edwards's figure of *brevicornis* shows a transverse line of granules not only on the sternite between the chelipeds, but on the three following sternites.

Menaethiops delagoae n. sp.

Fig. 3*g–i*.

In general similar to *fascicularis*, but rostral prongs longer, distally divergent. Supraorbital margin sinuous, the acute anterior corner larger than the acute

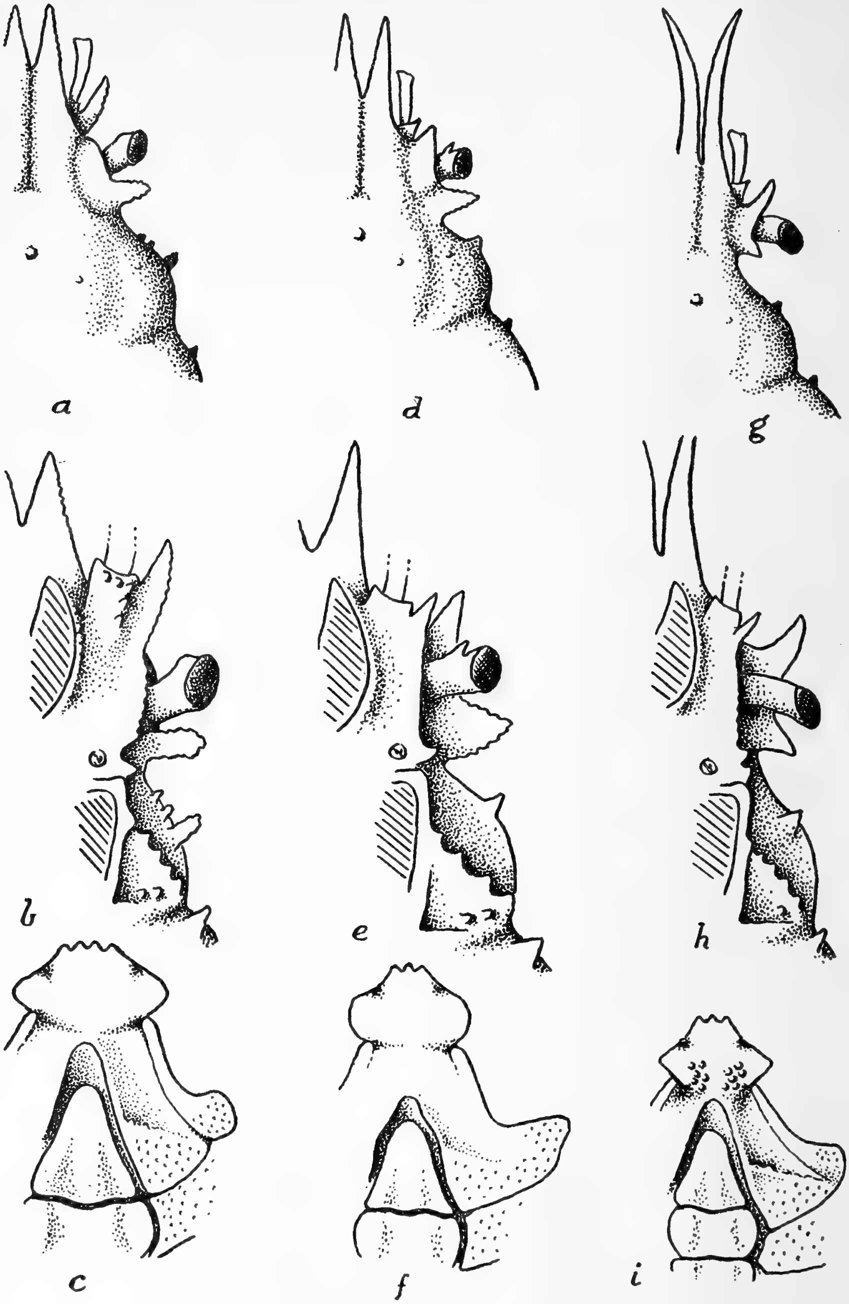

Fig. 3.

Menaethiops fascicularis (Krauss). *a.* dorsal view of rostral prongs and antero-lateral portion of carapace. *b.* ventral view of same. *c.* sternite between chelipeds, and apex of abdomen.
Menaethiops natalensis n. sp. *d, e, f.* as in *a, b, c* respectively.
Menaethiops delagoae n. sp. *g, h, i.* as in *a, b, c* respectively.

posterior corner (postocular tooth), both non-serrulate. Suborbital margin straight, denticulate posteriorly. Outer apex of basal joint of ant. 2 acutely, but not strongly, produced. Rim of antennulary socket not crenulate, and no ridge on basal joint of ant. 2. No spine on ocular peduncle.

Sternite between chelipeds with 2 groups of 6–7 granules in front of the abdominal groove, polished and concave in front of a transverse series of granules, punctate behind. Other sternites punctate, without granules. The suture between 1st and 2nd sternites opposite the middle of the 6th abdominal segment, not as in the other species opposite the suture between 6th and 7th segments.

Pleopod 1 ♂ as in *fascicularis*.

Length 10·5 mm.

Locality. Delagoa Bay. 1 ♂ (U.W.)

Remarks. M. Edwards does not figure the sternites of *acutifrons*.

Fam. MAMAIIDAE

Gen. *Cyphocarcinus* M. Edw.

1868. M. Edwards, *Nouv. Arch. Mus. Paris*, IV, p. 73 (♀).
1875. Paulson, *Red Sea Crust*, p. 3 (♂) (*Ixion*).
1889. Cano, *Bol. Soc. Napoli* (1), 3, pp. 86, 180 (*Podohuenia*).
1923. Gravier, *Bull. Mus. N. H. Paris*, 1923, 3, p. 214 (♂) (*Stenocarabus*).
1929. Balss, *Denkschr. Ak. Wiss. Wien.*, cii, p. 22.
1945. Stephensen, *Dan. Sci. Invest. Iran*, 4, p. 108, fig. 21 A, B (plp. 1, 2. ♂).

Cyphocarcinus capreolus (Paulson)

Fig. 4.

1875. Paulson, loc. cit., p. 3, pl. 2, figs. 1*a–f* (♂) (*Ixion c.*).
1923. Gravier, loc. cit., p. 214, figs. 1–8 (♂) (*Stenocarabus suspensus*).

Carapace of both sexes resembling the figures given by Paulson and Gravier, i.e. without conspicuous knobs, only a rostral knob followed by 2 small granules in the median line; some tiny granules along the costate lateral margin, discernible more by their white colour than by their relief; a rather conspicuous white granule just in front of the faint cervical groove. A transverse section through the hinder third of the carapace would show an almost evenly curved semicircular profile in the ♂, but in the ♀ a somewhat squarish profile owing to the presence of an obscure blunt longitudinal ridge, on which are 2-3 little granules; below this the lateral wall of the branchial region is nearly vertical. All these granules are better developed in ♀ than in ♂; in addition ♀ has 4 granules *en carré* in the middle of the carapace and a medio-dorsal series (3–5) towards the hind end.

Orbit circular, with a slit on anterior, posterior, and inferior margins; upper margin anteriorly with a small setiferous tubercle. Surface closely pitted (as in Paulson's and Gravier's figures), and covered with short fine pile; longer setae on supraorbital ridge and on rostral knob and prongs.

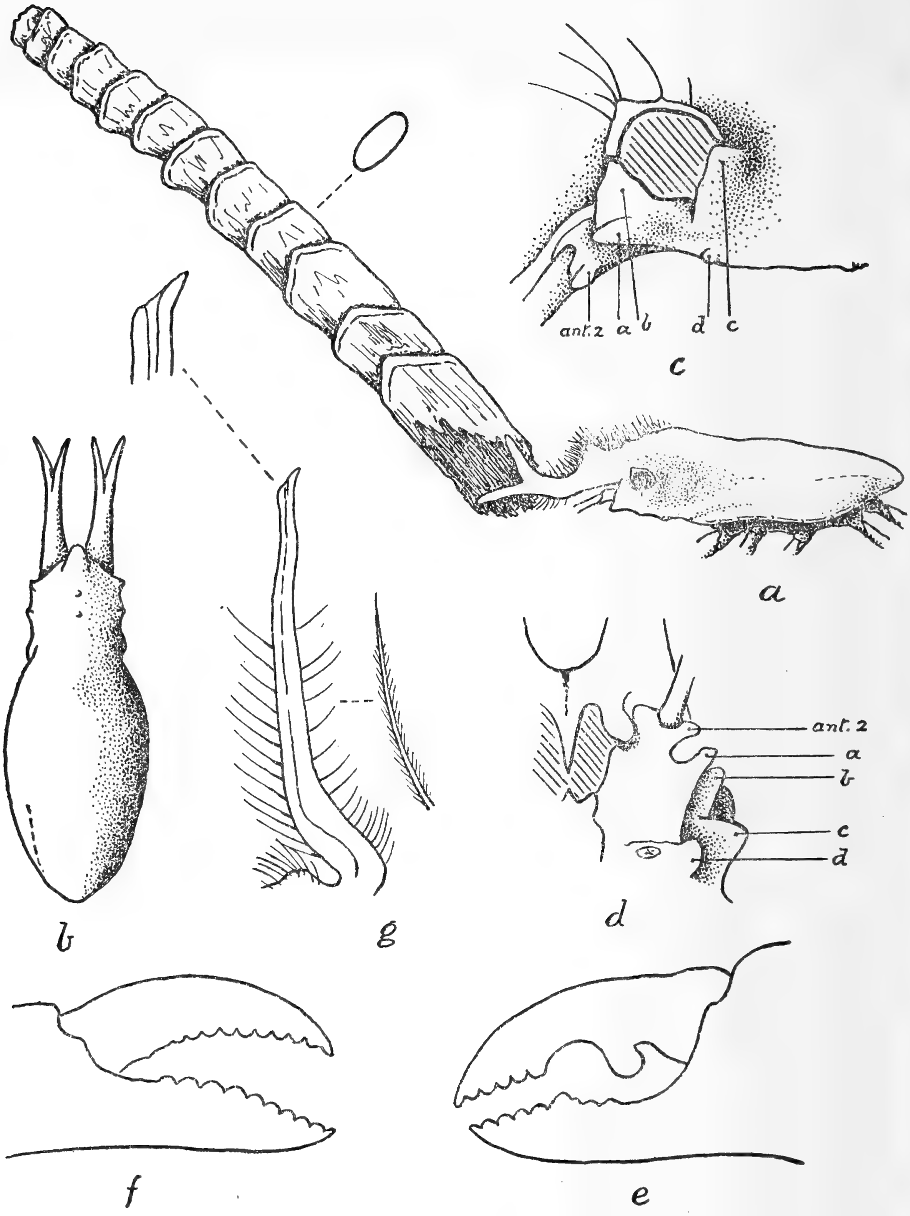

Fig. 4.

Cyphocarcinus capreolus (Paulson). *a.* side view of ♂ carrying a piece of *Cymodocea*. *b.* dorsal view of carapace (the tips of the upper branches of the rostral prongs have been drawn too far apart). *c.* view of the left orbital region. *d.* ventral view of left antennulary and antennal region: ant. 1 removed from socket; lettering corresponding with that in fig. *c.* *e.* chela of ♂. *f.* chela of ♀. *g.* pleopod 1 ♂, with apex further enlarged.

Abdomen in both sexes of 7 segments; in ♂ 1st short, 2nd and 3rd much wider, remainder gradually decreasing, but 6th slightly widened across distal margin, 7th longer than its basal width; in ♀ (nonovigerous) widest across suture between 3rd and 4th segments, 7th shorter than its basal width; 2nd segment in both sexes with a small blunt median knob.

Chelipeds subequal, larger and more robust in ♂ than ♀, arm with 4 granules on upper margin, and 5–6 on lower margin (not shown in Paulson's figure). In ♂ finger with strong tooth near base, followed by a semicircular gap, and a distal cutting-edge with 5 rounded denticles, thumb with 8–9 denticles, one larger than the others, distal to which the cutting-edge resembles that of the finger. In ♀ finger with no tooth (or only a very small one) at base, cutting-edge with 9 rounded denticles, thumb with 9 similar denticles. Paulson's figure of the cheliped of his ♂ almost corresponds with that of the present ♀♀, from which one may assume that the toothed and gaping finger seen in the present ♂♂ is developed only when the animal is fully grown. The curve of the cutting-edge of the thumb in Paulson's figure is not exactly like that of the present ♀♀, but seems to indicate that at a future, perhaps the next, moult it would assume that of the present ♂♂. Gravier's specimen was in the same stage as Paulson's.

Dactylus of all legs with 7–8 strong spiniform teeth, increasing in size distally, in addition to the unguis.

Pleopod 1 ♂ as in Stephensen's figure; the process on the basal transverse joint not so strong as in Gravier's figure 8.

Length ♂ ♀ 11·5 from rostral knob, 13–14 mm. including the rostral prongs. As preserved, madder-brown, pinkish or pale salmon, abdomen of ♀ speckled, chelipeds and legs paler, finger and thumb of chelipeds white, eyes maroon.

Locality. Inhaca Island, Delagoa Bay. 4 ♂♂, 9 ovigerous and 1 non-ovigerous ♀♀, 2 juv. (U.W.)

Distribution. Red Sea (*capreolus*); Madagascar (*suspensus*).

Remarks. Laurie (1915. *J. Linn. Soc. Lond.*, xxxi, p. 433), Nobili (1906 and 1907), and Balss (1929) regard *capreolus* as a synonym of *minutus* M. Edw. 1868. Balss accepted two species: the knobbly *minutus* and the smooth *suspensus*, but nevertheless made the smooth *capreolus* a synonym of the former.

I am inclined to concur with Dr. Gordon (in litt. July 1954) that in all probability there is only one somewhat variable species whose distribution extends from the Red Sea, Persian Gulf, Andaman Is., to the Seychelles, Madagascar, and Delagoa Bay (Stephensen misquoted M. Edwards and included Zanzibar). For the present, however, I prefer to record these specimens, smooth (except for the granules) in both sexes, as *capreolus*.

Laurie and Gravier both refer to M. Edwards's fig. 8 which shows in the ♀ the rostral prongs united for a distance about equal to the length of the antennulary sockets, and then divergent, with a V-shaped sinus; very different from Paulson's fig. 1*b* and the present specimens. Rathbun (1911. *Trans. Linn. Soc. Lond.*, zool., xiv, p. 255), however, suggests that M. Edwards overlooked a narrow slit separating the bases of the prongs. But that does not obviate the difference in the shape of the sinuses.

Nobili and Rathbun record the ♂ as carrying a long cylindrical sponge 'projecting' from its rostral prongs; but it is not stated (I have not seen Nobili) whether the sponge was growing on the crab or had been picked up by the crab.

One of the present ♂ specimens has a length (22 mm.) of the stem of the marine flowering plant *Cymodocea ciliata* firmly wedged between the prongs. The stem is oval in section and will only fit one way between the prongs. Another ♂ (total length 11 mm.) carries edgwise a piece of the leaf of Cymodocea, approximately 11 × 8 mm. A ♀ (total length 13 mm.) carries, edgewise, a piece of leaf 10 × 3 mm. In these cases there is no possibility of a natural settlement as there might be in the case of a sponge; the crabs must have 'purposely' picked up their burdens and fitted them between the prongs. The other specimens have nothing wedged between the prongs. But all are so densely covered with the filaments of a calcareous alga and hydroids as to be scarcely recognizable as animals until cleaned. One ♀ is overgrown with a sponge (with calcareous calthrop spicules) and another ♀ is almost completely covered by a gelatinous Tunicate; both are covered in addition with other 'rubbish'.

For a figure of *Cymodocea* see: Cohen. *S. Afr. J. Sci.*, xxxvi, p. 246, fig. 1, 1939. Delagoa Bay is the southernmost recorded limit of this Red Sea genus: Kalk. *S. Afr. J. Sci.*, li, 4, p. 108, 1954.

Fam. Parthenopidae

Gen. *Eumedonus* M. Edw.

1834. M. Edwards, *Hist. Nat. Crust.*, i, p. 349.
1894. Rathbun, *Proc. U.S. Nat. Mus.*, xvii, p. 66 (*Echinoecia*).
1906. id., *Bull. U.S. Fish. Comm. for* 1903, pt. 3, p. 880.
1918. id., *Biol. Res. 'Endeavour'*. v, pt. 1, pp. 27, 28.
1922. Gravier, *Bull. Mus. Hist. Nat. Paris*, 1922, no. 7, p. 484.
1930. Flipse, *Siboga Exp. monogr.*, xxxix, c. 2, pp. 80, 90 (the genotype *niger* M. Edw. is, by some mischance, omitted).
1934. Gordon, *Res. Sci. Ind. orient. Neerl.*, iii, 15, p. 62.
1938. Monod, *Mem. Inst. Egypte*, xxxvii, pp. 110–12.

Eumedonus granulosus MacGilch.

1905. MacGilchrist, *Ann. Mag. Nat. Hist.* (7), xv, p. 253.
1907. *Illustr. Zool. 'Investigator'*, pt. 12, pl. 77, figs. 2, 2*a*.
1911. Rathbun, *Trans. Linn. Soc. Lond.* (2), zool., xiv, p. 259.
1942. Ward, *Mauritius Inst. Bull.*, ii, p. 78.
1954. Barnard. *Mem. Inst. Sci. Madagascar*, A. ix. p. 96. fig. 1.
?1905. Lenz, *Abh. Senckenb. Ges.*, xxvii, 4, p. 344 (*zebra*, non Alcock).

Length 14, breadth 15 mm. Dull salmon with longitudinal, paler, dark-bordered stripes; chelipeds and legs speckled with red, finger and thumb of chelipeds white.

Locality. Delagoa Bay. 1 ♀ (U.W.).

Distribution. Persian Gulf, 47–9 fms.; Amirante Is., 28 fms. ? Zanzibar (Lenz).

Fam. HYMENOSOMATIDAE

Hymenosoma orbiculare Desm.

Fig. 5.

1950. Barnard, loc. cit., p. 68, fig. 15*a*, *b*.
1951. Capart, *Exp. ocean. Belge*, p. 61, fig. 18.
1955. Broekhuysen, *Ann. S. Afr. Mus.*, xli, pp. 313–43, text-figs. 1–13 (breeding and growth).

Additional localities. Tiger Bay, Angola (Capart); Inhambane, Portuguese East Africa (U.C.T. 1954).

A figure is given here of the specimens referred to on pages 70, 71 of my monograph. I am still of opinion that a specific name is not really necessary. The full life-history and ecology of the normal shallow-water form and the ornate form from deeper water should be fully investigated.

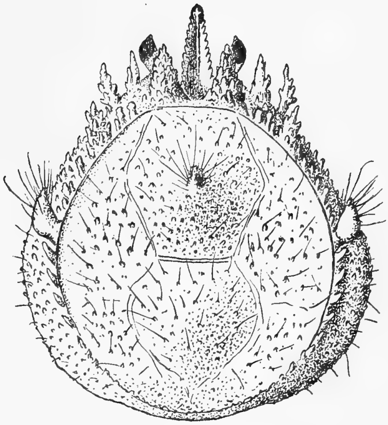

FIG. 5.

Hymenosoma orbiculare Desm. Carapace of ovigerous ♀ of the ornate form from deep water in False Bay. See: Barnard, 1950, loc. cit., pp. 70–1.

FAM. PINNOTHERIDAE

Gen. *Pinnixa* White.

1846. White, *Ann. Mag. Nat. Hist.*, xviii, p. 177.
1876. Lockington, *Proc. Calif. Ac.*, vii, p. 55 (*Tubicola*).
1918. Tesch, *Siboga Exp. monogr.*, xxxix, c. 1, p. 266 (list of species).

Commensal in tubes and burrows of Polychaets and Holothurians. Hitherto recorded mostly from the coasts of America.

Pinnixa penultipedalis Stmpsn.

Fig. 6.

1858. Stimpson, *Proc. Ac. Nat. Sc. Philad.*, x, p. 108 (♀).
1894. Ortmann, *Zool. Jahrb. Abt. Syst.*, vii, p. 695, pl. 23, fig. 7.
1907. Stimpson ed. Rathbun, *Smiths. Misc. Coll.*, xlix, p. 143 (♀).

Carapace smooth, punctate laterally on the branchial region; very fine tomentum occupying very shallow grooves: one transverse to anterior margin (hepatic), one parallel to antero-lateral margin, and one parallel to postero-lateral margin; a faint transverse ridge across posterior half of carapace; pterygostomial region and bases of legs furry.

Abdomen reaching to buccal cavity; ♂ with segments 4–6 fused, basal segments not nearly occupying sternal width; in ♀ sutures between segments 1 and 2, and between 2 and 3 (cf. Stimpson) furry.

Mxp. 3, 6th joint articulated within the apical margin of 5th which projects as a rounded flange on the internal (anterior) surface. A transverse subapical row of long close-set setae on 5th joint, a submarginal one on the median edge

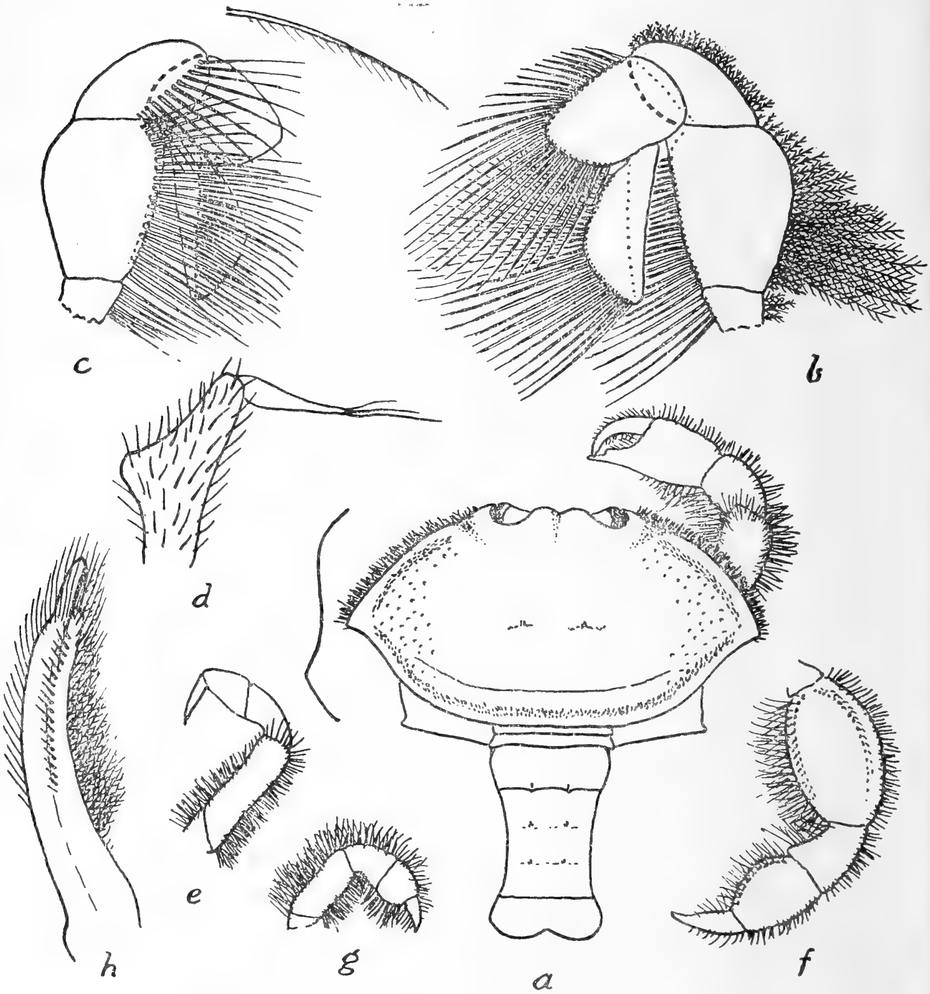

Fig. 6.

Pinnixa penultipedalis Stmpsn. *a*. carapace, cheliped, and extended abdomen, longitudinal profile of carapace on left. *b*. external view of left maxilliped 3. *c*. internal view of same. *d*. external view of exopod of right mxp. 3. *e*. 1st walking leg. *f*. 3rd leg. *g*. 4th leg. *h*. posterior view of left pleopod 1 ♂.

of 4th joint, and a longitudinal one on 7th joint, all three series of setae on the inner (anterior) surface of the appendage.

Finger and thumb of chelipeds gaping, furry, finger crossing apex of thumb which has a subapical ridge.

Third leg much larger and stronger than any of the others (incl. chelipeds); outer (upper) margin of 4th–6th and inner (lower) margin of 4th and 6th joints minutely crenulate, concealed by thick marginal fur on posterior surface but visible on the anterior surface; 4th joint with 2 rows of fur-covered granules on posterior surface, subparallel with upper and lower margins; and a similar row very near the lower margin of 6th joint. (The lower margin of this latter joint might be described as flat between 2 granular ridges.) Fourth leg shortest, thickly setose; upper margin of 4th joint crenulate, lower margin flat between 2 granular ridges.

Length 3·5 mm., breadth 6·5 mm. Pinkish.

Locality. Inhambane. ♂♂ and ♀♀ associated with Sipunculid worms: ovig. ♀♀ in Jan. (U.C.T. Jan. and July 1954).

Distribution. Hong Kong and Japan.

Remarks. These specimens seem to agree with Stimpson's description as regards the characters mentioned by him. The identification, however, is by no means certain. The transverse ridge across the carapace, and the large penultimate pair of legs are characters shared with other species.

Ortmann's small figure shows an ovoid carapace, without any lateral angularities such as are present in other species (see e.g. Rathbun. 1898. *Proc. U.S. Nat. Mus.*, xxi, pl. 43, figs. 6 and 7).

P. penultipedalis and *tumida* seem to be the only two species recorded from the Indo-Pacific region. The Madagascan *P. brevipes* M. Edw. 1853 is considered by Tesch to belong to another genus.

Fam. Oxypodidae

Gen. *Macrophthalmus* Latr.

1950. Barnard, loc. cit., p. 101.

A revised key is given to include the new South African records of *convexus*, *latreillei*, and *depressus*.

A. Carapace about twice as broad as long. Outer surface hand ♂ with a ridge near lower margin.
  1. Inner surface hand ♂ with a spine. External orbital tooth smaller than 1st antero-lateral tooth.
    a. External orbital tooth and 1st antero-lateral tooth crossed, or nearly at right angles.
      (i) Eye-stalks extending slightly beyond sides of carapace. . . . . [*sulcatus* Mauritius]
      (ii) Eye-stalks scarcely reaching inner margin of 1st lateral tooth. . . . *grandidieri*
    b. External orbital tooth and 1st antero-lateral tooth pointing approximately in same direction.
      (i) Length of hand ♂ chela (without thumb) 4 times as long as high. Carapace with verrucose tubercles laterally. . . . . [*brevis* Mauritius]

(ii) Length of hand (without thumb) about twice as long as high. Carapace without verrucose tubercles. . . . . *hilgendorfi*
2. Inner surface of palm without spine. External orbital tooth larger than 1st antero-lateral tooth, and forming the anterior angle of carapace. . . . . *convexus*
B. Carapace less than twice as broad as long, conspicuously granulate. Inner surface palm of ♂ chela without spine.
1. Four lateral teeth, including the external orbital tooth. . . . . *latreillei*
2. Two lateral teeth (3rd tooth indicated by a minute notch).
a. Length of carapace about ⅔ width. On each branchial region 2 longitudinal parallel lines of granules. . . . . *depressus*
b. Length of carapace about ¾ width. No parallel lines of granules. . . . . *boscii*

Macrophthalmus hilgendorfi Tesch

1950. Barnard, loc. cit., p. 103, fig. 20*j*

Two immature specimens, ♂ 5·5 × 11 mm. and ♀ 5 × 10 mm., seem to be referable to this species. The one discrepancy is the absence of the tooth on the inner surface of palm of cheliped. Apparently this tooth should be regarded as an adult feature.

Locality. Inhambane. (U.C.T.)

Macrophthalmus convexus Stmpsn.

1900. Alcock, *J. Asiat. Soc. Bengal.*, lxix, p. 378.
1915. Tesch, *Zool. Med. Mus. Leiden*, i, p. 175, pl. 7, fig. 8.
1919. Kemp, *Rec. Ind. Mus.*, xvi, p. 389, pl. 24, fig. 2 (abnormal ♂ chela).

Locality. Durban Bay. (U.C.T.)

Distribution. Mauritius, Madagascar, Indo-Pacific.

Macrophthalmus latreillei (Desm.)

1881. Lenz and Richters, *Abh. Senckenb. Ges.*, xii, p. 4, figs. 24–7 (*polleni*).
1886. Miers, '*Challenger*' *Rep.*, xvii, p. 250, pl. 20, fig. 1 (*serratus*).
1906. Laurie, *Herdman Ceylon Pearl Fish.*, v. Suppl., Rep. 40, p. 427, text-fig. 12 and pl. 2, fig. 3.
1915. Tesch, loc. cit., p. 181 (synonymy).

Locality. Inhaca Island, Delagoa Bay. 1 ♀ (U.W.).

Distribution. Madagascar, Indo-Pacific.

Macrophthalmus depressus Rüppell

1915. Tesch, loc. cit., p. 196, pl. 9, fig. 13.
1919. Kemp, loc. cit., p. 392.
1945. Stephensen; *Dan. Sci. Invest., Iran*, pt. 4, p. 191, fig. 58A (plp. 1 ♂).

Locality. Inhambane. (U.C.T.)

Distribution. Red Sea, Persian Gulf, Aden, Ceylon.

Gen. *Paracleistostoma* de Man

1895. de Man, *Zool. Jahrb. Syst.*, viii, p. 580.
1918. Tesch, *Siboga Exp. monogr.*, xxxix, c. pp. 58 (in key), 62.
1932. Shen, *Zool. Sinica.*, A, ix, 1, p. 231 (*P. cristatum* de Man figured).
1937. Tweedie, *Bull. Raffles Mus.*, 13, p. 157 (2 n. spp.).

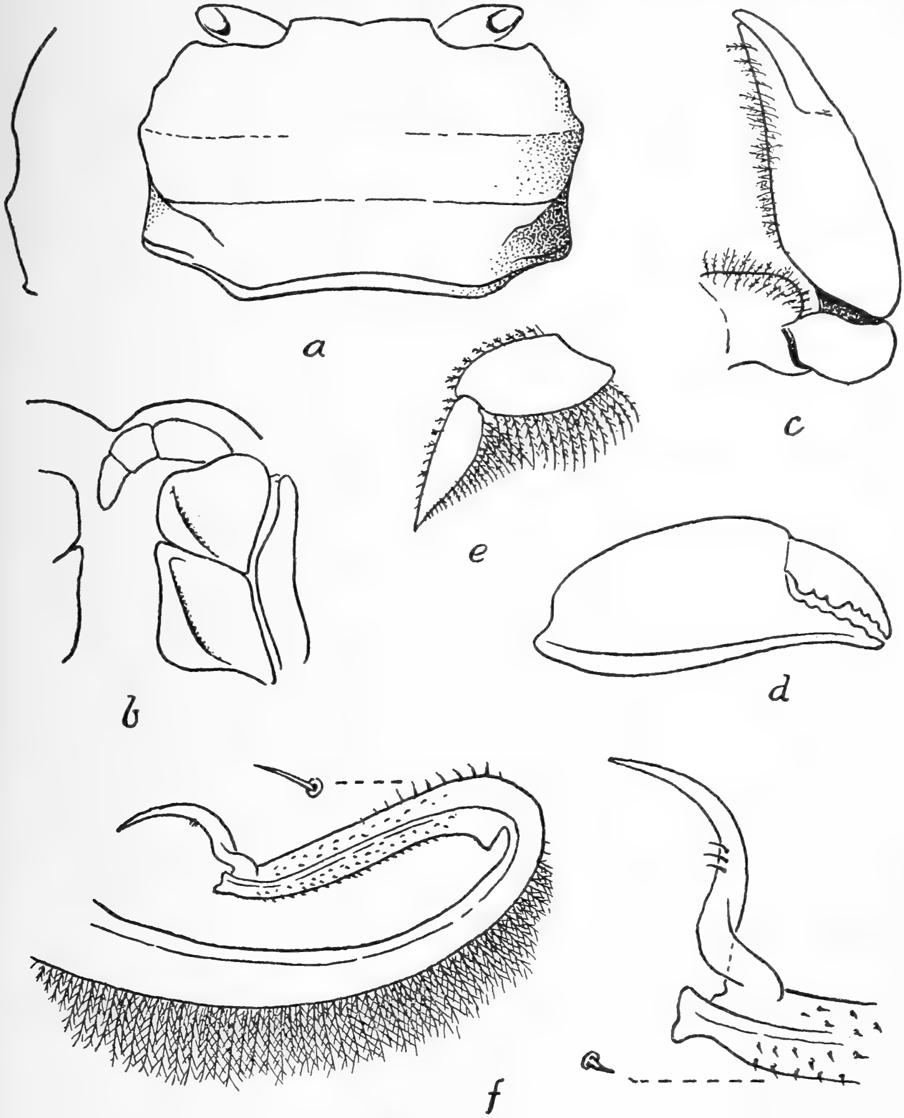

Fig. 7.

Paracleistostoma fossula n. sp. *a*. carapace, with longitudinal profile. *b*. left mxp. 3 *in situ*. *c*. dorsal view of cheliped. *d*. outer view of chela. *e*. distal joints of leg.
Tylodiplax blephariskios (Stebb.). *f*. pleopod 1 ♂, with apex further enlarged. See p. 3.

Paracleistostoma fossula n. sp.

Fig. 7*a–e*.

Carapace smooth, glabrous; a very feeble ridge across the cardiac and branchial regions forming the hind border of a shallow transverse furrow, very faint medianly but more distinct laterally, the front border of which is even less conspicuous than the hind border, and obsolete medianly but better indicated laterally; lateral corners of front angular, but appearing rounded in a general dorsal view; antero-lateral angles squarish, antero-lateral margins with 2 feeble indentations; post-frontal crests obsolete.

Third maxillipeds separated by a gap almost as wide as width of 3rd joint, 4th joint shorter but slightly broader than 3rd joint, both joints obliquely furrowed; exopod visible.

Chelipeds equal, smooth; arm with rounded lobe at inner upper apex, inner margin with plumose setae, inner surface of palm also with plumose setae, outer surface with costa near lower margin from base almost to apex of thumb, cutting-edges with rounded teeth, the 3 nearest the base of finger larger than the others.

Legs smooth, without ridges on 4th joints, not specially setose; anterior margin of 4th joints of all legs, and front and hind margins (especially the hind margin) of 5th leg (presumably the 5th, but all legs detached) with plumose setae; coxal joints with plumose setae dorsally.

3·3 × 5 mm. As preserved, pale brown.

Locality. Delagoa Bay. 1 ovig. ♀. (U.W.)

Fam. HAPALOCARCINIDAE

1900. Calman, *Trans. Linn. Soc. Lond.* (2), zool., viii, p. 47.
1915. Potts, *Carnegie Inst. publ.*, 212, Papers Dept. Mar. Biol., viii, pp. 33 sqq.
1936. Shen, *Hong Kong Nat. Suppl.*, No. 5, p. 21.
1937. Rathbun, *Bull. U.S. Nat. Mus.*, No. 166, p. 258.
1944. Utinomi, *Palao Trop. Biol. Sta. Studies*, II, 4, pp. 687 sqq.

Gen. *Hapalocarcinus* Stmpsn.

1859. Stimpson, *Proc. Boston Soc. N.H.*, vi, p. 412.

Hapalocarcinus marsupialis Stmpsn.

1859. Stimpson, loc. cit., p. 412.
1900. Calman, loc. cit., p. 43, pl. 3, figs. 29–40.
1902. Borradaile, *Fauna Geogr. Mald. Lacc. Arch.*, I, p. 271.
1906. Rathbun, *Bull. U.S. Fish. Comm. for* 1903, pt. 3, p. 892.
1907. Stimpson (ed. Rathbun), *Smiths Misc. Coll.*, xlix, p. 170 footnote, pl. 14, fig. 8.
1911. Rathbun, *Trans. Linn. Soc. Lond.* (2), zool., xiv, p. 242.
1915. Potts, loc. cit., pp. 35 sqq. figs. 1–4, 5C, 6B, 7B, D, 8B, 9–15, pls. 1, 2 (♀, ♂, zoea) (formation of galls and biology).

1924. Balss, *Denkschr. Ak. Wiss. Wien.*, xcix, p. 16.
1925. Edmondson, *P. B. Bishop Mus. Bull.*, 27, p. 32.
1933. id., *B. P. Bishop Mus. Occas. Papers*, X, 5, p. 17, fig. 6*b*, *d* (zoea).
1937. Hiro, *Palao Trop. Biol. Sta. Studies*, No. 1, pp. 137 sqq., pl. 4, fig. 1, pl. 5.
1937. Rathbun, loc. cit., p. 259, fig. 46, pl. 79, figs. 3–9.
1944. Utinomi (= Hiro), loc. cit., p. 700 *et passim*, figs. 5A, 8, 13B, pl. 3, figs. 1–4.

A juvenile ♀, 2 mm. in length, corresponds with Potts's figure of Stage 2 (pl. 1, fig. 2). The chelipeds are robust, with a prominent spine distally on the inner margin of the arm. Three pairs of incipient pleopods.

Locality. Delagoa Bay. 2 ovig. and 1 juv. ♀♀ from the coral *Stylophora* (*Sideropora*) *digitata*. (U.W.)

Distribution. Red Sea, Maldives, Chagos Archipelago, Réunion, Ceylon, Indo-Pacific. In various corals (see Utinomi, 1944).

Gen. *Cryptochirus* Heller

1861. Heller, *Verh. zool. bot. Ges. Wien.*, xi, p. 19.
1862. M. Edwards, *Ann. Sci. nat. Paris* (4), xvii, p. 362 (*Lithoscaptus*).
1937. Richardson, *Bull U.S. Nat. Mus.*, No. 166, p. 262.
1944. Utinomi (=Hiro), *Palao Trop. Biol. Sta. Studies*, II, 4, pp. 687 sqq.

Distinguished by the granulate carapace and dentate peduncle of antenna 1 from *Hapalocarcinus* with smooth carapace.

Cryptochirus coralliodytes Heller

1861. Heller, loc. cit., p. 19.
1861. id., *SB. Ak. Wiss. Wien.*, xliii, p. 366, pl. 2, figs. 33–9. (Paulson quotes 'pl. iv'.)
1875. Paulson, *Red Sea Crust.*, p. 72. (*Lithoscaptus paradoxus* M. Edw.)
1880. Richters, *Beitr. Meeresf. Mauritius Seych.*, p. 159.
1902. Borradaile, *Fauna Geogr. Mald. Lacc. Arch.*, I, p. 271.
1933. Edmondson, *Occ. Pap. B. P. Bishop Mus.*, X, 5, p. 14, fig. 5, and pl. 4, A, B.
1937. Hiro, *Palao Trop. Biol. Sta. Studies*, No. 1, p. 140 *et passim*, pl. 4, figs. 2, 3, pl. 6.
1944. Utinomi, loc. cit., p. 697 *et passim*, figs. 5 B, 6 A, 7 A,D, 9, 11 A,B, 12 A, 13 A, 15 A,E, 16 A,B, and pl. 3, figs. 5, 6, pl. 4, figs. 1, 2.

Locality. Durban, 4 ovig. ♀♀ from circular holes in the coral *Favia*. (U.W.).

Distribution. Red Sea, Maldives, Mauritius, Indo-Pacific. In *Favia* and other massive corals (see Utinomi, 1944).

Fam. GRAPSIDAE

Ilyograpsus n.g.

Carapace subquadrangular, antero-lateral margins slightly oblique, dentate; fronto-orbital width three-quarters or more, front less than half, the greatest width of carapace. Orbits large, lower border complete, no infra-orbital crest. Antennules oblique, septum rather narrow. Antennae in the orbital hiatus. Epistome short. Maxillipeds widely gaping, no hairy oblique ridge, 4th joint broader than long, flagellum inserted in the middle of anterior margin, exopod narrow, without tooth on inner margin. Chelipeds ♂ weak, shorter than legs; tips of finger and thumb spooned. Legs slender, dactyls slender, terete. Abdomen ♂ extending nearly to margin of buccal cavity, all segments distinct, evenly tapering, not constricted in middle, 1st segment occupying not quite all the space between the 5th coxae, 2nd segment very short, and narrower than 1st and 3rd, 3rd widest. Female unknown.

Genotype. *I. rhizophorae* n. sp.

Remarks. There is a most disconcerting resemblance, even to the faint cross-bands on the legs, between the species described below and *Camptandrium paludicola* Rathbun (1910. *D. Vidensk. Selsk. Skr.* (7), vol. V, no. 4, p. 326, fig. 9). Tesch (1918. *Siboga Exp. monogr.*, xxxix, c. p. 68) maintains that Rathbun's species does not belong to *Camptandrium*, and is certainly a Grapsid; he suggests it should be referred to *Cyrtograpsus* Dana.

Cyrtograpsus belongs to the subfam. *Varuninae* (Rathbun. 1918. *U.S. Nat. Mus. Bull.*, 97, p. 225) in which the incomplete lower orbital border is supplemented by a suborbital crest (as it is also in *Camptandrium*; see: Rathbun, 1907, *Smiths. Misc. Coll.*, xlix, p. 137, and 1910, loc. cit., p. 325; also Kemp, 1915, *Mem. Ind. Mus.*, v, p. 236). The new species has a complete lower orbital border and therefore belongs to the *Grapsinae*, in which subfamily, however, there seems to be no existing suitable genus for it.

Ilyograpsus rhizophorae n. sp.

Fig. 8.

♂—Carapace subquadrangular, front prominent; antero-lateral margin with 3 teeth behind the outer orbital tooth, the 1st blunt and less prominent than either the orbital tooth or the 2nd lateral, the 3rd lateral the smallest; lateral margins subparallel. Post-frontal crests prominent; regions obscure, but groove between gastric and cardiac regions distinct; 3 short setulose crests near the lateral and postero-lateral margins. Surface with short sparse pubescence, when denuded feebly granulose, chiefly around the lateral margins. Infra-orbital border with 2 low denticles. A feeble setose ridge from angle of buccal cavity across the sparsely setose pterygostomial region. Sternum and abdomen minutely and obscurely granulose.

Chelipeds subequal, anterior margin of 4th joint finely crenulate-dentate; inner surface of hand distally and inner surface of finger and thumb pubescent; finger and thumb apically spooned, cutting-edges crenulate-dentate, that of the finger proximally with broad low tooth.

Legs (only 5 are present, all detached) longer than chelipeds, 4th joint about 2½ times as long as broad, anterior margin with plumose setae, and a conspicuous subterminal tooth; in four of the legs the 6th joint is about 4 times as long as broad, smooth, dactyls slender, terete, slightly curved, a little more than half length of 6th joint, finely setulose; in the remaining leg (probably the hindmost leg) 6th joint is only twice as long as broad, and furry on both margins, 5th joint with plumose setae on anterior margin as in 4th joint, dactyl nearly as long as 6th joint, thickly setulose.

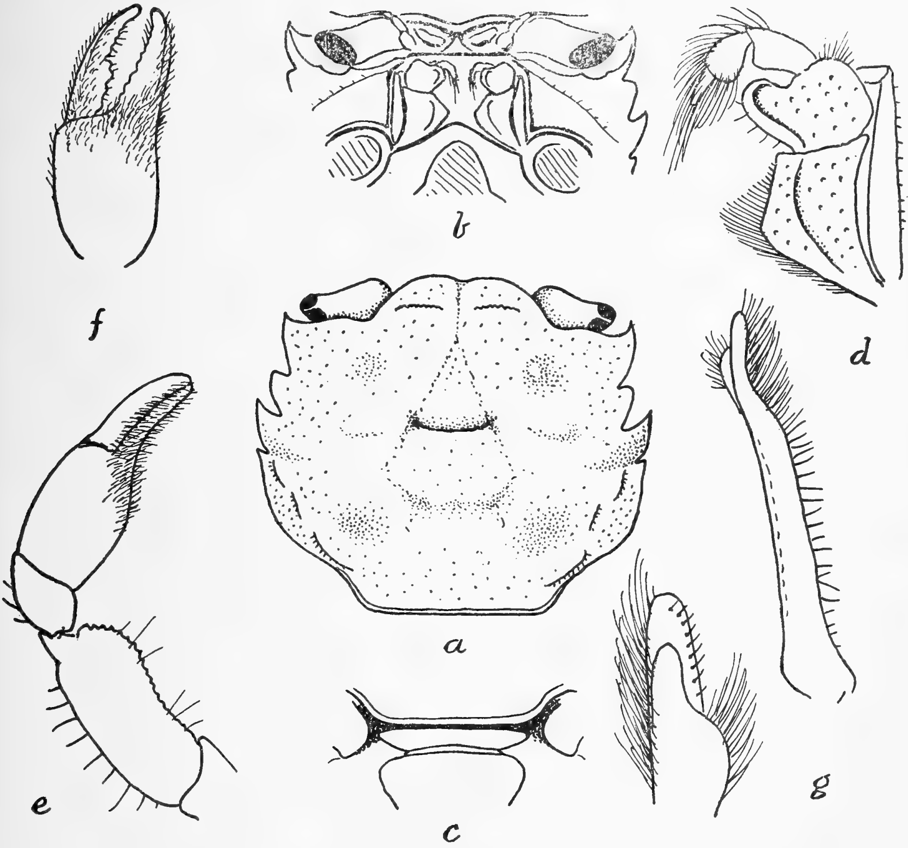

Fig. 8.

Ilyograpsus rhizophorae n.g., n. sp. *a.* carapace. *b.* ventral view of anterior portion of carapace showing mxp. 3 *in situ*. *c.* abdominal segments 1–3. *d.* mxp. 3. *e.* left cheliped. *f.* inner view of chela. *g.* posterior view of left pleopod 1 ♂, with anterior view of apex.

Abdomen, 1st segment not quite extending to the sockets of 5th coxae, 2nd very short and narrower than 1st, 3rd widest at base but also not reaching the 5th coxae, lateral margins of 3rd-6th segments tapering evenly, but rather abruptly in distal half of 6th, 7th almost as long as its basal width, apically rounded.

Pleopod 1 rather slender, distally slightly curved outwards, outer margin setose, apex rounded, the 'lip' of the seminal channel on the anterior side not as long as the posterior 'lip'.

Length 6·5, breadth 7·5 mm. As preserved, yellowish-brown with very faint indications of cross-bands on 6th joints of the legs.

Locality. Inhambane, in mangrove swamps. 1 ♂. (U.C.T.) (July, 1954.)

Sarmatium crassum Dana

Fig. 9.

1851. Dana, *Pr. Ac. Nat. Sc. Philad.*, p. 251.
1852. id., *U.S. Expl. Exp. Crust.*, p. 358, pl. 23, fig. 1.
1869. M. Edwards, *Nouv. Arch. Mus. Paris*, v, p. 28 (*germani*).
1900. Alcock, *J. Asiat. Soc. Bengal*, lxix, p. 426.
1917. Tesch, *Zool. Med*, iii, p. 215 and p. 258 (in key).

Carapace glabrous, regions indistinct, as long as broad (greatest width at 2nd epibranchial tooth, but distance between hind angles of carapace slightly greater); lateral margins very slightly sinuous, subparallel, with a small indent behind the blunt external orbital angle, and a feeble inconspicuous indent about midway between latter and hind angle. Some short oblique lines of small granules on hinder branchial region, with some tiny tufts of setules. Postfrontal lobes not conspicuous, median pair occupying nearly all the space between orbits.

Chelipeds ♂ subequal, 4th joint with inner lower margin serrulate, outer lower margin only finely serrulate, upper margin with a small acute spiniform tooth subterminal (projecting over the transverse groove on outer surface), wrist with short tooth on inner margin, palm glabrous, coarsely punctate on outer surface becoming granulate on lower margin, inner surface smooth, sparsely punctate, with a few very inconspicuous granules in a transverse series, upper surface with 4 smooth transverse ridges with subsidiary milled ridges (Alcock quotes: 4–5 ridges; Tesch says 6–7), a series of small dark denticles above insertion of finger; finger with 4 short black-tipped spines in proximal half, and a series of minute dark denticles distally; finger and thumb not gaping, slightly furry at base. A sharp subterminal tooth on upper margin of 4th joint of legs; 4th joint of 5th leg slightly longer than twice its width.

Fig. 9.

Sarmatium crassum Dana. Lateral margin of carapace; upper surface of hand and finger of ♂ cheliped, with profiles.

Seventh abdominal segment longer than basal width ($2\frac{1}{2}$–$1\frac{3}{4}$ mm.).

Length 12 mm., breadth 12·5 mm. Fawn-brown, chelipeds and legs biscuit-coloured with orange tinge.

Locality. Durban Bay. 1 ♂. (U.C.T. 1950.)

Distribution. Samoa, S. China, Sumatra, Nicobars.

Fam. XANTHIDAE

Chlorodiella niger (Forskal)

Fig. 10.

1950. Barnard, loc. cit., p. 213 (references).

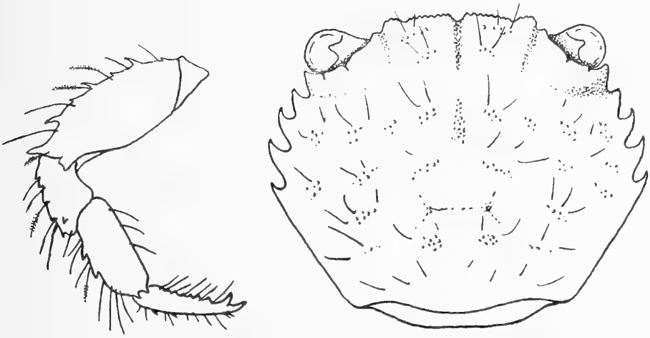

FIG. 10.
Chlorodiella niger (Forskal). Carapace and leg of juv. ♂.

As this species was not figured in the above-cited work, the opportunity is here taken to give a figure of a juvenile, with remarks on the differences between the latter and the adult.

Juv. ♂, 5 × 6 mm. Front as well as infraorbital margin very clearly denticulate. Second, third and fourth antero-lateral teeth distinctly spiniform; in adult the teeth become progressively blunter (cf. Laurie, 1915). Upper surface of carapace with fairly well-marked regions, small groups of minute granules, and scattered setae; in adult regions scarcely traceable, surface smooth to the naked eye but minutely shagreened, glabrous.

Legs less setose than in adult, consequently the spines on 4th-6th joints more clearly visible, and especially the denticles on inner margin of dactylus.

All abdominal segments distinct; pleopods 1 and 2 not fully developed.

Locality. Delagoa Bay. 1 adult ♂, 1 juv. ♂. (U.W.)

Gen. *Cymo* de Haan

1833. de Haan in *Siebold. Fauna Japon. Crust.*, p. 22.

Cymo andreossyi (Audouin)

Fig. 11.

1826. Audouin in Savigny, *Descr. Egypte*, p. 86, pl. 5, fig. 5 (*Pilumnus a*).
1875. Paulson, *Red Sea Crust.*, p. 38, pl. 6, fig. 5.
1884. Miers, *Crust. H.M.S. 'Alert'*, p. 532 (*andreossii*).
1887. de Man, *J. Linn. Soc. Lond.*, xxii, p. 35.
1898. Alcock, *J. Asiat. Soc. Bengal*, lxvii, p. 173 (references).
1915. Bouvier, *Bull. Sci. Fr. Belg.*, xlviii, p. 280.

The left half of the front of the juvenile agrees exactly with de Man's description. The fingers and thumbs of both chelae of both specimens are pure white.

Locality. Delagoa Bay. 1 immature 5·5 × 6 mm., 1 non-ovig. ♀ 11 × 11·5 mm. (U.W.)

Distribution. Red Sea, Seychelles, Mauritius, Rodriguez, Indo-Pacific.

Gen. *Pilumnopeus* M. Edw.

1863. Milne Edwards, *Ann. Sci. Nat.* (4), xx, p. 289.
1887. De Man, *J. Linn. Soc. Lond.*, xxii, p. 52 (*Heteropanope* part).
1893. Alcock, *J. Asiat. Soc. Bengal*, lxvii, p. 207 (*Heteropanope* part).
1933. Balss, *Capita Zool.*, iv, p. 33.

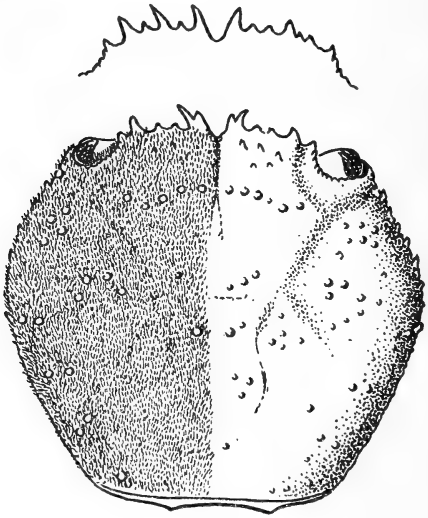

FIG. 11.

Cymo andreossyi (Aud.). Carapace of ♀, right half denuded; with frontal margin of juvenile.

De Man and Alcock regarded *Pilumnopeus* as synonymous with *Heteropanope* Stimpson 1858. Balss, however, keeps them separate, defining *Pilumnopeus* as having the middle frontal lobes convex, the carapace more convex, and with transverse setose lines of granules.

Pilumnopeus indica (de Man)

Fig. 12.

1887. de Man, loc. cit., p. 53, pl. 3, figs. 1, 2 (*Heteropanope i*).
1898. Alcock, loc. cit., p. 208 (*Heteropanope i*)
1933. Balss, loc. cit., p. 33.

One ♂, 8 × 12 mm., and ovig. ♀♀ up to 8·5 × 12·5 mm., agree so well with de Man's detailed description that there can scarcely be any doubt as to their identity. The only difference in these specimens is: the hand of the larger (right) chela is granular on the upper surface and on the outer surface near the articulation with the wrist; and the lower surface and distal half of outer surface of the smaller (left) chela are not granular.

Smallest ovig. ♀ 4·5 × 6 mm. Brownish, speckled and mottled with reddish-brown, hand of cheliped with small orange spots, finger and thumb blackish, colour not extending on to palm.

Locality. Durban Bay. 1 ♂ and ovig. ♀♀. (U.C.T.)

Distribution. Mergui Archipelago.

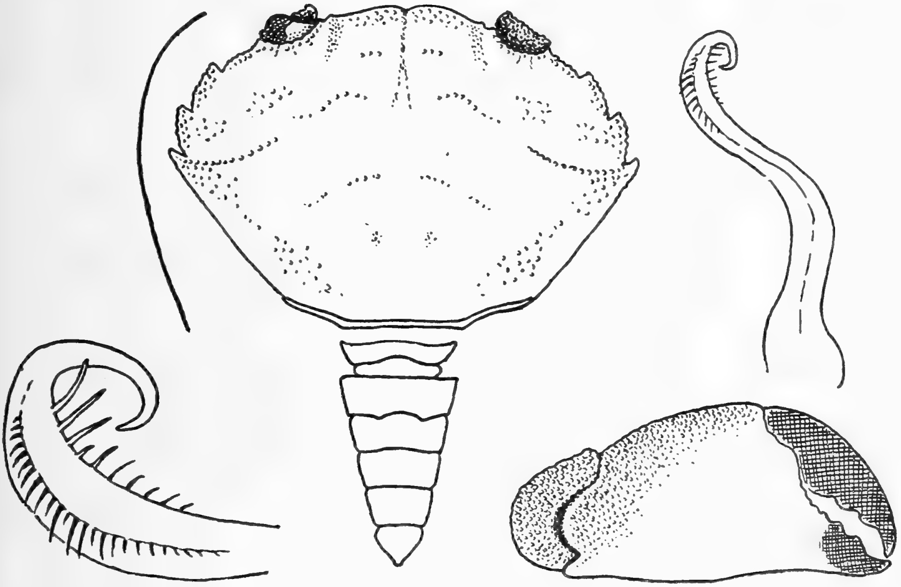

Fig. 12.

Pilumnopeus indica (de Man). Carapace of ♂, right eye removed; abdomen; right chela; pleopod 1 ♂, with apex further enlarged.

Gen. *Actumnus* Dana

1851. Dana, *Amer. J. Sci.* (2), xii, p. 128.

? *Actumnus laevigatus* Rathbun

Fig. 13.

1911. Rathbun, *Trans. Linn. Soc. Lond.*, xiv, p. 233, pl. 19, figs. 3, 4.
1933. Balss, *Capita Zool.*, iv, p. 36 (*Pilumnus l*).

♀—Carapace strongly declivous anteriorly, with very short pile, with scattered long plumose setae. Front $\frac{1}{3}$ width of carapace, 2 broad lobes without (or with a scarcely noticeable) notch next to the orbit. Supraorbital margin with very inconspicuous trace of one slit, feebly beaded; infraorbital margin beaded. No infraorbital or subhepatic teeth. Antero-lateral margin with 3 small teeth, each tipped with a white spinule. Distance between outer orbital angle and 1st tooth slightly greater than that between 1st and 3rd teeth.

Only the left cheliped present. Wrist with a conical knob on inner surface, upper surface inconspicuously corrugated, minutely granulate on outer surface. Palm finely granulate, some of the granules slightly larger and forming 3 moderately definite longitudinal rows on outer surface. A few granules on base of upper surface of finger. Tips of finger and thumb pointed. Finely pilose, with a few long plumose setae. Legs without spinules on margins; pilose and setose, especially the dactyls, with longer plumose setae.

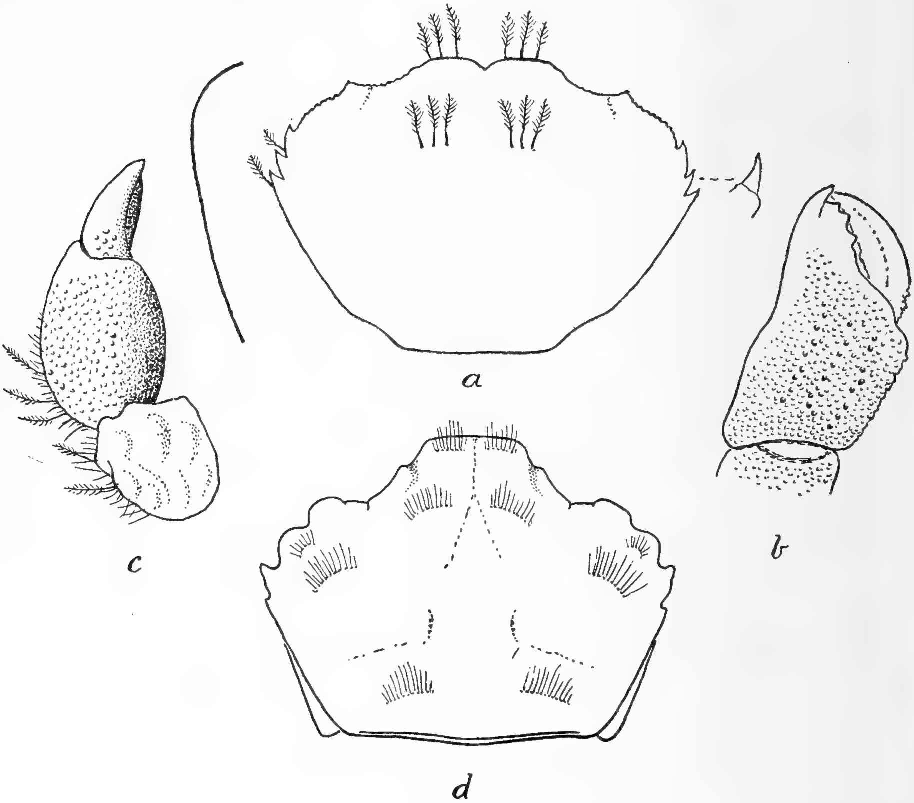

Fig. 13.

? *Actumnus laevigatus* Rathbun. *a.* carapace of ♀, the short pile removed, with longitudinal profile. *b, c.* outer and upper surfaces of chela.
Lybia plumosa Brnrd. *d.* carapace more correctly drawn than in fig. 46*f* in Barnard, 1950, loc. cit.

Length 5 mm., breadth 7·5 mm.

Locality. Inhambane. 1 ovig. ♀. (U.C.T.).

Distribution. Seychelles.

Remarks. This specimen seems to be near, if not identical with, *A. laevigatus* Rathbun, described from a single ovig. ♀ 6·8 × 9·3 mm. Balss regards this species as a *Pilumnus* on account of the broad sternum.

Gen. *Sphaerozius* Stimpson

1950. Barnard, loc. cit., p. 253.

The two species recorded from the South African region may be distinguished as follows:

1. Frontal lobes oblique, entire. Outer surface of hand of chela granular. . . . *nitidus*
2. Frontal lobes transverse, each 3-lobulate. Outer surface of hand of chela smooth. . . . . . *fornasinii*

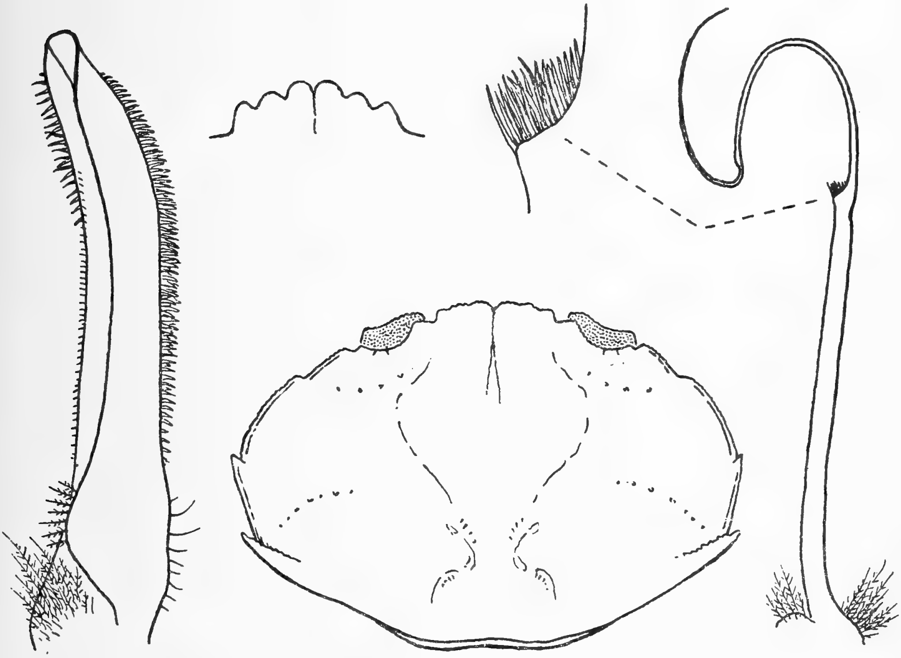

Fig. 14.

Sphaerozius fornasinii (Bianconi). Carapace of specimen 12·5 × 18·5 mm., from Inhambane. Frontal lobes of adult ♂. Pleopods 1 and 2 ♂, the latter with group of spines further enlarged.

Sphaerozius fornasinii (Bianconi)

Fig. 14.

1851. Bianconi, *Spec. Zool. Mosambic.*, fasc. 5, p. 84, *Crust.*, pl. 2, figs. 1, 1*a–c*. (*Mem. Ac. Sci. Bologna*, III.) (*Galene f.*)
1878. Hilgendorf, *MB. Ak. Wiss. Berlin*, p. 795 (*Menippe* subg. *Myomenippe f*).
1899. de Man, *Notes Leyden Mus.*, xxi, p. 57, pl. 7, fig. 1 (*Myomenippe f*).
1950. Barnard, loc. cit., p. 256.

The lobules on the frontal lobes are not so conspicuous in the young as in the adult.

Length, ♂ 52 mm., breadth, 75 mm. (Hilgendorf, 54 × 79 mm.). Reddish-brown, more or less mottled, chelae with small pale spots, finger and thumb black, the colour not extending on to palm.

Locality. Inhambane. 3 specimens. (U.C.T. 1954.)

Distribution. Mozambique; Ibo.

Remarks. There is a curious resemblance between the 2nd pleopod ♂ of this species and that of *Notonyx nitidus* (Goneplacidae, Rhizopinae) (Stephensen, 1945, *Dan. Sci. Invest. Iran*, pt. 4, fig. 47B): both have a spiniferous step midway along the appendage.

Fam. GONEPLACIDAE

Gen. *Xenopthalmodes* Richters

1950. Barnard, loc. cit., p. 296 (references).

Xenophthalmodes brachyphallus n. sp.

Fig. 15*a–d*.

Two ♂♂ agree with *moebii* except in two characters.

The first abdominal segment is proportionately wider, extending well beyond the lateral angle of the 3rd segment (fig. 15*a*) whereas in *moebii* the two

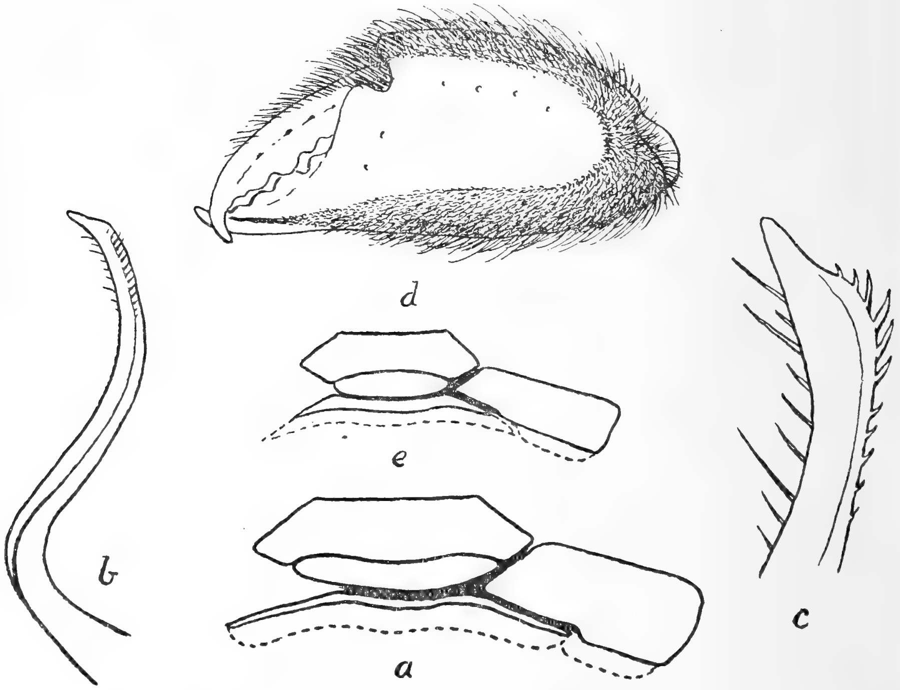

FIG. 15.

Xenophthalmodes brachyphallus n. sp. *a.* abdominal segments 1–3, and left sternal plate ♂, articular surface of segment 1 dotted. *b.* posterior view of right pleopod 1 ♂. *c.* apex of same further enlarged. *d.* outer surface of chela of large ♀ 12 × 18 mm.

Xenophthalmodes moebii Richters. *e.* abdominal segments 1–3, and sternal plate ♂, for comparison with *a.*

segments are subequal in width (fig. 15*e*), consequently it reaches midway along the sternal plate, instead of scarcely one quarter.

The 1st pleopods extend almost to the tip of the abdomen, but do not project beyond it as in *moebii* and *dolichophallus*. The appendage is strongly sinuous, with a slight beak-like apex curving outwards, with 2 series of strong spines distally; in the other two species the appendage is straight, slender, tapering to a fine unarmed point.

Length ♂♂ 5·5 and 12 mm., ♀ 12 mm. (measured by calipers, not over the curve of the carapace); breadth ♂♂ 8 and 16 mm. resp., ♀ (nonovig.) 18 mm.

Locality. Inhambane. 2 ♂♂, 1♀, and immat. (U.C.T. Jan. and July 1954.)

Remarks. The size of the ♀ and the larger ♂ specimen is noteworthy, the breadth being considerably greater than the largest of Alcock's specimens (12 mm.).

The specific identity, or otherwise, of Richters', de Man's, Alcock's, the Delagoa Bay specimen (Barnard, loc. cit., 1950), and *dolichophallus* Tesch remains somewhat uncertain. The shape of the 4th joint of mxp. 3 may vary to some extent, but the 1st plp. ♂ is a very definite character. Tesch presumably examined de Man's ♂ specimen, but he does not describe this appendage, merely stating that an elongated, externally visible appendage is 'not to be observed in de Man's specimen' (p. 217).

Stephensen (1945, *Dan. Sci. Invest. Iran*, pt. 4, p. 178, figs. 47 C–E) has further remarks on *dolichophallus* Tesch 1918.

Gen. *Typhlocarcinodes* Alcock

1900. Alcock, *J. Asiat. Soc. Bengal*, lxix, p. 326.
1902. Borradaile, *F. Geogr. Mald. Lacc. Arch.*, I, p. 267 (*Caecopilumnus*).
1918. Tesch, *Siboga Exp. monogr.*, xxxix, c. 1, pp. 202 (in key), 226.

Typhlocarcinodes piroculatus (Rathbun)

Fig. 16.

1911. Rathbun, *Trans. Linn. Soc. London* (2), zool., xiv, p. 239, pl. 20, figs. 1, 2 (♀). (*Typhlocarcinops p.*)
1918. Tesch, loc. cit., p. 231, pl. 15, fig. 2 (♂).

Fronto-orbital width one half width of carapace. Front wider than orbit, just over 3 times in carapace width. Antero-lateral margin entire, costate, beaded, passing into postero-lateral margin without any appreciable notch. Abdomen 1st segment in ♂ and ♀ occupying whole distance between the 5th coxae; in ♂ 2nd segment narrower than the adjoining sternal plate, 3rd–5th segments fused but indicated by faint median impressions.

Ocular peduncle immovable, piriform, cornea small but distinct on ventral surface of apex. Antenna 1 folding completely into fossa, stout, flagellum with broad, short joints tapering into 4 or 5 slender distal joints, with long smooth (non-setose) sensory filaments. Antenna 2 flagellum longer than last joint of peduncle, 12-jointed in ♂, 8-jointed in ♀.

Epistome sunken, not prominent. Buccal cavity slightly narrowing in front. External maxillipeds nearly meeting in centre line, 4th joint subcircular, the antero-lateral corner rounded.

Cheliped, internal angle of wrist not prominent; in ♂ palm about as long as broad, finger and thumb about as long as palm, gaping, each with a furry groove on outer surface, upper surface of wrist and palm with small granules concealed by the fur, outer and inner surfaces glabrous, finger with 2–3 small teeth on cutting-edge, thumb with a more prominent one; in ♀ less robust, more setose, finger and thumb not gaping.

Legs setose, margins of 4th-6th joints especially thickly clothed with long fringes.

Pleopod 1 ♂ distally tapering and laterally compressed, the dorsal edge with 5–6 denticles. Pleopod 2 very slender, as long as pleopod 1.

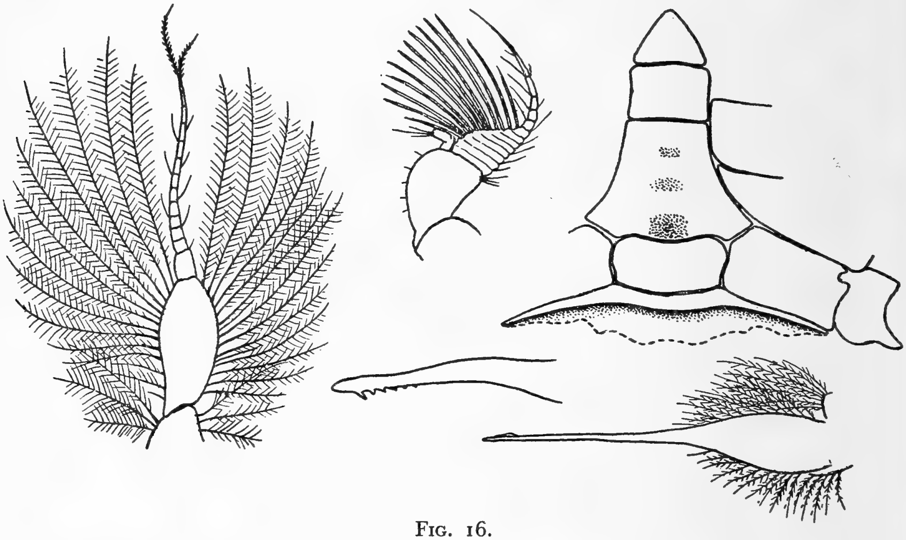

Fig. 16.

Typhlocarcinodes piroculatus (Rathbun). Antennae 1 and 2. Abdomen of ♂. Pleopod 1 ♂, posterior view of right appendage, with lateral view of apex (to same scale).

Length ♂ 8·5 mm. (by calipers, not over the curve), ♀ 7 mm.; breadth ♂ 11 mm., ♀ 9 mm. As preserved, dirty white, the fringes on the legs brown with a reddish tinge.

Locality. Delagoa Bay. 1 ♂, 1 non-ovig. ♀. (U.W.)

Distribution. Amirante Is., Seychelles, 34 fms.; Philippine Is., 36 metres.

Remarks. In spite of a few minor differences from the descriptions of Rathbun and Tesch (e.g. the flagellum of antenna 2 is longer, especially in the ♂) these specimens appear to belong to this species. Both are larger than the other known specimens.

Tesch did not describe the pleopods of the ♂. Nor have they been previously described in any species of this genus. Stephensen (1945, *Dan. Sci.*

Invest. Iran, pt. 4, p. 227) notes that, as far as recorded, pleopod 2 in the *Rhizopinae* is short except in *Notonyx*. The present species forms another exception.

Fam. DROMIIDAE

Pseudodromia integrifrons Hend.

Fig. 17.

1888. Henderson, '*Challenger*' *Rep.*, xxvii, p. 16 footnote (sine descr.).
1893. id., *Trans. Linn. Soc. Lond.* (2), v, p. 406, pl. 38, figs. 7–9.
1950. Barnard, loc. cit., p. 316 (in key only).

Pubescence on surface of carapace chiefly in the shallow grooves marking the regions; the lateral and anterior margin of carapace, however, with thick fringe of plumose setae, especially noticeable on the rostrum.

The 6th joint of 5th leg has 2 strong spines on outer surface of apex (not 3 as in Henderson's description).

Length of carapace ♂ 7·5 mm., ovig. ♀ 6·5 mm. 36 ova, about 1 mm. in diameter.

Locality. Inhambane. ♂♂ and ovig. ♀♀. (U.C.T.)

Distribution. Ceylon; Obock.

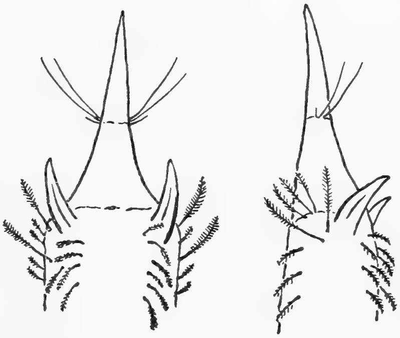

FIG 17.
Pseudodromia integrifrons Hend. Left 5th leg, outer surface (on left) and anterior (upper) lateral view (on right).

Cryptodromia tomentosa (Heller)

1861. Heller, *SB. Ak. Wiss. Wien.*, xliv, p. 214.
1875. Paulson, *Red Sea Crust.*, p. 83.
1878. Hilgendorf, *MB. Ak. Wiss. Berlin*, p. 813, pl. 2, figs. 3–5.
1880. Kossmann, *Reise. Roth. Meeres.*, pt. 2, p. 68.
1888. de Man, *J. Linn. Soc. Lond.*, xxii, p. 212.
?1903. Borradaile, *Fauna Geogr. Mald. Lacc. Arch.*, II, p. 577, pl. 33, fig. 3 (*hirsuta*).
1942. Ward, *Mauritius Inst. Bull.*, II, 2, p. 70.

A non-ovigerous ♀, 14 × 14 mm., is more like Hilgendorf's figure of *pentagonalis* in general outline, but the large antero-lateral tooth is truly marginal, and the median rostral tooth is only just visible in dorsal view as in his figure of *tomentosa*. The tooth behind the branchial groove is slightly less prominent than in the figure of the former species, and the supraorbital margin is less concave than in that of the latter species. Dorsal surface of carapace completely covered with tomentum.

Localities. Ibo (Hilgendorf); Inhambane. 1 ♀. (U.C.T.)

Distribution. Red Sea, Chagos Archipelago.

Remarks. C. pentagonalis Hilg. (loc. cit, p. 814, pl. 2, figs. 1, 2) should, I think, be united with *tomentosa*. According to Hilgendorf the antero-lateral tooth is truly marginal in *tomentosa*, but inframarginal in *pentagonalis*. Both species were found together at Ibo; *pentagonalis* has been recorded also from Mauritius and India (Henderson, 1893). Alcock (1899) and Henderson also thought the two species were not distinct.

C. hirsuta Borrad. is also very similar.

Regarded as synonymous with *canaliculata* Stimpson 1858 by de Man (1887, *Arch. Naturg.*, liii) and by Ortmann (1892). Rathbun (1911) records both *canaliculata* and *pentagonalis* from the Seychelles.

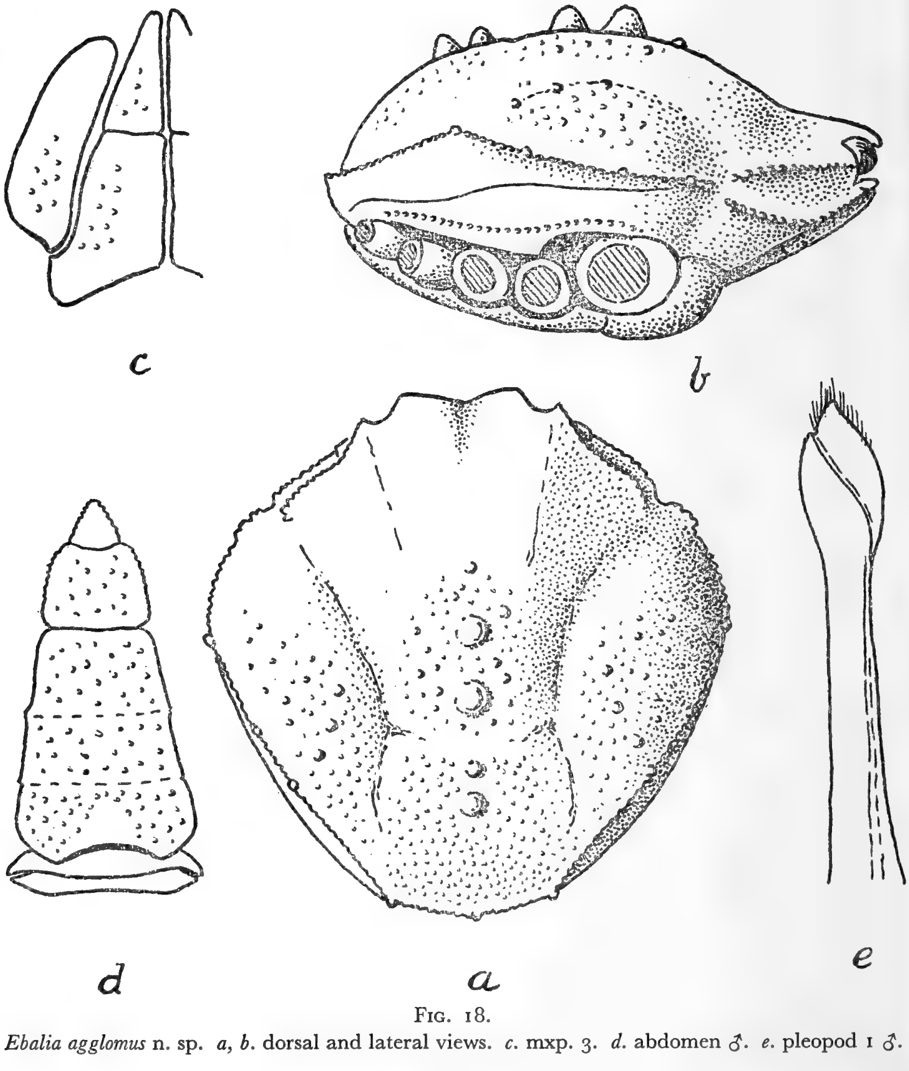

FIG. 18.
Ebalia agglomus n. sp. *a, b*. dorsal and lateral views. *c*. mxp. 3. *d*. abdomen ♂. *e*. pleopod 1 ♂.

Fam. LEUCOSIIDAE

Ebalia agglomus n. sp.

Fig. 18.

♂—Carapace as broad as long, but postero-lateral margins slightly converging behind; branchial regions separated from the median gastro-cardiac-intestinal regions by a well-marked furrow (not as deep as in *glomus*), 2 large medio-dorsal cardiac tubercles, 2 smaller intestinal ones, smaller tubercles and granules on the cardiac and branchial regions, and minute granules on intestinal region; gastric region and front quite smooth (with sparse impressed punctae); front with shallow median groove; supraorbital and antero-lateral margins beaded; pterygostomial ridge prominent, beaded, separated by the shallow hepatic-branchial gap from the beaded postero-lateral margin; hind margin with slightly enlarged median and lateral granules.

Cheliped about 1½ times length of carapace; arm shorter than carapace, granulate on upper, lower, and outer surfaces especially basally; wrist, palm and fingers minutely granulate (appearing smooth even under ×8 lens).

Abdomen with 3rd–5th segments fused, lateral margins of 6th and 7th segments crenulate. Pleopod 1 straight, distally enlarged, with pointed apex.

Length and breadth 7·5 mm.

Locality. Inhambane. 1 ♂ (U.C.T.). Delagoa Bay. 1 ♂ (U.W.).

Remarks. At first glance resembling a less highly sculptured form of *glomus* or *diadumena*, but distinguished by the 1st pleopod ♂.

Gen. *Cryptocnemus* Stimpson

1858. Stimpson, *Proc. Ac. Nat. Sci. Philad.*, x, p. 161.
1918. Ihle, *Siboga Exp. monogr.*, xxxix, b2, p. 285 (with key to species) and p. 317 (references).

Cryptocnemus holdsworthi Miers

Fig. 19.

1877. Miers, *Trans. Linn. Soc. Lond.* (2), zool., I, p. 241, pl. 38, figs, 30–2.
1906. Laurie, *Herdman's Ceylon Pearl Oyster Rep.*, Suppl. Rep. V, p. 356.
1910. Lenz, *Voeltzkow Reise Ostafr.*, II, p. 544.
1918. Ihle, loc. cit., p. 286 (in key) and p. 317 (in list of species).

Laurie remarks that the shape of the carapace is somewhat variable; and that Miers's ♀ specimen and his two ♀♀ were the only three specimens recorded to that date. Lenz had one ♀, whose abdomen agreed with Miers's figure. In the present specimen the abdomen is for the most part parallel-sided, and all 7 segments are distinct, but the 1st and 2nd are immovably fused; the hind margin of the 1st segment (probably, but may be the front margin of the 2nd) with a transverse ridge.

A strong ridge on the pterygostomial region, anteriorly forming the border of the inhalent channel.

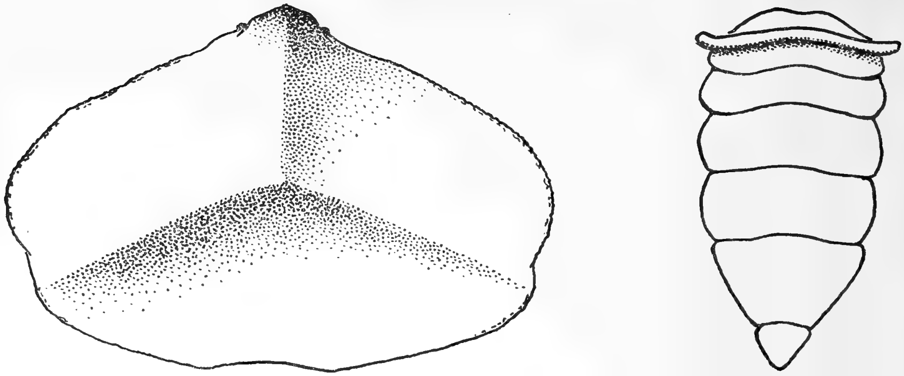

Fig. 19.

Cryptocnemus holdsworthi Miers. Carapace and abdomen of immature (? ♀).

Length 6·25 mm., breadth 10 mm. As preserved, white.

Locality. Inhambane. 1 immat. ? ♀, dredged in 4–1·5 metres, bottom sand, with patches of *Cymodocea* weed. (U.C.T. July 1954).

Distribution. Ceylon.

Fam. Porcellanidae

Porcellana delagoae n. sp.

Fig. 20.

Median frontal tooth rather narrow, length subequal to basal width; margins of frontal teeth thickly fringed with short plumose setae. Carapace with scattered plumose setae, chiefly anteriorly and on the lateral branchial regions; the 2 semicircular postfrontal lobes rather prominent, with rather deep depression in front of them. Lateral margin with 3–4 spines above insertion of

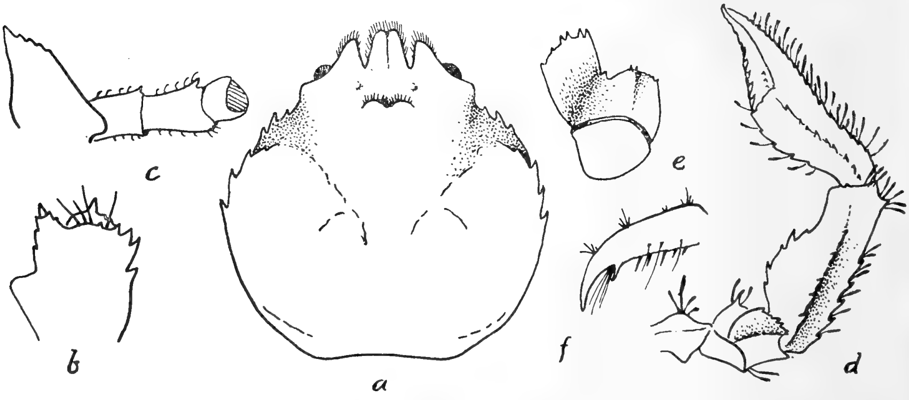

Fig. 20.

Porcellana delagoae n. sp. *a*. carapace. *b*. ventral view of basal joint of left ant. 1. *c*. ventral view of peduncle of left ant. 2. *d*. right cheliped, the vertical flange on 4th joint seen foreshortened. *e*. external view of 3rd and 4th joints of cheliped. *f*. dactylus of leg.

peduncle of ant. 2 in front of lateral indent, 5 behind it, increasing in size posteriorly. First peduncular joint of ant. 1 thick, dentate, the ventral apical transverse margin with a couple of small denticles and some long setae, dorsal apical margin with 1 spiniform tooth and some small denticles, outer apical angle with 3–4 strong teeth. Basal peduncular joint of ant. 2 with margin entire except at apex which is serrulate; following two joints each with apical tooth on front margin. Inner margin of 3rd joint of cheliped rather prominent, with tuft of plumose setae; 4th joint with strong spine on lower inner margin, upper inner margin produced as a rounded, denticulate flange projecting vertically, perpendicular to the plane of upper surface of 5th joint, the median keel spinulose; both margins of hand, and outer margins of finger and thumb spinulose, and with plumose setae, the latter especially numerous on outer margin of hand; median keel of hand spinulose, 2–3 denticles on base of finger; cutting-edges of finger and thumb furry on inner (lower) side. (Only the right cheliped present, which seems to be the smaller.) Legs with moderately numerous plumose setae on 2nd–4th joints; dactyls with 4–5 spines, the distalmost one the largest, followed by a tuft of setae.

Length and breadth 4 mm. Pinkish-orange, somewhat faintly mottled, 2 red dots on the cardiac region.

Locality. Delagoa Bay. 1 ovig. ♀. (U.W.)

Remarks. At first glance deceptively like *dehaanii*, but distinguished by the spinulose and setose cheliped. The upstanding flange on the 4th joint of cheliped, if normal, is curious. Among a large number of both sexes of *dehaanii* I have found no tendency of this flange to become vertical and perpendicular to the plane of the upper surface of the 5th joint.

Petrolisthes virgatus Paulson

Fig. 21.

1875. Paulson, *Red Sea Crust.*, p. 87, pl. xi, fig. 4 (Paulson gives a reference to to a figure 'pl. 1, fig. 9' in another paper by himself).
1894. Ortmann in Semon, *Austral. Reise*, v, p. 28, pl. 2, fig. 5 (*trivirgatus*).
1905. Lenz, *Abh. Senckenb. Ges.*, xxvii, p. 375 (*trivirgatus*).

Integument not strongly calcified. Carapace, chelipeds and legs completely covered with short spinate spine-setae. No supraorbital or epibranchial spines. First peduncular joint of ant. 1 distally tridentate, inner and outer teeth acute, the broad median lobe with serrulate margin and 2–3 larger denticles. Second (1st free) peduncular joint of ant. 2 squarely lobed on front margin. Inner apex of 4th joint of cheliped sharply dentate, 5th joint with 3 sharp teeth on inner (front) margin; outer margin of hand proximally with sharp spiniform denticles, hidden by the thick marginal fringe of rather long spinate setae, which is continued along outer margin of thumb. Fourth joints of 2nd-4th legs without spines on front margin, lower (hind) margin of 4th joint of 2nd leg with acute apical tooth, 4th joint of 4th leg 1½ times as long as broad; both margins of legs strongly fringed with spinate setae.

Length 8·5 mm., breadth 8 mm. (As preserved in formalin) dark crimson-maroon dorsally, more crimson ventrally, sternum pale but speckled; carapace with 3 broad longitudinal pale, dark-bordered stripes, a pair of dark rings between the gastric-cardiac regions ending posteriorly in a pair of small shallow glabrous pits; abdomen with transverse crimson and pale bands; legs with pale stripes; chelipeds with pale stripe on hinder margin of 4th and 5th joints, hand with faint pale stripe along inner (upper) margin continued along finger, a more conspicuous pale stripe along middle of upper surface, continued along cutting-edge of finger. Ortmann gave the ground-colour as dark violet, paler below, with pattern as in the present specimens, but without mentioning the dark rings which are shown in Paulson' figure.

Locality. Delagoa Bay. 2 specimens. (U.W.)

Distribution. Red Sea, Dar-es-Salaam, Zanzibar.

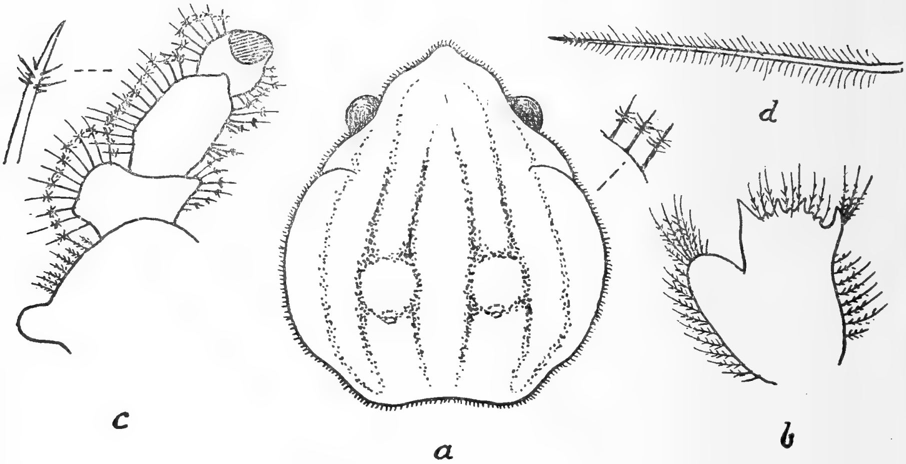

FIG. 21.

Petrolisthes virgatus Paulson. *a.* carapace, denuded, the spinate setae shown only around the margin. *b.* ventral view of basal joint of left ant. 1. *c.* ventral view of peduncle of left ant. 2, with spinate seta further enlarged. *d.* spine-seta from front margin of hand of cheliped.

Remarks. There can be little doubt that Ortmann's species is the same as Paulson's. From the figure (× 2) Ortmann's specimens measured 10 × 7·5 mm. but the length has almost certainly been exaggerated in relation to the width. Paulson's much better figure (× 3) gives the size as (approx.) 6·17 × 5·7 mm.

Fam. SERGESTIDAE

Gen. *Acetes* M. Edw.

1950. Barnard, loc. cit., p. 822

Key to the South African species

1. Telson extending beyond middle of inner ramus of uropod, apically pointed. . *erythraeus*
2. Telson not extending beyond middle of inner ramus of uropod, apically truncate. . . . . *natalensis*

Acetes natalensis n. sp.

Very close to *insularis* Kemp (1917 *Rec. Ind. Mus.*, xiii, p. 54, figs.) (= *serrulatus* (Kröyer)) from the East Indies, differing only in the ♂ petasma.

Outer flagellum of ant. 1 ♂ as in Kemp's fig. 2*c* of *insularis*; 2 spinules proximal to a retrorse process on the side of the flagellum remote from the 2 large clasping spines.

Petasma: proximal and distal extensions of the inner lobe more like those of *indicus* (Kemp, loc. cit., fig. 4*g*), but between the two portions an angular lobe or tooth on inner margin, distal portion with a pointed process beyond which extends the apical cylindrical portion, the latter with several granules or 'pits' (Kemp).

Telson not reaching beyond middle of inner ramus of uropod, apex truncate but slightly convex, with a denticle at each corner.

Length ♂ ca. 20 mm., ♀ 22–3 mm.

Locality: Durban Bay, 4 ♂♂, 5 ♀♀ (U.C.T., 1951); also a single specimen from the same locality submitted in 1955 by Mr. W. D. Oliff of the Natal River Survey.

Remarks. Examination of the latter specimen showed that I had not heeded Kemp's warning (loc. cit., p. 44): '. . . two species are often found together. In such cases . . . identification is a tedious process, for each individual must be separately and carefully examined.' U.C.T. collected many juveniles of the large *erythraeus* and I assumed that *all* the small examples were the same species.

The character of the telson will at once distinguish the two species, reinforced in the case of ♂♂ by the flagellum of antenna 1 and the petasma.

Fam. PROCESSIDAE

Key to the South African genera

1. First peraeopod without exopod. . . . . . *Processa*
2. First peraeopod with exopod. . . . . . *Nikoides*

Gen. PROCESSA Leach

1950. Barnard, loc. cit., p. 715
1951. Holthuis, *Atlantide Rep.*, 2, p. 37

Key to the South African species

1. Rostrum narrow, slender.
   a. 2nd legs unequal.
      i. Body and 3rd–5th legs slender. 5th abdominal segment with hind corner rounded. . . . . . *austroafricana*
      ii. Body and 3rd–5th legs robust. 5th abdominal segment with hind corner dentate. . . . . . cf. *edulis*
   b. 2nd legs equal (or subequal). . . . . . *aequimana*
2. Rostrum broad at base, triangular in dorsal view. . . . . . *japonica*

Processa aequimana (Paulson)

1875. Paulson, *Red Sea Crust.*, p. 97, pl. 14, figs. 6, 6*a* (*Nika ae*).
1906. Nobili, *Ann. Sci. Nat. zool. Paris* (9), iv, (no specimens, translation of Paulson's description).
1922. de Man, *Siboga Exp. monogr.*, xxxix, a4, p. 44, pl. 4, figs. 19–19*f.*
1937. Gurney, *Proc. Zool. Soc. Lond.*, cvii, B, p. 87, pl. 1, figs. 1–10; pp. 91, 92 (in key); and pp. 92, 95, 97; pl. 2, figs. 33–5, pl. 3, fig. 36 (development).

Distinguished by the 2nd legs being equal, or nearly so, in length.

Length 17 mm.

Locality. Inhambane. 1 ovig. ♀, in Zostera bed. (U.C.T. Jan. 1954).

Distribution. Red Sea; East Indies.

Remarks. Gurney records ovigerous ♀♀ in late February.

At Ghardaqa, Red Sea, the shrimps inhabit 'the shallow reef-flat, which is largely laid bare at the lowest tides'. They appear to burrow in the sand during the day, and were only taken at night (loc. cit., p. 86).

Processa japonica (de Haan)

1849. De Haan, *Fauna Japonica*, p. 184, pl. 46, fig. 6.
1920. De Man, *Siboga Exp. monogr.*, xxxix, *a* 3, p. 208, pl. 18, figs. 53–53*k*.
1937. Gurney, *Proc. Zool. Soc. Lond.*, B, cvii, p. 88, pl. 1, figs. 16–19.

Three ovig. ♀♀, 30–36 mm., have the broad triangular rostrum and minute telsonic spines which Gurney notes as distinctive of this species.

Recorded as 'yellow (bright golden) shrimps burrowing in sand' (Mrs. M. Kalk, U.W.).

Locality: Delagoa Bay (U.W. 1955).

Distribution. Japan; East Indies; east coast of Africa (Gurney does not state the exact locality of the specimen he examined from the John Murray Expedition).

Gen. *Nikoides* Paulson

1875. Paulson, *Red Sea Crust.*, p. 98.

Nikoides danae Paulson

1875. Paulson, loc. cit., p. 98, pl. 14, figs. 5–5*d.*
1906. Nobili, *Ann. Sci. zool. Paris* (9), iv, p. 79, pl. 5, figs. 1–1*f.*
1937. Gurney, loc. cit., p. 89, pl. 1, figs. 20–5, pl. 2, figs. 26–9.

One specimen, ca 27 mm. (if extended) is provisionally assigned to this species. The basal process of ant. 1 is short and broad, apex obliquely truncate, the internal corner projecting farther forwards than the external corner; thus differing from Paulson's fig. 5*d.* Gurney does not figure this appendage, and Nobili's paper is not available to me; de Man (1920, loc. cit., p. 193, pl. 16, figs. 50–50*j*) also gives no figure of it for his *sibogae*, and without a figure his description is not very enlightening.

Locality: Delagoa Bay (U.W.).

Distribution. Red Sea; Djibouti. Gurney (loc. cit., pp. 89, 91) considers *sibogae* from the East Indies synonymous with *danae*.

Fam. ALPHEIDAE

Alpheus bullatus n. sp.

Fig. 22.

1950. Barnard, loc. cit, p. 742 (banded species from St. Lucia Bay).

Rostrum extending to end of 1st peduncular joint of ant. 1, not strongly keeled, similar to that of *crassimanus*. Supraorbital spines present. Basal process of ant. 1 reaching to (or a trifle beyond) apex of 1st peduncular joint. Basal joint of ant. 2 with ventral (external) spine; blade of antennal scale reaching half way along spine, which does not quite reach end of last peduncular joint of ant. 2.

First leg: margins of 4th joint entire, upper apex blunt; large chela ♂ (right) about twice as long as broad, outer half of upper surface with rounded granules, more or less in transverse rows, inner half with smaller granules and punctae; lower surface with scattered large punctae; finger knob-like, apex truncate; small chela ♂, a short denticle at upper apex of 5th joint, a short blunt tooth on upper surface of palm at base of finger, outer half of upper surface with rounded granules, inner half with punctae, lower surface with a few large punctae, finger subequal to palm. Both chelae in ♀ similar to, and almost as robust as in ♂; the large chela on the left side.

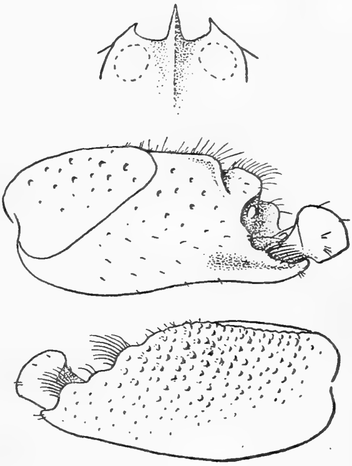

FIG. 22.

Alpheus bullatus n. sp. Dorsal view of front. Large chela of ♂, lower and upper surfaces.

Third and fourth legs, 4th joint 3 times as long as broad, lower margin with spaced groups of 2–3 setules, no tooth at lower apex; 6th joint of 3rd leg with 7, of 4th leg with 5 stout spines. Fifth leg more slender than 3rd and 4th. Dactyls of 3rd–5th legs biunguiculate.

Telson not strongly narrowed distally; with median groove between well-marked ridges on which are inserted 2 pairs of strong spines.

Length ♂ 22 mm., ♀ 27 mm. As preserved, two broad transverse bands on carapace and one on each abdominal segment brick-red; no medio-dorsal abdominal pale stripe; spine on outer ramus of uropod dark brown or blackish.

Localities. Delagoa Bay. 1 ♂, 1 ♀. (U.W.) St. Lucia Bay (S. Afr. Mus.).

Remarks. Although the chelae are missing, all three specimens from St. Lucia Bay agree with the Delagoa Bay specimens in all other features, including the colour pattern.

These specimens do not seem to agree with any described species. The large chela, although broader, seems to resemble in general that of *lutini* Cout. and of *phrygianus* Cout.; but both these species have a tapering telson and no supraorbital spines.

The large chela is indeed very similar to that of *malleator* Dana, as figured by Coutiére (1899, fig. 262), and in other characters also there is a close resemblance to the specimen described by Balss (1914, *2te. D. Zentr. Afr. Exp.*, I, p. 98, figs. 1–5) as 'tuberculosus' (non Osorio) and later (1916, *Beitr. Meeresf. Westafr.*, II, p. 22) identified as *malleator* Dana var. *edentatus* Zimmer 1913.

A. malleator is recorded from the Eastern Pacific, West Indies, Brazil, and West Africa. The finger of the large chela of the present specimens, however, is more knob-like than hammer-shaped: the proximal end only slightly bulbous and the apex abruptly truncate.

The strongly bicarinate telson of the Delagoa Bay specimens seems to be an unusual feature in the genus, but it is scarcely noticeable in the smaller specimens from St. Lucia Bay.

Fam. PALAEMONIDAE

Subfam. *Palaemoninae*

Key to South African genera and subgenera (after Holthuis)

I. Branchiostegal spine present.

  A. Branchiostegal groove absent. Lower margin of rostrum with double row of setae, which arise some distance above the bases of the teeth. 6th joint of 5th leg without transverse rows of setae distally. Two median spines on telson very strong. Pleopod 1 ♂ with well developed appendix interna. Mandibular palp 2-jointed. . . . . *Leander*
    L. tenuicornis (Say), circumtropical.

  B. Branchiostegal groove present. Lower margin of rostrum with (usually) a single row of setae (if two rows, the setae arise near the margin). 6th joint of 5th leg with transverse rows of setae distally. Two median spines on telson slender. Pleopod 1 ♂ appendix interna rudimentary or absent. . . *Palaemon*

    1. Mandibular palp 2-jointed. . . . . subgen. *Palaeander*
      elegans Rathke, *maculatus* (Thallw.),
      squilla (Linn.) (*adspersus* Rathke),
      west coast of southern Africa.

    2. Mandibular palp 3-jointed. . . . . subgen. *Palaemon*
      a. Pleopod 1 ♂ appendix interna rudimentary. . . . . *concinnus*
      b. Pleopod 1 ♂ appendix interna absent.
        i. Rostrum very slender, curving upwards. Free part of antennulary flagellum subequal to fused part. Peraeopod 2 slender, 5th joint twice as long as chela. . . . . *debilis*
        ii. Rostrum curving upwards. Free part of antennulary flagellum 3½ times the fused part. Peraeopod 2 5th joint shorter than chela. . *pacificus*
        iii. Rostrum straight. Freshwater. . . . . *capensis*

II. Branchiostegal spine absent. Hepatic spine present. . . . . *Macrobrachium*

Leander tenuicornis (Say)

1818. Say, *Proc. Ac. Sc. Philad.*, I, p. 249.
1875. Paulson, *Red Sea Crust.*, p. 116, pl. 17, figs. 3–5 (*torensis*).
1925. Kemp, *Rec. Ind. Mus.*, xxvii, p. 302, fig. 11 (append. intern., plp. 1 ♂).
1950. Holthuis, *Siboga Exp. monogr.*, xxxix, a 9, p. 26, figs. 1, 2.
1952. id., *Allan Hancock Publ. Occ. Pap.*, No. 12, p. 155, pls. 41, 42 (synonymy and references).

Two specimens with rostral teeth $\frac{10}{6}$ and $\frac{11}{7}$.

Locality. Delagoa Bay. (U.W.)

Distribution. Red Sea, Rèunion. Indo-Pacific and Atlantic. Common in floating Sargassum weed and among seaweeds in shallow water (Holthuis).

Palaemon (*Palaemon*) *debilis* Dana

1852. Dana, *Proc. Ac. Nat. Sci. Philad.*, vi, p. 26.
1950. Holthuis, *Siboga Exp. monogr.*, xxxix, a. 9, p. 66, fig. 13 (references).

Holthuis records this species from mangrove swamps at Durban. Also recorded from Chagos, Maldives, and Indo-Pacific.

Subfam. *Pontoniinae*

1952. Holthuis, *Siboga Exp. monogr.*, xxxix, a 10, pp. 1–254 (key to genera and subgenera).

Holthuis regards *Ancylocaris* Schenkel 1902 as a synonym of *Harpilius* Dana 1852. The two species recorded by me (1950) as species of *Harpilius* should be included in *Harpiliopsis* Borradaile 1915.

Gen. *Periclimenes* Costa

Subgen. *Periclimenes*

Periclimenes rex Kemp

1922. Kemp, *Rec. Ind. Mus.*, xxiv, p. 158, text-fig. 25, and pl. 5, fig. 5.

An ovig. ♀ 24 mm. in length agrees with Kemp's description except in two features, probably varietal or sexual.

The upper edge of the rostrum has a series of 28 teeth, excluding the apical point, and the two teeth immediately preceding the latter are smaller than the others; the posterior 3 teeth are postorbital, but there is no isolated tooth on the carapace.

The outer margin of the external lobe of the basal joint of ant. 1 ends in an acute point (as in Kemp's fig. 25*b*), but the distal margin projects beyond this point and ends in one (left) or two (right) sharp points (somewhat similar to the right ant. 1 in fig. 39*c* of *Paranchistus ornatus* Holthuis 1952).

Only one (detached) leg of the second pair is present.

Kemp records the gorgeous coloration of this species; as preserved, the present specimen is uniform deep orange, with a hint of a pale dorsal patch on the carapace, and the chelae of the first pair of legs and of the one remaining leg of the second pair still retain a purple tinge (as described by Kemp).

Locality: Delagoa Bay. (U.W.)

Distribution. Andaman Islands.

Subgen. *Harpilius*

Key to the South African species

1. Supraorbital spine present. 4th joint of 2nd leg with spine-tooth on lower apex.
    a. Spine of antennal scale extending well beyond apex of scale. 5th joint of 2nd leg shorter than palm (♂♀). . . . . *grandis*
    b. Spine of antennal scale not, or scarcely, extending beyond apex of scale. 5th joint of 2nd leg subequal to (♀), longer than (♂) palm. . *demani*
2. Supraorbital spine absent. 4th joint of 2nd leg without apical spine-tooth. 5th joint of 2nd leg shorter than palm. . . . . *brevicarpalis*

Periclimenes (*Harpilius*) *grandis* (Stimpson)

1922. Kemp, loc. cit., p. 210, text-figs. 58, 59, and pl. 7, fig. 10.
1952. Holthuis, loc. cit., pp. 11, 79 (references).

Locality: Delagoa Bay, 1 ♂, 1 ovig. ♀. (U.W.)

Distribution. Japan, East Indies, India, Ceylon, Red Sea, Zanzibar.

Periclimenes (*Harpilius*) *demani* Kemp

1915. Kemp, *Mem. Ind. Mus.*, v, p. 279, pl. 13, fig. 10, and text-figs. 27 *a–i.*
1922. id., *Rec. Ind. Mus.*, xxiv, pp. 171 (in key), 219, fig. 64 (antennal scale).
1952. Holthuis, loc. cit., pp. 11, 83.

Using Kemp's 1922 key, these specimens are easily identified as this species; and they agree with his 1915 detailed description. The rostral formula varies: 8–9 teeth above, 2–3 below.

Length 20 mm.

Localities. Durban Bay. ♂♂, ovig. ♀♀ July 1950. 1 ovig. ♀, Jan. 1951; and Inhambane. ♂♂, ovig. ♀♀, and immature, Jan. 1954. (U.C.T.)

Distribution. Chilka Lake; Madras; Mergui Archipelago. Inhabits both sea and brackish water.

Fam. CRANGONIDAE

Pontophilus pilosus Kemp

1916. Kemp, *Rec. Ind. Mus.*, xii, p. 367, text-fig. 4, and pl. 8, fig. 4.

Of 6 specimens the smallest (9 mm.) agrees with Kemp's description, but the others (12–13 mm.) have 4 medio-dorsal spines on the carapace instead of 3. The basal process of ant. 1 and other characters agree with the description.

Mottled and banded with brown as described by Kemp.

Locality: Delagoa Bay, 6 specimens, incl. ovig. ♀♀, from among *Cymodocea* plants. (U.W.)

Distribution. Southern India.

STOMATOPODA

Fam. SQUILLIDAE

Squilla harpax de Haan

1849. de Haan, *Fauna Japon. Crust.*, vii, p. 222, pl. 51, fig. 1.
1913. Kemp, *Mem. Ind. Mus.*, iv, p. 88, pl. 7, fig. 77 (*raphidea*, part)
1950. Barnard, *Ann. S. Afr. Mus.*, xxxviii, p. 851, fig. 1*c*, *g* (*raphidea*, non Fabr.).
1952. Tiswari and Biswas, *Rec. Ind. Mus.*, xlix, p. 358, fig. 3*b*, *d*, *f*.

The last-mentioned authors, Holthuis concurring, have separated *harpax* from *raphidea*, and given the differential characters.

S. harpax appears to be a smaller species, not exceeding 200 mm. in length. The cornea is even wider proportionately to the length of the whole eye than in *raphidea*; the lateral margin of the carapace is concave from the antero-lateral spines to the angular projection in hinder third (sinuous in *raphidea*). The 5th thoracic segment is laterally obtuse (not armed with a spine); the submedian keels on the thoracic segments and first five abdominal segments are obsolete. The intermediate keels on the thoracic segments do not end in spines. The keels supporting the marginal teeth on the telson are not massive or inflated.

The 5th thoracic segment is the crucial character.

The single specimen from Durban in the South African Museum, measuring 195 mm. in length, shows the above diagnostic characters.

Distribution. Japan, Hong Kong, Singapore, Andaman Islands, Bay of Bengal, Bombay.

TANAIDACEA

Fam. TANAIDAE

Leptochelia mirabilis Stebb.

Fig. 23.

These specimens are identified with *mirabilis* solely on geographical reasons, Ceylon being the nearest locality from which these 'dolichochelous' Tanaids have been recorded. The other species to be considered are: *minuta* Dana 1853 (loc. ?), *rapax* Harger 1879 (east coast of N. America and Bermuda) and *foresti* (Stebb.) 1896 (West Indies). Stebbing (1900, Willey's *Zool. Res.*, pt. 5, p. 616) suggests that *Paratanais erythraea* Kossm. 1880 (Red Sea) may be synonymous with *minuta*.

These species have been distinguished by minute differences in the relative lengths of the joints, and the number of flagellar joints in 1st and 2nd antennae.

A one-jointed outer ramus of the uropod is said to distinguish *rapax* (see: Richardson, 1905, *Bull. U.S. Nat. Mus.*, no. 54, p. 23 in key), but Stebbing (1905, loc. cit., p. 6) states that even the same species may have a one- or two-jointed outer ramus.

Stebbing's single specimen of *mirabilis* was a ♂ with the 1st gnathopods not quite symmetrical, and both of them damaged; he was therefore unable to describe the apex of the thumb. In the present specimens the 1st gnathopods are symmetrical in all the ♂♂, and the thumb is similar to those of *rapax* and *foresti* (see: Richardson, loc. cit., figs. 31 and 25).

Length, ♂ 3 mm., 1st gnathopod 5–6 mm.; ♀ 2·5 mm. As preserved, white, eyes black.

Locality. Inhambane, in Zostera beds. ♂♂, ovig. ♀♀. (U.C.T.)

Distribution (*mirabilis*). Ceylon.

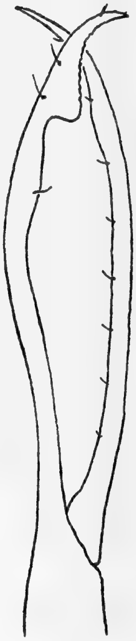

FIG. 23. *Leptochelia mirabilis* Stebb. Finger and thumb of 1st peraeopod ♂.

ISOPODA

Fam. ANTHURIDAE

Gen. *Haliophasma* Hasw.

1940. Barnard, *Ann. S. Afr. Mus.*, xxxii, pp. 382, 498 (key to species).

The following key seems preferable to that given in the above work on p. 498.

1. Telson clearly distinct from pleon segment 6.	
a. Telson narrow-ovate, strongly tricarinate.	. . . . *tricarinata*
b. Telson broadly-ovate.	
i. Telson widest proximally, with basal lateral flanges, more or less distinctly tricarinate.	. . . . *foveolata*
ii. Telson widest in middle, not tricarinate.	. . . . *coronicauda*
iii. Telson obovate, apically upturned.	. . . . *hermani*
2. Telson fused with pleon segment 6.	. . . . *pseudocarinata*

Haliophasma foveolata Brnrd.

Fig. 24*a–c*.

1940. Barnard, loc. cit., p. 384, fig. 2.

My suggestion that this species might be the female of *tricarinata* is put entirely out of court by the present fine male specimen.

Foveolae and pits present on dorsal surface of head and peraeon segments 1–3 (only a few on 3), demarcated lateral areas on segments 2–5 (one or two on segments 6 and 7), and strongly marked on sternites of segments 2–7.

Antenna 1, flagellum 12-jointed (the apical one minute), with dense fascicles of setae. Antenna 2, flagellum 7-jointed, with fascicles of shorter and stiffer setae (not 'furry' as in antenna 1).

Peraeopod 1, 5th joint with lower apex blunt, 6th joint cylindrical but curved, lower margin concave from base to a triangular tooth near finger hinge.

Pleopod 2 ♂ stylet inserted slightly beyond middle of inner ramus, extending slightly beyond apex of ramus, slightly expanded distally, apex acute.

Telson as in the original figure: basal half with marginal flanges, distinctly narrowed in distal half; lateral ridges present but no trace of the central ridge; ventral surface as a whole concave, but with a slight median convexity.

Length 26 mm.

Locality. False Bay. 1 ♂. (U.C.T.)

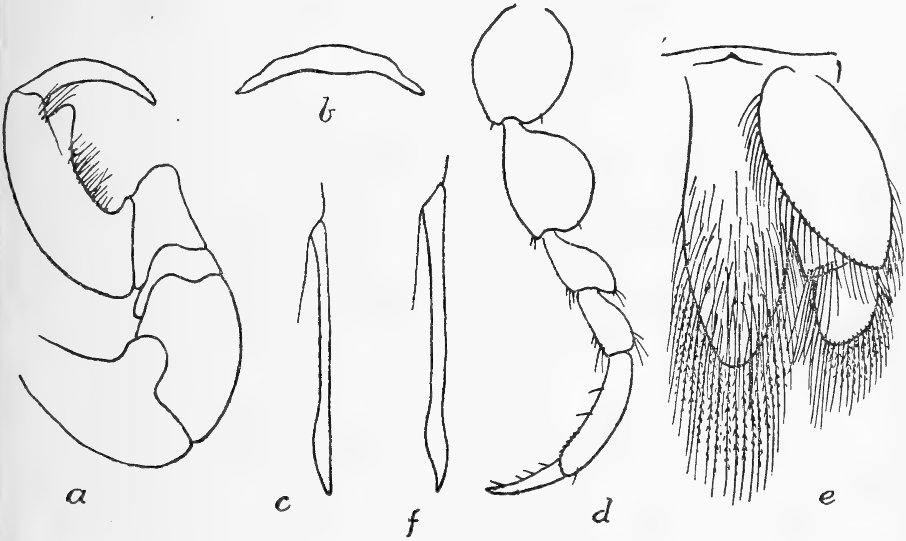

Fig. 24.

Haliophasma foveolata Brnrd. *a*. peraeopod 1 ♂. *b*. transverse section of telson. *c*. pleopod 2 ♂ stylet.
Paranthura latipes n. sp. *d*. peraeopod 5. *e*. telson and uropod. *f*. pleopod 2 ♂ stylet.

Gen. *Paranthura* B. & W.

1925. Barnard, *J. Linn. Soc. Lond.*, xxxvi, p. 152.

Paranthura latipes n. sp.

Fig. 24*d–f*.

Telson ovate-lanceolate, lateral margin slightly sinuous, greatest width a little before midway, margin and dorsal surface with long, minutely plumose setae. Uropod, peduncle with a transverse series of long setae at distal inner corner, ramus longer than basal width, outer ramus broadly ovate, margins with long, minutely plumose setae. Antenna 1, flagellum 6-jointed, setose.

Peraeopod 1 as in *punctata* (1914, Barnard, *Ann. S. Afr. Mus.*, x, pl. 29 C) but basal tooth on palm not prominent. Peraeopods 4–7 with 2nd and 3rd joints broadly oval. Pleopod 2 ♂ stylet a little longer than inner ramus, slightly constricted at two-thirds the length, the distal third slightly lanceolate, apex acute.

Length, ♂ 7·5 mm. As preserved, yellowish-grey; head, a medio-dorsal line and the hind margins of peraeon segments, pleon segments laterally, telson, peduncle and outer ramus of uropods darker grey, eyes black, antennae and peraeopods white.

Locality. Maxixe (Machiche), Inhambane Bay. Low tide, sand banks and concrete piles. (U.C.T.)

Remarks. Distinguished by the broadly oval 2nd and 3rd joints of peraeopods 4–7, and the densely setose telson.

In my references to *punctata* (loc. cit., p. 348a) the inclusion of Hilgendorf's opinion (1878, *MB. Berl. Ak. Wiss.*, p. 847) that *punctata* was a *Paranthura*, might be construed as a record of Stimpson's species from Ibo (Mozambique). Hilgendorf merely recorded an 'Anthura sp.' without any description.

Fam. EURYDICIDAE (CIROLANIDAE)

Cirolana imposita n. sp.

Fig. 25*c*, *d*.

♂—Head, peraeon and pleon smooth, but, when viewed semidried under a × 16 lens, sparsely sprinkled with minute granules. Frontal lamina pentagonal, separate (but barely) from rostral point. Telson with 2–3 granules at base on either side of a broad median ridge which extends to apex; this ridge with a median groove, the edges of which are approximate basally but divergent in the distal two-thirds, and enclose a subsidiary median ridge; lateral margins distally and apex with plumose setae (spines may have been present but are now broken off).

Pleopod 1, outer ramus twice as broad as inner ramus.

Uropod rami extending slightly beyond apex of telson; outer ramus with 2 groups of a spine and setae near the outer margin in distal two-thirds, inner margin and apex with plumose setae; inner ramus with spines (6 or 7) and plumose setae.

Penial processes on 7th sternite as in *sulcata* (Barnard, 1939, *Ann. S. Afr. Mus.*, xxxii, p. 392, fig. 6*f*). Stylet on pleopod 2 extending slightly beyond apex of ramus, slender, slightly curved outwards distally, apex acute.

Length 9–10 mm.

Localities. 1 ♂ from stomach of cormorant shot off Danger Point, 1954. (R. W. Rand, Biologist to the Guano Islands Administration); 1 ♂, 1 ♀ off Cove Rock (East London), 80 fms. (s.s. *Pieter Faure* coll. in S. Afr. Mus.).

Remarks. In regard to the sculpturing of the telson, this species is allied to *sulcata* Hansen 1890, but invites closer comparison with *cingulata* Brnrd., 1920. The telson of *sulcata* has a median groove between two ridges, open from close to the base of the telson, without any indication of a median ridge ('imposita') (fig. 25*a*).

The granules on the pleon segments are usually distinct, but are usually obsolete on the ridges bounding the telsonic furrow. I have seen only one specimen as strongly granulate as in Hansen's figure, which shows in addition a median line of granules in the furrow.

C. sulcaticauda Stebb. 1904 has the tuberculate ridges nearly parallel, and also a median row of tubercles in the furrow. In other features *sulcaticauda* and *sulcata* are quite distinct.

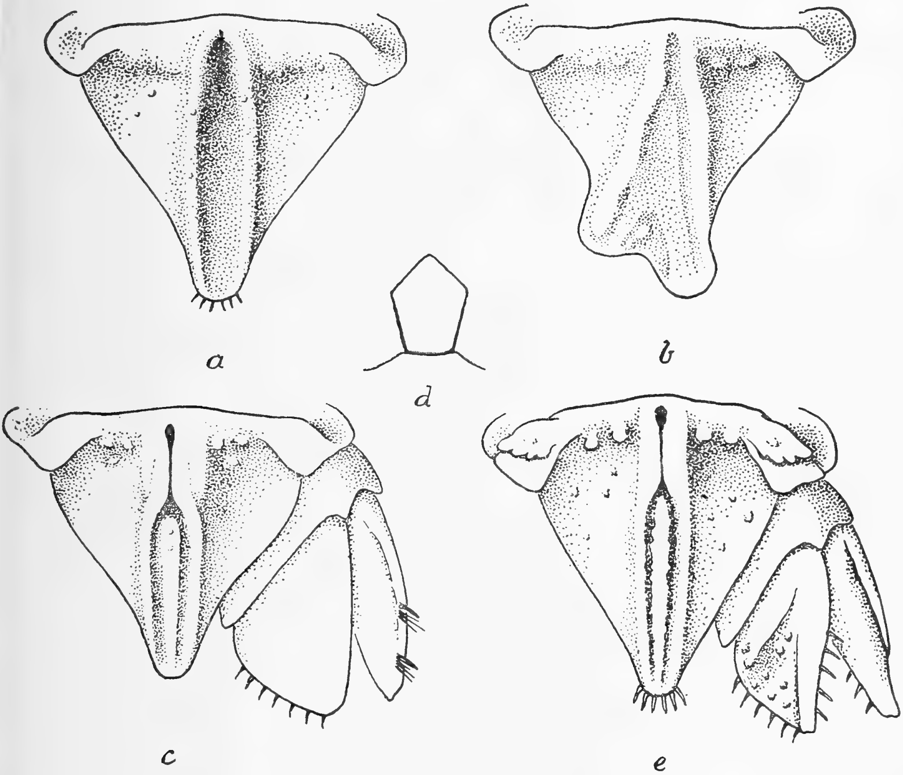

Fig. 25.

Cirolana sulcata Hansen. *a.* telson

Cirolana palifrons Brnrd. *b.* malformed telson of the Type.

Cirolana imposita n. sp. *c.* telson and right uropod. *d.* frontal lamina.

Cirolana cingulata Brnrd. *e.* telson and right uropod (marginal plumose setae omitted).

My original description of the telson of *cingulata* ('a median ridge with two punctate-striate grooves') is correct; but for comparison with the present species would be better worded: a median ridge with a groove which is slit-like in basal third, but widens in distal two-thirds, where it is nearly completely filled with a median somewhat granular ridge (fig. 25*e*).

Another species with a similarly sculptured telson is *palifrons* Brnrd. 1920. Although the sculpture had been disrupted by injury in the only known specimen, the normal sculpture seems to have been very similar to that of *cingulata* (fig. 25*b*). The two species are easily distinguished by other characters.

Cirolana pilula n. sp.

Fig. 26*a–c*.

Body smooth, very convex. Frontal lamina and peraeopods as in *hirtipes*. Eyes round. Impressed line on hind margin of eyes continuous across median area of head.

Telson broader than long, length about $\frac{3}{4}$ basal width, broadly rounded, distal margin minutely crenulate, with a plumose short seta in each notch. Uropods not reaching telsonic apex, inner ramus broad, distal margin with plumose setae and 6–7 spines, outer ramus shorter than inner, ovate, apex with plumose setae and 5–6 spines.

Vasa deferentia opening by pores flush with sternal surface (as in *hirtipes*). Stylet on pleopod 2 ♂ slender, straight but slightly curved distally, apex serrulate, with a minute digitiform process.

Length ca. 11 mm., breadth 4·5 mm. As preserved, pale with pinkish or greyish speckles.

Locality. False Bay (34° 17′ 6″ S. 18° 39′ 2″ E. and 34° 12′ 8″ S. 18° 36′ 5″ E.), 25–34 fathoms, shelly sand. 3 specimens, including ♂ but no ovig. ♀. (U.C.T.)

Remarks. This species appears to be able to 'conglobate' almost as completely as the terrestrial *Tylos*, and in fact bears a strong resemblance to this littoral Isopod. It belongs to the *hirtipes* group, but is at once distinguished by the short, rounded telson.

Cirolana capitella n. sp.

Fig. 26*d–g*.

A fringe of setae on hind margins of the peraeon segments laterally and on side-plates, smaller specimens not so setose as the largest (in fact almost glabrous); pleurae of pleon segments sparsely setose; pleon and telson with very fine pile.

Head with an upstanding median process between the eyes, apically slightly bifid, and near the inner margin of eye a very low rounded tubercle; median process not developed in juveniles 7 mm. in length, but indicated in specimens 9–11 mm. in length, in which latter also the tubercles can just be seen if specimen examined semi-dry.

Frontal lamina obovate, anterior margin rounded, freely projecting, separated from small rostral point by the contiguous bases of 1st antennae.

Hind margins of peraeon segments each with a series of small sharp denticles, 5 or 6 on either side of a median one, feeble and obscure on 1st and 2nd segments, but becoming more prominent on hinder segments.

Pleon segments 3 and 4 each with 3 or 4 denticles on either side of a median one; in the largest specimen the denticles on segment 4 stronger than on segment

3, and the submedian pair stronger than the others; segment 5 with a median and 2 (or 3) lateral denticles. Telson with an obscure median groove bounded by very feeble ridges; this sculpture can only be seen when specimen is semi-dry; a strong acute tooth laterally over the articulation of uropod; apex narrowly rounded, with plumose setae and about 6 spines.

Uropod, inner ramus broad, outer ramus ovate, of about equal length, margins with plumose setae and spines.

Vasa deferentia opening by pores flush with surface.

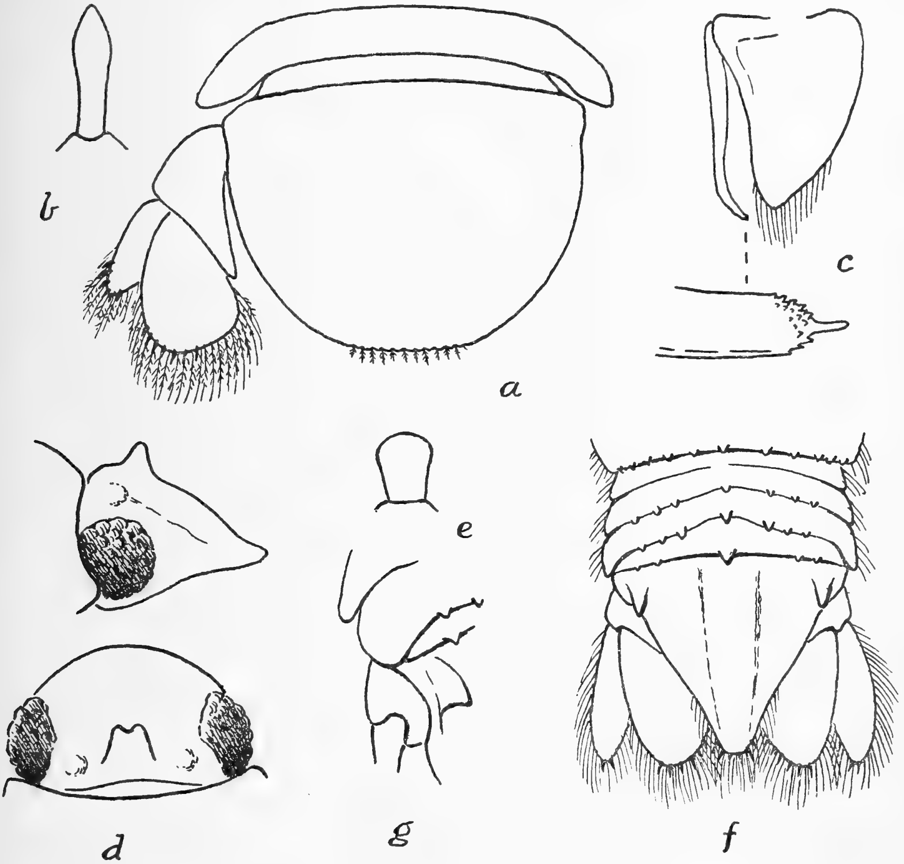

Fig. 26.

Cirolana pilula n. sp. *a*. pleon segments 4 and 5, telson and uropod. *b*. frontal lamina. *c*. pleopod 2 ♂ with apex of stylet further enlarged.

Cirolana capitella n. sp. *d*. lateral and dorsal views of head. *e*. frontal lamina. *f*. peraeon segment 7, pleon, telson and uropods. *g*. lateral view of pleon segments 3–5, basal corner of telson, and peduncle of uropod.

Pleopod 1, inner ramus $\frac{2}{3}$ as broad as outer ramus. Pleopod 2 ♂ stylet as long as ramus, slender, apically acute.

Largest specimen 12 × 4·5 mm. Preserved, uniform pale yellowish, eyes black.

Locality. Inhambane, and in the Lagoa Poelela at Inharrime. 1 adult ♂, 3 immature ♂♂, 7 juv. (U.C.T. 1954)

Remarks. Closely resembling *willeyi* Stebb. (1904, *Spol. Zeylan.*, II, p. 11, pl. 3) but pleon segment 3 not overlapping segment 4, and frontal lamina not pentagonal with anterior point meeting rostral point (see: Barnard, 1935, *Rec. Ind. Mus.*, xxxvii, pp. 309, 312, fig. 18*b*). In this last respect the present species is comparable with *fluviatilis* (see: Barnard, loc. cit., p. 310, fig. 19).

Gen. *Conilorpheus* Stebb.

The coinciding of three characters, viz. transverse impressed lines on the peraeon segments, a particular kind of sculpture on the telson, and a narrow inner ramus on pleopod 1, in *Conilorpheus scutifrons* and *Cirolana cingulata* led to a check-up on all the South African species of *Cirolana.*

A narrow inner ramus on pleopod 1 was recorded in the original descriptions of *cingulata* and *palifrons,* and is found in *imposita* n. sp. (*supra*), but the transference of these three species to *Conilorpheus* is precluded by the frontal lamina being separate from the rostral point, and the bases of 1st antennae contiguous. In *C. scutifrons* the bases of 1st antennae are definitely separated by the junction of the rostral point and the strongly produced frontal lamina.

A narrow inner ramus on pleopod 1 is also found in *C. sulcata.* But in this species—with the same basic type of telsonic sculpture in its simplest form—the contiguity of the bases of 1st antennae is an ambiguous character: in some specimens the bases are sufficiently bulbous to meet over the lower-lying septum joining the rostral point and the frontal lamina, in others the rostral point and the frontal lamina meet, or almost meet, on the surface.

One cannot go farther than say: there is a group of four species of *Cirolana* with closely comparable telsonic sculpture: *sulcata, palifrons, imposita* and *cingulata,* the last of which shows a truly remarkable convergence with *Conilorpheus scutifrons.*

In the course of examining the *Cirolana* species one or two features were noted suggestive of a possible division of the rather numerous species into groups. It would, however, be premature to attempt this.

Conilorpheus scutifrons Stebb.

Fig. 27*a–d*.

1908. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 46, pl. 5 (Crustacea pl. 31).
1920. Barnard, ibid., xvii, pp. 351, 352.

An unfortunate error occurred in the latter description; the ♂ and ♀ symbols were transposed. The first paragraph (p. 352) applies to the ♀, the second to the ♂. As is often the case, the ♂ is the more highly sculptured of the two sexes, but not to a very great extent. The sculpturing typical of the species is the same in both sexes.

There are traces sometimes of feeble tubercles on peraeon segment 2, but usually one of the 3 or 4 transverse impressed lines is merely undulate or crenulate; these crenulations are more marked on segments 3 and 4, and on segment 5 become definite denticles or tubercles. There are usually accessory denticles between the major tubercles on segments 5–7.

On the pleon the median pair of tubercles on segments 3–5 are more prominent than any of the other tubercles, of which there appear to be constantly 2 on either side, and some minor denticles.

For reasons given by Stebbing the full development of the telsonic sculpture was not present in his (type) specimen, and as no mention was made in my

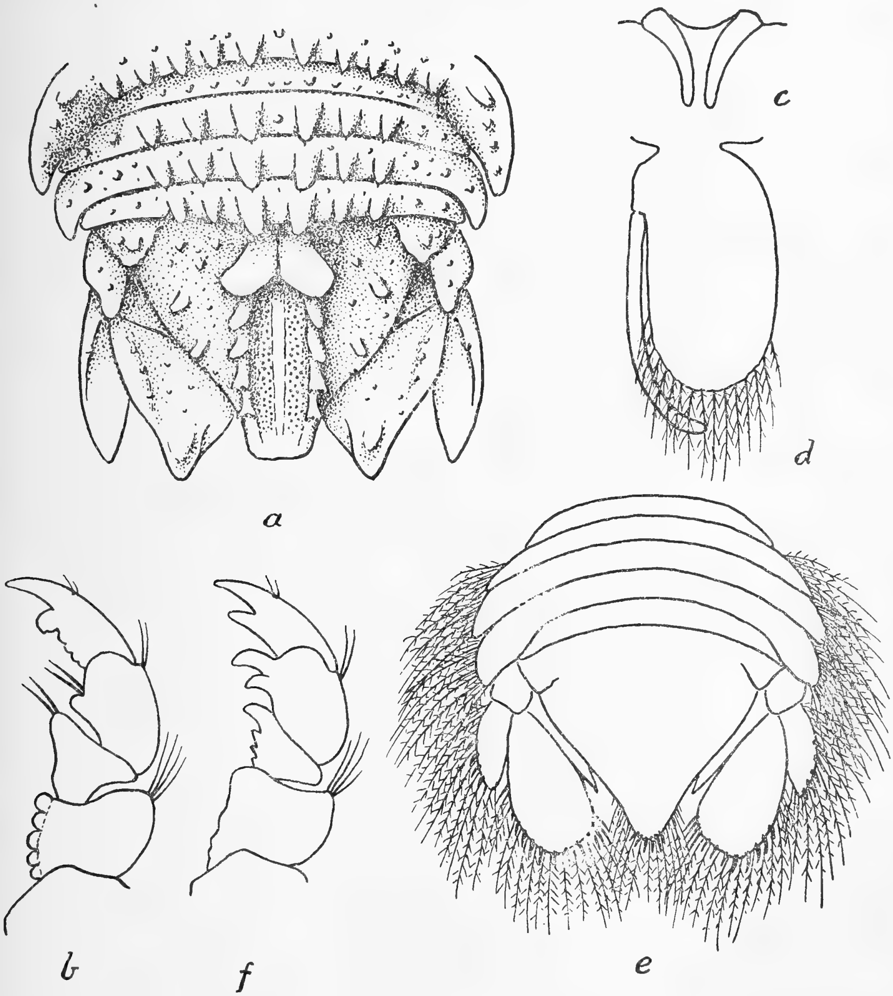

FIG. 27.

Conilorpheus scutifrons Stebb. *a*. peraeon segment 7, pleon, telson and uropods (marginal spines and setae on telson and uropods omitted). *b*. peraeopod 1. *c*. ♂ penial processes on peraeon segment 7. *d*. pleopod 2 ♂.

Conilorpheus blandus n. sp. *e*. pleon, telson and uropods. *f*. peraeopod 1.

note, a description and figure is given here. As will be seen from the figure the sculpturing is distinctly reminiscent of that of *Cirolana cingulata* (fig. 25*e*), which species also has transverse impressed lines on the peraeon segments. The median ridge is overlapped at the base by two adnate lobules, there is a slight ridge (sometimes obscure) in the middle of the central groove, each margin of the latter being ornamented with 4 little tubercles, often apically bifid. There are several other little denticles and points on the telson, as also on the inner ramus of uropod. Minor variations in arrangement occur among the smaller denticles.

Peraeopod 1 as described by Stebbing. The 4th joint has 4 (sometimes 5) bluntly rounded teeth as shown in his figure (not 'spines' as in his description); 5th and 6th joints each with 2 spine-setae on inner apex; inner margin of 7th joint crenulate, ending in a 'squared' or rounded lobe at base of unguis.

Penial processes on 7th peraeon sternite separated by about twice the basal width of one of them; apices curving inwards.

Stylet on pleopod 2 in *fully adult* ♂ arising at basal quarter of inner ramus, not midway as in the 'subadult'; uniform in width, distally curved outwards, apex rounded.

One ♀ has large brood lamellae on peraeopods 2–5. Only one embryo, 2·5 mm. in length, remains in the pouch.

Length ♂ 9 mm., ♀ 10 mm. As preserved, the Algoa Bay specimen has greyish irregular mottling on the peraeon; the other specimens are yellowish, eyes black.

Additional localities. East London, littoral. 1 ♂, 1 ♀ (Prof. Stephenson, 1937); False Bay and Algoa Bay. (U.C.T.)

Conilorpheus blandus n. sp.

Fig. 27*e*, *f*.

♀—Head and body covered with very fine and short pile, which becomes thicker on pleon and telson; when semi-dried the head and peraeon are seen to be obscurely rugulose. Postero-inferior corners of side-plates 1–4 with a few plumose setae; whole inferior margins of 5–7 thickly set with plumose setae, as are also the pleural margins of the (exposed) pleon segments.

Frontal lamina as in *scutifrons*, meeting the rostral point and separating the bases of 1st antennae, tridentate, with an accessory denticle on each side proximally.

Flagellum of 1st antenna 5–7-jointed, of 2nd antenna 9–10-jointed.

Maxilla 1 inner lobe with 3 strongly setose spines.

Peraeopod 1, 4th joint with undulate inner margin, feebly crenulate proximally, 5th joint with 4 blunt teeth increasing in size distally, 6th with 2 large blunt curved teeth, 7th with a strong curved tooth at base of unguis.

Pleopod 1, inner ramus only half the width of outer ramus.

Uropod, inner ramus obovate, outer distal corner extending slightly beyond telson apex, outer ramus ovate, not reaching level of telson apex, both rami with marginal spines and thick fringe of plumose setae.

Telson apex more narrowly rounded than in *scutifrons*, with about 6 spines, and thick fringe of plumose setae.

8–8·5 mm. × 4 mm. As preserved, yellowish, eyes black.

Locality. Algoa Bay. 2 subadult ♀♀. (U.C.T.)

Remarks. Both specimens are subadult, preparing for ecdysis. The contrast between this smooth velvety species and the sculptured *scutifrons*, both with a tridentate frontal lamina, is very striking.

Fam. CORALLANIDAE

Gen. *Corallana* Dana

1879. Schiödte and Meinert, *Nat. Tidsskr.* (3), xii, p. 286.
1904. Stebbing, *Fauna Geogr. Mald. Lacc. Archip.*, ii, p. 703.
1914. Barnard, *Ann. S. Afr. Mus.*, x, p. 358a.
1931. Nierstrasz, *Siboga Exp. monogr.*, xxxii, c., p. 163.

Corallana furcilla n. sp.

Fig. 28*c–e*.

♀ with embryos—Body with scattered setules, chiefly on side-plates and hind margins of peraeon segments. Surface obscurely rugulose or foveolate, pleon and telson with irregularly scattered pits.

Peraeon segments 1–4 without sculpture; segment 5 with 4–5 obscure flattened tubercles laterally; segment 6 with 3 tubercles, the submedian pair obscure; segment 7 with 5–6 tubercles, the lateral ones more prominent than the central ones.

Pleon segment 2 smooth; segments 3 and 4 each with a median pair of tubercles and a single lateral one, upper margin of pleuron of segment 4 crenulate; segment 5 with a median pair of longitudinal tubercles.

Telson with a very obscure transverse series of granules at base, outer basal corner upturned, carinate; surface slightly concave between the lateral margins but with a very slight central convexity, apex with a pair of short slightly upturned points, distal margin with plumose setae, a pair of spines in the sinus, and one spine on outer margin of each prong.

Basal joints of 1st antennae contiguous, not anteriorly dilated, flagellum 13-jointed. Antenna 2 flagellum 23-jointed.

Epistome transverse, vertical and not visible until upper lip is depressed.

Peraeopods 1–3, inner apex of 3rd joint with 3 blunt tubercles, 5th with 4 blunt tubercles on inner margin; these tubercles do not lie in the plane of the limb, but curve backwards towards the posterior surface.

Uropod, inner ramus extending almost to telson apex, obovate, apically truncate with 2 spines near inner corner, outer and apical margins with plumose setae; outer ramus slightly longer than inner, narrow, ovate, articulating vertically, upper margin thick, both margins with plumose setae.

13 × 5 mm. As preserved, slaty-grey, somewhat mottled, eyes black.

Embryo 3·3 mm. Telson with broadly rounded, subtruncate apex.

Juvenile 8·5 mm. Peraeon and pleon without sculpture. Telson as in embryo, but apical margin with plumose setae and 6 spines; distal margin of

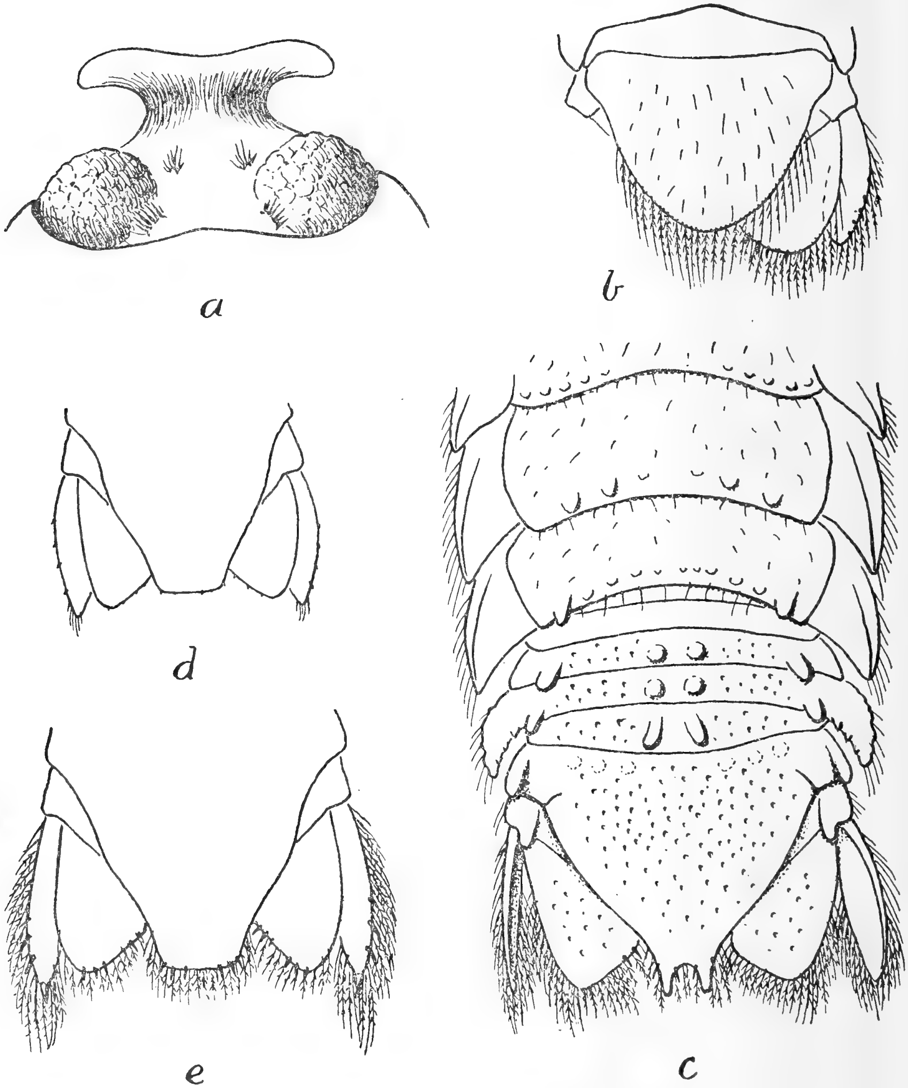

FIG. 28.

Lanocira latifrons Stebb. *a.* head. *b.* telson and uropod.
Corallana furcilla n. sp. *c.* peraeon segments 5–7, pleon, telson and uropods of adult ♀. *d.* telson and uropods of juvenile from brood pouch, 3·3 mm. *e.* telson and uropods of juvenile 8·5 mm.

inner ramus of uropod with plumose setae and 6 spines; outer ramus with 3 spines on outer and 1 on inner margin distally, apex with 1 stout spine and plumose setae.

Locality. Inhambane, from holes in roots of mangroves. 1 ♀ with embryos, 1 juv. (U.C.T.)

Remarks. Similar to *nodosa* S. & M. and *hirsuta* S. & M. as regards the tubercular sculpture of the hinder peraeon segments.

The juvenile, presumably, is conspecific with the adult.

The recurved tubercles or stout spines on the anterior peraeopods appear to be well adapted to excavating holes or burrows.

Lanocira latifrons Stebb.

Fig. 28*a*, *b*.

1910. Stebbing, *J. Linn. Soc. Lond.*, xxxi, p. 217, pl. 21.

♂—Agreeing with Stebbing's description except in two features: one obvious, the other rather obscure.

The telson has not a 'rather narrowly rounded apex'. The margins are convex, without any concavity, and the apex is broadly rounded. Moreover there are no marginal spines among the plumose setae, though marginal spines are present on both rami of uropods.

The second feature is one which may not have been developed in Stebbing's smaller ♂ (7·75 mm.), or may have been overlooked. There are two pairs of tufts of setae on the head, one near inner hind margin of eye, the other near inner front margin of eye. Unless examined semi-dry these little tufts might easily be overlooked.

Bases of 1st antennae contiguous, separating the pentagonal frontal lamina from the rostral point.

Length 9·5 mm. As preserved, yellowish, eyes black.

Locality: Inhaca Island, Delagoa Bay. 1 ♂. (U.W.)

Distribution. Sudanese Red Sea.

Remarks. In a large number of specimens the growth of the rostral process in the ♂ could be followed. The suggestion seems not unreasonable that *latifrons* may be only the fully adult ♂ of the earlier species *gardineri* Stebb. 1904, and *zeylanica* Stebb. 1905. The latter was also found in the Sudanese Red Sea; and *gardineri* and *zeylanica* at Ceylon.

One point deserves attention: Stebbing's figure (pl. 51A) of *gardineri* seems to indicate that the frontal lamina separates the bases of the 1st antennae.

Fam. SPHAEROMIDAE

Sphaeroma annandalei Stebb.

1940. Barnard, *Ann. S. Afr. Mus.*, xxxii, p. 405.

A ♂ and an ovigerous ♀ from Inhambane (U.C.T.) have the transverse ridges on the peraeon segments continuous from side to side, not broken up into tubercles; there are 2 circular tubercles on pleon segment 4, very indistinct in ♂; in ♀ the left-hand one only of one of the normal 2 pairs of submedian tubercles on telson is present, the other pair and the median tubercle being obsolete; in ♂ there is a mere suspicion of one submedian pair of tubercles on telson.

Gen. *Isocladus* Miers

1914. Barnard, *Ann. S. Afr. Mus.*, x, p. 384.

The two species here described are the first representatives of this genus to be recorded from South African waters.

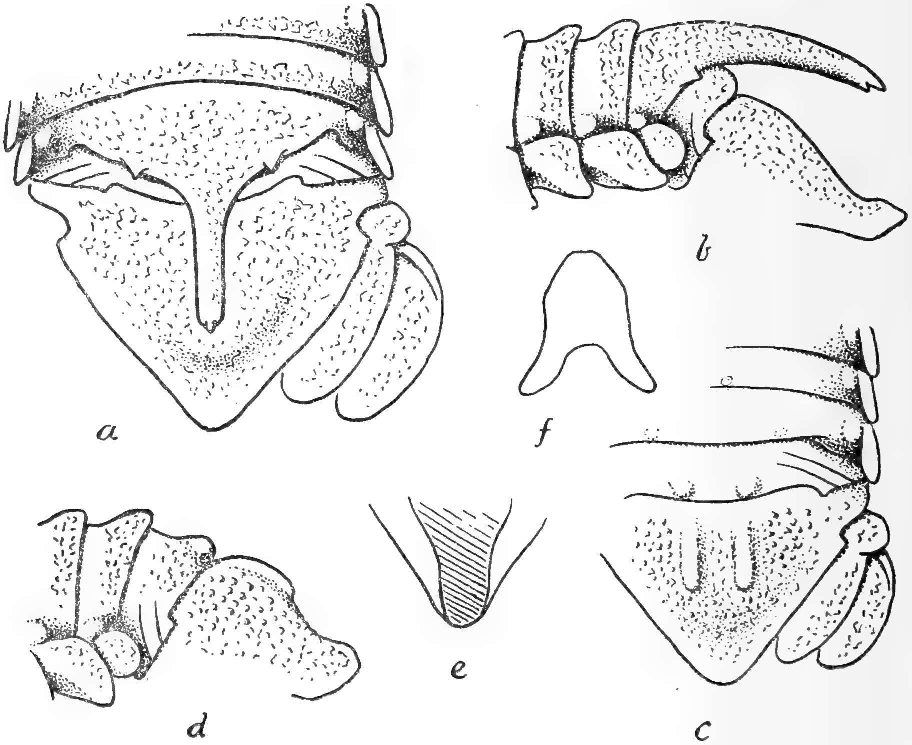

Fig. 29.

Isocladus otion n. sp. *a.* 5th–7th peraeon segments and pleotelson with uropod ♂. *b.* lateral view, ♂. *c.* 5th–7th peraeon segments, pleotelson with uropod ♀. *d.* lateral view ♀. *e.* ventral view of apex of telson. *f.* epistome.

The sharp denticle on either side of the median process in ♂ is a distinctive character. The ridge formed by the bulbous junctions of the peraeon segments with their side-plates does not occur in *tristensis* (Leach) or *integer* (Heller), in both of which the transverse profile forms a perfectly even curve. It occurs, however, to a lesser degree in the Australian *Zuzara venosa* (Stebb.) of which I have seen specimens, and in the Cape *Z. furcifer* Brnrd.; and appears to be quite well marked in *Z.* (*Isocladus*) *excavata* Baker judging by his figure (1910, *Trans. Roy. Soc. S. Austr.*, xxxiv, pl. 24, fig. 4).

Isocladus otion n. sp.

Fig. 29.

Body glabrous, inconspicuously rugulose (best seen when removed from liquid and semi-dry). Epistome without crest, almost in contact with rostral process. Hind margins of peraeon segments rather prominent. Antero-lateral corner of peraeon segments bulbous at junctions with epimera, the latter also bulbous at the junctions so as to form a rather prominent lateral ridge on each side of the peraeon. On 7th segment the epimeron stands up conspicuously, more so in ♂ than in ♀, like a little ear (hence the specific name).

Seventh segment in ♂ with a median process, its apex obscurely trifid, and flanked on each side (midway between median line and epimeron) by a sharp denticle; in ♀ hind margin only slightly more convex than in preceding segments, with a mere suggestion of a pair of granules corresponding with the sharp denticles in the ♂.

Pleon smooth in ♂, but with a submedian pair of inconspicuous knobs. Telson in ♂ smooth, with bluntly pointed apex; in ♀ more strongly convex proximally, with 2 submedian parallel ridges and the rugulosity becoming almost granular; a shallow ventral groove in both sexes.

Uropods not extending to apex of telson in either sex, ovate, broader in ♂ than in ♀.

Penial processes on 7th peraeon segment close together but bases not contiguous. Stylet on pleopod 2 straight, longer than endopod, apex acute.

Length, 6·5 mm. As preserved, chalky white.

Locality. False Bay, 4–10 fathoms. 2 ♂♂, 1 ovig. ♀. Sept. 1946; 2 immat. ♀♀. Febr. 1947. (U.C.T.)

Remarks. The apices of the uropods falling short of the telsonic apex may perhaps indicate that the only two males are not quite fully grown, although in other respects (separation of stylet on pleopod 2) they seem to be mature.

Isocladus mimetes n. sp.

Fig. 30.

Body glabrous. Head and peraeon segment 1 granulate. Epistome as in *otion*, without crest, almost in contact with rostral process. Posterior half of segments 2–6 rather conspicuously ridged in side view, each segment with 2 submedian small granules, segments 2–4 also with a less conspicuous median granule; additional intervening minute granules can be seen when examined semi-dry.

Segment 7 in ♂ inconspicuously granulose, with median process, its apex forked, flanked on either side by a prominent conical denticle; in ♀ similar to segment 6, with the 4 well-marked granules, and additional minute ones.

Junctions of peraeon segments with their side-plates bulbous, forming a rather prominent lateral ridge. Side-plates vertical, scarcely visible in dorsal view; side-plate on 7th segment not so prominent as in *otion*.

Pleon in ♂ granulose, but without definite granules, in ♀ distinctly granulate, and with a submedian pair of short ridges or longitudinally oval tubercles.

Telson in ♂ obscurely granulose, apex slightly raised, with a rather wide open notch; seen from behind the ventral groove is rather deep; in ♀ distinctly granulate with 2 submedian parallel ridges, apex bluntly pointed, dorsally raised, scarcely carinate but with a few granules; the profile of telson but not that of pleon closely resembles that of *Zuzara furcifer* (fig. 31*c*), in hind view the ventral groove not so deep as in ♂.

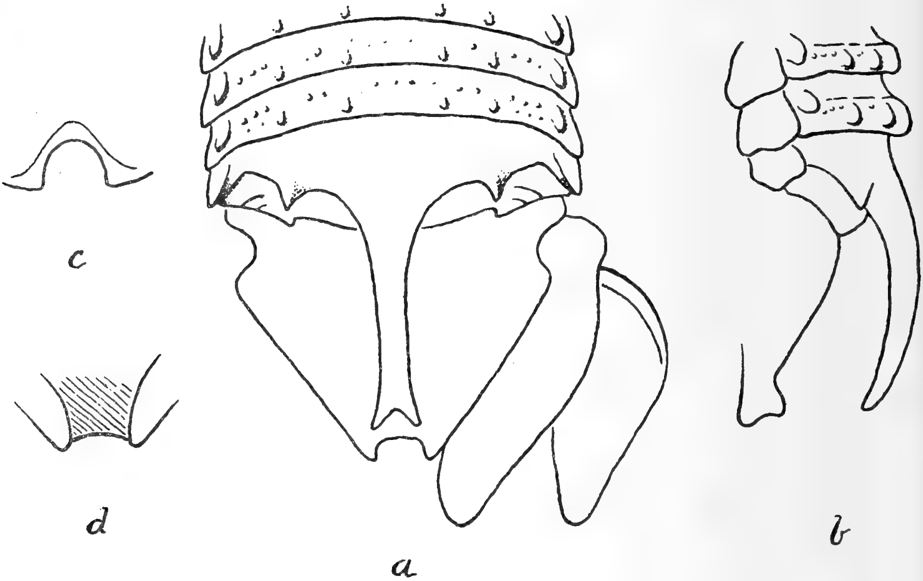

FIG. 30.

Isocladus mimetes n. sp. *a.* 5th–7th peraeon segments and pleotelson with uropod ♂. *b.* lateral view. *c, d.* posterior and ventral views of apex of telson.

Uropods in ♂ extending beyond telsonic apex, inner ramus rather narrow, outer margin in distal $\frac{2}{3}$ nearly straight, outer ramus subtriangular, basally rather broad, distal half of outer margin nearly straight and sloping to the narrowly pointed apex; in ♀ not extending to telsonic apex, ovate.

Penial processes on 7th peraeon segment close together but bases not contiguous. Stylet on pleopod 2 ♂ straight, longer than endopod, apex acute.

Length, 5 mm. (the ♂ appears larger than ♀ on account of the projecting uropods). As preserved, amber-coloured, with minute pigment specks, uropods paler.

Locality. Off Roman Rock, False Bay, 12–14 metres. 3 ♂♂. 1 ♀. (U.C.T. 1954.)

Remarks. The forked process on peraeon segment 7 in the ♂ gives a remarkably deceptive likeness to *Zuzara furcifer.* The absence of the median process on telsonic apex, and the shape of the uropods, however, at once distinguish the present species.

The ♀ is distinguished from that of *otion* by the four longitudinal series of granules on the peraeon, and by the tubercles on the pleon being more longitudinally oval than circular. The telson is more rugged and in this respect resembles that of *Z. furcifer* (*infra*).

These three species were found at slightly different sites, but in each case both sexes were found in association; otherwise the correlation of the sexes would have been difficult if not impossible.

Zuzara furcifer Brnrd.

Fig. 31.

1920. Barnard, *Ann. S. Afr. Mus.*, xvii, p. 361, pl. 15, figs. 26, 27 (♂).

Adult ♂. On 6th peraeon there is a feeble tubercle about midway between the median line and the side-plate. This was overlooked in the original description and figure.

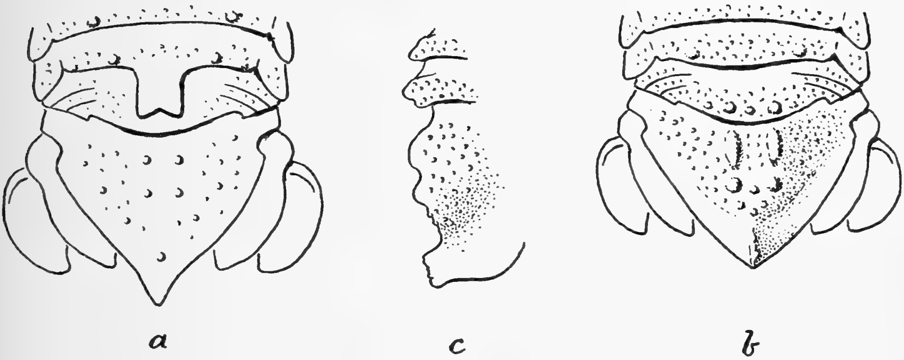

Fig. 31.

Zuzara furcifer Brnrd. *a.* dorsal view of 6th and 7th peraeon segments and pleotelson with uropods of immature ♂ 4·5 mm. *b.* the same of ♀ 5·5 mm. *c.* lateral view ♀.

Immature ♂, 4·5–5 mm. in length: 7th peraeon segment with a submedian tubercle on either side of the short, quadrangular median process, which does not extend beyond the hind margin of pleon segment 4; the second tubercle clearly seen in the adult, is very faint. Telson relatively a little shorter than in adult, apex acute, subapical margin slightly concave; small tubercles or granules as in adult. Rami of uropods not reaching telsonic apex.

♀, 5·5–6 mm.: more strongly granulose than ♂; no trace of tubercles on 6th peraeon segment; 7th peraeon segment with an obscure tubercle about midway between median line and side-plate; pleon segment 4 with a small median granule, flanked by a larger tubercle. Telson shield-shaped, apex acute, margins evenly convex; a submedian pair of elongate tubercles followed by a pair of round tubercles, apex upturned and bluntly keeled, with 2 granules. Rami of uropods not reaching telsonic apex.

Additional localities. Keurbooms River estuary (K.H.B. 1931. 1 ♂); Kleinmond (Caledon Division) (K.H.B. 1 ♂); False Bay, 7 fathoms (U.C.T. ♂♂, ♀♀, juv.).

Gen. *Sphaeramene* Brnrd.

1914. Barnard, *Ann. S. Afr. Mus.*, x, p. 405.

Sphaeramene microtylotos n. sp.

Fig. 32*a–e*.

In general very similar to *polytylotos* Brnrd. 1914, but the larger tubercles, especially the submedian ones on the pleo-telson, are conical instead of button-like, and the smaller ones are rounded granules (cf. fig. 32*f*).

Telson with 3 pairs of submedian conical tubercles, increasing in size and diverging posteriorly; apex bluntly pointed, with a rounded tubercle dorsally, and a groove ventrally.

Epistome pentagonal, the bluntly pointed apex meeting the rostral point. Antenna 1, 1st joint L-shaped, with prominent conical boss on anterior margin.

Uropods extending to telsonic apex, inner ramus oblong, margins subparallel, with a median series of 6–7 granules. Distal margin truncate, slightly emarginate; outer ramus ovate, apex turned outwards, outer distal margin feebly serrulate.

Length 6–7 mm. As preserved, pinkish.

Localities. False Bay, from stomach of cormorant. 3 specimens (R. W. Rand, Biologist to Guano Islands Administration, 1954); False Bay, 14–17 metres. 1 ovig. ♀. (U.C.T. 1954.)

Remarks. The great likeness to *polytylotos* obviously suggests inclusion in the same genus, although the characters of the ♂, when discovered, may necessitate the removal of the new species to another genus.

The 3 specimens are fairly well preserved in spite of their having been taken from the stomach of a cormorant, in all probability having been first swallowed by a fish. The dorsal integument of two of the specimens has not suffered from the gastric juices, and the pleopods are intact. All three specimens appear to be immature, because neither brood lamellae, penes, nor ♂ stylets on pleopod 2 could be found.

The tubercles and granules are not quite symmetrically arranged, and differ slightly in the 3 specimens.

The ovig. ♀ was received later, and confirms the description based on the three specimens.

Cymodoce zanzibarensis Stebb.

1910. Stebbing, *Trans. Linn. Soc. Lond.*, zool., xiv, p. 105, pl. 9, fig. D.

♂—Agreeing with Stebbing's description. It is a little tempting to make this species a synonym of the earlier *bicarinata* Stebb., described from Minikoi, Ceylon and Zanzibar; but the fact that Stebbing himself (1910, loc. cit., pp. 105, 106) has recorded both species from Zanzibar precludes this. Moreover *zanzibarensis* is a larger species, less setose, especially anteriorly, and the stylet on pleopod 2 ♂ is straight and relatively shorter than the long, inward curving stylet in *bicarinata* (see: Stebbing, 1904, *Fauna Geogr. Mald. Lacc. Arch.*, II, p. 712, pl. 52, fig. B).

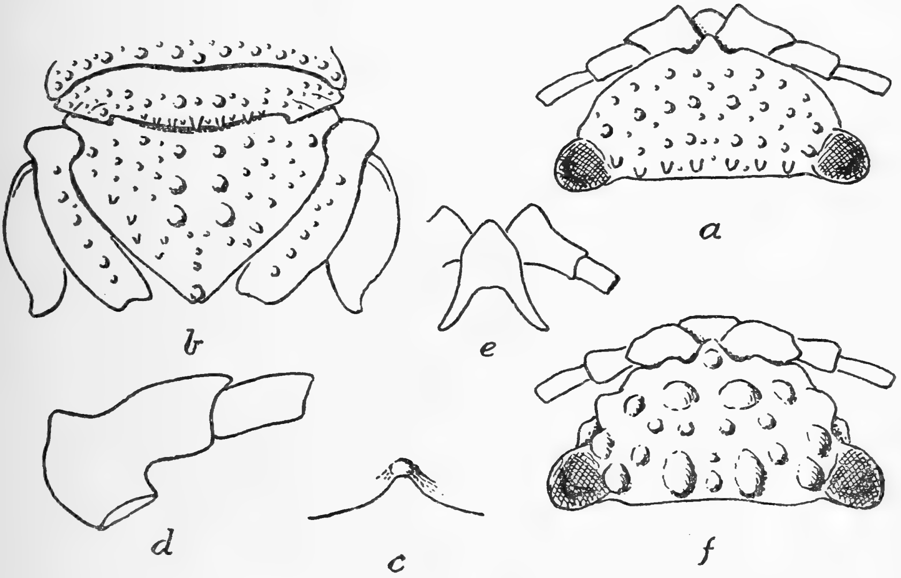

FIG. 32.

Sphaeramene microtylotos n. sp. *a.* head with peduncles of 1st antennae. *b.* 7th peraeon segment, pleotelson with uropods. *c.* posterior view of apex of telson. *d.* dorsal view of first two joints of peduncle of 1st antenna. *e.* epistome with bases of 1st antennae.
Sphaeramene polytylotos Brnrd. *f.* head for comparison with *a.*

11–12 × 6 mm. As preserved, pinkish-brown, buff, or greyish, the smooth telsonic boss rose-pink or pale orange. In Stebbing's specimens the rose-coloured boss on the telson had retained its colour for seven or eight years.

♀—At one station 5 ovig. ♀♀ were taken in the same haul as 5 ♂♂, and may be presumed to belong to this species. 9–10 mm. Telson with 2 small submedian tubercles or low rounded bosses, each surmounted by a granule; the median lobe of the trilobate apex bears no dorsal tubercle or boss, but is slightly gibbous, and more densely setose than the surrounding area. Rami of uropods of equal length, extending to level of telsonic apex.

On another occasion 1 ♀ was taken with ♂♂ of both *C. zanzibarensis* and *Paracilicaea clavus*; which raises a little doubt as to whose wives these females really are.

Locality. Inhambane. 9 ♂♂. (U.C.T.)
Distribution. Zanzibar.

Cymodoce natalensis Brnrd.

1920. Barnard, *Ann. S. Afr. Mus.*, xvii, p. 366, pl. 16, figs. 1, 2 (*japonica* Rich. var. *n.*).

Additional locality. Algoa Bay. 2 ♂♂. (U.C.T.)

These two specimens correspond exactly with the Natal specimens, which were formerly considered as a variety of *japonica*. I now think this form should be given specific status. The 3 pairs of tubercles (1 on 4th pleon segment and 2 on telson) are all very nearly of the same size; in fact the anterior pair on the telson are usually larger than the posterior pair; and the closely fitting opposed surfaces of the former pair and the pair on the 4th pleon segment is distinctive; neither Richardson's nor Thienemann's figures bear the least resemblance to this arrangement.

Cymodoce cryptodoma Brnrd.

Fig. 33*d*.

1920. Barnard, loc. cit., p. 368, pl. 16, figs. 6, 7.

Additional locality. Algoa Bay. 1 ♂, 1 ovig. ♀. (U.C.T.)

The present ♂ has the 4th pleon segment more prominent than in the type ♂; it might almost be said to have a submedian pair of low bosses. A lateral view is given here, as the shape of the telsonic projections is not fully indicated in a dorsal view. On the outer side of each ridge is a shallow submarginal hollow.

Cymodoce lis n. sp.

Fig. 33*a*, *b*.

♂—Head, peraeon and pleo-telson perfectly smooth and glabrous, obscurely and sparsely punctate (seen when examined semi-dry). Telson apically broadly rounded. Antenna 1, basal peduncular joint entire (not dentate). Epistome broadly Λ-shaped. Penial processes on 7th peraeon segment close together, elongate, slender and tapering to fine points. Pleopod 2 ♂ stylet tapering to a fine point, extending slightly beyond apex of ramus. Uropod, inner ramus obovate, apically truncate, inner distal angle extending to level of telsonic apex, outer ramus much longer, narrow ovate, apex narrowly rounded.

11 × 6 mm. As preserved, creamy whitish, eyes black.

Locality. Algoa Bay. 1 ♂. (U.C.T.)

Remarks. A species with the telson of an *Exosphaeroma* (cf. *truncatitelson*) combined with the broad, arrowhead-like epistome and the long slender penial processes of a *Cymodoce.*

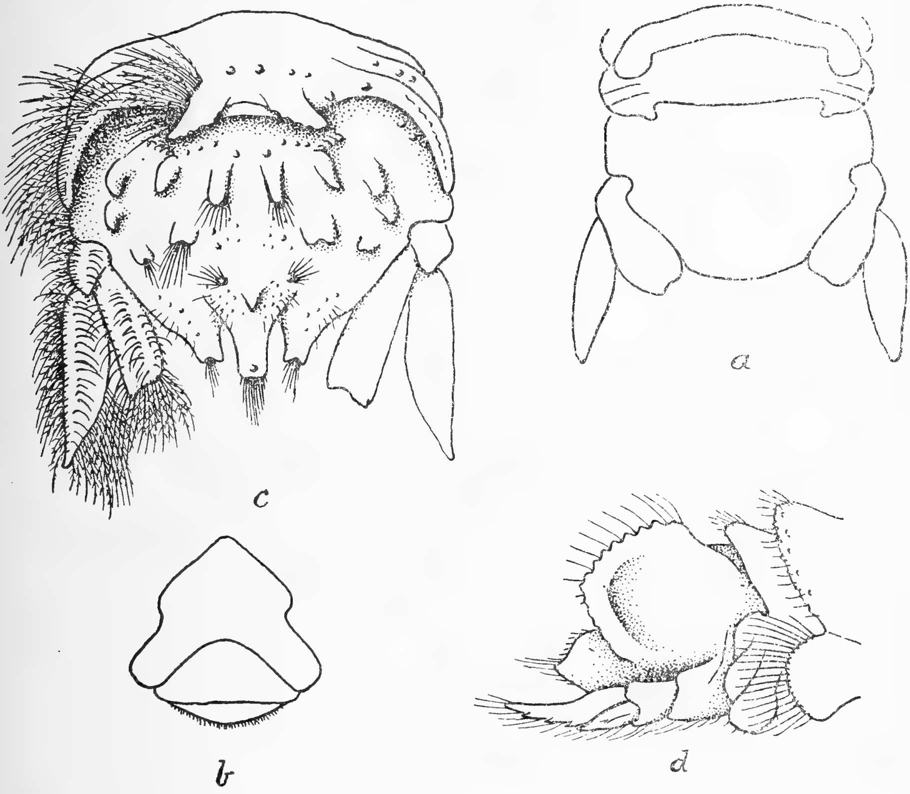

Fig. 33.
Cymodoce lis n. sp. *a.* peraeon segment 7, pleotelson and uropods. *b.* epistome.
Cymodoce alis n. sp. *c.* pleotelson and uropods.
Cymodoce cryptodoma Brnrd. *d.* lateral view of peraeon segment 7, pleotelson and uropod.

Cymodoce alis n. sp.

Fig. 33*c.*

♂—Setulose, becoming densely setose on pleo-telson and uropods. Peraeon segments 2–7 each with a transverse series of granules on the thickened hind margin, becoming more conspicuous posteriorly, almost tubercles on segments 6 and 7. Pleon, some small granules on pleura of segment 3, segment 4 with a submedian pair of large conical tubercles on hind margin overlapping base of telson, splayed outwards, their inner margins more or less crenulate, flanked externally by 2 small granules; on anterior portion of segment a series of 4–6 granules.

Telson basally with a transverse (curved) row of 4 tubercles, centrally with 2 widely separated apically bifid tubercles; laterally a (longitudinal) series of 3 tubercles, the hindmost one apically bifid; apex trilobate, median lobe with a submedian pair of small setiferous tubercles and a larger conical median one, apex truncate, with a small medio-dorsal conical tubercle; lateral lobes apically bifid; minute granules basally, centrally and apically.

A strong fringe of plumose setae on pleura of segment 4 and on the submedian tubercles. The bifid tubercles on telson setiferous, and the apical lobes with stiff golden-brown setae.

Penial processes on 7th peraeon segment close together, slender. Pleopod 2 ♂ stylet 1¼ times as long as ramus, moderately stout, tapering to an acute apex.

Uropods extending beyond telsonic apex, inner ramus oblong, apex obliquely truncate, outer apical corner with an acute point, outer ramus longer, narrow ovate, apex with acute point; peduncle and rami with stiffish brown setae on upper surfaces, margins with long plumose setae.

First peduncular joint of antenna 1 not denticulate.

9–9·5 × 4–4·25 mm. As preserved, dull yellowish-grey, eyes black.

Locality. Algoa Bay. 3 ♂♂. (U.C.T.)

Paracilicaea mossambicus Brnrd.

1914. Barnard, *Ann. S. Afr. Mus.*, x, p. 397, pl. 34, fig. D.

♂—Agreeing with the type, but: peraeon segments 2–7 each with 2 transverse rows of granules on hind margin, feeble on segment 2, becoming stronger posteriorly, but not conspicuous. Each boss on telson with 2 denticles more or less concealed among setae.

♀—Whole body setulose, especially pleon segment 4 and telson. Telson with 2 low bosses, each surmounted by an inconspicuous glabrous point; no depression between the bosses at base of telson; apex trilobate, the lobes broad and separated by short clefts. Rami of uropods not extending beyond telsonic apex, subequal, ovate, apices blunt.

Length ♂ 9 mm., ♀ 8 mm. As preserved, ♂ amber-coloured, the telsonic bosses and the subcircular basal depression between them castaneous; ♀ pale greyish-cream; eyes black.

Locality. Inhaca Island, Delagoa Bay. 1 ♂, 2 ovig. ♀♀. (U.W.)

Paracilicaea teretron n. sp.

Fig. 34*a*, *b*.

Setulose. Head, peraeon and pleon without tubercles or granules; in a few specimens there is a hint of a submedian pair of granules on hind margin of 4th pleon segment.

Telson in ♂ with a submedian pair of small tubercles in centre; in some specimens these granules are the end points on very feeble and obscure ridges; apex trilobate, median lobe not bulbous dorsally; in ♀ evenly convex, without any tubercles, apex not so deeply trifid as in ♂.

Uropod, inner ramus extending to level of telsonic apex in ♂, slightly beyond in ♀, oblong, obliquely truncate, outer apex acute; outer ramus in ♂ twice as long as inner ramus, terete, outer margin gently convex, tapering to an acute apex; in ♀ a little longer than inner ramus, ovate, apex acute.

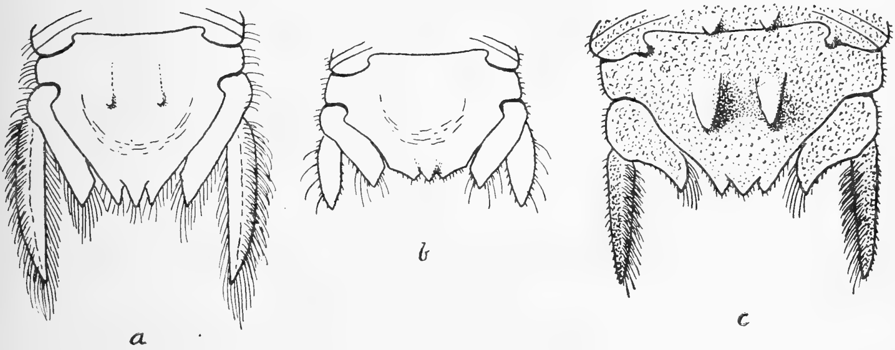

Fig. 34.

Paracilicaea teretron n. sp. *a*, *b*. pleon, telson and uropods, ♂ and ♀.
Paracilicaea clavus n. sp. *c*. pleon, telson and uropods ♂.

Penial processes on 7th peraeon segment close together, elongate, slender, tapering to acute points. Pleopod 2 ♂ stylet one third longer than ramus, scarcely tapering, apex blunt.

Length ♂ 7·5 mm., ♀ 6 mm., breadth 3 mm. As preserved, slaty-grey or buff coloured.

Locality. Inhambane. ♂♂, ♀♀. (U.C.T.)

Remarks. Very close to *mossambicus* Brnrd. (1914, loc. cit., *supra*) but differing by the simpler sculpturing on the telson, and the narrower, terete outer rami of the uropods.

There can be little doubt that the present ♂♂ and ♀♀ are conspecific, as they were found on several occasions, and always together. The ♀ of *hanseni* Stebb. 1910 (Zanzibar) is unknown. '*Cymodoce*' *hamata* Baker (1908, *Trans. Roy. Soc. S. Austr.*, xxxii, p. 141, pl. 4, figs. 1–11) appears to belong to *Paracilicaea*, but Baker has described the ♀ as being very similar to the ♂ both as regards the telson and the outer rami of uropods.

A small ♂, 6 mm., with penial processes and pleopod 2 stylet already developed, appears to belong to this species, but the telsonic apex is not so deeply incised, and the inner margin of outer ramus of uropod is gently convex, consequently the ramus is not so narrow and terete. Delagoa Bay (U.W.).

Paracilicaea clavus n. sp.

Fig. 34*c*.

♂—Smooth; when semi-dried the whole surface is seen to be shallowly and rather coarsely pitted; glabrous except for a few setae on the margins of the side-plates, pleura, telson and uropods.

Pleon segment 4 with a submedian pair of low conical tubercles; the angle of the pleuron where it articulates with the telson is also often rather prominent. Telson with a submedian pair of large bosses; apex trilobate, the median lobe not dorsally gibbous.

Uropod, inner ramus not extending to apex of telson, somewhat curved, outer distal corner sharp, distal and inner margins forming a continuous curve; outer ramus elongate, outer and inner margins straight, terete, with apical point, rather thickly setose on inner margin.

Penial processes on 7th peraeon segment close together, elongate, slender, tapering to acute points. Pleopod 2 ♂ stylet one third longer than ramus, proximally rather stout, distally tapering to a subacute apex, inner margin proximally and the apex minutely setulose (cf. *hanseni* Stebb., loc. cit., pl. 9, fig. C *m. a.*).

Length (largest) 11 mm., breadth 6 mm. As preserved, cream or greyish, mottled, or slaty-grey.

Locality. Inhambane. 10 ♂♂. (U.C.T.)

Remarks. Similar to *mossambicus* in having submedian tubercles on 4th pleon segment and submedian bosses on telson, but smooth (to the naked eye) and almost glabrous.

The ten specimens were taken on three different occasions, but no females referable to this species were caught.

Dies monodi Brnrd.

1951. Barnard, *Ann. Mag. Nat. Hist.* (12), iv, p. 701, fig. 3.

Additional locality. Inhambane estuary. (U.C.T.)

Remarks. Dr. Th. Monod has suggested to me that *Cassidina pulchra* Chilton (1924, *Mem. Ind. Mus.*, v, p. 888, fig. 8, and pl. 60, fig. 4) might belong to the genus *Dies*. This may well be so, but it cannot be decided without further details, e.g. if *pulchra* has a single penial process, it should be transferred to *Dies*, if double it can remain in *Cassidina* (see: M. Edwards, *Hist. Nat. Crust.*, pl. 32, fig. 11, which shows two processes on the 7th sternite).

Gen. *Artopoles* Brnrd.

1920. Barnard, *Ann. S. Afr. Mus.*, xvii, p. 376.

Artopoles capensis n. sp.

Fig. 35.

♂—Body depressed, almost circular; surface granulose, margin setose. Rostral point curved downwards, abutting against the projecting apex of epistome which is visible in dorsal view.

Antenna 1, 1st and 2nd joints each with a triangular lobate expansion on front margin.

Peraeopod 1 dissimilar from the other peraeopods, much stouter, 4th joint produced at lower apex, lower margin crenulate, upper apex with a biserrate spine, 5th joint underriding 6th and partly enclosed in 4th joint, with stout biserrate spine on lower apex, 6th joint with a similar spine on lower apex.

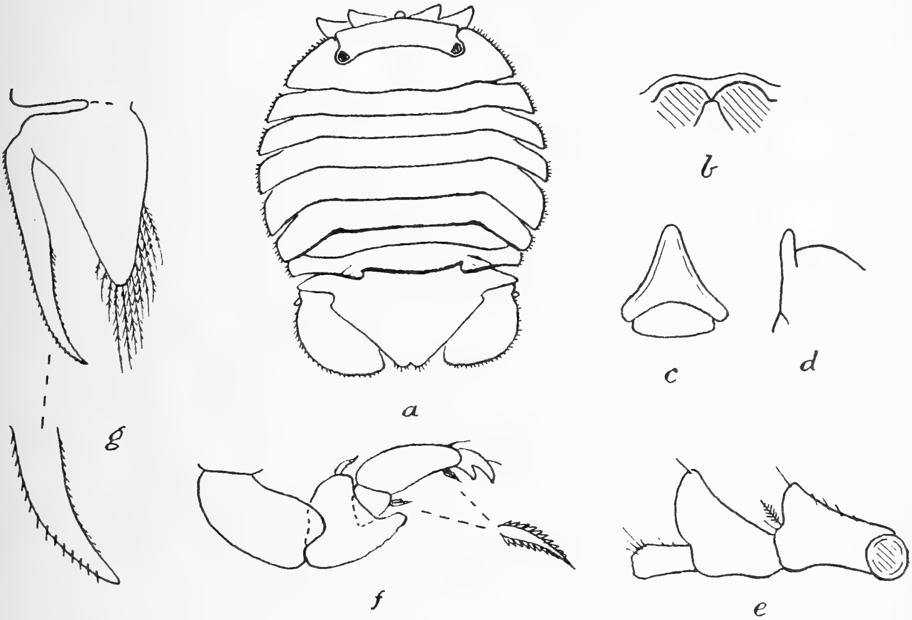

Fig. 35.

Artopoles capensis n. sp. *a.* dorsal view. *b, c, d.* frontal, ventral and lateral views of epistome; in *b* sockets of 1st antennae shaded. *e.* inner view of peduncle of left 1st antenna. *f.* anterior view of left peraeopod 1 ♂, with biserrate spine further enlarged. *g.* pleopod 2 ♂, with apex of stylet further enlarged.

Penial processes on 7th peraeon sternite contiguous. Stylet on pleopod 2 longer than inner ramus, rather stout, margins minutely spinulose, apex acute.

Pleopod 3 outer ramus obscurely 2-jointed. Pleopods 4 and 5 both rami without marginal setae, inner ramus with 3 or 4 transverse undulations (scarcely folds or pleats); pleopod 5 outer ramus 2-jointed, squamiferous processes distinct.

Telson with small apical notch, no ventral groove. Uropod (peduncle plus inner ramus) broad, almost semicircular, outer ramus minute.

Length 6 mm., breadth 5 mm.

Locality. False Bay (south of Kogel Bay), 14–17 metres, rock. 1 ♂. (U.C.T.)

Remarks. This ♂ specimen is obviously a species of *Artopoles*, a genus which was based on a single ♀ specimen; no other specimens have been recorded, and no other species has been added to the genus. The generic diagnosis needs some slight emendations to accommodate sexual dimorphism, viz.: telson with small apical notch in ♂; peraeopod 1 in ♂ with enlarged 4th joint.

The small differences in the pleopods may or may not be important; for the present they can only be recorded. The appearance of the inner rami of pleopods 4 and 5 at first glance seem to indicate affinity to the Hemibranchiate group.

The question arises whether this specimen is the ♂ of *A. natalis*. The ♂ is very much broader than the ♀ (6 : 5 and 4 : 3·25 resp.); if the reverse were the case, one might accept the difference as being merely sexual. The notch at the telsonic apex and also the different shape of the uropods might well be characteristic of the male. But the difference in shape of the lobate expansions on 1st and 2nd joints of the 1st antennae is too great to be considered as sexual. This ♂ specimen is therefore described as a new species.

Fam. IDOTEIDAE

Synidotea variegata Cllge.

1917. Collinge, *Rec. Ind. Mus.*, xii, p. 2, pl. 1.
1936. Barnard, ibid., xxxviii, p. 185, fig. 16*a*.
1940. id., *Ann. S. Afr. Mus.*, xxxii, p. 428.

Additional localities. Durban, Empangazi, Richards Bay, St. Lucia Bay; Inhambane. (U.C.T.)

Remarks. In the key, loc. cit., 1940, p. 507, in the first couplet the words 'Peraeopods . . . peduncle' should be omitted in both sets of characters. An additional character for separating *hirtipes* and *variegata* is the width relative to the length: width $2\frac{1}{4}$–$2\frac{1}{2}$ in length in the former, at least 3 in the latter.

Synidotea setifer Brnrd.

1914. Barnard. *Ann. S. Afr. Mus.*, x, p. 205, pl. 18 A.

The fully developed stylet on pleopod 2 of a ♂, 21 mm. in length, is rather remarkable, but the specimen was received too late for figuring in this paper. It extends beyond the apex of the inner ramus of the pleopod; the inner edge (i.e. remote from the ramus and facing its fellow on the opposite side) is formed by a rather strongly chitinized rib, ending in a short point; from about midway a thin flange extends on one side to the apex, widening distally; this flange is armed with numerous close-set parallel lines of spinules, appearing under a low magnification as if obliquely striated.

There is a single median penial process, as in *S. hirtipes* and *variegata* (Barnard, 1920, *Ann. S. Afr. Mus.*, xvii, p. 380, footnote; and 1936, *Rec. Indian Mus.*, xxxviii, p. 185).

Largest specimen 23 mm., an ovigerous ♀ 16 mm. Colour of some freshly preserved specimens: cream, with a row of tiny black dots along the lateral margins and on upper surfaces of antennae and legs.

Additional localities: 33° 53′ S., 25° 51′ E. 26 fms. 6 specimens, incl. 1 ovig. ♀, on red Fan-coral (*Gorgonia*). s.s. *Pieter Faure*; 34° S., 20° 49′ E. 91 metres. s.s. *Africana* (per U.C.T., 1948); 34° 49′ S., 20° 21′ E. 47 fms. 1 specimen 23 mm., 1 ♂ 21 mm. (trawler, 1947, per U.C.T.).

Cleantis natalensis Brnrd.

1925. Barnard, *Ann. S. Afr. Mus.*, xx, p. 394.
1936. id., *Rec. Indian Mus.*, xxxviii, p. 186, fig. 17.

This is the first recorded ♂. A pair of penial processes. Stylet on pleopod 2 half as long again as inner ramus, rather stout, triquetral in section at base, distal third curving gently outwards, apex subacute. Length 8 mm.

Locality: Richards Bay, Natal. 1 ♂. (U.C.T.)

Distribution: Described from Durban Bay, and later recorded from India.

Fam. JAERIDAE

Ianiropsis bisbidens n. sp.

Fig. 36.

Head, peraeon and pleon sparsely setose dorsally, profusely laterally, setae on lateral margins of posterior peraeon segments and pleon especially long.

Head produced in a prominent triangular rostral process, apex bluntly pointed. Side-plates on segments 1 and 5–7 unilobate, on segments 2–4 bilobate.

Antenna 1 flagellum 15–16-jointed. Mouth-parts normal. Maxilliped with external distal angle of 2nd and 3rd joints acutely produced; 4th and 5th joints broad.

Peraeopod 1 ♂ more robust than the following peraeopods, distal half of lower margin of 4th joint and whole lower margin of 5th and 6th joints with dense fringe of long, very fine (non-plumose) setae. In the larger ♂ the right peraeopod is thus enlarged and furry, but the left is similar to peraeopod 2; in a smaller ♂, 5 mm. in length, the reverse is the case. In ♀ all peraeopods similar (except the hinder ones increase in length, as in ♂).

Pleopod 1 ♂ peduncles fused, rami well developed, adnate but not fused, apices of peduncle and rami each with a tiny scarious projection. Pleopod 2 ♂ normal. Pleopods 1–2 ♀ forming a circular operculum with shallowly emarginate distal margin.

Pleopod 3 ♂ operculiform, inner ramus with truncate apex, 1 plumose seta on inner angle, 2 on outer; outer ramus enormously enlarged, ovate, incompletely 2-jointed, the suture indicated only on inner and outer margin. In ♀ also operculiform, but outer ramus not enlarged to such an extent as in ♂.

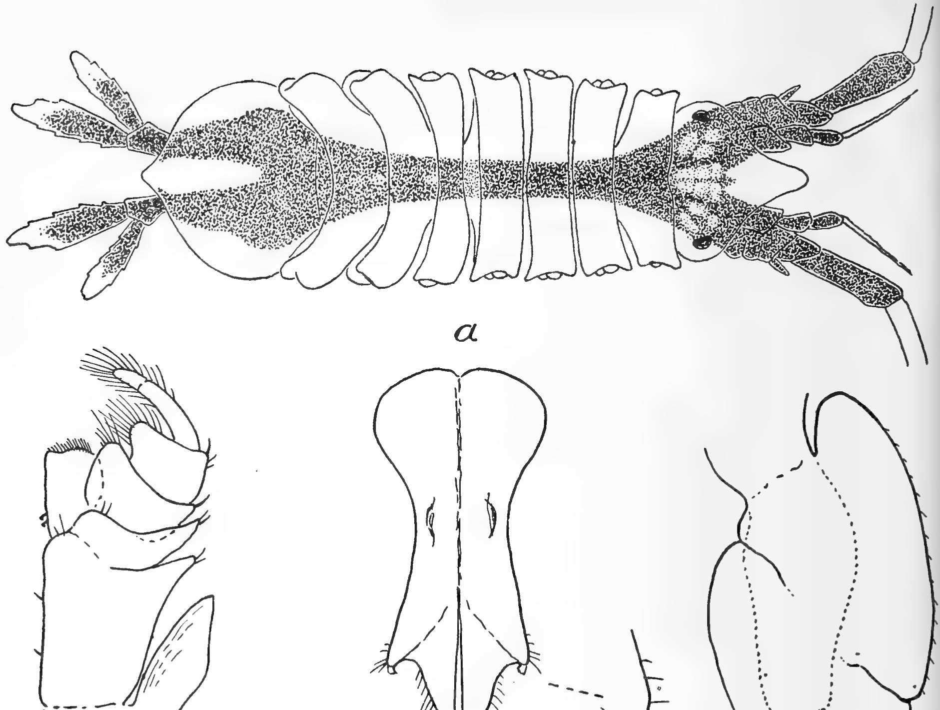

Fig. 36.

Ianiropsis bisbidens n. sp. *a.* whole animal, flagella of 2nd antennae omitted. *b.* maxilliped. *c.* 4th–7th joints of peraeopod 1 ♂. *d.* pleopod 1 ♂, with apices of peduncle and ramus further enlarged. *e.* anterior view of left pleopod 3 ♂. *f.* pleopod 3 ♀. *g.* pleopod 4 (♂ and ♀).

Pleopod 4 ♂ and ♀ inner ramus with 7–8 plumose setae on the oblique distal margin. Pleopod 5 normal, uniramous.

Uropods well developed, rami in both sexes well developed, narrowly ovate, strongly setose, especially the distal half of the inner ramus.

Length, 2 ♂♂ 5 and 8 mm., 2 ovig, ♀♀ 7 and 9 mm. Pale cream becoming white laterally where the integument is thin, probably semitransparent when alive; a black medio-dorsal stripe which bifurcates in front on the head and behind on the pleon; in front the black colour is continued on to the peduncles of 1st antennae, and peduncles of 2nd antennae except the last (6th) joint; behind it is continued on to the peduncles and proximal halves of the uropods. Eyes black.

Locality. False Bay (Oatland Point, south of Simonstown), 4–6½ metres, rock. 2 ♂♂, 2 ovig. ♀♀. (U.C.T. 1953.)

Remarks. Remarkable at first sight on account of its striking colour pattern. It would be interesting to discover the particular habitat and habits of this animal. The coloration may be concealing, adapted possibly to that of some Hydroid or Alcyonarian. The colour appears to be fast in alcohol; the specimens were caught in June 1953 and submitted to me in November 1954, and the colour is still (1955) intense black.

Morphologically the shape of the head is noticeable, but there are no unusual features in the appendages except the 3rd pleopods. These are operculiform in both sexes; in the ♀ the outer ramus is moderately enlarged, somewhat similar to that of *Jaera marina* (Sars, 1897, *Crust. Norw. II*, pt. 5–6, pl. 43, labelled 'plp. 1'), but in the ♂ the outer ramus is enormous.

Fam. Bopyridae

Gen. *Athelges* Gerst.

1861. Hesse, *Ann. Sci. Nat.* (4), zool., xv, p. 91 (*Athelgue* ? vernac.).
1862. Gerstaecker, *Arch. Naturg.*, xxviii, Abt. 2, p. 558.
1898. Sars, *Crust. Norw.*, II, p. 209.

As the genus *Parathelges* Bonnier 1900 does not seem to be differentiated by very tangible and distinctive characters from *Athelges*, the present species may be assigned to the older genus.

Athelges caudalis n. sp.

Fig. 37*a*.

♀–First pair of oostegites projecting beyond head like a double 'cocked hat', the outer angles curving backwards (cf. *Parathelges whiteleggei* N. & B., 1931, *Vidensk. Medd. Dansk. nat. Foren.*, xci, pl. 1, fig. 4).

Pleon narrower than peraeon; 5th segment and 'pleo-telson' freely projecting (not embraced by pleura of 4th segment as in *P. weberi* N. & B. 1923), with a pair of circular uropods. The two pleopodal lamellae on each pleuron arise from a common stalk; both lamellae of pleopods 1 and 2 are ovate; the anterior one of pleopods 3 and 4 is subcylindrical and the other ovate.

♂—Attached on outside of bases of last peraeopods on left side of ♀. Similar to that of *A. paguri*. The pleon segments fused, longer than basal width, not so elongate as in *A. paguri* (cf. Sars, 1898, pls. 88, 89), but more elongate than in *P. whiteleggei* N. & B. (1931, loc. cit., fig. 92) and *P. weberi* (cf. Nierstrasz & Brandis, 1929, *Zool. Anz.*, lxxxv, p. 302, fig. 11). Eyes distinct.

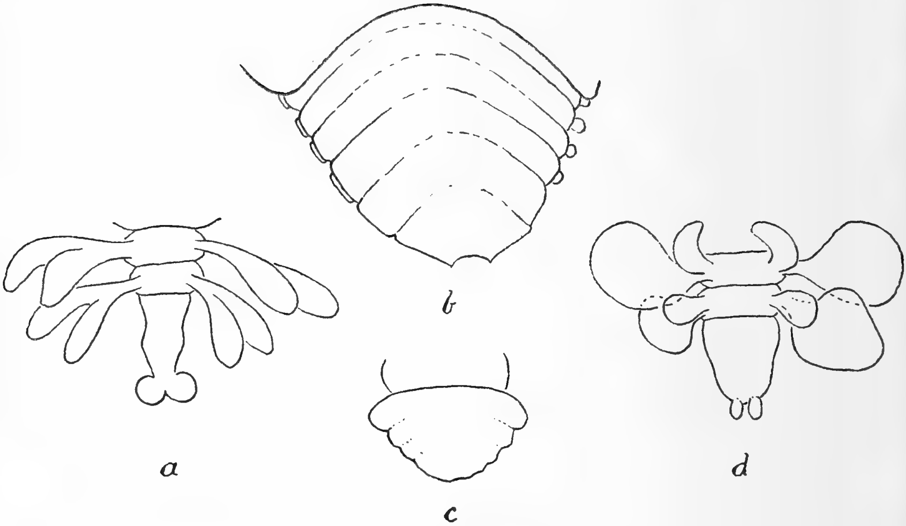

Fig. 37.

a. Athelges caudalis n. sp. *b, c. Bopyrella hodgarti* Chopra ♀ and ♂. *d. Miophrixus latreutidis* n.g., n. sp.

Length, ♀ ca. 9 mm., ♂ 1·3 mm.

Locality. Inhambane. 1 ovig. ♀ with ♂, on the Pagurid *Diogenes senex*. (U.C.T.)

Gen. *Bopyrella* Bonnier

1900. Bonnier, *Trav. Sta. zool. Wimereux*, viii, p. 347.
1923. Nierstrasz & Brandis, *Siboga Exp. monogr.*, xxxii, b, p. 95.
1923. Chopra, *Rec. Ind. Mus.*, xxv, pp. 467, 540.
1929. Nierstrasz & Brandis, *Vid. Medd. Dansk. Naturh. Foren.*, lxxxvii, p. 29.
1930. Chopra, *Rec. Ind. Mus.*, xxxii, p. 132.
1931. Nierstrasz & Brandis, *Vid. Medd. D. Naturh. Foren*, xci, p. 150.
1936. Shiino, *Mem. Coll. Sc. Kyoto Univ.*, B. xi, 3, p. 157.

Bopyrella hodgarti Chopra

Fig. 37*b*, *c*.

1923. Chopra, loc. cit., p. 473, pl. 14, figs. 7–12.

Locality. Inhambane. One ovig. ♀, with ♂, in left branchial cavity of *Alpheus crassimanus.* (U.C.T.)

Distribution. Vizagapatam, Madras, on *Alpheus crassimanus.*

One ovig. ♀, without ♂, on *Hippolyte,* may also belong to this genus. Length 1·25 mm. Pleon segments fused, outline entire but slightly undulate on the one side.

Miophrixus n. g.

♀—Body asymmetrical. All 7 peraeopods present on the shorter side, but only peraeopods 1 and 2 on the longer side. Pleon 3-segmented, segments 1 and 2 distinct, followed by a larger segment representing the fused 3rd-5th segments and telson. A pair of bilobed processes on each side of pleon segments 1 and 2; the dorsal processes (side-plates or exopods of pleopods) more or less pedunculate, the ventral processes (uniramous pleopods or endopods of pleopods) smaller, sessile. Uropods distinct.

♂—Pleon segments fused. Eyes distinct.

Remarks. The presence of only two free pleon segments, with pleopods, seem to differentiate this form from the several closely related genera or sub-genera of the original genus *Hemiarthrus* (olim *Phryxus*). If *Hemiarthrus* Giard & Bonnier 1887 is adopted for the preoccupied name *Phryxus* Rathke, as Chopra (1923, *Rec. Ind. Mus.*, xxv, p. 428) has done, *Phrixus* proposed by Caroli (1929, and adopted by Nierstrasz & Brandis 1931) falls into synonymy.

Miophrixus latreutidis n. sp.

Fig. 37*d*.

Length, ♀ 3–3·5 mm. Attached between the pleopods and facing telson of host. ♂ 0·75 mm.

Locality. Inhambane. 3 ovig. ♀♀, 1 ♂, on *Latreutes pygmaeus.* (U.C.T.)

Fam. DETONIDAE (SCYPHACIDAE)

Camorta nicobarica Brnrd.

1936. Barnard, *Rec. Ind. Mus.*, xxxviii, p. 190, fig. 19.

Two ♂♂ and 2 ovig. ♀♀, 5–6 mm. in length, appear to belong to this species. The short telson has the minute apical indent (loc. cit., fig. 19*b*). The mouthparts also agree, except that the spines on the apex of outer lobe of maxilla 1 are not so blunt, and the lobe on outer distal corner of 2nd joint of the maxilliped is more broadly rounded. This last feature should be checked in the type specimens; the acute lobe shown in my fig. 19*f* may be an error in observation or draftsmanship.

Locality. Inhambane, among mangroves. (U.C.T.)

Distribution. Nicobar Islands.

Remarks. The genus *Olibrinus* Budde-lund (1912, *Trans. Linn. Soc. Lond.* (2), zool., xv, p. 389), placed by its author in a separate subfamily of the *Oniscoidea*, appears to have some similarity with the above genus. Both have a multi-articulate flagellum in antenna 2, but the apex of inner lobe of maxilla 1 has 2 plumose setae in *Olibrinus*, and only a few setules in *Camorta*.

The three species of *Olibrinus* have been recorded from the Malay Peninsula, Djibouti, and the Chagos Archipelago.

AMPHIPODA

Fam. LYSIANASSIDAE

Euonyx conicurus n. sp.

Fig. 38.

Closely resembling the North Atlantic *chelatus* Norman (see: Sars, *Crust. Norw.*, pl. 40, fig. 1), but differing as follows:

Pleon segment 3 dorsally ridged, but not sharply keeled; postero-interior angle quadrate with a short sharp point; segment 4 dorsally depressed at base, then raised into an acute forwardly directed process (cf. *Tryphosa onconotus* Stebb. 1908).

Antenna 1, basal joint prominently lobed in distal half. Gnathopod 2, 6th joint about two-thirds length of 5th joint, upper distal corner gibbous, palm short, rounded, finger weak.

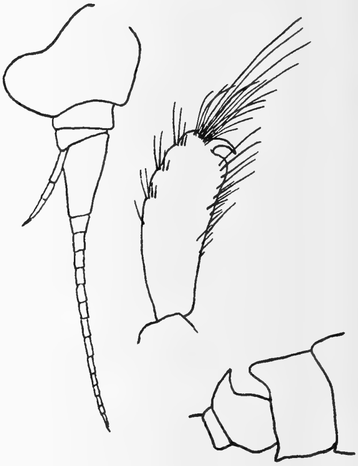

FIG. 38.

Euonyx conicurus n. sp. Pleon segments 3 and 4; 1st antenna; 6th joint and dactylus of 2nd gnathopod.

Length 6·5 mm. As preserved, white.

Locality. Fish Hoek Bay (False Bay), 15 metres. (U.C.T.)

Tryphosa normalis n. sp.

Fig. 39.

No eyes. Lateral angles of head moderately acute. Postero-lateral angles of pleon segment 3 quadrangular, the angle rounded. Pleon segment 4 with convex dorsal hump, but not sharply carinate. Epistome moderately projecting, rounded above, front margin straight. Gnathopod 1, palm of 6th joint very oblique and almost as long as hind margin, angle between the two about

160°, defined by two slender spines. Telson with 2 pairs of dorsal spines, and a pair of small spines on apex of each lobe.

8–9 mm. As preserved, white.

Locality. Langebaan, Saldanha Bay; False Bay, 26 metres. (U.C.T.)

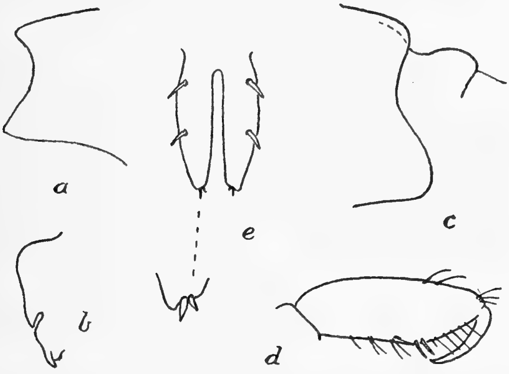

FIG. 39.

Tryphosa normalis n. sp. *a.* lateral view of head. *b.* epistome and upper lip. *c.* pleon segments 3 and 4. *d.* 1st gnathopod. *e.* telson, with apex of one lobe further enlarged.

Remarks. A very ordinary and featureless species. The best differential character seems to be the very oblique palm of gnathopod 1, not unlike that of *onconotus* Stebb., but the whole joint is more slender and parallel-sided than in the latter species. The epistome is similar in these two species. The dorsal profile of the 4th pleon segment resembles that of the eyeless *bispinosa* Schell. from the Falkland Islands.

Tryphosa africana n. sp.

No eyes. Lateral angles of head moderately acute. Postero-lateral angle of pleon segment 3 as in *trigonica* (Stebbing, *Challenger Rep.*, pl. 9) but rather more produced (cf. *Tryphosites longipes*, Sars, *Crust. Norw.*, pl. 29, fig. 1); pleon segment 4 with rounded carina. Antenna 2 ♂ 4th joint broadly oval, width more than half the length. Epistome rounded above, front margin straight. Gnathopod 1 6th joint slightly ovoid, palm very oblique, subequal to hind margin. Gnathopod 2, 5th joint ovoid, width slightly more than half length of anterior margin. Telson tapering, with 2 pairs of dorsal spines, and a spine and seta on apex of each lobe.

Length 7–8 mm. Colour as preserved white.

Locality. 32° 5′ S., 17° 52′ E. (off Lamberts Bay), 123 metres. ♂♂, ovig. ♀♀. 5 Febr. 1953. (Trawler, per U.C.T.)

Remarks. Rather like *trigonica* from Kerguelen Island as regards pleon segment 3, and like *normalis* as regards gnathopod 1.

Fam. AMPELISCIDAE

Ampelisca excavata Brnrd.

Fig. 40*a*.

1925. Barnard, *Ann. S. Afr. Mus.*, xx, p. 336, pl. 34, figs. 5–7.

This species grows to a length of 10 to 13 mm. The 2nd joint of peraeopod 5 in the original specimen appears to have been abnormal, and a figure is here given of the normal form.

Additional localities. Gordon's Bay (False Bay), 36 metres; Algoa Bay, 14 metres. (U.C.T.)

Byblis anisuropus Stebb.

Fig. 40*b*.

1908. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 72, pl. 10 (Crust., pl. 36).

A co-type from Stebbing, and three other examples from approximately the same locality (off East London) have been examined. These confirm Stebbing's description.

The present specimen also agrees with Stebbing's description except as regards the 5th peraeopod and the length of the 3rd uropods. It is smaller than the above-mentioned specimens, but about the same size as Stebbing's type. The 3rd uropod reaches beyond the apices of the other two pairs of uropods by only half, instead of the whole, length of its rami.

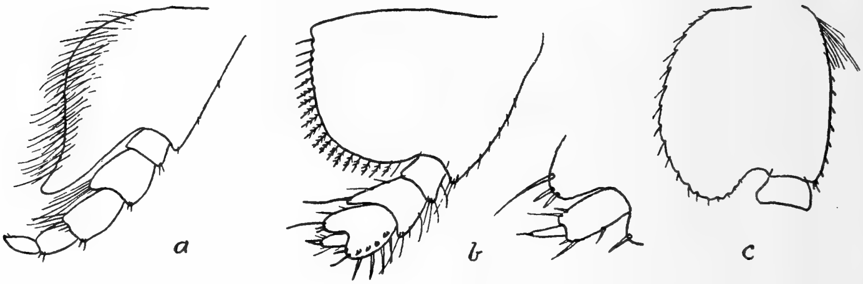

FIG. 40.
a. Ampelisca excavata Brnrd. 5th peraeopod. *b. Byblis anisuropus* Stebb. 5th peraeopod, with 6th and 7th joints further enlarged. *c. Nototropis granulosa* Wlkr. 2nd joint of 5th peraeopod.

In general, peraeopod 5 agrees with Stebbing's description, but the 2nd joint is broader, the 5th joint is relatively larger and the front and hind apices, especially the hind apex, embrace the base of the 6th joint, which is shorter and stouter, 7th joint much smaller. Peraeopods 3 and 4 of both sides missing.

Locality. False Bay. 1 specimen, 7 mm. in length. (U.C.T., Sept. 1953.)

Remarks. When more specimens are available, a separate specific name may be justified for this form.

Fam. HAUSTORIIDAE

Gen. *Urothoe* Dana

1891. Stebbing, *Trans. Zool. Soc. Lond.*, xiii, p. 1.

The tuft of plumose setae on the pleura of pleon segment 2 is on the outer surface in the specimens I have examined (cf. Ruffo, loc. cit., *infra*, fig. I, 3, 4, 7), not on the inside as Stebbing (loc. cit., p. 4) says. In some cases these tufts are composed of numerous very long setae, and are very noticeable in a dorsal view of the animal.

Key to the South African species

1.	Peraeopod 3, 4th and 5th joints longer than broad.	. . . . *elegans*
	Peraeopod 3, 4th and 5th joints broader than long.	 2
2.	Peraeopod 3, 5th joint 1½ times as broad as long. Dactyl slender, minutely denticulate.	. . . . *pulchella*
	Peraeopod 3, 5th joint twice (or nearly so) as broad as long. Dactyl cultriform.	 3
3.	Peraeopod 3, dactyl spinose.	. . . . *grimaldii*
	Peraeopod 3, dactyl serrulate or crenulate.	 4
4.	Peraeopod 5, 2nd joint subcircular, as broad as long.	. . . . *serrulidactylus*
	Peraeopod 5, 2nd joint oval, about 1¼ times as long as broad.	. . . . *pinnata* and var. *femoralis*

Urothoe elegans Bate

1925. Chevreux & Fage, *Faune de France. Amphip.*, p. 101, fig. 95.
1949.* Ruffo, *Ann. Mus. Civ. St. Nat. Genova*, lxiii, p. 80, fig. I, 1–4.
1951. Barnard, *Ann. Mag. Nat. Hist.* (12), iv, p. 704.

Length 2·5–3·5 mm.

Localities. 21 miles off Cape St. Blaize, 44 fathoms. 2 ♀♀ (mutilated), (S. Afr. Mus., s.s. '*Pieter Faure*' coll.); False Bay (near Seal Island), larva traps at surface. ♂♂ and ♀♀ (s.s. *Africana*); Still Bay, 38 fms.; Langebaan, Saldanha Bay. (U.C.T.)

Remarks. The minute denticulations on the dactyl of peraeopod 3 are often very obscure and difficult to observe.

Urothoe pulchella (Costa)

Fig. 41*a*.

1916. Barnard, *Ann. S. Afr. Mus.*, xv, p. 143.
1925. Chevreux & Fage, loc. cit., p. 99, fig. 92.
1949. Ruffo, loc. cit., p. 82, fig. I, 5–7.

Localities. 33 miles off Cape St. Blaize, 60 fathoms. 1 ♂ (Barnard); 12 miles off Cape St. Blaize, 42 fathoms. 1 ♀ (S. Afr. Mus., s.s. '*Pieter Faure*' coll.); False Bay, 40 metres. 1 ♂, 1 ♀; Great Brak R. mouth; Knysna; Sundays R. estuary; Port St. Johns. (U.C.T.)

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*Date of publication of reprints 11th September, 1947. See Vol. lxiii, pp. 303, 304.

Remarks. Reid (1951, *Atlantide Rep. II*, p. 221, fig. 21) has described *U. leone* from the coast of Monrovia, a species so close to *pulchella* as almost to amount to synonymy. The quadrate, slightly produced and acute postero-inferior corner of 2nd joint of peraeopod 3 is unusual and may be abnormal (only 1 ♀ was obtained). The oblique series of spine-setae near the apices of 4th and 5th joints of peraeopods 1 and 2 are not shown in the figure (in any case they are not specific characters), nor are any stout spines shown on the 4th joint of peraeopod 3.

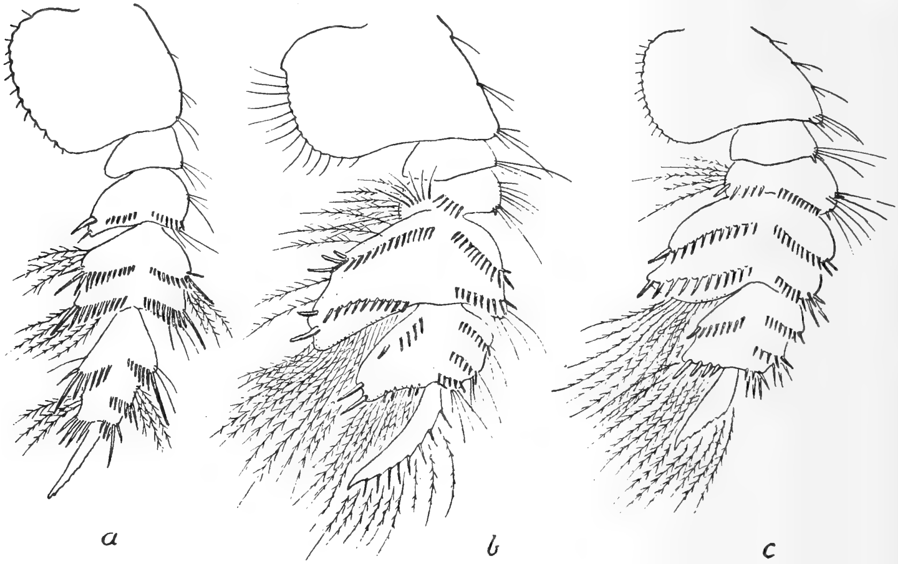

FIG. 41.

Outer view of 3rd peraeopod of: *a. Urothoe pulchella* (Costa); *b. U. grimaldii* Chevr. *c. U. serrulidactylus* n. sp.

Urothoe grimaldii Chevr.

Fig. 41*b*.

1895. Chevreux, *Mem. Soc. zool. Fr.*, viii, p. 428, figs. 1–4 (♂).
1925. Chevreux & Fage, loc. cit., p. 99, fig. 93 (♂ ♀); and var. *inermis*, p. 100.
1935. Chevreux, *Res. Sci. Camp. Monaco*, fasc. xc, p. 69, pl. 16, figs. 10, 16–18 (♂) (♀ stated to be unknown).
1951. Reid, *Atlantide Rep.*, II, p. 220 (localities only).

Peraeopods 1 and 2, 4th joint is slightly oval, the front and hind margins being slightly convex, 1½ times as long as 5th joint (in *pulchella* the 4th joint is twice as long as 5th, and parallel-sided). The usual oblique rows of long slender setae near apices of 4th and 5th joints, on outer surface.

Peraeopod 3, 4th joint with 5 spines immediately above articulation of 5th joint, and in its hinder half a fan-like series of 6 slender spine-setae, plumose setae on hind margin but not on distal margin (inner surface); marginal plumose setae on hinder half of distal margin of 5th and 6th joints; dactyl cultriform, with (6) 7–8 slender spines in a *single* row on front margin in both sexes.

Length 5 mm. As preserved (U.C.T. specimens), white, eyes black.

Localities. 21 and 33 miles off Cape St. Blaize, 44 and 60 fathoms. 1 ♂, 5 ♀♀ (S. Afr. Mus., s.s. '*Pieter Faure*' coll.); False Bay, 26 metres; 32° 12′ S., 16° 38′ E., 215 fms.; from sponge; Langebaan, Saldanha Bay. (U.C.T.)

Distribution. North and west coast of France; Moroccan coast (Mediterranean); off Monrovia, Ivory Coast and French Guinea.

Remarks. These specimens seem referable to Chevreux's species without much doubt. Chevreux & Fage describe the dactyl of peraeopod 3 as having 12 spines in a *double* row in ♀, in contrast with the single row of 6 in ♂. In the present specimens both sexes have only a single row. The variety *inermis* (French coast and coast of Sahara) has no spines on the dactyl.

Urothoe serrulidactylus n. sp.

Fig. 41*c*.

1951. Barnard, *Ann. Mag. Nat. Hist.* (12), iv, p. 704 (*ruber*, non Giles).

Antenna 1, flagellum 6–7-jointed, accessory flagellum 3–4-jointed.

Peraeopods 1 and 2, front and hind margins of 4th joint slightly convex, 5th joint as broad as long.

Peraeopod 3, 4th joint with a series of 10 spines in front half and one of 5 spines in hind half, plumose setae on hind margin and a tuft of 4–5 in middle of distal margin on inner surface (not shown in figure); marginal plumose setae on hind half of distal margins of 5th and 6th joints; dactyl cultriform, front margin serrulate.

Peraeopod 4, 2nd joint about 1⅔ longer than wide, hind margin entire, with a few setules, and a submarginal row of long plumose setae on inner surface.

Peraeopod 5, 2nd joint nearly as wide as long, hind margin convex, entire, with a few setules.

Pleon segment 2, postero-inferior corner quadrate, outer surface with tuft of plumose setae. Lower margins of segments 1 and 3 rounded. Telson with 3 spinules on apex of each lobe.

Length 4–5 mm. As preserved, yellowish, eyes black.

Locality. Kosi Bay, Zululand. 10 ♀♀, some ovig. (U.C.T.)

Remarks. These specimens were erroneously recorded as *ruber*. The character of the dactyl of peraeopod 3 is against such identification. In the present specimens it is serrulate, whereas Giles's figure shows two spines on the front margin; probably there are, normally, more than two spines. I still consider that *spinidigitus* Wlkr. 1904 will prove to be a synonym of *ruber*.

The somewhat oval shape of the 4th joint, and the broad 5th joint of peraeopods 1 and 2 seem to be differential characters in the present specimens.

Urothoe pinnata n. sp.

Fig. 42*a*, *b*.

Antenna 1, flagellum 6–8-jointed, accessory flagellum 5–6-jointed.

Peraeopods 1 and 2, front and hind margins of 4th joint slightly convex, 5th joint longer than broad.

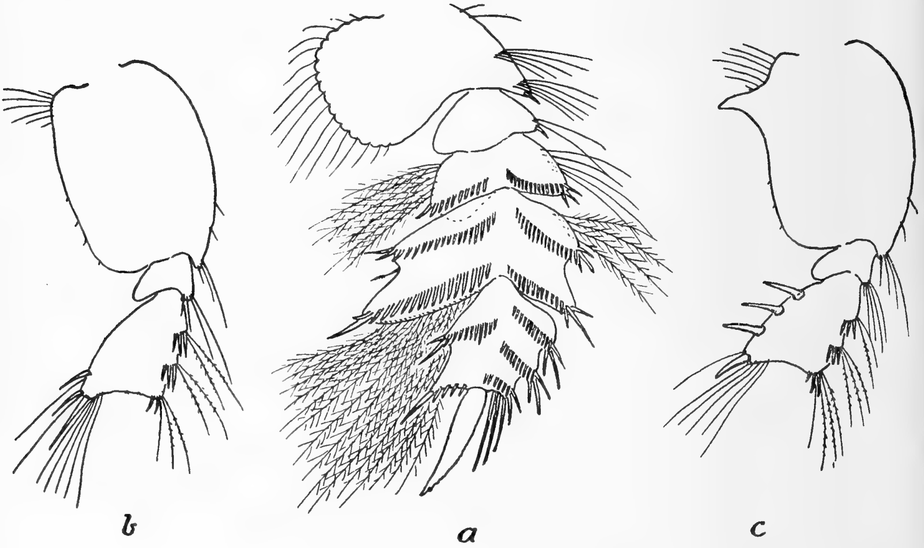

Fig. 42.

Urothoe pinnata n. sp. *a.* outer view of 3rd peraeopod. *b.* 2nd-4th joints of 5th peraeopod. *c.* 2nd-4th joints of 5th peraeopod of *femoralis* n. var.

Peraeopod 3, 4th joint with a row of 14 spines in front half, with 3 larger ones at apex, a row of 9–10 in hind half, plumose setae on hind margin, and along hind half of distal margin on inner surface (not shown in figure), some of the latter very long, extending to apex of dactylus; marginal plumose setae on hind half of distal margin of 5th joint, and a tuft on inner surface of 6th joint (not shown in figure); dactyl narrow cultriform, front margin more or less crenulate (sometimes obscure).

Peraeopod 4, 2nd joint about $1\frac{1}{3}$ as long as broad, hind margin entire with a few setules, and a submarginal row of plumose setae on inner surface; plumose setae on hind margin of 4th joint.

Peraeopod 5, 2nd joint about $1\frac{1}{4}$ as long as broad, hind margin convex, entire, with a few setae at upper corner, and a few setules below, 4th joint with 3 graduated spines near hind apex and some long setae.

Pleon segment 2 with postero-inferior corner quadrate, outer surface with large and conspicuous tuft of long plumose setae. Lower margins of segments 1 and 3 rounded. Telson with 2–3 spinules on apex of each lobe.

Length 5–10 mm. As preserved, white, eyes black.

Locality. False Bay, 30 metres. 18 ♀♀, some with ripe ovaries, but none actually ovigerous, Sept. 1953. (U.C.T.).

var. *femoralis* n.

Fig. 42*c*.

Six of the above specimens are exceptional in possessing an acute projection proximally on the hind margin of 2nd joint of peraeopod 5, and 4 very stout equidistant spines on hind margin of 4th joint.

Remarks. The long plumose setae on either side of pleon segment 2 seem to be more abundant than in other species, and appear in a dorsal view of the animal like little wings.

The feature which characterizes the variety is remarkable. If a specimen with this feature had been collected separately (in a different locality, or even in the same locality on a different date) it would undoubtedly have been regarded as a species. But the eighteen specimens, all of the same sex, were collected together at the same time and place, and the six exceptional specimens can only be regarded as a variety or an aberration.

Fam. ACANTHONOTOZOMATIDAE

Iphimedia capicola Brnrd.

1932. Barnard. *Discovery Rep.*, V, p. 118, fig. 66.

The original ♂ was only 4·5 mm. in length; the present two ovigerous ♀♀ are 11 and 12 mm. in length. They are from the same area as the '*Discovery*' specimen, and, in spite of two discrepancies from the original description, must be ascribed to this species.

The postero-inferior corners of peraeon segments 6 and 7 are quadrate in the smaller, but acute in the larger specimen. The postero-inferior corners of side-plates 5–7 are acute in both specimens.

The telson is apically concave between rounded apices, without any lateral denticles.

Locality. Langebaan, Saldanha Bay; mussel bank at low spring tide mark in main channel. 2 ovig. ♀♀. (U.C.T., May 1951.)

Cypsiphimedia n.g.

Near *Iphimedia.* Peraeon segment 1 dorsally enlarged and gibbous, front margin nearly horizontal; head projecting vertically downwards (cf. figure of *eblanae* in Bate, 1862, pl. 22, fig. 3); segments 2–7 increasing in length, 7th about twice the 2nd.

Side-plate 1 small, partly concealed at hind base by side-plate 2; anterior and lower margins of side-plates 1–3 forming an even curve; 3 deepest, 4 not so deep as 3, narrow. Telson short, apically incised.

Upper lip incised. Lower lip with lobes apically notched. Mandible without spine-row and molar (position of latter indicated by a facet), secondary cutting-edge feeble or absent, palp well developed. Maxilla 1 palp extending beyond apex of outer plate. Maxilla 2 and maxilliped as in *Iphimedia*, inner apex of 2nd joint of palp of maxilliped produced.

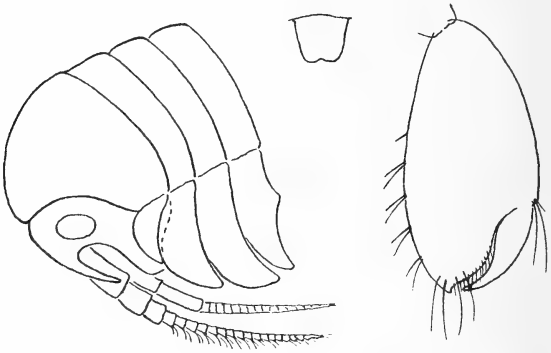

FIG. 43.
Cypsiphimedia gibba n.g., n. sp. Head and peraeon segments 1–4, with side-plates; 6th and 7th joints of 2nd gnathopod; and telson.

Gnathopod 1 slender, minutely chelate; gnathopod 2 subchelate. Hind apex of 4th joint of peraeopods 5–7 acutely produced.

The swollen 1st peraeon segment with its reduced side-plate, and the absence of any dorsal denticles on peraeon and pleon, seem to indicate a new genus. The *entirely* smooth body is an unusual feature in this family.

Genotype: *C. gibba* n. sp.

Cypsiphimedia gibba n. sp.

Fig. 43.

Peraeon and pleon smooth, without processes or denticles. Postero-inferior corner of pleon segment 3 rounded, with a small point.

Antenna 1 flagellum 17-jointed; antenna 2 flagellum 15–16-jointed. Gnathopod 1 as in *I. obesa* (see: Sars, *Crust. Norw.*, pl. 132), 2nd joint sinuous. Gnathopod 2 6th joint ovate, shorter than the (dorsal margin of) 5th joint, and broader. Hind margin of 2nd joint of peraeopods 5–7 entire, with a few widely spaced minute setules in notches.

Length (front of peraeon segment 1 to telson) 4·5 mm. As preserved, dull yellowish, eyes black.

Locality. Algoa Bay, 5–7 metres. 1 specimen. (U.C.T.)

Remarks. Apart from the swollen 1st peraeon segment, distinguished from the other South African species of this family (*Iphimedia capicola* and *Panoploea excisa* (both from the Saldanha Bay area) by the absence of any dorsal denticles on peraeon and pleon.

Fam. LILJEBORGIIDAE

Liljeborgia epistomata Brnrd.

Fig. 44.

1932. Barnard, *Discovery Rep.*, v, p. 144, fig. 83 (♀).

♂—Integument smooth. Corneal lenses and ocular pigment absent.

Side-plate 1 enormously enlarged, ovoid, hind margin concave, front and lower margins very finely setulose; side-plate 2 trapezoidal, deeper than long, lower hind corner bluntly pointed; side-plate 3 subtrigonal, deeper than long, front margin convex, hind margin straight.

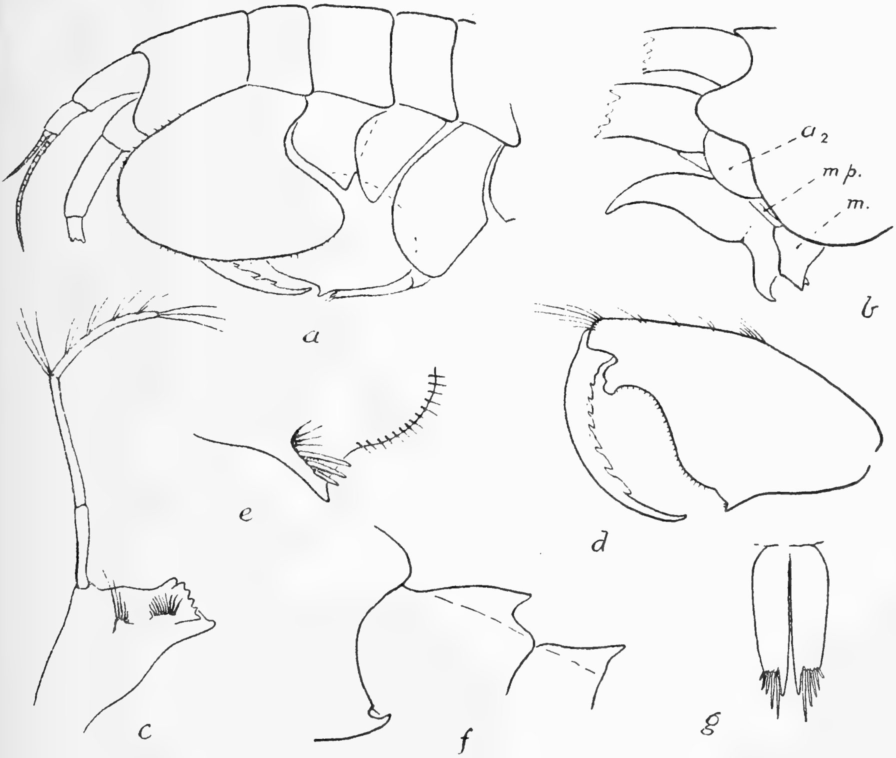

FIG. 44.

Liljeborgia epistomata Brnrd. ♂. *a.* head and peraeon segments 1–4, with side-plates (gnathopod 2 partially visible). *b.* anterior margin of head with bases of 1st and 2nd antennae, mandible with basal joint of palp, epistome and upper lip. *c.* mandible. *d.* outer view of 6th and 7th joints of gnathopod 2. *e.* inner view of palmar angle of hand of gnathopod 2. *f.* pleon segments 3–5. *g.* telson.

Pleon segment 2 with a very slight dorsal keel ending in a minute denticle; segment 3 dorsally rounded and gibbous above base of segment 4, margin medianly notched to receive the keel on segment 4. Telson longer than its basal width, cleft to base, each lobe apically with 5 graduated spines external to the acutely produced inner apex.

Epistome strongly produced, cultriform, apically curved and acute. Mandible with cutting-edge straight, entire, with blunt tooth at each end, secondary cutting-edge 5-dentate, spine-row with 11 spines, molar tubercle with a tuft of setae, palp nearly twice as long as mandible, very slender, 2nd and 3rd joints subequal, 1st joint shorter. Innermost seta on inner lobe of maxilla 2 longer than any of the others.

Antenna 1 reaching to about midway along 5th peduncular joint of antenna 2, or when laid back, to end of 2nd peraeon segment; antenna 2 almost as long as body (14 mm.).

Gnathopod 2, 6th joint about 1½ times as long as greatest width, palm oblique, sinuous, with prominent bilobed tooth near finger-hinge, finger with 7–8 serrations; on inner surface tip of finger fits into a shallow pit bordered by 3 setae and 3 stout spines.

Locality. False Bay. 1 specimen. (U.C.T., Sept. 1953.)

Remarks. There can be no doubt that this is the ♂ of *epistomata* described from ♀♀ collected by the '*Discovery*' at Saldanha Bay. It is not unexpected to find sexual dimorphism in the 2nd gnathopod, but the enormous development of the 1st side-plate and the elongate mandibular palp in the ♂ are remarkable.

Fam. ATYLIDAE

Nototropis granulosus Wlkr.

Fig. 40*c*.

1914. Barnard, loc. cit., p. 173.

Integument (examined semi-dry) minutely shagreened and punctate, which gives an impression of being granulose when tilted at certain angles to the light.

Postantennal angle of head rounded, below a shallow notch (cf. *vedlomensis* Sars, pl. 164, fig. 2). Peraeopod 3 as in *vedlomensis*. Peraeopod 5 2nd joint broadly lobed (more so than in *homochir*).

Additional localities. False Bay and Algoa Bay. (U.C.T.)

Fam. GAMMARIDAE

Melita machaera n. sp.

Fig. 45.

Integument sparsely pitted. Head with lateral corner rounded, post-antennal corner quadrate, a little larger than in *obtusata* (as figured in Sars, pl. 180, fig. 1; more like fig. 243 in Chevreux & Fage, *Faune de France*). Side-plates 1–3 deep, a minute denticle at lower hind corner; side-plate 4 in ♀ not modified.

Pleon segment 3 with a small medio-dorsal tooth (not developed in juv.), segment 4 with medio-dorsal tooth (in one specimen flanked on one side by a minute denticle); segment 5 with a lateral tooth on each side. Postero-lateral corner of segment 1 rounded, of segment 2 quadrate, of segment 3 shortly produced.

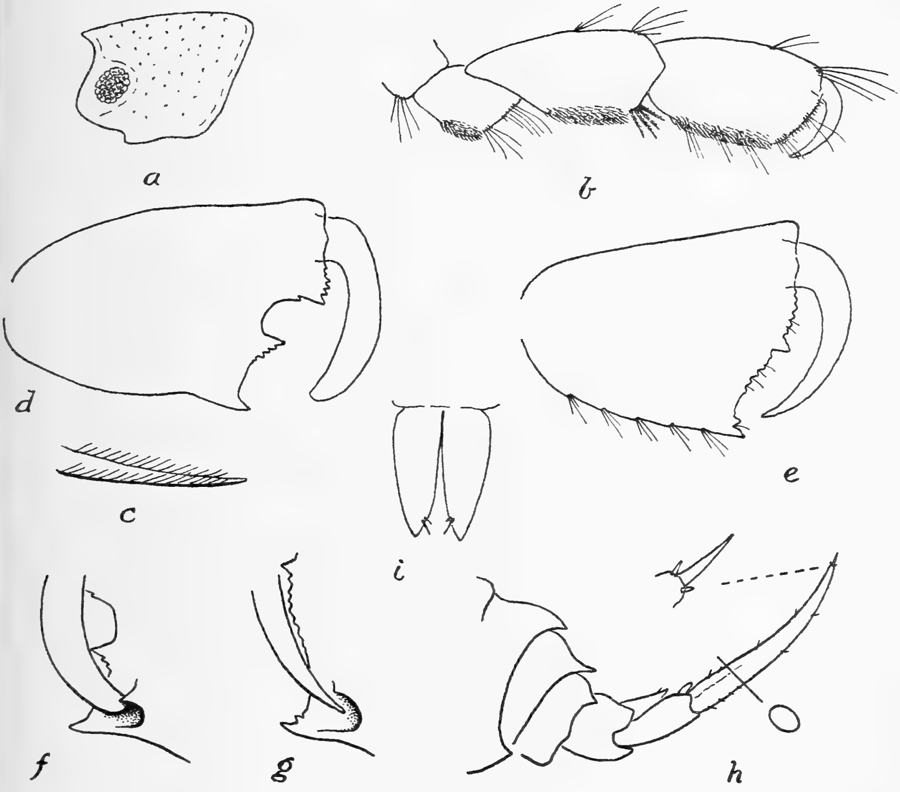

FIG. 45.

Melita machaera n. sp. *a*. head. *b*. gnathopod 1 (♂ and ♀). *c*. spine from lower apex of 5th joint of gnathopod 1. *d*, *e*. gnathopod 2, ♂ and ♀ respectively. *f*, *g*. inner view of palmar angle of hand of gnathopod 2, ♂ and ♀ respectively. *h*. pleon segments 3–6, with uropod 3. *i*. telson.

Telson longer than basal width, cleft to base, lobes narrow-ovate, each with 1 long and 1 short spine subterminally on inner margin.

Antenna 1 with 5-jointed accessory flagellum. Mandibular palp slender (as in *obtusata*).

Gnathopod 1 ♂ ♀, 4th–6th joints with thick fringe of short setae on lower margin, extending a short distance on to inner margin (as in *obtusata*; see Bate, 1862, pl. 33, fig. 3*h*; Bate & Westwood, 1863, vol. i, p. 342; and Sars, pl. 180, fig. 1). These fringes are present in a juvenile 3 mm. in length.

Gnathopod 2 ♂, 6th joint nearly as in *obtusata* as figured by Bate, 1862, pl. 33, fig. 3*i*, but with a stronger palmar tooth between the basal tooth and the defining angle; dactylus widest in middle (not subterminally), apex rounded but not quite evenly (cf. *gladiosa*, Bate, pl. 33, fig. 6). In ♀ almost as large and robust as in ♂, 6th joint with palm denticulate, with a larger tooth in the middle, defining angle bidentate, dactylus more slender than in ♂, tapering to an acute apex which closes on inside of palm. In juveniles the palm resembles that of ♀, but without the larger denticle in middle.

Peraeopods 3–5, hind margin of 2nd joint with very feeble indents.

Uropod 3 very long, nearly equal to length of pleon segments 2–6, peduncle extending to apices of rami of uropods 1 and 2, outer ramus about 2½ times as long as peduncle, sword-like, slightly curved distally, broadly oval in cross-section, feebly setulose, with apical spine (2nd joint). In juv. up to about 6–7 mm. the ramus is of more normal shape, relatively broader and less sword-like, more strongly setulose; from about 8–9 mm. in length the ramus assumes the adult shape.

Length 11 mm. (14 mm. incl. urop. 3). As preserved, chocolate or vinous brown, with white transverse bands at the sutures of the segments, i.e. hind margin of head, and both front and hind margins of segments 1–7 are narrowly bordered with white, pleon segments with only the hind margins bordered with white; front margin of side-plates 1–3, front and hind margins of 4 and 5, and hind margins of 6 and 7 white, continuing in line with the white sutural bands on peraeon; 2nd joints of peraeopods 5–7 with front margin, the 'mid-rib' (muscles) and the hind margin white; antennae white but suffused basally; gnathopods 1 and 2 brown, the dactylus of gn. 2 white; peraeopods 1 and 2 white, 3–5 white (except 2nd joints); peduncles of uropods 1–3 brown, rami of urop. 1 and 2 white, of urop. 3 brown basally, distally white. Front margin of head with white border, which also surrounds the dark brown eye.

Locality. False Bay. ♂♂, ovig. ♀ and juv. (U.C.T., Nov. 1953 and Sept. 1954.)

Remarks. These specimens have so many features in common with *obtusata* (North Atlantic and Mediterranean) that they might be regarded as only a variety of this species. But as the ♀ has the hand of gnathopod 2 almost as large and robust as that of the ♂ (the ovigerous ♀ leaves no doubt on this point), a fact which does not seem to be recorded for *obtusata* (or any species of *Melita*), there seems some justification for specific status. To this character may be added the greater length of the telson, and especially the length and shape of the 3rd uropod, the latter being a most outstanding feature.

The coloration is comparable with that of *dentata*: 'yellowish, with broad transverse bands of a dark reddish brown hue' (Sars, *Crust. Norw.*, I, p. 514). Of *gladiosa* Chevreux & Fage (*Faune de France. Amphip.*, p. 234) say: 'couleur persistant longtemps dans l'alcool'; this applies to the present specimens, some of which have been in alcohol two years without, so it seems, any appreciable fading of the intensity of the brown colour.

Elasmopus affinis Della Valle

1893. Della Valle, *F. Fl. Golf. Neap.*, p. 734, pl. 1, fig. 9 (col.), pl. 22, figs. 1–15.
1920. Shoemaker, *Bull. Amer. Mus. N.H.*, xliii, p. 371, figs. 1, 2 (*congoensis*).
1930. Monod, *Bull. Soc. zool. Fr.*, lv, p. 496, figs. 7, 8.

Locality. Langebaan, Saldanha Bay. ♂♂, ♀♀, juv. (U.C.T., Dec. 1950.)
Distribution. Mediterranean; Port Etienne; St. Paul de Loanda.

Fam. TALITRIDAE

Talorchestia malayensis Tatt.

1922. Tattersall, *Mem. Asiat. Soc. Bengal*, VI, p. 453, pl. 21, figs. 11–20.

Locality. Delagoa Bay. 2 ♂♂, 2 ♀♀. Length 7 mm. (U.W.)

Distribution. Singapore Botanic Gardens. According to Annandale (in Tattersall, loc. cit.) this is a completely terrestrial Amphipod, being found in damp places at considerable distances from water.

Remarks. This species is distinguished from all the species recorded up to the present from southern Africa by having a scabrous lobe on the lower margin of the *fourth* joint of gnathopod 1 ♂, as well as on the 5th and 6th joints.

Hyale grandicornis (Kröyer)

Fig. 46.

This opportunity is taken to figure the 1st gnathopod of a ♂ specimen from Port Edward, which appears to be *grandicornis*. The 2nd gnathopod agrees with this species, but the anterior margin of 2nd joint is crenulate, with setules in the notches.

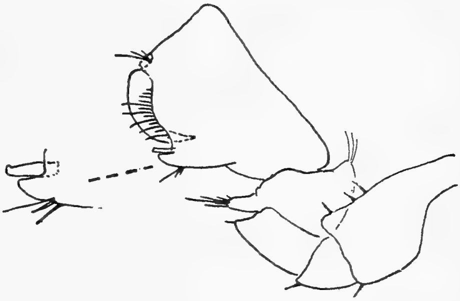

FIG. 46.

Hyale grandicornis (Kröyer). Gnathopod 1 of a ♂ specimen from Port Edward, Natal, with palmar angle further enlarged.

Additional localities. Various localities from Lambert's Bay on the west coast to Port Shepstone, Isipingo, and Port Edward in Natal. (Professor Stephenson and Professor Day, U.C.T.)

Afrochiltonia n.g.

As in *Chiltonia* Stebb. emend. Hurley, but: gnathopods 1 and 2 similar to one another and alike in both sexes (gnathopod 2 not enlarged in ♂), and pleopod 1 not modified in ♂.

Genotype: *Chiltonia capensis* Brnrd. 1916.

Remarks. To include this species, with '1st and 2nd gnathopods alike in both sexes, the 2nd not enlarged', in the genus *Chiltonia*, I suggested enlarging the generic diagnosis. Hurley has recently (1954, *Tr. Roy. Soc. N. Zeal.*, lxxxi, p. 565) amended the diagnosis to read 'Gnathopods 1 and 2 subchelate in both sexes'. But he has made the interesting discovery that in the type species (*mihiwaka* Chilton) and two other New Zealand species the 1st pleopod in the ♂ is modified. This fact entirely alters the situation. The species *capensis* is not a suitable companion with species in which the males have an enlarged gnathopod 2 and a modified 1st pleopod.

At Dr. Hurley's suggestion I re-examined the type material of *capensis* and found there was no modification of the 1st pleopod in ♂. This fact was communicated to him. He has suggested the possible desirability of raising the South African and Australian species to subgeneric or generic rank (Hurley, loc. cit., p. 576 and footnote). The Australian species still await detailed investigation, but I have no hesitation in removing *capensis* to a different genus. The adoption of the prefix Afro- indicates my doubt that the Australian species will be found to be congeneric with the South African.

Rühe's record (1914, *D. Südpol. Exp.*, xvi, p. 35, figs. 13, 14 *a–c*) of '*Chiltonia subtenuis* Sayce' from Lakeside Vlei is curious and needs further inquiry. He figures an enlarged gnathopod 2 (fig. 13*b*) but says he had 6 young *females* measuring 1·5 mm. Lakeside Vlei is the same as Muizenberg Vlei, from which I have seen material collected by U.C.T. In this material there are no ♂♂ with enlarged 2nd gnathopods.

Additional localities. Muizenberg Vlei; Kosi Bay, Zululand; Olifants River mouth. (U.C.T.)

Another apparent error in Rühe's paper: he records a *Paramoera* sp. ? and figures (fig. 14*d*) the characteristic telson of *P. capensis*, but gives the locality 'Plumstead', which is some five miles inland from the coast.

Fam. Aoridae

Lembos teleporus n. sp.

Fig. 47.

A strong ventral, slightly forwardly curved spine on peraeon segment 3 in ♂ (adult).

Gnathopod 1 ♂ elongate, 6th joint 3 times as long as 5th, sub-

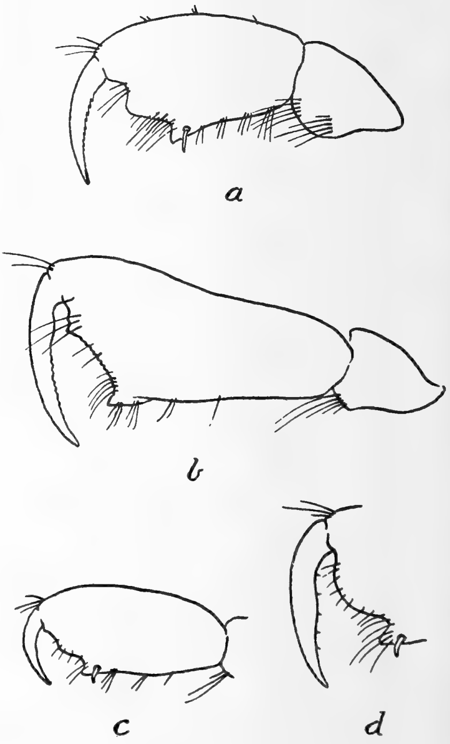

Fig. 47.
Lembos teleporus n. sp. *a*, *b*. gnathopod 1, ♀ and ♂ respectively. *c*, *d*. gnathopod 1 ♂, juvenile and intermediate stage.

equal in width to 5th at base, widening distally, palm oblique, a blunt tooth near finger hinge, palmar angles quadrate, margin between finely crenulate, inner margin of finger crenulate. In ♀ 6th joint twice as long as 5th, widening slightly to the oblique palm, with broad tooth, palmar angle rather sharp, with spine on lower margin.

In juv. ♂ 6th joint oval, palm oblique, slightly convex, with notch near the acute palmar angle, near which a spine on lower margin, inner margin of finger serrate. Intermediate stage, 6th joint beginning to widen distally, palm with a stronger convexity, inner margin of finger neither serrate nor crenulate.

Gnathopod 2 ♂ ♀ 6th joint subequal to 5th in length (outer margin) and width, palm transverse, palmar angle square, with a spine, both joints setose, finger serrate on inner margin.

Length ♂ ♀ 8 mm., 2nd–6th joints of gnathopod 1 ♂ 5 mm., ♀ 3 mm. As preserved, greyish, speckled, eyes black.

Locality. Inhambane, 1–2 fathoms. ♂♂, ♀♀. (U.C.T.)

Remarks. The 1st gnathopod ♂ bears some resemblance to that of *gambiense* Reid (1951, *Atlantide Rep.*, 2, p. 255, fig. 47), but the 6th joint is more cuneiform and without the strongly produced spiniform palmar angle.

Gen. *Lemboides* Stebb.

1932. Barnard, '*Discovery*' *Rep.*, v, p. 222.
1940. id., loc. cit., p. 537 (key to species).

L. afer has been shown (1932) to have ventral spines, and therefore my 1940 key is wrong. The following may be substituted.

1. No ventral spines or processes. . . . . *crenatipalma*
   With ventral spines or processes. 2
2. Gnathopod 1 ♂ palm defined by two denticles, finger short, not overlapping palm. . . . . *afer*
   Gnathopod 1 ♂ defined by a strong tooth, finger long, overlapping palm. . . *acanthiger*

Fam. Photidae

Eurystheus holmesi Stebb.

Fig. 48*a–d*.

1908. Stebbing, *Ann. S. Afr. Mus.*, vi, p. 85, pl. 14 A (Crustacea, pl. 40 A).
1910. id., ibid., p. 461.

Gnathopod 2 ♂ differs in shape from Stebbing's figure. The hind margins of 2nd joints of peraeopods 3–5 are not *irregularly* dentate, and the 2nd joint of peraeopod 3 is not proximally expanded into a lobe. As Stebbing says, peraeopod 4 is longer than peraeopod 5.

Locality. False Bay. 1 ♂. Length 7 mm. (U.C.T.)

Eurystheus palmoides Brnrd.

Fig. 48*e–g*.

1932. Barnard, '*Discovery Rep*', v. p. 231, fig. 144.

The discovery of these adult ♂ and ♀ specimens shows that *palmoides* was based on the immature ♂, and that the species has considerable resemblance to *maculatus* (Johnston) from the North Atlantic, Norway to France, Azores, and Senegal.

The 2nd joint of gnathopod 2, however, is relatively more slender, and the 6th joint in ♂ (at least when fully developed) is stronger and differently shaped. The 2nd gnathopod ♂ bears a striking similarity to Stebbing's enlarged figure of this appendage in *holmesi* (loc. cit., *supra*, pl. 40 A, gn. 2).

Length ♂ 4·5 mm., ♀ ovig. 4–5·5 mm.

Locality. Fish Hoek Bay (False Bay), 7–9 metres. (U.C.T.)

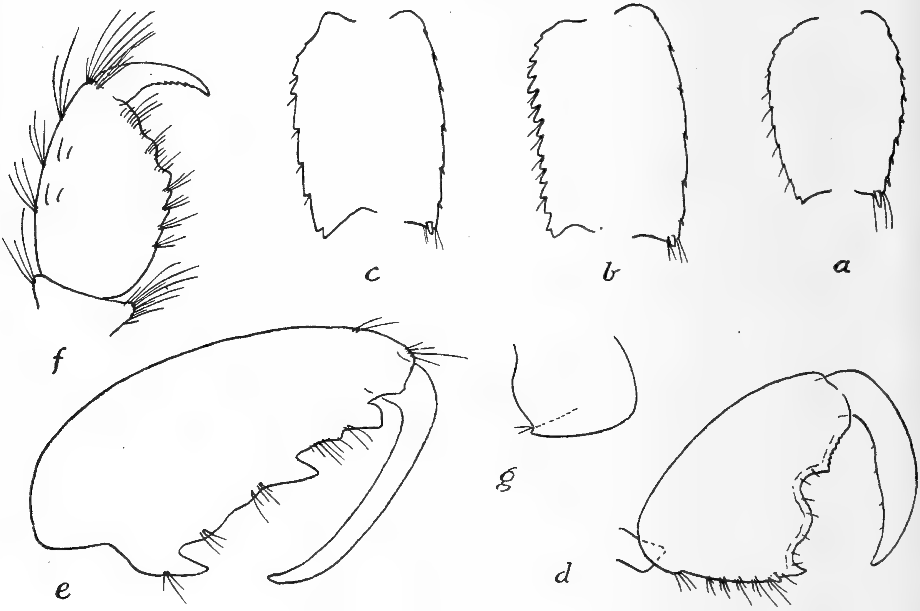

Fig. 48.

Eurystheus holmesi Stebb. *a, b, c*. 2nd joint of 3rd-5th peraeopods respectively. *d*. gnathopod 2 ♂. *Eurytheus palmoides* Brnrd. *e, f*. gnathopod 2 ♂ and ♀ respectively. *g*. postero-inferior angle of pleon segment 3.

Fam. COROPHIIDAE

Gen. *Unciolella* Chevr.

1910. Chevreux, *Mem. Soc. zool. Fr.*, xxiii, p. 263.

1928. Schellenberg, in Fox, *Trans. Zool. Soc. Lond.*, xxii, p. 633.

Differs from *Unciola* in having the hind corners of pleura of pleon segments rounded, and styliform dactyls on peraeopods 1 and 2. The unattached ♂

gnathopod 1 assigned by Schellenberg to Chevreux's species has the 5th joint greatly enlarged (somewhat in the manner of *Microdeutopus*).

Unciolella foveolata n. sp.

Fig. 49.

Integument coarsely but closely pitted. Head with vertical groove laterally near posterior margin, post-antennal corner acutely quadrate but not produced. Eyes well developed, oval.

Peraeon segments each with a lateral furrow, oblique on segments 1–3 but thereafter becoming more horizontal, and continued on pleon segments 1–3 as a shallow furrow immediately above the pleura. Peraeon segments 2–7 each with a transverse furrow near the anterior margin. No sternal spines or hooks on any of the segments. Side-plates shallow, 1–4 subtriangular, 5–7 bilobed. Pleura with postero-inferior corners completely rounded.

Telson subtriangular, with slight median projection apically, and a minute spine on each lateral margin.

Antenna 1 subequal to head plus peraeon segments 1–4 (or 5), flagellum 17–20-jointed, accessory flagellum 4–5-jointed.

Antenna 2 shorter than antenna 1, flagellum 7–8-jointed.

Mouth-parts as in *Unciola* (Sars, pl. 222), but mandibular palp more robust, larger than in *U. lunata* (Chevreux, loc. cit., pl. 20, fig. 6) with thick brush of setae on 3rd joint.

Gnathopod 1 nearly alike in both sexes, 5th joint not enlarged, oblong, lower margin convex in ♂, less so in ♀, densely setose, 6th joint subequal to 5th, somewhat ovate, palm oblique, less so in ♀ than in ♂ and defining angle consequently better defined, with 1 strong spine, dactyl serrate.

Gnathopod 2 nearly alike in both sexes, similar to gnathopod 1, but slightly longer.

Peraeopods 1 and 2, 4th joint about $\frac{3}{4}$ length of 2nd and as broad, 5th abruptly narrower, 6th slightly longer than 5th, only half as wide at base, dactyl subequal to 5th joint, styliform.

Peraeopod 3 robust, 2nd joint not quite twice as long as broad, oval, 5th shorter than 4th, with 3–4 stout blunt spines on posterior apex, 6th subequal to 5th but only half as wide, with 1 stout blunt spine on posterior apex, and a bunch of plumose setae on anterior apex, more or less concealing the dactyl which is less than half length of 6th joint.

Peraeopod 4 nearly twice as long as peraeopod 3, relatively slender, 2nd joint with plumose setae on hind margin, 4th joint $2\frac{1}{2}$ times as long as 5th, 6th slightly shorter than 4th, twice as long as 5th, dactyl strong, curved.

Peraeopod 5 not present on any of the specimens, presumably similar to 4th but probably slightly longer.

Uropod 1, 4 strong spines on upper margin of peduncle, and a stronger apical one, rami subequal, setose. Uropod 2, 2 strong spines on upper margin of peduncle, outer ramus shorter than inner. Uropod 3 transversely oblong, inner apex with a short spine (? representing the inner ramus), outer ramus extending to apex of rami of uropod 2, with apical tuft of plumose setae.

Length 13–14 mm. As preserved, whitish, eyes pale brown.

Locality. False Bay. ♂♂, ovig. ♀♀ and immature. (U.C.T., Sept. 1953.)

Remarks. Apart from the foveolate integument the present species in distinguished from *lunata* Chevr. (Algeria and Suez) by the 3rd peraeopod and 3rd uropod.

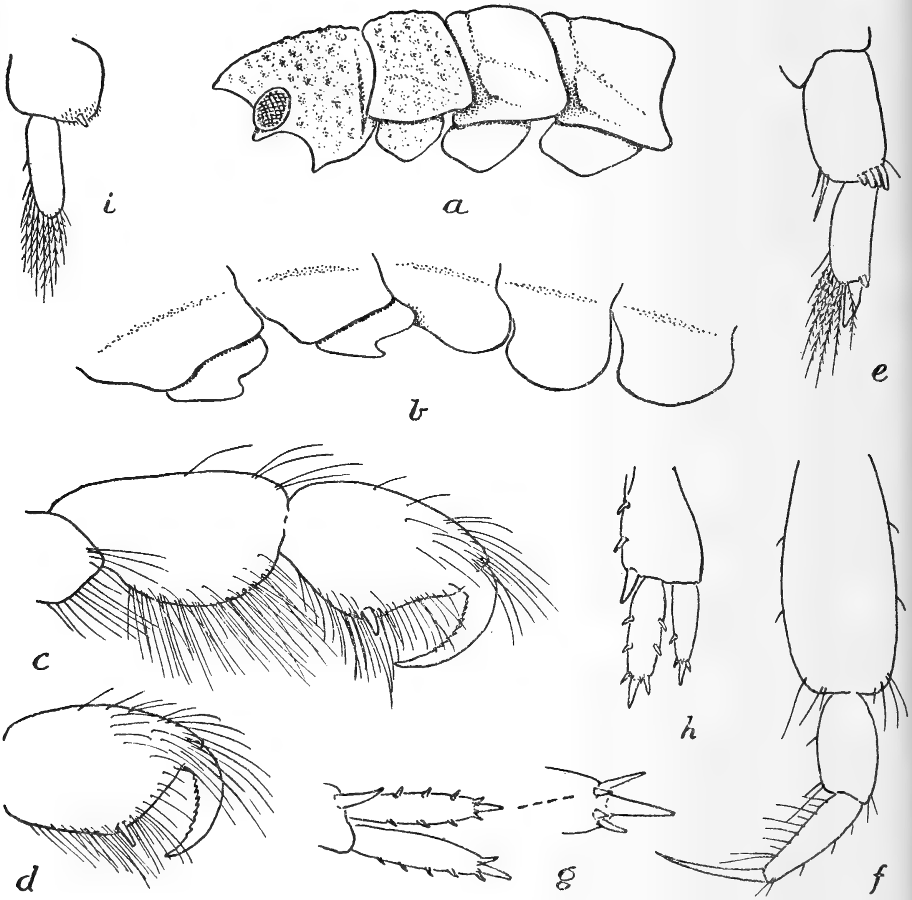

FIG. 49.

Unciolella foveolata n. sp. *a*. head and peraeon segments 1–3. *b*. peraeon segments 6 and 7, and pleon segments 1–3. *c*, *d*. gnathopod 1 ♂ and ♀ respectively. *e*. apical joints of peraeopod 3. *f*. apical joints of peraeopod 1. *g*. apex of peduncle, and rami of uropod 1. *h*. uropod 2. *i*. uropod. 3.

Fam. CAPRELLIDAE

Gen. *Paracaprella* Mayer

1890. Mayer, *F. Fl. Golf Neapel.*, xvii, p. 41.
1903. id., *Siboga Exp. monogr.*, xxxiv, p. 65 (with key to species).

In my 1940 key (loc. cit., p. 542) in the second alternative of couplet 4, after '(fig. p. 522)' insert: . . . 4 a. Transfer 'Mandibular palp 3-jointed . . . 6.' to couplet 4 a, and add: 'Mandibular palp absent . . . *Paracaprella*'.

Paracaprella pusilla Mayer

1890. Mayer, loc. cit., p. 41, pl. 1, figs. 28–30, pl. 3, figs. 45–7, pl. 5, figs. 48, 49, pl. 6, fig. 10.
1903. id., loc. cit., p. 67, pl. 2, figs. 36, 37, pl. 7, fig. 52 (adult ♂♀).

A 5 mm. ♂ specimen agreeing exactly, including the 12-jointed flagellum of antenna 1, with Mayer's description of this Brazilian and West Indian species, was scraped from a ship's hull in Durban harbour. (U.C.T., 1951.)

Caprellina spiniger Brnrd.

1916. Barnard, *Ann. S. Afr. Mus.*, xv, p. 282, pl. 28, fig. 35 (♀).

The large dorsal bifid hook-like spine on the 3rd segment is present in a juv. 4 mm., a ♀ with incipient brood lamellae 5·5 mm., and a ♂ 6·5 mm.; in a ♀ with developed brood lamellae 5 mm. there is only a slight medio-dorsal hump. In all the specimens the other dorsal spines on the 2nd and 4th segments are absent.

Locality. Langebaan, Saldanha Bay. (U.C.T.)

Remarks. The coloration, though faded, is similar to that of the ♀ described from False Bay; the dark band at base of 6th joint of 5th peraepod is present in the ♂.

COPEPODA PARASITICA

Gen. *Caligus*

See: Barnard, *Ann. S. Afr. Mus.*, xli, p. 244, 1955.

Extended key to South African species

I. Fourth leg 4-jointed.
A. Abdomen 2-segmented
1. 1st abdominal segment 4 times length of 2nd. . . . . *pelamydis*
2. 1st abdominal segment shorter than 2nd. . . . . [*elongatus*]
B. Abdomen 1-segmented, shorter than genital segment. . . . . *lunatus*
II. Fourth leg 3-jointed.
A. Abdomen ♀ 4-segmented, ♂ 2-segmented. . . . . *coryphaenae*
B. Abdomen 1-segmented, or more or less distinctly 2-segmented.
1. Abdomen long, in ♀ about as long as genital segment, in ♂ longer.
a. Caudal rami long, in ♂ about half length, in ♂ longer than, abdomen. . . . . *lalandei*
b. Caudal rami short or very short.

i. Caudal rami short. Abdomen distinctly 2-segmented, a little shorter than genital segment. .... *cossackii*
ii. Caudal rami short. Abdomen ♀ 1-segmented, ♂ 2-segmented. . *rapax*
iii. Caudal rami short. Abdomen a little longer than genital segment, indistinctly 2-segmented. .... *mauritanicus*
iv. Caudal rami very short. Abdomen 1-segmented, a little longer than genital segment. .... *arii*

2. Abdomen about as long as genital segment; in ♂ distinctly, in ♀ indistinctly, 2-segmented. .... *bonito*
3. Abdomen short or very short, about half, or less, genital segment.
 a. Caudal rami much longer than wide. .... *engraulidis*
 b. Caudal rami about as broad as long
  i. Genital segment a little longer than broad.
   α. Abdomen longer than broad. 2nd joint of antenna 1 very long. Prongs of sternal fork apically acute. .... *zei*
   β. Abdomen broader than long. Antenna 1 normal. Prongs of sternal fork apically rounded. .... *brevicaudatus*
  ii. Genital segment broader than long.
   α. 5th leg visible dorsally. .... *labracis*
   β. 5th leg invisible dorsally. .... *tetrodontis*

Gen. *Hermilius* Heller

1865. Heller, *Novara Crust.*, p. 186.

The genus is easily distinguished by the carapace being longitudinally folded, like that of an Ostracod or Concostracan.

The only other species: *longicornis* Bassett-Smith (1898, *Ann. Mag. Nat. Hist.* (7), ii, p. 80, pl. 3, fig. 2) from Trincomalee on *Arius acutirostris*, is probably synonymous with Heller's species.

Hermilius pyriventris Heller

1865. Heller, loc. cit., p. 187, pl. 18, figs. 1, 1*a*, 1*b*.
1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 445.
1924. Brian, *Parasit. Mauritan*, fasc. 1, p. 32.

Localities. Gordons Bay (False Bay) and Table Bay, on gills of *Galeichthys* (*Tachysurus*) *felicebs*. (U.C.T.)

Distribution. Java, on *Arius acutus* (Heller); Mauritania, on *Arius heudeloti* (Brian).

Chondracanthus neali L-S.

Fig. 50.

1930. Leigh-Sharpe, *Parasitology*, xxii, p. 468, figs. 1, 2 (♀♂).

The present specimens agree with the description, but have four (as in *C. zei*) medio-dorsal processes instead of three, and a single medio-ventral process close behind the second pair of legs.

The ovisacs are 3–4 times the length of the body, and irregularly coiled.

Locality. 32° 15′ S., 16° 30′ E., 230–250 fathoms, on *Malacocephalus laevis.* (U.C.T.)

Distribution. Off south-west Ireland, deep water, on the same fish-host.

Chondracanthus colligens n. sp.

Fig. 50.

♀—Head longer than wide, postero-lateral corners rounded, without noticeable projections. Thorax elongate, about as long as genital segment, obscurely segmented, the first part carrying posteriorly the 1st pair of biramous legs, the second part fused with the genital segment, carrying the 2nd pair of biramous legs, and laterally produced on each side into a large curved process; the latter may actually belong to the genital segment. Genital segment oblong, with an acute process in middle of each lateral margin, a medio-ventral process at about the same level, and short, incurved postero-lateral corners. Ovisacs cylindrical (but not fully preserved). 8–10 mm.

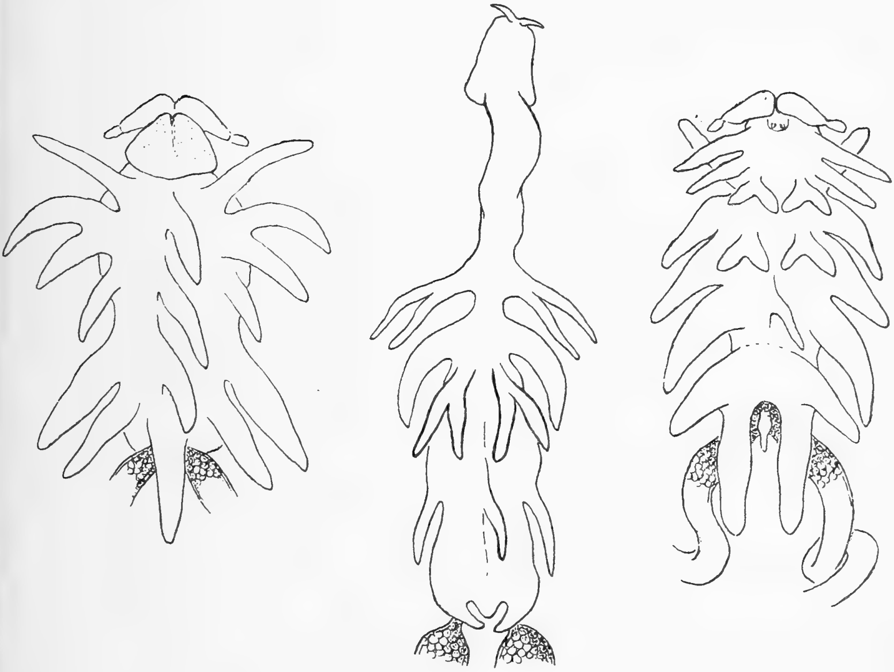

FIG. 50.

Chondracanthus neali L-S. Left and right, dorsal and ventral views respectively of ♀.
Chondracanthus colligens n. sp. Centre, ventral view of ♀.

Localities. Approximately 32° 15′ S., 16° 30′ E., 230–250 fathoms, and Table Bay, on Kingklip (*Genypterus capensis*). (U.C.T.)

Remarks. From microfilm photographs of *C. ophidii* Kröyer 1863, which I owe to the kindness of Dr. J. P. Harding of the British Museum, the Cape specimens seem to be quite different from the South American species taken from a fish of the same genus (or family).

The resemblance to the New Zealand *C. genypteri* Thomson 1890 may be closer, but there are neither lateral processes nor a medio-ventral process in the middle of the genital segment; nor can one be certain from either of Thomson's two figures whether the postero-lateral processes are actually the postero-lateral processes flanking the abdomen, or an additional larger pair concealing the latter.

It is a little curious that there should be three forms of a *Chondracanthus* (or possibly allied genus) on three fishes so closely allied generically or specifically, or even specifically identical, from subantarctic waters of South America, New Zealand, and the Cape.

Brachiella supplicans n. sp.

Fig. 51.

♀—Cephalothorax somewhat shorter than trunk, carapace of head distinct; a pair of uniramous posterior processes ventral to the ovisacs, a pair of biramous processes dorso-laterally dorsal to the ovisacs. Second maxillae completely fused, or fused only at base and tips, in both cases enclosed in a common membranous sheath; or separate, fused only at base and at tips, and each appendage enclosed in its own sheath; bulla small. The membranous sheath encloses also the whole body and processes, each biramous process being enclosed in its own sheath. Ovisacs short, ovoid, not enclosed in sheaths. Cephalothorax to junction with 2nd maxillae 2 mm., 2nd maxillae 2 mm., trunk 2·5 mm., ovisac 1 mm.

♂—*Brachiella*-type (Wilson, 1915, *Proc. U.S. Nat. Mus.*, xlvii, pl. 25 C). 1·3 mm.

Locality. Table Bay, on Kingklip (*Genypterus capensis*). (U.C.T.)

Remarks. Thanks to Dr. Harding for sending photographs of Kröyer's figures of 'Anchorella' *appendiculosa* and *appendiculata*, I am able to say that the present specimens do not appear to be referable to either of these species.

No specific importance is attached to the parasites being enclosed in a membranous sheath; it may be due to the method of

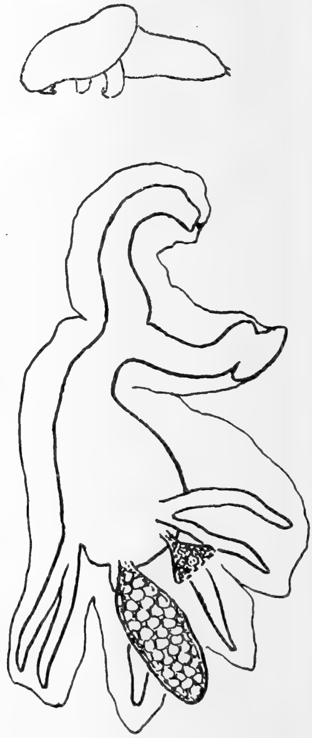

Fig. 51.
Brachiella supplicans n. sp. ♂ and ♀ (one of the ovisacs not completely drawn).

preservation (cf. Brian, 1906, *Copep. Parasit. Pesci Ital.*, pl. 8, fig. 6, of *Brachiella impudica*, and other figures).

Gen. *Medesicaste* Kröyer

1955. Barnard, *Ann. S. Afr. Mus.*, xli, p. 300.

The genus contains the genotype *triglarum* Kröyer and *penetrans* Heller. The species *asellinum* described and figured in T. and A. Scott (1913, *Brit. Parasit. Copep.*, p. 184, pl. 52, fig. 6) as belonging to this genus, is really the genotype of *Lernentoma* (see: Leigh-Sharpe and Oakley, 1927, loc. cit., *infra*).

Medesicaste penetrans Heller

1955. Barnard, loc. cit., p. 301, fig. 31.

The posterior bilobed expansion of the thorax is often much more developed than in Heller's figure (copy in Barnard, loc. cit., fig. 31*a*). One specimen measures from head to end of genital segment 18 mm., from head to end of thorax 9 mm., posterior expansion of latter 3·5 mm. wide.

In my description the term 'neck' applies to the thinnest portion of the animal between the thoracic expansion and the genital segment, not to the constriction between head and thorax.

Localities. Table Bay, on *Trigla capensis*, and False Bay, on *Trigla queketti*. (U.C.T.)

Gen. *Oralien* B-S.

1899. Bassett-Smith, *Proc. Zool. Soc. Lond.*, p. 489.
1927. Leigh-Sharpe and Oakley, *Parasitology*, xix, pp. 456–8.
1927. Oakley in Leigh-Sharpe, ibid., p. 465.
1932. Wilson, *Bull. U.S. Nat. Mus.*, no. 158, pp. 494, and 614, 616 (in key).

Leigh-Sharpe and Oakley (jointly) give an historical account of the genera *Lernentoma*, *Oralien*, and *Medesicaste*, with their genotypes *L. asellina* (Linn.), *O. triglae* (Blainville), and *M. triglarum* Kröyer; and justify the validity of *Oralien*. Oakley (solo) gives revised definitions of the three genera.

Oralien triglae (Blainville)

Fig. 52.

1822. Blainville, *Journ. Phys.*, xcv, p. 441, pl. 62, fig. 12 (*Lernentoma t.*).
1927. Oakley, loc. cit., p. 460, figs. 3–6, 7 B; and p. 465.
1932. Wilson, loc. cit., p. 495, fig. 296 *b*, *c* (♀♂).

Head and neck 3–4 mm. (somewhat foreshortened in the drawing) 'body' (thorax and genital segment) about as wide as long, 2·75 mm.

Locality. Table Bay, on gills of *Trigla capensis*. (U.C.T.)

Distribution. British coasts; Mediterranean; Martha's Vineyard, U.S.A.

Gen. *Sphyrion* Cuv.

1955. Barnard, loc. cit., p. 305.

R. W. Rand, Biologist to the Guano Islands Administration, has submitted several specimens of this genus taken from the stomachs of seals which had been feeding on the fish-hosts of the parasites.

Two specimens have a cylindrical knob on either side of the buccal mass, and indications of a developing knob on each postero-lateral corner of the 'hammer'. The width of the hammer is 8 mm. and 12 mm., and the length of the neck 26 and 14 mm. respectively. The '8 × 26' specimen has an even longer neck, relatively, than the long-necked specimen 12 × 25 recorded in my paper, p. 306.

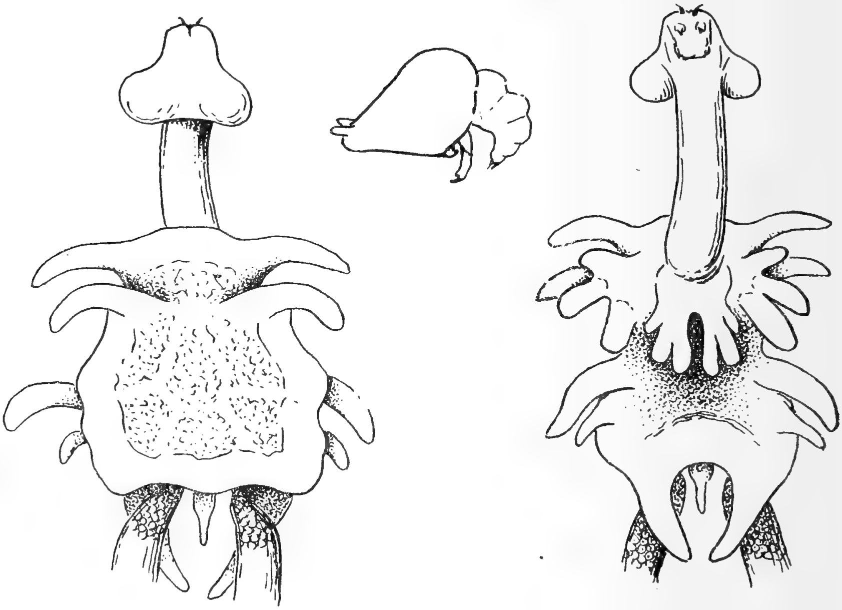

Fig. 52.

Oralien triglae (Blainville). Dorsal (left) and ventral (right) views of ♀; and ♂.

The other specimens have a smooth, transversely oblong hammer as figured for *lumpi* (loc. cit., fig. 33 *b*). The hammer and neck proportions vary as follows: 9 × 11, 13 × 16 (two specimens), 7 × 22, 11 × 22, 11 × 11, 7 × 18, 9 × 14, 9 × 12, 9 × 9.

Tyvold (1914, *Bergens Mus. Aarbok.*, p. 15) came to the conclusion, based on 24 examples, that the neck is much longer relatively in young than in old examples. It may, therefore, be used as an indication of age, but not as a specific character.

PYCNOGONIDA

Fam. PALLENIDAE

Gen. *Propallene* Schimk.

1909. Schimkewitsch, *Zool. Anz.*, xxxiv, pp. 7, 9 (table), 11.
1937. Calman, *Ann. Mag. Nat. Hist.* (10), xx, p. 534.
1951. Stock, *Mem. Inst. R. Sci. Nat. Belg.*, (2) fasc. 43, p. 9 footnote.

Ocular tubercles at hind end of cephalic segment. Legs without auxiliary claws. Palp consisting of 2 slender joints. Oviger without apical claw; 5th joint in ♂ with distal lobe(s), last 4 joints with lanceolate serrate spines. Finger and thumb of chelifer spinose or setose. Proboscis with setae around mouth.

Propallene similis n. sp.

Fig. 53*a–c*.

♂—Very similar to *kempi* (Calman) (*Rec. Ind. Mus.*, xxv, p. 277, fig. 6 as ***Parapallene** k.*) from India. The thumb of chelifer has 8 setae, 4 longer and 4 shorter; the finger has 7 short spines (in *kempi* both have 4 strong 'teeth').

Calman regards the short basal tubercle of the palp as a joint, with an elongate 2nd joint. Here the elongate slightly clavate joint is definitely divided into two, and arises from a knob-like expansion of the integument (cf. *longiceps* as figured by Schimkewitsch, loc. cit.).

Oviger, 5th joint apically with a setose lobe on one side, and a recurved tooth on the opposite side (as in Calman's figure), distal joints with lanceolate serrate spines: 12, 11, 11, 13 = 47 (Calman does not give the numbers in *kempi*).

Length 2·5 mm. (proboscis 0·5 mm.).

Locality. Algoa Bay, 9 metres. 1 non-ovigerous ♂. (U.C.T.)

Remarks. I have seen Schimkewitsch's description of the Japanese *longiceps* (Böhm) but not Böhm's or Ortmann's descriptions. Schimkewitsch does not give the numbers of serrate spines on the distal joints of the oviger.

Gen. *Pallenoides* Stock

1951. Stock, loc. cit., p. 8.
1952. id., *Bull. Inst. R. Sci. Nat. Belg.*, xxviii, 14, p. 4.

Pallenoides proboscideum n. sp.

Fig. 53*d*, *e*.

♂—Body as in *magnicollis* Stock, but with a pair of knobs, ending in sharp points, on cephalic segment, which also has one tooth and a denticle on each lateral margin. An obscure median knob on each segment and on crurigers; the anterior and posterior distal corners of the latter with sharp points.

Proboscis squarish, slightly wider distally than proximally, apically truncate. Chelifer scape with denticles on outer and distal margins, and 3–4 rather stout spines on inner distal corner; thumb expanded basally on inner margin, with crenulate edge; finger curved, without gape. Oviger with apical lobe on 5th joint, distal joints with 8, 7, 6, 8 = 29 obovate, extremely finely serrate spines, with one or two longer serrations basally.

Length 3 mm.

Locality. Algoa Bay, 5–7 metres. 1 non-ovig. ♂. (U.C.T.)

Remarks. Agrees generally with the genotype except for the presence of an apical lobe on 5th joint of oviger. According to Schimkewitsch (1909, loc. cit., table on p. 9) this lobe may be present or absent in species of *Parapallene*; its generic importance therefore seems doubtful.

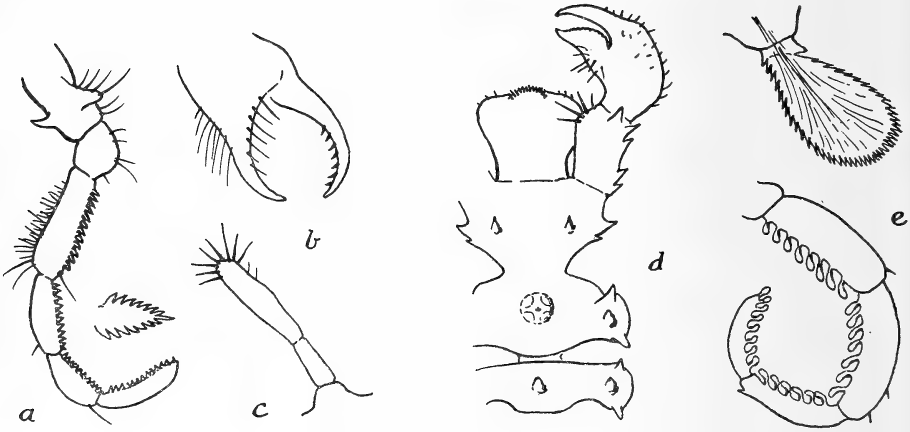

Fig. 53.

Propallene similis n. sp. *a.* oviger, with serrated spine further enlarged. *b.* chelifer. *c.* palp. *Pallenoides proboscideum* n. sp. *d.* proboscis, chelifer, cephalic and 1st segment. *e.* oviger, with spine further enlarged.

Fam. Pycnogonidae

Pycnogonum nodulosum Dohrn

1881. Dohrn, *F. Fl. Golf. Neapel.*, III, p. 203, pl. 16, figs. 1–3.
1953. Fage, *Bull. Mus. Paris* (2), xxv, p. 381 (in list of West African species).

Agreeing with Dohrn's description and figures, including the tubercle on the proboscis.

Length 4·75 mm.

Locality. Algoa Bay, 9 metres. 1 ♀. (U.C.T. 1954.)

Remarks. I have not seen the papers on which Fage based his 1953 (loc. cit.) list of species occurring on the west coast of Africa from Gibraltar to the Congo.

P. cessaci Bouvier also occurs on the West African coast (1952, *Fage. Bull. Mus. Paris* (2), xxiv, p. 531, fig.), but lacks the tubercle on the proboscis and the nodulose legs. Both species are distinguished from *pusillum* by the absence of auxiliary claws.

Pycnogonum sp. cf. *microps* Loman

Two immature specimens 6·5 and 5·5 mm. in length, collected at Inhaca Island, Delagoa Bay (U.W.).

Surface minutely granulate, the larger specimen faintly reticulate on proboscis and cephalic segment. No auxiliary claws. 3rd and 4th segments distinct; crurigers not contiguous. A small knob on hinder part of cephalic segment, one each on segments 2 and 3; feeble knobs on crurigers, those on the 4th pair being the best developed. Proboscis cylindrical in the smaller, slightly tapering in the larger specimen. Ocular tubercle small, eyes obscure. Legs scarcely nodulose in the smaller, but distinctly so on 1st and 2nd tibiae in the larger specimen. Oviger short, 8-jointed (incl. claw), apparently not fully developed.

The smaller specimen has a strong resemblance to *microps* Loman (see: Barnard, 1954, *Ann. S. Afr. Mus.*, xli, p. 154) from Natal, especially as there is a suspicion of a minute tubercle behind the ocular tubercle as well as the larger one on hind part of cephalic segment.

Incertae sedis

Queubus jamesanus Brnrd.

1946. Barnard, *Ann. Mag. Nat. Hist.* (xi), 13, p. 63.
1954. id., loc. cit., p. 157, fig. 34.

The University of Cape Town Ecological Survey collection contains two specimens of this species: one from the type locality St. James (False Bay), the other from East London (1937).

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ANNALS

OF THE

SOUTH AFRICAN MUSEUM

VOLUME XLIII

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2. *The Species of Lepidochrysops, Euchrysops and Cupidopsis of Southern Africa.* The Genitalia (*Lepidoptera - Lycaenidae*). By Desmond P. Murray, F.R.E.S.
3. *Ichneumonidae Nouveaux ou Interessants de l'Afrique du Sud.* Par P. L. G. Benoit, Musée Royal du Congo Belge, Tervuren.

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ANNALS

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VOLUME XLIII

2. *The Species of Lepidochrysops, Euchrysops and Cupidopsis of Southern Africa.* The Genitalia (*Lepidoptera-Lycaenidae*). By Desmond P. Murray, F.R.E.S.

(With Plates I–III)

Introduction

With the recent publication of *South African Butterflies* by D. A. Swanepoel (1953) one is now able to deal with the twenty-eight species of this genus in a more comprehensive way than was previously possible.

Swanepoel does not give any information about the genitalia, although the very detailed accounts he gives of each species of the *Lycaenidae* (which comprise a third of the volume of 320 pages) are very exhaustive, showing long experience in the field and careful note-keeping. The present author dealt with the same matter twenty years ago (Murray, 1935) from a different viewpoint, but since then a number of new species have been added to the list. Bethune-Baker (1922) is the only author who has previously studied the genitalia of the *Lepidochrysops* (*Catochrysops*—nom. preocc.) (see also the same author's paper on the value of this study, 1914), giving us photographs of all the then known African species. The three magnificent coloured plates (by Knight) are the finest drawings that have ever been made of Lycaenids. Stempffer has already dealt with most of the tropical species.

Drawings of the genitalia are much more satisfactory for comparison of these organs. The present ones have all been made direct from mounts with the aid of the camera lucida, to assure accuracy; a photo often conceals the very part one wishes to examine. The present author has dissected the species of all the other genera of the South African Lycaenids; the published findings will be found in two papers (Murray, 1944, 1948). The present genus and the species of *Phasis* alone remain to complete the study. The disorganization caused by the late war was the main cause of the delay, but perhaps this now proves to be an advantage since the new species and those hitherto very rare but lately rediscovered, can be included. It has been recently shown that it is of great importance in this study to examine first the type species, for all species under any given genus should naturally correspond with the genotype before being placed therein (Murray, 1954). If the genitalia had been examined first instead of last when a new species was discovered, we should have been saved a terrible lot of confusion in names, to say nothing of the consequent controversies to which such procedure gives rise. Unfortunately it is found that the European, Indian, North American (and no doubt other) species are very mixed up, simply because in the past wing-colouring was practically the only standard by which a species was judged and placed accordingly.

With the *Lycaenidae* this is a much more uncertain criterion than with most other families. It is to be hoped that we have now passed this stage and make use of more modern and better methods for differentiation and classification. Many students still do not seem to appreciate how essential is the present study. Nomenclature is, of course, another great stumbling-block; yet here again if the genotype were always taken as the standard to which all species within the genus should conform, we should be saved the multiplication of small genera, often quite unnecessary and certainly adding to confusion rather than elucidation.

In this paper we give short descriptions of the genitalia, after setting down the genotypes; under each species the place and date of capture, from the author's own collection except where otherwise stated, and a few necessary notes accompanied by clear line-drawings of the male genitalia of all the species for comparison. The same order is used as given by Swanepoel, and Peters' *Check List of Ethiopian Butterflies* (1952) can be consulted. At the end a list of food-plants is added, as this important information has been gathered together over a number of years by various collectors and is now practically complete.

Detailed description of the genitalia of each species is not necessary as they nearly all resemble each other very closely.

It is by the shape of the *valves* (*harpes*), particularly in this genus, that the different species are distinguished; these are therefore shown clearly on the plates. These are the two club-shaped *claspers* which are nearly always symmetrical but occasionally show asymmetry as in *L. asteris* and *caffrariae*.

Sometimes the *aedoeagus* (*penis*) varies in shape, but not sufficiently to mark out a species as distinct. It is also often forgotten that before and after coitus this organ is apt to show differences, according as it is extended or contracted. The *falces* are two prominent hooks always present on and being part of the *gnathos*, attached to the *uncus*, which here are bilobed hairy pads. In this genus they do not vary much in form or length. The *anellus* is the central cone-like tube which bears on its ventral surface a shield or place called the *juxta*, often holding (in some genera) hairs or scales (i.e. the *cristae*). The *juxta* probably acts as a guide to the *penis*, through which this organ passes (Pierce, 1914; Beirne, 1942). In the species of *Lepidochrysops* the *anellus* is sometimes large and of varied shape.

Gen. *Lepidochrysops*, Hed.

1923. Hedicke, *Dtsch. ent. Zeit.*, p. 226.

*1. *L. parsimon parsimon* (Fabr.). *Genotype.*

No tail. *Exp.* ♂ 37-39 mm. ♀ 38–46 mm. Potchefstroom, Transvaal, Dec., 1933.

For a number of years this species was confused with *plebeja* (which has a tail), until Bethune-Baker (*loc. cit.*) showed clearly that it was a distinct species. From the drawing it will be seen that the apex of the valve is quite different in each case.

2. *L. plebeja* (Butler).

With tail. *Exp.* ♂ 48 mm. ♀ 48–50 mm.

Drawing made from Bethune-Baker's photo-plate. This species has six spots on the underside of hindwing (as also *parsimon*), whereas *patricia* and *glauca* have only five.

3. *L. patricia* (Trimen).

With tail. *Exp.* ♂ 38–41 mm. ♀ 41–45 mm. Pretoria, Transvaal, Febr., 1932.
Natal, Oct., 1942.

This species is generally more common than the two former ones, but often flies with them. The apex of the valve is rounded, almost club-shaped; the aedoeagus is sometimes bulbous at the point.

4. *L. aethiopia* (Bethune-Baker).

With tail. *Exp.* ♂ and ♂ 50 mm.

Drawing made from Bethune-Baker's photo-plate as no specimen was available. It is a larger species than the above.

5. *L. glauca* (Trimen).

With tail. *Exp.* 40–45 mm. ♀ 40–47 mm. Pretoria, Transvaal, Febr., 1932.

Distinguished externally by its pale blue colour and five black spots on the underside of hindwings. This species has often been confused with *patricia* which it closely resembles, and although the apex of the valve is also rounded, it is of a different form to *patricia*.

6. *L. jefferyi* (Swierstra).

No tail. *Exp.* ♂ and ♀ 29 mm. Barberton, Transvaal, Oct., 1945 (Swanepoel).

This is the measurement given in the original description, but specimens I received are at least 10 mm. larger, i.e. 38–40 mm. similar to *patricia*.

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* The numbers of the species correspond with the numbers of the figures on the plates.

It was first discovered by Mr. Jeffery near Ulundi, Barberton, October, 1906, and at Noordkloof, Transvaal, November, 1908, the type-specimen being in the Transvaal Museum, Pretoria. It was rediscovered by Mr. Swanepoel in the same district October to November, 1945–7. His very interesting account of his long search for this species, which had not been collected for about thirty-seven years, should be read.

7. *L. hypopolia* (Trimen).

No tail. *Exp.* ♂ 38 mm. ♀ 40 mm. Potchefstroom, Transvaal, 1920 (Ayres).

This rare and dull species, only found in the Transvaal, was first taken by Mr. Morant in Natal, September, 1870, and again by Mr. Ayres in 1903 and 1920 near Potchefstroom, and refound there after ten years' search by Mr. Swanepoel, September, 1950–1. The specimen I dissected was one of those taken by Ayres in 1920, now in the Feltham Coll., Witwatersrand University, Johannesburg. It is possible that two species have been confused here, as the figures given by Swanepoel do not look like ♂ and ♀ of the same species, and he also queries whether Ayres' species is identical with his own later captures. The point cannot be decided until comparison is made of the genitalia.

8. *L. procera* (Trimen).

No tail. *Exp.* ♂ 29 mm. ♀ 30 mm. Natal, Dec., 1941. Estcourt and Weenen, Natal, Oct., 1946.

This elusive species, although first named by Trimen as early as 1893, did not become well known until it was found in Natal by Messrs. Pennington and Swanepoel in October, 1943, and again in October and November, 1943–6. The underside markings of the hindwing are almost identical with *letsea*, which is slightly larger. This led me to confuse the two species in the description given in the *Monograph of the S. African Lycaenidae* (Murray, 1935). The shape of the valves, however, is quite distinct: in *procera* very long and tapering; in *letsea* much shorter and not so pointed. *Anellus* produced forward with an irregular front edge.

9. *L. vansoni* Swan.

No tail. *Exp.* ♂ 15 mm. Swartklip, Vivo, Transvaal, March, 1948 (Swanepoel).

This small species was first found by Mr. Swanepoel on the flats between the Zoutpansberg and the Blaauwberg Mts., Northern Transvaal, in March, 1947; he kindly sent me two males for examination. The valves are very long and slender, the apex (in the two specimens received) ends in a distinct hook.

10. *L. letsea* (Trimen).

No tail. *Exp.* ♂ 32–33 mm. ♀ 32–38 mm. Potchefstroom, Transvaal, Dec., 1933.

The Transvaal examples show a much lighter colouring on the upper side than the Cape specimens, which in both sexes is a glossy-brown, not greyish as those taken by myself near Potchefstroom on the border of the O.F.S. (specimen now at Pretoria). Mr. Swanepoel says there is very little difference in the colouring of the ♂ and ♀, but the Transvaal examples are distinctly grey, not brown as those from the Cape. I suspect two different species have been confused here or overlooked.

11. *L. irvingi* Swan.

No tail. *Exp.* ♂ 20 mm. ♀ 22 mm. Barberton, Transvaal, Nov., 1946 (Swanepoel).

Smaller and darker than the last species. First taken by Mr. Swanepoel on the Nelshoogte Range near Barberton, November, 1946. It flies together with *lacrimosa* and *tantalus.* The valve is similar in shape to that of *letsea*, but shorter; the *anellus* produced into two long pointed arms.

12. *L. ignota* (Trimen).

No tail. *Exp.* ♂ 31–33 mm. ♀ 31–36 mm. Natal, 12 Nov., 1942. Estcourt, Natal, Dec., 1942.

The valve, which is very long, has a sickle-shaped apex, sharply dentate, according to Bethune-Baker, but my specimens do not show this feature.

13. *L. lerothodi* (Trimen).

No tail. *Exp.* ♂ 32–33 mm. ♀ 33–36 mm. Mokhotlong, Basutoland, Jan., 1944 (Pennington).

This very rare and dark species (♂ and ♀ both dark brown) was first found by Major Crawshay in the Maluti Mts., Basutoland, in January, 1902, and remained unknown until rediscovered by Mr. Pennington in January, 1940, in the same area and by Mr. Swanepoel in a kloof of the same range in January, 1949, flying with *methymna* and *ortygia.* The former collector very kindly sent me some specimens from which the slide and drawing were made. It has not been found outside Basutoland. Valve long with apex turned into a sharp hook; *anellus* produced into two curved prongs.

14. *L. loewensteini* Swan.

No tail. *Exp.* ♂ 18 mm. Basutoland, Jan., 1949 (Swanepoel).

First taken by Mr. Swanepoel, January, 1949, at the same place as the former species. Although resembling *lerothodi* very closely, it is much smaller and has a lunule in the hindwing, which the former species lacks, and five prominent black spots on the underside of the hindwing. The valves are much larger than in the former species, the apex being slightly curved but not into a curved prong.

15. *L. tantalus* (Trimen).

No tail. *Exp.* ♂ 33–37 mm. ♀ 41 mm. Letaba District, Transvaal, Oct., 1943 (Swanepoel). Estcourt, Natal, Oct., 1946.

After being lost sight of for a great number of years this species was found again in 1943–6, both in the Transvaal and in Natal. The valves are very long and narrow, tapering at apex into a slight hook with a fine point; *anellus* large, the front edge being greatly curved.

16. *L. pephredo* (Trimen).

No tail. *Exp.* ♂ 32–36 mm. ♀ 36 mm. Estcourt, Natal (Tring Mus.).

First discovered by Mr. C. W. Morrison at Estcourt in October and December, 1888, and lost sight of until October, 1943–6, when it was collected again in the same area. This species closely resembles *grahami*. The valves in both species are very similar, with a distinct difference in the shape of the apex, the former being broad, the latter narrow in comparison; *anellus* large, excavated above in front and curved laterally.

17. *L. puncticilia* (Trimen).

No tail. *Exp.* ♂ 25–32 mm. ♀ 32–35 mm. Withhock [*sic*] Springs, Transvaal, Jan., 1938.

A very dark brown species, both ♂ and ♀, on both sides of the wings. The valves of this species, *pephredo*, and *methymna* resemble each other very closely; *anellus* front edge sub-conical.

18. *L. methymna* (Trimen)

No tail. *Exp.* ♂ 29–31 mm. ♀ 32–33 mm. Cape, Oct., 1937.

This is also a very dark species. Valve long, apex narrow, tapering into a slightly curved fine point; *anellus* front edge well curved.

A much larger variety of this species was discovered by Mr. C. G. Dickson at the Cape, November, 1936: *Exp.* 42–44 mm., with very dark brown, almost black, uppersides. It is as large as *trimeni*, which it resembles closely in the underside markings and with which it has previously been confused. The apex of the valve shows a more distinctly hooked shape than that of the smaller *methymna*; the apex of the valve is given for comparison in the figure alongside fig. 18. The author thinks it should be recognized as a distinct species on account of these differences and proposes the name *major* sp. nov. Cape Peninsula, November, 1936 (Dickson). cf. *Trans. Roy. Entom. Soc. Lond.*, lxxxvii, pt. 10, pl. 2, figs. 48-50, 1938, where *methymna* and *puncticilia* are shown together with the following variety (*bacchus*). There are at least three or four forms of *methymna*; until these have been carefully compared and more material is available, it is not possible to say whether they are distinct species or not.

19. *L. bacchus* Riley

No tail. *Exp.* ♂ 13 mm. ♀ 15 mm. Tygerberg Mt., Cape, Sept., 1936 (Dickson).

This very small example, described as a new species in 1938, was found on Tygerberg Mt. near Cape Town in September, 1936, by Mr. Dickson, who very kindly sent me a specimen. Although smaller than *puncticilia* and much smaller than *methymna*, it resembles both these species very closely. My mounts show very little difference, if any, in the shape of the valves from *methymna*, though slightly larger and broader in the latter. 'The aedoeagus alone seems to distinguish them.'—(Riley). But a difference in form of this organ alone does not warrant specific separation. As already shown in the introduction to this paper, this organ sometimes varies in form before and after coitus. For these reasons, in the author's opinion *bacchus* is a small variety of *methymna*, probably confined locally to dry, arid hillsides and therefore a local variety but not a distinct species.

20. *L. ortygia* (Trimen).

No tail. *Exp.* ♂ 34–39 mm. ♀ 39–42 mm. Muizenberg, Cape, Febr., 1930. Kalk Bay Mts., Cape, Dec., 1942 (Dickson).

The unusually long-arm valves, with the sudden excised sickle-shaped apex, distinguishes at once this species from all the others. Some examples show a slightly different shaped apex.

21. *L. asteris* (Godart).

With tail. *Exp.* ♂ 40–45 mm. ♀ 45 mm. Cape, Nov., 1942.

Until Bethune-Baker (*loc. cit.*) pointed out the mistake in identification, this species was confused with the following. Valves sometimes asymmetrical, very near in shape to *trimeni*, but distinct; *anellus* with front edge well arched.

22. *L. trimeni* (Bethune-Baker).

With tail. *Exp.* ♂ and ♀ 38–45 mm. Cape, Jan., 1936.

Bethune-Baker named this insect after Trimen, but there are two species involved, not one only; the underside also shows a difference from *asteris*. Valve apex broader than the previous species; size varies somewhat in both forms.

23. *L. caffrariae* (Trimen).

With tail. *Exp.* ♂ 38–41 mm. ♀ 38–45 mm. Natal, Dec., 1941. Cape, Dec., 1935.

One valve in this species is nearly always asymmetrical, a distinction, as well as being quite different from the previous two species in form; the left valve shown in the drawing is the normal form.

24. *L. swanepoeli* Pennington

No tail. *Exp.* ♂ 20 mm. Barberton, Transvaal, April, 1948.

This small species was first taken by Mr. Swanepoel near Sheba Mines, Barberton, in October, 1945, flying with *jefferyi.* The valves are very narrow and long, the most delicately formed of all the South African species.

25. *L. grahami* (Trimen).

No tail. *Exp.* ♂ 33–36 mm. ♀ 38 mm. Cala, Cape, Dec., 1950 (Swanepoel).

It was first taken by Mr. F. Graham in the north-east Cape Province in 1891. As already noted, the valves are almost the same as in *pephredo,* the apex in the present species being only slightly narrower.

26. *L. lacrimosa* (Bethune-Baker).

No tail. *Exp.* ♂ 30–38 mm. ♀ 35–40 mm. Greytown, Natal, 1920 (Pennington). Harding, Natal, Oct., 1922.

This and the two following species show a form of valve quite distinct from all the former examples; they approximate more to those of *Euchrysops,* to which genus the author thinks they should be moved, if we are to adhere to the rule that species should conform to the genotype. In the present case the valve is much broader and armed with a hood of fine spines near the apex, distinguishing it from *niobe*; the aedoeagus is large with a fine hooked point; the *anellus* forms two curved arms on each side of the *penis.*

27. *L. niobe* (Trimen).

No tail. *Exp.* ♂ 26–33 mm. ♀ 26–38 mm. Natal, Jan., 1941 (Clark). Natal, Dec., 1942.

This species is slightly smaller than the previous one. The genitalia similar in most respects, except that the valves are not armed with spines; aedoeagus extended to a long hooked point with two fine spines or cornuti (Pierce); the *anellus* is the same as in *lacrimosa.*

28. *L. ariadne*, Butler.

No tail. *Exp.* ♂ and ♀ 39–42 mm. Karkloof, Natal, April, 1947.

This very rare species was first taken near Karkloof Falls, Natal, in 1897; it was not until forty-five years afterwards that it was found again in 1941 near Belgowan, Natal, by Mr. Clark. It has never been found outside Natal. The photo Bethune-Baker gives of the genitalia clearly shows how inadequate photographs of these organs often are in comparison with a drawing, as in his picture the form of the valve cannot be seen at all.

Compared with *niobe* this species shows a distinct shape of valve; the aedoeagus is also different, it is nearer in general form to *lacrimosa.* Through the kindness of Mr. Swanepoel, who took it at Karkloof in April, 1947, and sent me a male for dissection, the genitalia can now be compared.

Gen. *Euchrysops* Butler

1900. Butler, *Entomologist*, xxxiii, p. 1.

29. *E. cnejus* (Fabr.) *Genotype.*

With tail. *Exp.* ♂ and ♀ 27–32 mm. Cawnpore, India, Aug., 1935.

The valves are strongly made, long and straight, excavated at the apex forming a head like the head of a spanner; aedoeagus long, point divided; *anellus* developed into a large cone-shaped organ.

30. *E. barkeri* (Trimen).

With tail. *Exp.* ♂ 30–33 mm. ♀ 29–36 mm. Natal, Tring Mus. No date.

This is a species that has rarely been found, though where it occurs, it seems to be locally common, both in Natal and in the Transvaal. The valves are very long and narrow; *anellus* a hood-shaped cone; aedoeagus long with a bulbous apex. This species is definitely wrongly placed here; with *dolorosa* it should be transferred to *Lepidochrysops*. (See under No. 33.)

31. *E. osiris* (Hopffer).

With tail. *Exp.* ♂ 34–38 mm. ♀ 34–39 mm. Klerksdorp, Transvaal, May, 1932.
Natal, Dec., 1941.

Valves short and broad; apex a rounded dentate head; aedoeagus short, sometimes holding spines or cornuti; *anellus* front edge rounded.

32. *E. malathana* (Boisd.) (syn. *asopus* Hopffer).

No tail. *Exp.* ♂ 25–35 mm. ♀ 25–31 mm. Naboomspruit, N. Transvaal, Nov., 1932. Potchefstroom, Dec., 1936.

Valve fairly short and broad, the apex book-shaped; aedoeagus bulbous at apex with two fine spines; anellus cone-like, well developed.

33. *E. dolorosa* (Trimen).

No tail. *Exp.* ♂ 25–29 mm. ♀ 29 mm. Magaliesberg, Transvaal, Oct., 1927.

Valves very long and narrow, tapering into a fine hooked point; aedoeagus divided at apex; *anellus* cone-shaped. This species, with *barkeri* (No. 30) is definitely wrongly placed here; the genital form is identical with that of all the other species of *Lepidochrysops*, to which by affinity both species naturally belong.

Gen. *Cupidopsis* Karsch.

1895. Karsch, *Ent. Nachr.*, xxi, p. 298.

34. *C. cissus* (Godart) *Genotype.*

No tail. *Exp.* ♂ 30–33 mm. ♀ 30–38 mm. Irene, Pretoria Dec., 1931. Witpoortje, Krugersdorp, Transvaal, Jan., 1930.

In this genus the valves are of quite different formation from those of *Lepidochrysops*, which feature naturally separates the two genera. The form of the valves in the two species resemble each other closely.

35. *C. jobates* (Hopffer).

With tail. *Exp.* ♂ 25–30 mm. ♀ 26–30 mm. Pretoria, Transvaal, Jan., 1931. Klerksdorp, Transvaal, May, 1931. Natal, Jan., 1941.

Two new species from Southern Rhodesia have recently been described and figured, viz. *L. ruthica* Penn. and *barnesi* Penn. (1953, *J. Entom. Soc. S. Afr.*, xvi, pt. 2.)

SUMMARY

The paper has dealt with all the present known species of the *Lepidochrysops* found in South Africa, accompanied by drawings of the male genitalia for comparison and distinction. The great importance of examining these organs and comparing them with the genotype before a given species is placed in any particular genus is stressed.

One species only seems doubtful, i.e. *L. bacchus*, for the reasons stated. The author considers from the reasons given that *L. lacrimosa* and *L. niobe* should be placed in the genus *Euchrysops*. *E. barkeri* and *E. dolorosa* are shown to be definitely wrongly placed and should be transferred to *Lepidochrysops*. One new species is named under No. 18.

The author would like to state that his collection of the *Lycaenidae* of Europe (Pethers Coll.), South Africa, India, and of North America has been recently donated to the South London Entomological Society's collections now housed at Burlington House, Piccadilly.

FOOD-PLANTS

Species	*Plant*	*Family*
1. parsimon	(1) *Lantana salvifolia* Jacq. (Swanepoel, 1953)	Verbenaceae
	(2) *Salvia* sp. Transvaal (Murray, 1935)	Labiatae
2. plebeja	(1) *Lantana salvifolia* Jacq. (Swanepoel)	Verbenaceae
	(2) *Salvia* sp. (cultivated) Flowers. Transvaal (Murray)	Labiatae

Species	*Plant*	*Family*
3. patricia	*Lantana salvifolia* Jacq. (Irving)	Verbenaceae
4. aethiopia	—	—
5. glauca	The same as for *patricia*?	
6. jefferyi	*Becium obovatum* N.E. Br. (Swanepoel, 1953)	Labiatae
7. hypopolia	*Becium* sp. (Swanepoel, 1943)	,,
8. procera	*Becium* sp. Flowers. Transvaal (Swanepoel, 1953)	,,
9. vansoni	*Lantana salvifolia* Jacq. (Swanepoel, 1950)	Verbenaceae
10. letsea	*Lippia scaberrima.* Sond. Transvaal. (Murray, 1934)	Verbenaceae
11. irvingi	*Becium* sp. Flowers. Transvaal (Swanepoel, 1940)	Labiatae
12. ignota	,, (Swanepoel, 1953)	,,
13. lerothodi	,, (,, 1948)	,,
14. loewensteini	,, (,, 1948)	,,
15. tantalus	,, (,, 1943)	,,
16. pephredo	*Becium* sp. Flowers. Transvaal (Swanepoel, 1953)	,,
17. puncticilia	*Dischima ciliatum* Choisy (Dickson, Cape, 1943)	Selaginaceae In the Transvaal food-plant must be different as *Dischima* does not occur.
18. methymna	*Selago* sp. Flowers. Cape (Dickson, Cape, 1953)	Selaginaceae
19. bacchus	*S. fructicosa* Linn. (Dickson, Cape, 1944)	,,
20. ortygia	(1) *Selago fructiculosa* Rolfe. Cape (Dickson, Cape, 1945)	,,
	(2) *Becium burchellianum* N.E. Br. Cape (Clark)	Labiatae
21. asteris	*Selago serrata* Berg. Cape	Selaginaceae
22. trimeni	*Selago serrata* (and two other sp.) (Lunt)	,,
23. caffrariae	*Becium burchellianum* N.E. Br.	Labiatae
	Salvia sp. Cape (Dickson, 1953)	,,
	Selago sp. (Dickson)	Selaginaceae

Species	*Plant*	*Family*
24. swanepoeli	*Becium* sp. (Swanepoel, 1953)	Labiatiae
25. grahami	*Salvia* sp. Cape. Flowers (Swanepoel, 1953)	„
26. lacrimosa	*Indigofera* sp. Transvaal (Swanepoel, 1953)	Leguminosae
27. niobe	*Indigofera* sp. Natal (Swanepoel, 1953)	„
28. ariadne	*I. astraglina.* Natal (Swanepoel, 1953)	„
29. cnejus	—	—
30. barkeri	?	—
31. osiris	(1) *Rhynchosia* D.C. Flowers. Transvaal (Murray)	Leguminosae
	(2) *Vigna monophylla* Taub. Flowers. Kenya (Jackson, 1937)	„
32. malathana	*Vigna monophylla* Taub. Flowers. Kenya (Jackson, 1937)	„
33. dolorosa	*Becium* sp. Transvaal (Swanepoel, 1953)	Labiatae
34. cissus	(1) *Eriosema cordatum* E. Mag. Flowers Transvaal (Murray, 1935)	Leguminosae
	(2) *E. cynoides* Benth. Flowers (Murray, 1935)	„
35. jobates	„ „ „	„

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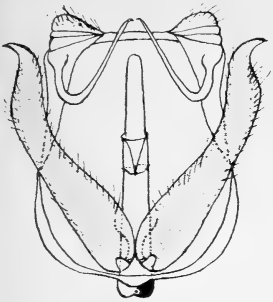

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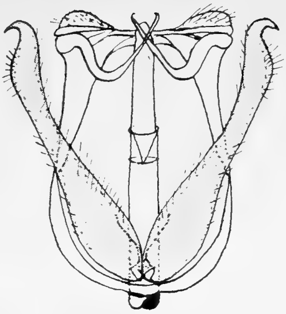

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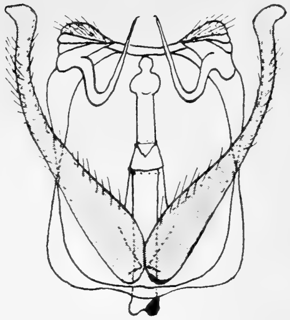

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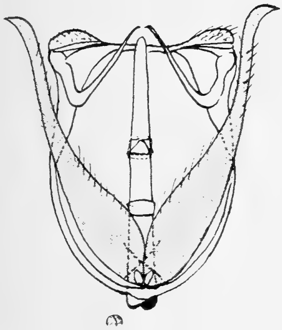

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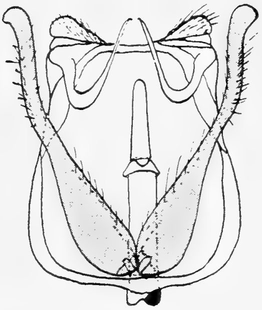

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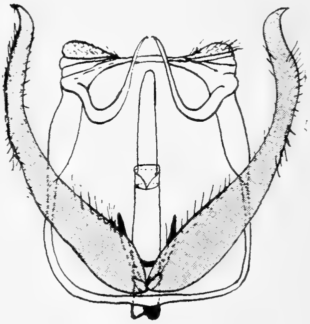

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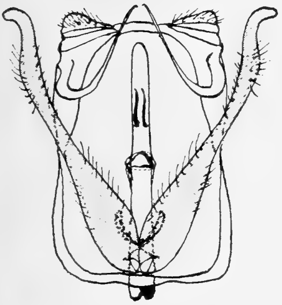

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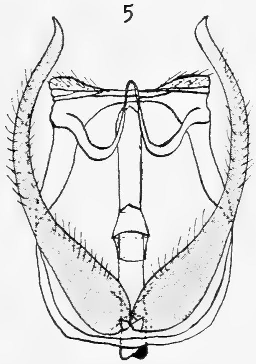

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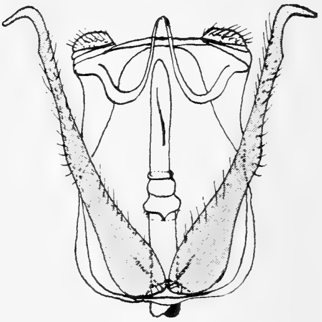

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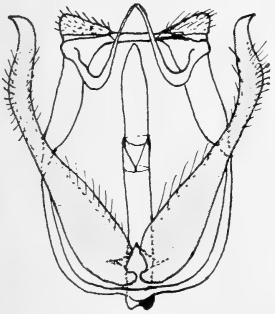

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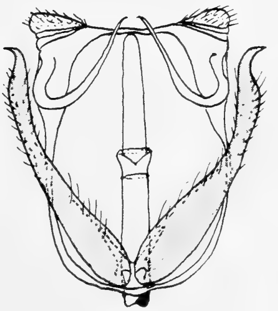

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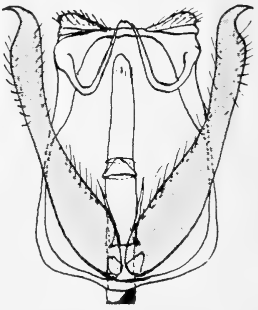

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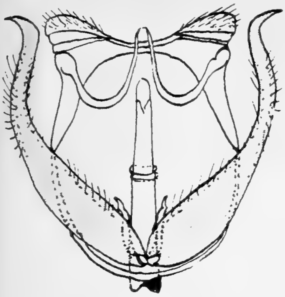
Fig.

1. *Lepidochrysops parsimon parsimon* (Fabr.). Genotype. Africa.
2. *L. plebeja* (Butler).
3. *L. patricia* (Trimen).
4. *L. aethiopica* (Bethune-Baker).
5. *L. glauca* (Trimen).
6. *L. jeffereyi* (Swierstra).

Fig.

7. *L. hypopolia* (Trimen).
8. *L. procera* (Trimen).
9. *L. vansoni* Swan.
10. *L. letsea* (Trimen).
11. *L. irvingi* Swan.
12. *L. ignota* (Trimen).



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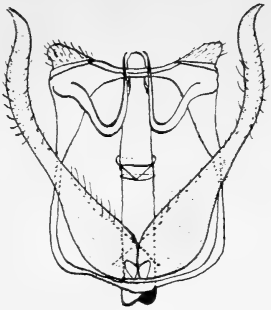

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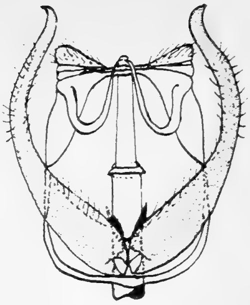

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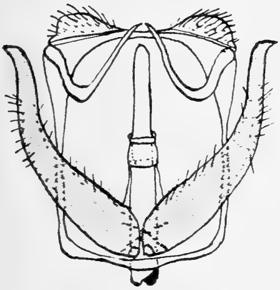

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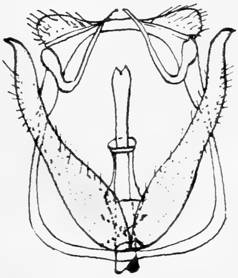

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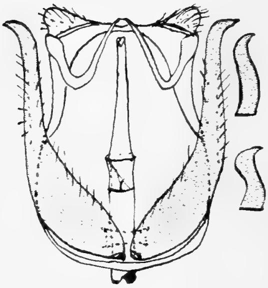

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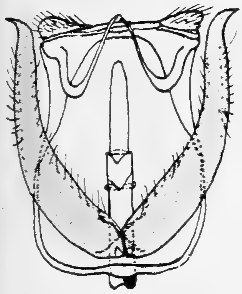

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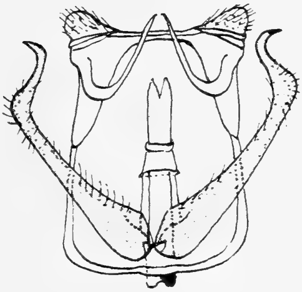

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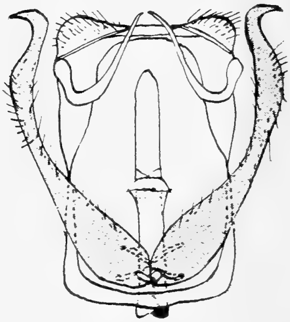

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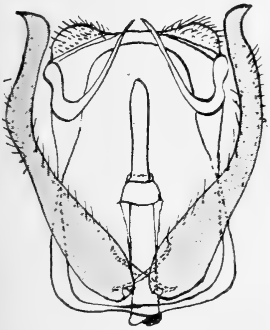

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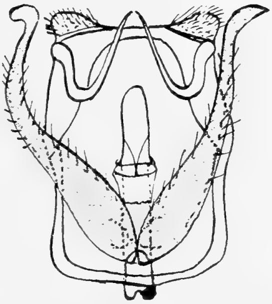

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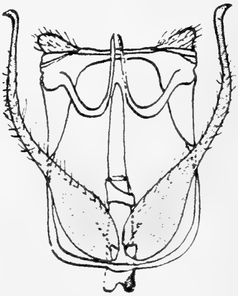

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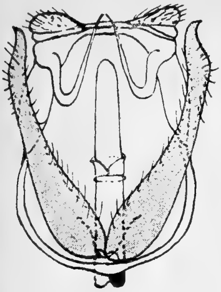
Fig.
13. *L. lerothodi* (Trimen).
14. *L. loewensteini* Swan.
15. *L. tantalus* (Trimen).
16. *L. pephredo* (Trimen).
17. *L. puncticilia* (Trimen).
18. *L. methymna* (Trimen).
Inset: *major* sp. nov. Apex of valve.

Fig.
19. *L. bacchus* Riley.
20. *L. ortygia* (Trimen)
21. *L. asteris* (Godart).
22. *L. trimeni* (Bethune-Baker).
23. *L. caffrariae* (Trimen).
24. *L. swanepoeli* Penn.

Plate III



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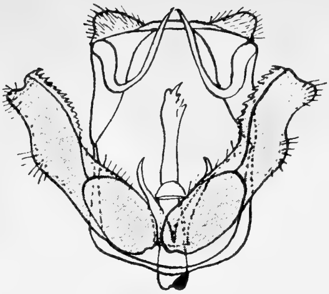

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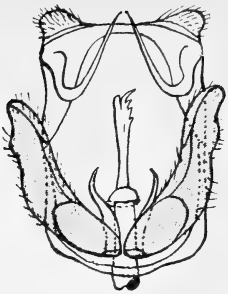

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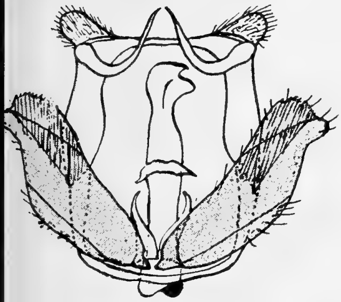

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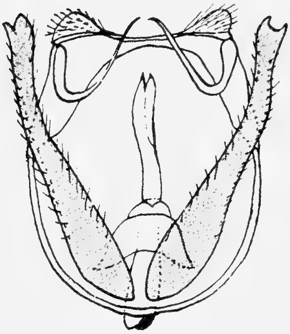

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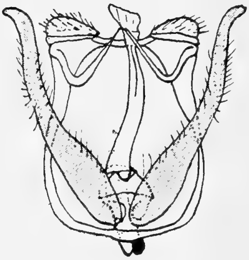

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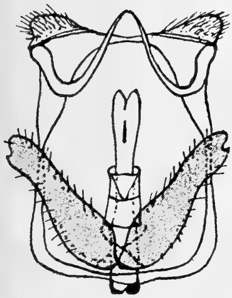

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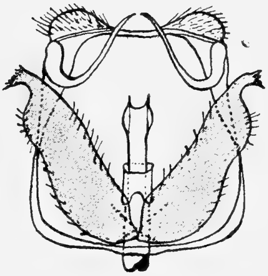

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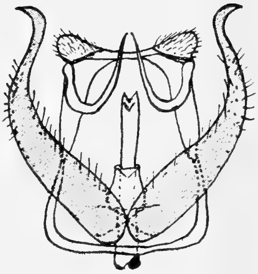

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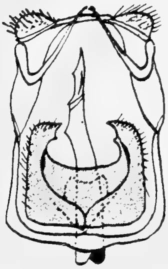

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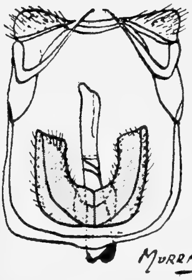

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Murray del. '53

Fig.

25. *L. grahami* (Trimen).
26. *L. lacrimosa* (Bethune-Baker).
27. *L. niobe* (Trimen).
28. *L. ariadne* Butler.
29. *Euchrysops cnejus* (Fabr.). Genotype. India.
30. *E. barkeri* (Trimen).

Fig.

31. *E. osiris* (Hopffer).
32. *E. malathana* (Boisd.) (syn. *asopus* Hopffer).
33. *E. dolorosa* (Trimen).
34. *Cupidopsis cissus* (Godart). Genotype. Africa.
35. *C. jobates* (Hopffer).

3. *Ichneumonidae Nouveaux ou Interessants de l'Afrique du Sud.* Par P. L. G. Benoit, Musée Royal du Congo Belge, Tervuren.

Les insectes qui font l'objet du présent mémoire m'ont été confiés pour étude par le South African Museum à Cape Town.

J'adresse mes remerciements les plus chaleureux à Monsieur le Dr. A. J. Hesse qui a bien voulu mettre à ma disposition cette collection d'Ichneumonides d'une qualité exceptionnelle.

Le travail a pu être mené à bien grâce à l'aide de Monsieur A. J. Hesse par le prêt de types de Cameron et de Morley, de Monsieur R. Malaise du Naturhistoriska Riksmuseum de Stockholm par le prêt de types de Szepligeti, et de Madame Delfa Guiglia du Museo Civico di Storia Naturale de Gênes par le prêt de types de Tosquinet. A tous ma profonde gratitude.

Les types de toutes les espèces décrites dans les lignes qui suivent se trouvent dans les collections du South African Museum à Cape Town.

Subf. METOPIINAE

Chorinaeus capensis sp. n.

Tête jaune à bande frontale et occiput noirs. Thorax et abdomen noirs. Pattes jaunes, les fémurs partiellement testacés. Antennes brunes, noircies au dessus. Ailes hyalines.

Flagellum des antennes composé de 21 articles, tous plus longs que larges. Face et clypéus bombés dans tous les sens, luisants, couverts de ponctuation peu profonde mais serrée. Front et vertex lisses et luisants; les ocelles limités à l'extérieur par un sillon. Tempes régulièrement arrondies.

Mésonotum finement ponctué, la ponctuation dense à la base, plus clairsemée vers l'apex; la seconde moitié du mésonotum est aplatie et luisante. Scutellum entièrement rebordé, lisse et luisant sauf quelques points à la base. Mésopleures luisants, à fine ponctuation dispersée, la partie postérieure présente une succession de fines rides longitudinales; aucune carène entre les mésopleures et le mésosternum. Métapleures lisses et luisants; il existe de fortes rides longitudinales sur la partie inférieure. Le propodeon présente une aire médiane rectangulaire, deux fois plus longue que large, couverte de sculpture finement ruguleuse. Les aires latérales couvertes de ponctuation dense et profonde.

Tous les tergites à ponctuation forte et serrée. Le tergite 1 est 1,25 fois aussi long que large à l'apex, il porte deux fortes carènes médianes parallèles et deux latérales. Tergite 2 peu plus large que long et muni de trois carènes entières, dont les deux latérales sont légèrement sinueuses. Le tergite 3 porte trois carènes qui s'estompent vers le milieu.

Tibias II avec deux longs éperons. Les fémurs III sont 2, 5 fois aussi longs que leur plus grand diamètre. Les tibias III sont 3,2 fois aussi longs que leur diamètre apical.

Ongles des tarses I et II lobés, ongles des tarses III simples. Longueur: 5 mm.

Cap: Mossel bay 12, X, 1941 (R. Turner), ♂, holotype au South African Museum.

Par les tibias II munies d'un seul long éperon cette espèce s'apparente à *C. latitarsis* Benoit et *C. quadricarinatus* Benoit; elle s'en distingue par l'absence d'une séparation caréniforme entre les mésopleures et le mésosternum.

Subf. ORTHOCENTRINAE

Orthocentrus limpidus Seyrig

Cape: Mossel bay 20, X, 1941 (R. Turner), ♂.

Cette espèce semble décidément la plus répandue du genre dans la faune éthiopienne. Jusqu'à présent, elle n'était connue que du Centre africain.

Subf. BANCHINAE

Exetastes peronatus Cameron

Cap: Augusfontein (Calvinia) IX, 1947 (Mus. Exped.) ♂ & ♀.
Dikbome, Merweville, Koup, X, 1952 (Mus. Exped.) ♂.
Brandkop, Nieuwoudtville, IX, 1941 (Mus. Staff), ♂.

Quatre exemplaires identiques au Type. Le mâle se distingue de la femelle par les mandibules tachetées de jaune.

L'espèce était connue par deux exemplaires (♀ et ♂) ayant servi à la description et originaires du Namaqualand: O'okiep et Klipfontein.

Glypta hispida Benoit

Uganda: Mulange novembre, 1922 (R. Dummer), ♂, allotype.

Le mâle diffère de la femelle par la ponctuation faciale disparue au milieu, ce qui laisse le tégument lisse et luisant à cet endroit. Les petites épines du scutellum sont atténuées.

J'ai décrit cette espèce sur un exemplaire originaire de Basoko, localité située en pleine forêt équatoriale. Il est étonnant de la retrouver en Uganda, où les conditions écologiques sont absolument différentes.

Sjöstedtiella pulchella Szepligeti

Cap: Mossel bay, 3, XII, 1941 (R. Turner)
Goedehoop (Heidelberg District), X, 1951.

Sjöstedtiella nigripectus Brullé

Glypta Brullé, *Hist. Nat. Ins., Hym.*, 1846, p. 108, ♀ ♂.
Morley, *Ann. S. Afr. Mus.*, XV, 1916, p. 388.

Glypta nigro-ornata Cameron, *Ann. S. Afr. Mus.*, V, 1906, p. 117, ♂ (syn. nov.).
Sjöstedtiella nigripectus Morley, ibid., XV, 1916, p. 388.
Sjöstedtiella unirufa Morley, ibid., XXIII, 1926, p. 460, ♂ (syn. nov.).

Le type de Brullé se trouve au Museum National d'Histoire Naturelle de Paris et son bon état de conservation a permis d'établir la présente synonymie.

Les types de Cameron et de Morley se trouvent au South African Museum, Cette espèce est connue de la Province du Cap: Stellenbosch, Lammerfontein in the Moordenaars Karoo, Het Kruis (Piquetberg), et Wit River (Wellington).

Zululand: Eshowe (Bell-Marley).

Sjöstedtiella vittinotum Morley

J'ai eu l'heureuse surprise de pouvoir étudier de cette espèce encore nele exemplaires capturés par Lightfoot en même temps que les types, sur uf Matroosberg (alt. 3,500 ft.) dans la Province du Cap. Comme les deux types, il s'agit de femelles uniquement; leur coloration ainsi que les caractères plastiques sont stables.

Asphragis densepunctatus sp. n.

A. flavidorbitalis Morley, *Ann. S. Afr. Mus.*, XVII, 1917, p. 217.

Tête jaune aux marques noires suivantes: une strie médiane faciale incomplète, une bande frontale médiane, celle-ci s'étend sur le vertex et envahit l'occiput. Antennes noires. Mésonotum jaune à trois bandes longitudinales noires. Scutellum jaune au milieu, noir sur les côtés. Propodeon noir. Propleures jaunes à bande noire longitudinale. Méso- et métapleures jaunes sauf la partie supérieure noire. Les sternums noirs en grande partie. Abdomen d'un rouge brique sauf le tergite I noir en grande partie et une tache noire sur les deux ou trois tergites suivants. Tous les coxas jaunes, les autres parties des pattes testacées sauf les tarses III rembrunis et les trochanters parfois noirs. Ailes hyalines.

Clypéus lisse et luisant. Face densément marquée de points profonds, sa partie médiane nettement bombée et saillante. Front et vertex également couverts de ponctuation profonde, mais celle-ci n'est pas si serrée que sur la face. Tempes rétrécies en ligne droite. Flagellum des antennes composé de 36 articles.

Mésonotum de peu plus long que large, densément marqué d'une forte ponctuation, l'espace entre les points est lisse et luisant, sans microsculpture. Scutellum avec une ponctuation dense, ainsi que les méso- et métapleures. Propodeon couvert de ponctuation profonde et extrêmement serrée, sans aucun espace entre les points; cette sculpture est uniforme. La carène transversale normale, régulièrement courbée. Les carènes métapleurales entières.

Le tergite I est 1,84 fois aussi long que large à l'apex, il porte à sa base deux courtes carènes le long de la fossette basale, il est couvert d'une ponctuation forte; sur les côtés, cette ponctuation est entremêlée de quelques rides; l'espace entre les points est sans aucune microsculpture. Le tergite 2 est à peine plus long que large à l'apex, densément marqué de gros points, mais ici l'espace entre les points est couvert d'une microsculpture alutacée. Les tergites 3 et 4 portent également une ponctuation très serrée mais un peu plus fine que sur le tergite 2. Tarière aussi longue que le corps. Ongles des tarses avec une dent à la base.

Longueur: 8–8,5 mm. Tarière: 8 mm.

Province du Cap: Gt. Winterhoek, Tulbagh, 3,600 ft., XI, 1916, ♀, holotype au South African Musuem, et IV, 1916, ♀, paratype au Musée Royal du Congo Belge.

Du point de vue plastique, cette espèce se rapproche de *A. rufipes* Cam., elle s'en distingue immédiatement par la coloration de la tête et celle du mésonotum ainsi que par la ponctuation faciale, les dimensions du tergite I et la sculpture différente de ce dernier.

Asphragis recalcitrans sp. n.

Espèce très proche de *A. marlieri* Benoit; elle ne s'en distingue que par les caractères suivants:
Mésonotum d'un roux testacé avec deux bandes jaunes. Le propodeon est dépourvu d'un sulcus médian. Chez *A. marlieri* Benoit, ce sulcus part de la base et s'estompe peu au delà du milieu. Le tergite 2 est entièrement aciculé et ne présente aucune trace de ponctuations dans les angles basaux. La tarière est nettement plus longue que chez l'espèce citée; elle atteint ici la longueur du corps. La taille du corps est plus petite. Les autres caractères plastiques sont rigoureusement les mêmes que chez *A. marlieri* Benoit.

Longueur: 5 mm. Tarière: 5 mm.

Cap: Mossel bay, 23, I, 1940 (R. Turner), ♀, holotype au South African Museum.

Subf. PIMPLINAE

Paracollyria calosoma sp. n.

Tête et thorax d'un rouge brique. Tergites 1 et 7 d'un rouge brique, les tergites intermédiaires noirs. Pattes I et II rouges. Coxas, trochanters et fémurs III rouges, les autres parties des pattes III noires. Le tiers basal des ailes antérieures est d'un jaune doré, les deux tiers apicaux sont violacés; cette dernière partie renferme une petite tache jaune à la pointe basale du ptérostigma et deux vagues taches hyalines au delà du milieu. Antennes noires, sauf le dernier article du funicule roux.

Antennes composées de 29 articles, le dernier article tronqué au sommet. Comme chez les autres espèces du genre, le labre dépasse légèrement le clypéus; ce dernier aplati, luisant avec quelques gros points, son bord inférieur tronqué. Espace malaire peu plus court que la base des mandibules. Face grossièrement ponctuée, elle n'est pas plus haute que large, munie d'une forte bosse en dessous des antennes. Front et vertex lisses et luisants.

Le lobe médian du mésonotum fortement saillant et entièrement lisse, les lobes latéraux à ponctuation très dispersée. Les notaules sont crénelés sur la partie de leur trajet qui longe le lobe médian. Scutellum lisse et luisant. Propodeon luisant à quelques points très dispersés, muni d'une faible carène postérieure, semicirculaire; son plan médian accuse un sulcus longitudinal. Carène métapleurale absente; la séparation propodeon—métapleures est indiquée par une faible rangée de points. Méso- et métapleures luisants, éparsement marqués de gros points.

Le tergite I est deux fois aussi long que large, fortement convexe, lisse et luisant. Les tergites suivants sont tous transversaux, lisses et luisants. Tarière aussi longue que l'abdomen.

Ongles des tarses I et II munis d'une dent supplémentaire, les ongles des tarses III simples. Fémurs III densément ponctués.

Longueur: 16 mm. Tarière: 8 mm.

Province du Cap: Cookhouse, III, 1954, ♀, holotype au South African Museum.

Cette espèce prend place parmi le groupe d'espèces dont la base de l'aile est jaune doré et l'extrémité violacée et qui compte encore *P. flavipennis* Cam., *P. pulchripennis* Cam. et *P. dapsilis* Tosq.

Outre la coloration qui lui est spécifique, cette espèce se distingue encore par la face pas plus haute que large, la carène postérieure du propodeon ainsi que par la présence d'un sulcus longitudinal sur le ce dernier.

Theronia hildebrandti Krieger

Province du Cap: Mossel bay, 15, XII, 1941 (R. Turner).
Cape Town, IX, 1918 (K. H. Barnard).
Robertson, 21, IV, 1927 (J. C. Le Roux).

Cette espèce a été décrite de Madagascar d'après un exemplaire portant une étiquette de fausse provenance et c'est seulement depuis Seyrig (*Mem. Ac. Malg.*, XIX, 1934) que nous conaissons les caractères qui la différencient de *T. lurida* Tosq., espèce très répandue et commune partout. Il est plus que probable que les *Theronia lurida* Tosq., signalés par Morley de l'Afrique du Sud (*Ann. S. Afr. Mus.*, XV, 1916, p. 387) renferment en partie des spécimens de cette espèce. Jusqu'à présent elle n'avait jamais été signalée de l'Union Sud-Africaine.

Theronia abyssinica Jacobson

Péninsule du Cap: Claremont, 23, IV, 1943 (D. E. Willis).
Newlands, I/II, 1931 (K. H. L. Key).

Il m'a été donné de réétudier les insectes cités par Morley (*Ann. S. Afr. Mus.*, XXIII, 1926, p. 458) comme *T. melanocera.* Holmgren et obtenus à Kabete

(Afrique Orientale Anglaise) comme parasites probables de *Plusia orichalcea*. Ces exemplaires appartiennent sans aucun doute à la présente espèce. Dans ce cas également, les citations de Morley relatives à *T. melanocera* Holmgren doivent se rapporter en partie à *T. abyssinica* Jac.

La distinction entre ces deux espèces est assez subtile, comme d'ailleurs le cas pour tous les Theronia actuellement connus; sauf en ce qui concerne la seul forme mélanique: *T. ruwenzorica* Benoit. Ce groupe est en pleine évolution. Chez *T. abyssinica* Jac., les tempes sont rétrécies en ligne droite derrière les yeux et les ailes sont légèrement jaunies. Chez *T. melanocera* Holmgren, les tempes sont nettement arrondies, rétrécies en ligne courbe et leur niveau atteint presque celui des yeux; les ailes sont légèrement enfumées. La forme du clypéus est la même chez les deux espèces.

Theronia interrupta Szepligeti

Zululand: Mfongosi (W. E. Jones).

Cette espèce n'etait connue que par le seul holotype originaire du Ruwenzori-Meru. J'en ai récemment trouvé un troisième exemplaire dans les collections du Musée Royal du Congo Belge, il est originaire du Congo Belge. Kivu: Rwankwi, 15, II, 1952 (J. V. Leroy).

Ces trois stations démontrent la très vaste aire de distribution géographique de cette espèce.

Afrephialtes violaceus Kriechbaumer

Province du Cap: Graafwater, X, 1947.
Nardouw, Clanwilliam, IX, 1941.

Espèce typiquement sud-africaine; décrite par Kriechbaumer de la 'Caffrerie' elle fut rédecrite par Cameron comme *Perithous violaceus* d'après un exemplaire originaire de Stellenbosch (Cap).

Charitopimpla sericata Kriechbaumer

Province du Cap: Burghersdorp, XI, 1939 (Mus. Staff).
Natal: Clan Syndicate wattle plantations, 25, VI, 1914 (C. B. Hardenberg).
Zululand: Mfongosi (W. E. Jones).

Espèce inféodée au parasitisme des Psychides. Sans être commune, elle est répandue dans toute l'Afrique Noire. *Philopsyche abdominalis* Morley (*Ann. S. Afr. Mus.*, XV, 1916, p. 388) est probablement synonyme de cette espèce. Les spécimens ayant servi à la description furent obtenus à Kentani (Cap) comme parasites du Psychide: *Chalioides junodi*.

Itoplectis melanospilus Cameron

Province du Cap: Mossel bay, 5, XII, 1941 (R. Turner).

Cette espèce occupe toute la partie méridionale de la faune éthiopienne; la limite de son aire de dispersion doit se situer au Ruanda et au Congo Belge (Kivu) d'où j'ai pu étudier quelques exemplaires.

Itoplectis tosquineti D.T.

Transvaal: Louis Trichardt, Zoutpansberg, 4,500 ft., II, 1928 (R. F. Lawrence).

Espèce très rare, connue jusqu'à présent par le holotype, originaire du Cap de la Bonne-Espérance et par un exemplaire récolté récemment au Ruanda (Kagogo). Les deux exemplaires du Transvaal sont morphologiquement identiques au type, mais se distinguent par la présence d'une bande noire sur les côtés du pronotum. Leur coloration est identique à celle de *I. saudus* Tosquinet. Un matériel plus abondant est nécessaire pour pouvoir conclure s'il s'agit ici d'une race distincte ou simplement une question de variabilité individuelle.

Itoplectis rugosus sp. n.

Tête noire. La moitié basale des antennes est noire, la moitié apicale rousse. Thorax et abdomen d'un rouge foncé. Coxas du même rouge foncé; les autres parties des pattes noirâtres, les fémurs et tibias I et II blancs en majeure partie. Tibias III munis d'une bande blanche à la base.

♀ Funicule des antennes composé de 28–32 articles. Face couverte d'une ponctuation forte et dense, en certains endroits cette sculpture est confluente et forme des rides. Front finement strié en travers, sans points. Occiput faiblement découpé. Mésonotum entièrement couvert de forte ponctuation serrée. Scutellum renflé, gibbeux; sa ponctuation est atténuée. Mésopleures entièrement couverts de ponctuation dense et forte sauf sur le spéculum postérieur qui reste lisse et luisant. Métapleures ponctués comme les mésopleures; sur leur partie inférieure au dessus des coxas III cette ponctuation conflue et forme des rides longitudinales. Le propodeon présente une aire horizontale nettement séparée de l'aire verticale; la première porte une sculpture rugueuseridée transversalement; la seconde se présente sous la forme d'un miroir semicirculaire lisse et luisant, et limité sur les côtés par une carène lamelliforme.

La base du tergite 1 est lisse et luisante, la partie postérieure grossièrement ponctuée, les tergites suivants à ponctuation forte et uniforme.

Coxas III mats, entièrement couverts de points serrés.

Longueur: 6,5–11 mm. Tarière: 1,5–3 mm.

♂: identique à la femelle. Le ♂ paratype de Mossel bay possède les sternums noirs.

Longueur: 8,8–9 mm.

Natal: Stella Bush (Durban), II, 1914 (Marley), ♀, holotype.

Cap: Mossel bay, 13, I, 1940 (R. Turner), ♂, allotype, ibidem 17, I, 1940, ♀, paratype.

Holotype et allotype au South African Museum. Un paratype au Musée Royal du Congo Belge.

Holcopimpla vitellina Tosquinet

Pimpla, Tosquinet, *Mem. Soc. Ent. Belg.*, 5, 1896, p. 325, ♂.

Holcopimpla nigricornis Cameron, *Ann. S. Afr. Mus.*, V, 1906, p. 113, ♀ (syn. nov.).

Pimpla concolor Szepligeti, *Sjöst. Kilim.-Meru Exp.*, II, 8, 1910, p. 85, ♀ (syn. nov.).
Cap: Wit River Valley, Bain's Kloof (Wellington), X, 1949.
Zululand: Mfongosi, V, 1916 (W. E. Jones).
Transvaal: Louis Trichardt, Zoutpansberg, 4,500 ft., II, 1923 (R. F. Lawrence).
Mozambique: Chai Chai, XI, 1923 (R. F. Lawrence).

Cette espèce se caractérise par la présence d'un large sillon médian sur le propodeon et par la ponctuation dense de la base du propodeon. Ce sillon médian est toutefois atténué chez les exemplaires de taille réduite et il subsiste dans ces cas seulement un léger défoncement médian. Chez le mâle le sillon du propodeon n'existe pas; il est remplacé par une zone médiane lisse, luisante et imperceptiblement défoncée. Chez le mâle le propodeon en entier, est couvert de ponctuation dense. La taille de cette espèce varie de 7 à 12 mm.

Delaulax rufus Cameron

Cameron, *Ann. S. Afr. Mus.*, V, 1906, p. 112, ♂.

♀—Tête, thorax et abdomen d'un rouge vineux sauf la zone médiane du front ainsi que le stemmaticum noirs. Deux petites taches noires à l'apex du propodeon et deux à l'apex du tergite 2. Ailes noircies à reflets violacés. Pattes rouges, les coxas III noirs.

Funicule des antennes composé de 30 à 32 articles, à l'extrémité les articles sont plus courts mais ils restent linéaires. Face luisante avec quelques fins points très dispersés. Le clypéus séparé de la face par un fin sillon. Tempes élargies et arrondies. Occiput à profonde excavation.

Mésonotum entièrement lisse et luisant, il est 1,25 fois aussi long que large (rapport 5/4). Scutellum lisse et luisant, normalement convexe. Propodeon à courbure régulière, sa base est grossièrement ponctuée. Méso- et métapleures lisses et luisants; la carène métapleurale entière.

Le tergite 1 est exactement aussi long que large à l'apex, sa cavité basale lisse et luisante, mais le reste de sa superficie est densément marquée de gros points.

Le tergite 2 transversal, il est 1,72 fois aussi large à l'apex que long, grossièrement ponctué sauf à la base et à l'apex où subsistent des zones lisses. Le tergite 2 est 1,91 fois aussi large à l'apex que long, la ponctuation profonde mais les points nettement séparés; à la base et à l'apex subsistent de grandes zones lisses. Le tergite 4 est deux fois aussi large que long, couvert de la même ponctuation. Tarière beaucoup plus longue que l'abdomen.

Longueur: 10 mm. Tarière 7,5 mm.

Province du Cap: Ceres District, Cold Bokkeveld, 15/30, X, 1934 (M. Versfeld), ♀, allotype au South African Museum; Laingsburg District, Koup Siding, X, 1952 (Mus. Exped.), ♀.

Note—Certains exemplaires possèdent le mésosternum noir ainsi que deux bandes noires sur le mésonotum, ces bandes sont confluentes devant. Le seul exemplaire connu à ce était originaire de Cape Town.

Xanthephialtes hyalina sp. n.

Tête noire sauf clypéus et mandibules rouges. Thorax et abdomen rouges aux marques noires suivantes: une petite tache triangulaire à l'apex du mésonotum, méso- et métasternum, une tache aux mésopleures sous l'insertion des ailes postérieures, la partie inférieure des métapleures, deux petites taches à l'apex du propodeon et deux à l'extrémité du tergite 2. Pattes rouges, les tarses III noirs. Ailes hyalines.

Funicule des antennes composé de 29 à 31 articles, les derniers sont graduellement raccourcis vers l'apex. Espace malaire alutacé, plus court que la moitié de la largeur basale des mandibules. Face densément ponctuée, l'espace entre les points est lisse et luisant. Front luisant, muni de deux petites fossettes centrales, juste au dessus de l'insertion des antennes. Tempes élargies et bombées, elles atteignent les deux tiers de la largeur des yeux. Occiput régulièrement excavé.

Mésonotum lisse et luisant, il est 1,2 fois aussi long que large, le lobe médian tronqué. Scutellum lisse et luisant, normalement convexe. Propodeon normalement bombé, lisse et luisant sauf quelques gros points espacés dans les angles antérieurs. Epicnémies entières. Mésopleures à ponctuation serrée sur leur partie antérieure, elle est plus espacé sur la seconde moitié des mésopleures. Métapleures bombés, ponctués sur leur partie supérieure.

Tergite 1, typique du genre. Tergite 2 de peu plus court que large à l'apex (rapport 6/7), luisant avec quelques gros points au milieu. Tergite 3 lisse et luisant sauf une étroite zone basale ponctuée, il est 1,3 fois aussi large que long. La même sculpture existe sur les tergites suivants.

Tarière aussi longue que le corps.

Longueur: 15 mm. Tarière: 15 mm.

Province du Cap: Upper sources of Olifants River, Ceres, XII, 1949 (Museum Expedition), 2 ♀♀, holotype au South African Museum, paratype au Musée Royal du Congo Belge.

Cette espèce se distingue de toutes les espèces actuellement connues par les ailes hyalines et l'abdomen lisse et luisant avec une étroite zone ponctuée à la base des tergites ainsi que par la taille réduite.

Delaulax natalensis Cameron

Zululand: St. Lucia Lake, 3, XI, 1920 (Marley). Montclair (Durban), 20, VI, 1945 (Marley).

Une revision du genre *Delaulax* Cameron est en préparation. *Hemipimpla bifasciata* Morley est probablement synonyme de cette espèce.

Pimpla bicolor Brullé

Brullé, *Hist. Nat. Ins. Hym.*, 4, 1846, p. 98, ♀.

Lissonota trochanterata Holmgren, *Eugenies Resa*, 1868, p. 407, ♂ (syn. nov.).
Pimpla rufiventris Szepligeti, *Sjöst. Kilim.-Meru Exp.*, II, 8, 1910, p. 82.

Cap: Mossel bay, 12, I, 1940 (R. Turner). Katberg, III, 1954. Tradouw Pass, Swellendam District, XI, 1925.
Zululand: Mfongosi, IV, 1917 et IV, V, 1934 (W. E. Jones).

Espèce rarement récolté et répandue du Cap jusqu'au Congo Belge (Kivu). Je remercie Monsieur R. Malaise du Naturhistoriska Riksmuseum de Stockholm qui a bien voulu me soumettre le type de Holmgren.

Pimpla conchyliata Tosquinet

Tosquinet, *Mem. Soc. Ent. Belg.*, 5, 1896, p. 288, ♀.

Pimpla spiloaspis Cameron, *Rec. Albany Museum*, I, 1904, p. 146, ♀ ♂ (syn. nov.).
Pimpla brunneiventris Cameron, ibid., I, 1905, p. 238 (syn. nov.).
Pimpla properata subsp. ***kivuensis*** Benoit, *Rev. Zool. Bot. Afr.*, 47, 1953, p. 155 (syn. nov.).
Transvaal: Louis Trichardt, I/II, 1928 (R. F. Lawrence). Potchefstroom T. Ayres).
Natal: Durban, VII, 1916 (Marley).
Cap: Robertson, 21, IV, 1927 (J. C. le Roux).
Rhodésie du Sud: Insiza, I, 1919 (G. French).

Je remercie Madame Delfa Guiglia du Museo Civico di Storia Naturale de Gênes qui a bien voulu m'envoyer le type de Tosquinet en étude, ainsi que Monsieur A. J. Hesse du South African Museum qui me permit l'étude des types de Cameron.

Pimpla conchyliata, subsp. *properata* Tosquinet

Pimpla properata Tosquinet, *Mem. Soc. Ent. Belg.*, 5, 1896, p. 293.
Pimpla pleuralis Buysson, *Ann. Soc. Ent. France*, 1897, p. 352.
Pimpla madecassa Morley, *Rev. Ichn. Brit. Mus.*, 3, 1914, p. 72.
Pimpla properata subsp. *aequatorialis* Seyrig, *Mém. Mus. H. N. Paris*, 4, 1936, p. 13 (syn. nov.).

Cette forme se distingue de la précédente par les fémurs III entièrement noirs. Il est à supposer qu'il s'agisse ici d'une race biologique qui cohabite parfois avec la véritable *P. conchyliata* Tosq. Nous ne disposons pas encore d'un matériel assez abondant pour trancher la question avec certitude.

Rhodésie du Sud: Salisbury, 19, IX, 1908.
Transvaal: Potchefstroom, I, 1930 (J. Joubert).
Cap: Jackals Water, Namaqualand (Lightfoot).
Outiep, Garies, Namaqualand, IX, 1953 (J. du Toit).
Cookhouse, III, 1954 (Mus. Staff).
Newlands, I, II, 1931 (K. H. L. Key).
Stellenbosch, 30, III, 1927 (J. J. Strijdom).
Cape Peninsula, 1941 (Mus. Staff); roadside, Chapman's Peak, II, 1934 (Wood and Barnard).

Pimpla vumbana Benoit subsp. *meridionalis* nov.

Cette race géographique se distingue de la série typique originaire des Mont Vumba (Rhodésie du Sud) par le thorax noir, sans reflets métalliques et par les fémurs III noirs. Les fémurs I et II sont également plus foncés que chez les exemplaires ayant servi à la description.

Province du Cap: Katberg, III, 1954, ♀, holotype au South African Museum.

Natal: Bulwer, 1914 (W. Haygarth), ♀, paratype au Musée Royal du Congo Belge.

Gen. *Clistopyga* Gravenhorst

Ce genre est représenté par quelques espèces paléarctiques et quelques espèces néarctiques. Une de ces espèces européennes *C. incitator* F. fut signalé par Seyrig du Kenya et plus tard par moi-même du Congo Belge. Aucune espèce typiquement éthiopienne ne fut décrite jusqu'à présent.

Le genre fut classé par les auteurs anciens parmi les tribu des *Pimplini* puis par les auteurs récents, tels Seyrig, et Townes, parmi les *Polysphinctini*. En réalité ses caractères morphologiques ne permettent son introduction dans aucune de ces deux tribus sans devoir élargir le sens de ces dernières. Il se distingue des *Pimplini* par la tarière sortant directement de l'extrémité de l'abdomen et par le dernier sternite entier. Il est exclu des *Polysphinctini* à cause de sa tarière à pointe non acérée et le dernier sternite très grand pas éloigné de l'extrémité de l'abdomen comme chez les *Polysphinctini* mais très grand, dépassant même l'extrémité de l'abdomen et formant une large gouttière sous la base de la tarière. Il est intéressant de noter que les *Polysphinctini* sont tous ectoparasites d'Araignées, tandis que les *Clistopyga* sont endoparasites de chenilles de Lépidoptères. J'ai obtenu en Belgique *Clistopyga incitator* F. comme endoparasite larvaire d'un microlépidoptère indéterminé. Je propose en conséquence de considérer ce genre comme type d'une tribu nouvelle: Clistopygini répondant aux caratères essentiels suivants:

Clypéus aplati pas comprimé latéralement. Notaules profonds, longs, et convergents. Scutellum normalement bombé. Propodeon sans aréolation, parfois muni d'une faible carène transversale. Carènes métapleurales entières. Tergites à ponctuation profonde et tubercules atténués. Tarière courbée vers le haut, sa pointe pas acérée et pas muni d''ecailles' comme chez les *Pimplini*; son extrémité apicale lisse. Dernier tergite très grand dépassant l'extrémité de l'abdomen et formant une gouttière sous la base de la tarière. Ailes san aréole. La nervure récurrente est percée de deux 'fenêtres'. Ongles des tarses fortement lobés à la base. Yeux non échancrés.

Clistopyga africana sp. n.

Entièrement roux aux marques jaunes suivantes: Clypéus, moitié inférieure de la face, deux stries orbitales, deux paires de taches allongées et jumelées sur le mésonotum, les angles antérieurs du scutellum et son extrémité apicale, partie médiane du métanotum, deux taches sur le propodeon au dessus des coxas III, l'angle infratégulaire des mésopleures ainsi qu'une large bande longitudinale sur ces derniers. Métasternum noir. Les propleures sont tricolores: jaunes au dessus et en dessous, le milieu noir et roux: le tergite 2 présente deux taches noires à son extrémité. Pattes jaunes en majeure partie aux marques brunes suivantes: une tache à la face inférieure des coxas III, une strie sur tous les fémurs, les tibias III en majeure partie et les tarses III. Ailes hyalines.

Tête entièrement lisse et luisante. Une étroite zone faciale est légèrement bombée et se détache des parties latérales de la face. Tempes rétrécies immédiatement derrière les yeux suivant une ligne très faiblement courbée.

Mésonotum très finement marqué de points espacés, l'espace entre les points est lisse et luisant. Notaules profonds, séparant un lobe médian saillant; ils se rejoignent aux 2/3 de la longueur du mésonotum. Le mésonotum est 1,23 fois aussi long que large et hautement bombé. Sillon scutellaire lisse et luisant. Scutellum lisse et luisant, normalement bombé. Propodeon sculpté de fines stries transversales serrées, vers l'insertion de l'abdomen cette sculpture s'efface progressivement; sur les côtés, les stries sont subponctuées. Propodeon, sans trace de carène postérieure. Mésopleures lisse au dessus, à ponctuation très espacée sur la moitié inférieure. Métapleures lisses et luisants.

Tergite 1 aussi long que large à l'apex, ses bords régulièrement divergents; couverts de sculpture ponctuée fine et subruguleuse; la fossette basale lisse. Tergite 2 aussi long que large à l'apex, grossièrement ponctué, les points se touchent. Tergite 3 de peu plus court que large à l'apex, à ponctuation dense mais un peu atténuée par rapport au tergite précédent, les tubercules nets. Les tergites suivants progressivement plus étroits, à ponctuation plus atténuée.

Taille proportionnelle des 6 premiers tergites.

tergite	1	2	3	4	5	6	Tarière
longueur	26	32	31	29	27	23	68
largeur	26	32	33	32	29	26	

Tarière courbée vers le haut et plus longue que les deux premiers tergites.

Nervulus interstitiel. Nervellus de l'aile postérieure brisée en dessous de son milieu.

♂ Identique à la femelle sauf la conformation de l'abdomen qui est plus étroit. Funicule des antennes composé de 24 articles.

Taille proportionnelle des 6 premiers tergites:

tergite	1	2	3	4	5	6
longueur	25	28	25	25	25	27
largeur	17	20	20	20	20	20

Longueur ♀: 7,5 mm. Tarière: 1,8 mm.
♂: 7 mm.

Transvaal: Louis Trichardt, Zoutpansberg, 4,500 ft., II, 1928 (R.F. Lawrence), ♀, holotype au South African Museum.

Province du Cap: Mossel bay, 22, I, 1940 (R. Turner), ♂ allotype au Musée Royal du Congo Belge.

2(2A)

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5. *Pareiasaurier-studies. Deel XII. 'n Lewensrekonstruksie van* Bradysaurus seeleyi. Deur Lieuwe Dirk Boonstra. (Met plaat IV.)

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ERRATUM

In the paper 'Fossil Carnivora from Hopefield', vol. XLII, pp. 335-347 on p. 340 the teeth whose dimensions are given in Table 3 are P_3, P_4 and M_1 and not P_1, P_3 and M_4: on p. 341 the caption to Table 4 should read 'Dimensions of teeth of fossil *Lycaon* compared with those of a sample of 11 extant *Lycaon pictus*'.

4. *The Skull of* Tapinocephalus *and its near Relatives.*

By Lieuwe Dirk Boonstra. (With Plate IV and seventeen text-figures.)

Introduction

All the known cranial material of the South African Tapinocephalidae is to be considered in this communication. I have examined the specimens in the British and American Museums of Natural History and those housed in the South African Museum. Adequate material exists of the genera *Tapinocephalus*, *Mormosaurus*, *Keratocephalus* and *Phocosaurus*, whereas of *Taurops* there is only a snout and of *Pelosuchus* only a single weathered dentary.

Historical

In 1876 Owen[13] made a snout the type of *Tapinocephalus atherstonei* and, although a part of the occiput and a part of the supraorbital region were associated, they were not described or figured.

Seeley in 1888[14] founded *Phocosaurus megischion* on a pelvis and this specimen with other associated bones were included by Lydekker[12] in the genus *Tapinocephalus* until I[4] revived Seeley's name *Phocosaurus*.

Broom's genus *Pelosuchus*,[5] founded on a weathered dentary, includes among other bones a fairly good femur and it was on the structure of these postcranial bones that I[4] recently included this genus in the Tapinocephalidae.

The first good Tapinocephalid skull was described by Broom[6] in 1909, in as Watson terms it 'a . . . somewhat inaccurate account' and referred it to Owen's *Tapinocephalus atherstonei* and subsequently (1914) it was made the type of the genus *Mormosaurus* by Watson.[15]

In the meantime (1912) Broom[7] had created the genus *Taurops* on a very inadequate weathered snout, and in 1913 Haughton[10] had published some poor photographs of a very good skull of *Tapinocephalus* in the South African Museum (No. 2344).

In 1928 Broom[8] described an incomplete skull of *Tapinocephalus*, which I refigured in 1936.[1]

In 1931 von Huene[11] founded the genus *Keratocephalus* on some pieces of a skull associated with some postcranial bones, and in 1951 I[2] figured an imperfect skull in the South African Museum which I referred to the same genus.

In 1936 I[1] arranged the then known genera of the South African Tapinocephalia into a number of groups in an attempt to facilitate our study of the various described forms. In this admittedly arrangement of convenience I grouped *Taurops* and *Keratocephalus* with *Tapinocephalus*, and included *Mormo-*

saurus in another group containing *Taurocephalus* and *Struthiocephalus*. Recently, in a study of the girdles and limbs, I[4] have included in the former group *Pelosuchus* and *Phocosaurus* and am here also transferring to it Watson's *Mormosaurus*.

In the Tapinocephalidae, thus including the genera *Tapinocephalus*, *Phocosaurus*, *Mormosaurus*, *Taurops*, *Keratocephalus* and *Pelosuchus*, the structure of the skull, considered as a group, can be described as follows:

The General Shape and Form of the Skull

The Tapinocephalid skull is large and massive (length 516–600 mm., width 456–543 mm., height 315–384 mm.). The snout is relatively weak, short, low to fairly low and fairly wide to wide (preorbital length 273–330 mm., height 144–186 mm., width 222–330 mm.).

The orbit, which is relatively small, lies wholly in the posterior half of the skull. The bones of the preorbital half of the skull are relatively unthickened, whereas the posterior half has the bones, particularly of the roof, greatly pachyostosed. In the latter the surface is rough, whereas in the former it is smooth. In this group the thickening also affects the 'cheek', whereas in *Struthiocephalus* and its allies this remains relatively unthickened and the surface is smooth. The pachyostosis of the dorsal cranial bones is accentuated in centres in *Keratocephalus* (*vide Struthiocephalus*), whereas in the other genera these centres coalesce, so that in the former the distinct naso-frontal boss and a parietal mound are present, whereas in the other genera these are incorporated in the general pachyostosis. This pachyostosis extends furthest anteriorly in *Tapinocephalus* and extends less anteriorly in *Phocosaurus*, *Mormosaurus* and *Keratocephalus* in this order. There is a distinct and abrupt step from the facial to the cranial surface. The postorbital bar is greatly thickened and massive, but its postfrontal part is not boss-like, but has its surface flowing evenly into the general thickening of the upper cranial surface.

The orbits are of moderate size and look forwards and outwards, posteriorly bounded by the massive outwardly thickened postorbital bar, dorsally overhung by the thick pre- and postfrontals; anteriorly the border is much less thickened, except in *Tapinocephalus* where the dorso-anterior part is also thickened.

The nostrils are fairly large and oval, situated on the dorsal surface and directed mainly dorsally and but little laterally; they lie well back from the anterior tip of the snout and are separated from each other by a strong internarial bar.

The temporal fossa is slitlike in all but *Keratocephalus*, where the antero-posterior diameter is not so reduced; dorsally the bay, characteristic of most species of *Struthiocephalus*, is obliterated in all except *Keratocephalus*, where remains of a bay are still apparent.

The interparietal width is fairly to very large (120–240 mm.) with only a slight pinching-in to form a bay in *Keratocephalus*.

Due to the forward position of the quadrate the lower jaw is short and the gape of the jaws fairly small.

In dorsal view the occipital edge is nearly straight except in *Tapinocephalus* where it is concave.

THE BONES OF THE DORSAL AND LATERAL SURFACES

The premaxillaries (P.M.) form the upper median surface of the snout, stretching from the anterior border posteriorly nearly to or beyond the plane of the antorbital border. The posterior extent is least in *Tapinocephalus* and *Keratocephalus* and most in *Phocosaurus* and *Mormosaurus*. The premaxillaries form a strong internarial bar and then taper in posterior direction—becoming very narrow in *Phocosaurus* and *Mormosaurus*—to lie in a grove in the nasals. The abrupt step from snout to cranial roof causes the posterior part of the premaxillaries to be sharply turned up in *Tapinocephalus*, but less sharply in *Keratocephalus, Mormosaurus* and *Phocosaurus* in this order.

The nasals (N.) are a pair of long, narrow bones tapering somewhat anteriorly; anteriorly separated by the premaxillaries and posteriorly forming a groove to receive the posterior ends of the paired premaxillaries; posterior to the limits of the premaxillaries the nasals meet in the median line and are here greatly to very greatly thickened to form the antero-median part of the pachyostosis of the cranial roof and the greater part of the distinct naso-frontal boss of *Keratocephalus*; at the line of thickening the surface of the nasal is bent more or less sharply upwards, thus facing more or less anteriorly; here each nasal carries a depression presumably to house some facial gland. In all but *Keratocephalus* the nasal thickening is confluent with that of the prefrontal, but in *Keratocephalus* these two thickenings are separated by a shallow groove.

The septomaxillaries (S.M.) are small bones forming the lower border and floor of the nostrils and extend posteriorly as narrow tapering splints between the nasal and maxilla.

The maxillaries (M.) are the largest bones of the snout, being long but low; posteriorly a dorsal prong meets the prefrontal, and a ventral prong extends further posteriorly with its upper edge meeting the ventro-anterior edge of the jugal. In the indentation between these two prongs lie the anterior ends of the jugal and the lacrimal. The ventral edge of the maxilla is fairly straight and this straight edge curves very slightly upwards anteriorly, where it is continued by the lower edge of the premaxilla.

The lacrimal (L.) is a small, low and relatively short bone. It is shortest in *Tapinocephalus*, somewhat larger in *Mormosaurus* and *Phocosaurus* and unknown in *Keratocephalus*. It forms only a small part of the median part of the anterior orbital border, which is relatively unthickened. It is overhung by the prefrontal—greatly so in *Tapinocephalus*, but much less in the other genera, where the anterior part of the prefrontal is not greatly swollen. It has no contact with the nasal, because of the intercalation of the dorsal prong of the maxilla.

The jugal (J.) is a strong bone; like the bones of the snout it is not greatly thickened and its surface is smooth, being without pits and rugae. It forms the antero-ventral, relatively unthickened, border of the orbit. It extends far ventrally, decreasing in width, with its anterior edge curving down sharply from the contact with the maxilla. Its ventral edge meets the quadratojugal in a firm suture in all the genera except *Mormosaurus*, where there is a deep incisure reminiscent of that shown in *Struthiocephalus*. Its anterior prong is short in *Tapinocephalus*, somewhat longer in *Mormosaurus* and long and high in *Phocosaurus*. Its posterior edge presents a shallow curve, where it meets the anterior wedge-like prolongation of the squamosal; this indentation is deepest in *Mormosaurus* and shallowest in *Tapinocephalus*.

The prefrontal (Pr. F.) is very greatly thickened along its lateral border to form the very thick rugose overhanging antero-dorsal border of the orbit. In *Tapinocephalus* it is swollen right up to its antero-ventral edge and thus strongly overhangs the lacrimal but in the other genera its anterior quarter is relatively unthickened. In all the Tapinocephalid genera it meets the maxilla, and the lacrimal is thus excluded from contact with the nasal. In dorsal view its width is seen to vary, this also in specimens of the same genus. Posteriorly it meets the postfrontal so that the frontal is excluded from the orbital border, but a longer or shorter tongue of the frontal represents the original participation of the frontal in the orbital border before the overgrowing swelling of the prefrontal and postfrontal pushed it out. Medially the swelling of the prefrontal is confluent with that of the nasal and frontal in all except in *Keratocephalus*. Here the prefrontal is medially thinner and a shallow groove-like hollow clearly demarcates it from the naso-frontal boss, as is also the case in the genus *Struthiocephalus*. An anterior tongue of the frontal is intercalated between the nasal and the prefrontal for a considerable distance in *Keratocephalus* but less in the other genera and least in *Tapinocephalus*.

The frontal (F.) is the largest bone of the dorsal skull roof. Its median part is roughly rectangular and from this body three tongues diverge; the posterior tongue is the strongest and extends as a fairly thin to fairly wide wedge, lying between the postfrontal and parietal to enter the border of the temporal fossa in its antero-dorsal part; the anterior tongue, already mentioned as a fairly narrow tapering wedge separating the posterior part of the nasal from the prefrontal, is much weaker than the posterior tongue and in *Keratocephalus* lies in the deepest part of the groove, lateral to the frontonasal boss; the lateral tongue is weak and only separates the pre- from the postfrontal for a short distance medially. Anteriorly the frontals are greatly thickened at their junction with the nasals, where, in *Keratocephalus* they form the posterior fifth of the naso-frontal boss, and in the other genera coalesce in the general pachyostosis. Behind the naso-frontal swelling the frontals remain thick and swollen in *Tapinocephalus* and *Phocosaurus*, but in *Mormosaurus* and particularly in *Keratocephalus* are reduced in thickness to form a saddle between the elevated naso-frontal boss and a mound on the parietal. Laterally the frontals are elevated near their contact with the postfrontals, forming a distinct ridge in *Mormosaurus*, which is reminiscent of a similar condition in *Struthiocephalus akraalensis*. Posteriorly the frontals meet the parietals in a shallowly to deeply curved suture just anterior to the pineal foramen.

The postfrontal (Po. F.) forms the dorso-posterior corner of the orbital border, which is here greatly thickened and rugose, and forming the upper part of the postorbital bar, extends to the margin of the post-temporal fossa. (Its posterior extent is inconstant and it is sometimes excluded from the margin of the temporal fossa by the overgrowing of the postorbital. Even in the same skull this inconstancy is shown, where it reaches the temporal fossa on one side but not on the other.) The postfrontal, although greatly thickened and massive, does not form a distinct boss (as in *Anteosaurus*) because the frontal above and the postorbital below are equally thickened with the swellings coalescing. The great thickening of the postfrontal coalescing with that of the prefrontal overgrows the lateral tongue of the frontal and thus excludes that bone from the orbital border. The postfrontal forms a greater part of the dorso-posterior thick orbital border in *Phocosaurus*, a small part in *Tapinocephalus*, a small or great part in *Keratocephalus* and a moderate part in *Mormosaurus*.

The parietals (P.) as a pair form a much smaller part of the cranial roof than do the two frontals. A moderate to large pineal foramen lies near the frontal suture. The antero-posterior length varies considerably even in the same genus; in *Mormosaurus* and *Phocosaurus* it is very short, moderate in *Tapinocephalus* and moderate to fairly long in *Keratocephalus*. In three of the known *Keratocephalus* specimens the pineal foramen is surrounded by a low moundlike boss, whereas in a fourth this area is flat to depressed. In one specimen of *Tapinocephalus* this area is depressed, whereas in another there is a mound; in *Mormosaurus* there is a low mound and in *Phocosaurus* this area is flat. There is a considerable variation in the intertemporal width of the parietals; the intertemporal width is great in *Tapinocephalus* (240 mm.), fairly great in *Mormosaurus* (201 mm.), moderate in *Phocosaurus* (177 mm.) and moderate to fairly small in *Keratocephalus* (120–158 mm.). In *Keratocephalus* there is still some indication of the pinching in to form a bay to the temporal fossa, as in some species of *Struthiocephalus*; and in one specimen of *Tapinocephalus* there is a narrow niche in the upper part of the temporal fossa. The parietal forms a sharp edge to the upper border of the temporal fossa; from here the parietal presents a lateral more or less vertical face within the temporal fossa and here meets the posterior flange of the postorbital and the dorsal flange of the squamosal. Laterally the parietal enters the posttemporal arch, extending as a thin wedge between the squamosal and the tabular in most of the skulls examined, but in one specimen of *Keratocephalus* the tabular enters the border of the temporal fossa and the parietal does thus not enter between the squamosal and the tabular, at least on the surface. The degree to which this parietal tongue, between the tabular and squamosal, is visible on the surface of the posttemporal arch is dependent on the amount of overgrowth of the tabular. Posteriorly the parietals are buttressed by the tabulars and interparietal.

The postorbital (P.O.) is a massive bone forming the lower part of the broad and massive postorbital bar; anteriorly it forms the greatly thickened postero-ventral part of the orbital border and posteriorly most of the thickened anterior border of the temporal fossa. Ventrally it abuts against the squamosal in a long curved suture, and anteriorly meets the jugal along a short suture. Dorsally it meets the postfrontal along a curved suture running across the postorbital bar, but posteriorly the postorbital sometimes ascends along the border of the temporal fossa to meet the frontal and thus excludes the postfrontal from the border of the temporal fossa. (This inconstancy is even seen in the same skull, where the postorbital excludes the postfrontal from the margin of the temporal fossa on the one side but not on the other.) Within the temporal fossa the postorbital sends a short flange upwards and backwards to meet the descending face of the parietal and at a lower level it meets the anteriorly directed flange of the squamosal, which lies within the temporal fossa of which it forms most of the posterior lining.

The squamosal (Sq.) is the main constitutent bone of the 'cheek'. It is a strong element, greatly to very greatly thickened. Its outer surface is swollen in *Tapinocephalus*, flat and smooth in *Keratocephalus*, with a strong ridge in *Mormosaurus*, and with a ridge, knobs and hollows in *Phocosaurus*. Anteriorly it meets the jugal in a long curved squamous suture—shallowly indented in *Tapinocephalus* and *Keratocephalus*, but deeply in *Phocosaurus* and very deeply in *Mormosaurus*. In its antero-ventral corner it receives the quadratojugal, which appears to be wedged into it, with a tongue of the squasmosal overlapping the postero-lateral surface of the quadratojugal. Dorsally it is overlapped by the strong postorbital along a long curved suture and further posteriorly it forms the thick lower and most of the thick posterior border of the temporal fossa and much of the posttemporal arch. From the edge of the temporal fossa it sweeps inwards to form most of the facing of the anterior surface of the posttemporal arch and here its dorsal edge overlaps the lower part of the lateral face of the parietal and at a lower level meets the postorbital. On the surface of the posttemporal arch the squamosal meets the dorso-lateral tongue-like process of the parietal, which is usually intercalated between the squamosal and the tabular for a longer or shorter distance; but in one specimen of *Keratocephalus* a thickening of the tabular prevents the squamosal from meeting the parietal on the surface of the posttemporal arch. Lower down the posterior face of the squamosal is covered by the tabular. Postero-ventrally the squamosal forms the thickly rounded postero-ventral edge of the skull. This rounded border forms the outer wall of the 'auditory' groove; medially of this groove the squamosal forms a strong and prominent curved ridge which forms the inner wall of the 'auditory' groove.

The tabular (T.) in dorsal view presents only its upper and lateral edge, which forms the postero-lateral corner of the skull, lining the posterior face of the parietal and the upper part of the upsweeping squamosal. In lateral view the tabular is seen to present its edge, which forms most of the posterior edge of the skull.

The interparietal (I.P.) in dorsal view just shows its upper edge which lines the median part of the posterior parietal edge. Its width from side to side is small in *Tapinocephalus* and *Mormosaurus*, fairly great in *Phocosaurus* and variable in *Keratocephalus*.

The quadratojugal (Q.J.) in lateral view presents a small to moderate surface. It tapers postero-dorsally and this end is firmly wedged into the antero-dorsal surface of the squamosal. It has quite a strong contact with the jugal, except in one specimen of *Mormosaurus*, where there is a notch at the junction of jugal with quadratojugal. The quadratojugal is firmly clasped by the squamosal especially along its posterior edge where the squamosal has a long ventral process.

The quadrate (Q.) in lateral view has only the outer cotylar face exposed antero-ventrally of the limits of the quadratojugal.

THE OCCIPUT

The occiput is adequately preserved only in *Tapinocephalus*, fairly well in *Mormosaurus* and poorly in *Phocosaurus* and *Keratocephalus*.

The occiput of the Tapinocephalidae forms a large surface, very much broader than high. It is shallowly concave from side to side. Along its median line the occiput is nearly vertical, with its dorsal edge, however, lying somewhat further posteriorly than its ventral edge. Along the median line the plane of the occiput makes an angle of slightly more than 90° with the plane in which the alveolar borders of the maxillaries lie. In the median line there is a robust ridge on the interparietal which runs to the upper rounded edge of the occiput. On both sides of the median ridge there lies a deep depression—very deep in one specimen (S.A.M. 11294) of *Keratocephalus* and not very deep in *Phocosaurus* (S.A.M. 11997). The upper edge of the occiput is thick and rounded and overhangs the lower part of the occiput.

The condyle is directed postero-ventrally so that the skull would hang downwards. The condyle forms a stout rounded knob that has its dorsal surface excavated by a shallow groove leading into the *foramen magnum.* The dorso-lateral corners of the condyle are formed by the exoccipitals. The *foramen magnum* is large and nearly circular. The posttemporal fossae are small slits, bounded dorsally by the supraoccipital and ventrally by the paroccipital. The lateral outer border of the skull is formed by the squamosal and medial to this edge lies a shallow 'auditory' groove that has its inner wall formed by a strong curved ridge formed wholly by the squamosal with no participation by the paroccipital and tabular as in *Struthiocephalus.* Ventrally the condyles of the quadrates lie far anteriorly of the plane of the occiput. In occipital view the basioccipital part of the condyle forms the median part of the ventral edge, which is laterally continued by the quadrate ramus of the pterygoid, the quadrate condyles and the quadratojugal. Looking at the occiput at right angles to the plane in which the alveolar borders of the maxillaries lie, much of the surfaces of the parietal, postorbitals, postfrontals and frontal is seen.

The basioccipital (B.O.) in occipital view shows a T-shaped surface with the stem, lying in the median line, excavated by a shallow groove leading into the *foramen magnum*, and the cross-member forming the ventral edge of the condyle carrying a large notochordal pit. The dorso-lateral corners of the condylar surface are formed by the exoccipitals.

Each exoccipital (E.O.) forms a small triangular part of the occipital face lying lateral to the lower half of the *foramen magnum* and then stretches posteriorly to overlap on to the dorso-lateral corner of the condyle.

The supraoccipital (S.O.) is a low, broad bone forming the upper half of the border of the *foramen magnum*. Laterally it tapers to a point extending just past the posttemporal fossa, and forms its dorsal edge. Ventrally its edge is overlapped by the exoccipital, dorsally it meets the interparietal and, laterally, the tabular with only small contacts with the paroccipital on both sides of the posttemporal fossa. The median occipital ridge is low or absent on the supraoccipital but is a prominent feature on the interparietal.

The interparietal (dermosupraoccipital) (I.P.) is the main median bone of the occiput. It is a fairly large bone—nearly square in outline—and carries a strong and prominent ridge along the median line of the occiput. Lateral to this ridge its surface is shallowly to very deeply excavated. Dorsally it forms the strong rounded edge of the middle part of the upper occipital edge, meeting the parietal on the dorsal surface of the skull.

The tabular (T.) is the bone with the largest surface of all the bones of the occiput. Dorsally it forms the major part of the strong rounded overhanging edge of the occiput and meets the parietal on the dorsal surface of the skull and on the dorsal face of the posttemporal arch. Dorso-laterally it meets the upsweeping process of the squamosal along the posterior edge of the posttemporal arch. It stretches far laterally but does not contribute to the formation of the ridge lying medially of the 'auditory' groove. Ventrally it overlaps the dorsal paroccipital edge lateral to the posttemporal fossa.

The paroccipital (P.Oc.) in occipital view is seen to be a strong bar medially abutting against the basioccipital and overlapped by the exoccipital and stretching far laterally to meet the squamosal mesial of the 'auditory ridge' and overlapping the dorsal part of the posterior face of the quadrate, which it buttresses very firmly. Its proximo-ventral corner is seen to form the posterior part of the rim of the *fenestra ovalis*. In occipital view it obscures much of the stapes—especially that bone's distal end.

The quadrate (Q.) in occipital view presents a roughly rectangular face with, ventrally, a pair of strong rounded knobs separated by a groove forming the articulatory condyles for the articular. Laterally the quadrate is overlapped by the squamosal and flanked by the quadratojugal. Dorsally the posterior face of the quadrate is overlapped by the distal end of the paroccipital firmly applied to it. Medially the short anterior process of the quadrate is firmly overlapped by the distal end of the quadrate ramus of the pterygoid and dorsally to this the postero-distal process of the stapes is securely applied to the posterior face of the quadrate. Latero-ventrally to the postero-distal corner of the stapes the quadrate carries a low rounded tubercle. An oval quadratic foramen cuts a notch into the lateral edge of the quadrate.

The quadratojugal (Q.J.) in posterior view presents a small triangular face; its inner edge is notched by the oval quadratic foramen; dorsally the squamosal overlaps the posterior face of the quadratojugal.

The stapes (St.) can only be partly seen in occipital view, as the paroccipital obscures its upper and dorso-distal corner. The stapedial foramen can just be seen. The postero-distal process, directed towards the tubercle of the quadrate, is seen to be applied to the quadrate and firmly wedged in between the paroccipital and the quadrate and its distal end securely overlapped by the end of the quadratic ramus of the pterygoid. Proximally the footplate of the stapes fits into the ventrally situated *fenestra ovalis*, which has the posterior part of its rim formed by a downgrown process of the paroccipital and its ventral edge formed by the basioccipital.

The stapes is seen to lie diagonally, with its proximal end appreciably higher than its distal end.

Finally, the quadrate ramus of the pterygoid (Pt.) is seen to be firmly applied to the postero-medial face of the anterior process of the quadrate and overlapping the ventro-distal end of the stapes.

The Ventral Surface of the Skull

The ventral surface of the skull in the Tapinocephalidae is well exposed in only one specimen of *Tapinocephalus* (S.A.M. 2344), fairly well in one specimen (B.M. R.3594) of *Mormosaurus*, poorly in another specimen (S.A.M. 9082), whereas little is known of this aspect in *Phocosaurus* and *Keratocephalus*.

The bones of the palate and the *basis cranii* lie in practically the same plane, with the fairly weak lateral pterygoidal rami extending ventral to this plane, and the bones of the suspensorium lying still further ventrally. Striking is the very anterior position of the articulatory condyles of the quadrates, which lie far anterior to the plane in which the basioccipital condyle lies, nearly half-way up the ventral surface of the skull. The subtemporal fossae are small, short but fairly wide, the *choanae* are large, short but wide and the inter-pterygoidal vacuity is a fairly narrow slit just extending anteriorly to between the posterior end of the prevomers. A very small suborbital opening lies between the palatine and transversum. In the projection on to the plane of the maxillary alveolar borders the surface of the occiput is seen as the occiput makes an angle of more than 90° with this plane.

The basioccipital (B.O.) is, in ventral view, seen to form the greater part of the occipital condyle. The condyle is a strong rounded knob with its postero-ventral corners formed by the exoccipitals. The basioccipital has a fairly large and deep notochordal pit facing postero-ventrally so that from the atlas the skull would hang downwards. Anteriorly to its condylar part the basioccipital has a short but apparently wide face, which is slightly tilted down in anterior direction and there carries two low tubera lying just posterior to the basioccipital-basisphenoidal suture. The lateral edge of these tubera forms the ventral rim of the *fenestra ovalis*, which thus lies far ventrally. Between the lateral corner of the tuber and the jugular foramen the basioccipital abuts against the antero-medial corner of the paroccipital. Further posteriorly the basioccipital meets the flange of the exoccipital, which overlaps the proximal part of the paroccipital face.

The basisphenoid (B.S.) posteriorly meets the basioccipital in a digitate transverse suture at an angle so that the ventral surfaces of these two bones subtend a very obtuse angle. On its postero-lateral processes the basisphenoid carries low tubera and their postero-lateral edge forms the antero-ventral rim of the *fenestra ovalis*. The anterior extension of the basisphenoid, wedged in between the quadratic rami of the pterygoids, is short. Along the median line the basisphenoid carries a low keel lateral to which, near the anterior edge of the bone, lie the internal carotid foramina. Lateral to each tuber lies the foramen for the carotid.

The paroccipital (P.Oc.) is a strong and massive bone which forms a strong and firm connecting link between the cranial base (more particularly the basioccipital, with the exoccipital overlapping on to its ventral and ventro-posterior face) and the tabular, lying dorsally, and the squamosal, laterally, and its firm support of the quadrate is most important. Its antero-lateral corner also affords a firm support to the postero-distal end of the stapes, and its antero-medial corner forms the postero-ventral part of the rim of the *fenestra ovalis*.

Concomitant with the forward shift of the quadrate a rotation of the paroccipital on its long axis has taken place with the result that the paroccipital presents a much greater face in ventral view than it presents in occipital view.

The two pterygoids (Pt.) together form a relatively small part of the centre of the ventral surface of the skull. As each pterygoid has no anterior process, only a weak lateral flange, a short quadrate ramus and in the median line extending only a short distance posteriorly, it is a not very prominent bone. Posterior to the interpterygoid slit the pterygoid meets its fellow in the median line to form a low keel, which is continuous with that formed by the basisphenoids. Lateral to this median keel each pterygoid is deeply excavated to form a wide and deep diagonally situated groove, which is then laterally bounded by the quadrate ramus, which is a deep sheet of bone lying obliquely in the skull and this sheet lies nearly at right angles to the plane of the palate. Although the quadrate ramus of the pterygoid is comparatively short, it has a large and firm overlap on the quadrate, being firmly applied to the mesial face of the anterior quadratic process and extending well posterior of the plane in which the condyle of the quadrate lies. The upper edge of the quadrate ramus lies ventrally to, but with a fairly firm contact with the anterior part of the distal end of the stapes, which, passing above it, is firmly applied to the mesial face of the anterior quadratic process.

The quadratic ramus is connected to the lateral ramus by a strong web of bone.

The lateral ramus of the pterygoid is weak and does not descend far ventrally nor extend much laterally, which is in strong contrast to the condition in the carnivorous Titanosuchia and Anteosauria. It is also relatively weaker than in the Moschopids, but about the same as in the Struthiocephalids. Laterally the flange is supported by the robust transversum which, because of the small lateral extent of the lateral ramus, presents a large ventral face. This is also seen in *Struthiocephalus*. Anteriorly the pterygoids do not appear to extend anterior to the plane in which the anterior edge of the lateral rami lie.

The transversum (Tr.) is a robust bone forming a strong link between the lateral ramus of the pterygoid and the side wall of the skull, being firmly buttressed against the inner face of the jugal and, to a lesser degree, against the maxilla. Anteriorly it meets the palatine in a straight suture, with only a small suborbital foramen separating them.

The palatine (Pal.) stretches antero-laterally from the anterior edge of the transverse pterygoid ramus as a thick sheet of bone to form much of the lateral border of the *choana*, and has its lateral edge applied to the inner maxillary surface, where it flanks the alveolar border. In the median line a tongue of the prevomers apparently prevents the two palatines from meeting each other. On its postero-median corner the palatine carries a mound-like ridge which does not, however, appear to be dentigerous.

The prevomers (vomers) (P.V.) are strong but relatively short bones, which together form a massive interchoanal bar. Their anterior bevelled ends underlie the inner face of the premaxillaries. Posteriorly they widen to meet the palatines postero-laterally, but in the median line apparently send a tongue posteriorly which is intercalated between the medial edges of the palatines. Anteriorly, along the median line, the interchoanal bone is grooved, whereas posteriorly a low keel is developed.

The premaxillary (P.M.) has a very massive alveolar face but in all the known specimens little of the teeth is known and where infilled alveolar sockets can be seen they appear to be irregular with some indication of replacement lingually.

The maxilla (M.) has its alveolar border anteriorly massive and wide but it then tapers rapidly in posterior direction with a sharp edge continuous with the sharp ventral edge of the jugal. Little is known of the teeth but it would appear that they were even more degenerate than those on the premaxilla.

The jugal (J.) in ventral view presents a sharp ventral edge curving sharply downwards to meet the quadratojugal, and an internal face forming, together with the transversum, the outer border of the subtemporal fossa. Anteriorly it meets the massive transversum in a sigmoid suture.

The quadrate (Q.) in ventral view presents its articulatory surface as a very prominent feature. The condyle is bipartite with two fairly robust rounded cotyli separated by a shallow groove. The edges of the cotyli overhang both the anterior and posterior faces of the dorsal part of the quadrate. Running obliquely inwards from the inner cotylus is the anterior quadratic process and it is against its mesial face that the quadrate ramus of the pterygoid is very firmly applied. Lateral to the outer cotylus the quadrate edge has a rounded step up before meeting the quadratojugal, which is applied to its outer surface, with a fairly small *foramen quadrati* lying half-way along the suture.

Since the quadrate lies in a forwardly inclined plane much of its posterior face is seen in ventral view. On this surface there is a small low tubercle above the inner cotylus, to which the postero-lateral sharp process of the stapes is all but applied. In ventral view it is very clearly shown how firmly the more dorsal part of the quadrate is overlapped by the down-sweeping squamosal outwardly and inwardly by the strongly down-sweeping antero-ventral part of the strong paroccipital. Above the upper edge of the quadratic ramus of the pterygoid the distal end of the stapes abuts very firmly against the mesial face of the quadrate. Another part of the distal end of the stapes passes above the antero-lateral corner of the paroccipital to abut against the quadrate.

The quadratojugal (Q.J.) in ventral view is seen to be a small element wedged in between the outer face of the quadrate and the lower overlapping edge of the down-sweeping squamosal. A small *foramen quadrati* notches the mesial edge of the quadratojugal.

The squamosal (Sq.) is seen to form the angle of the 'cheek' and sweeping downwards it overlaps the quadrate and quadratojugal. The strong and prominent 'auditory' ridge is well shown with the 'auditory' groove lying lateral to the ridge.

The stapes (St.) lies obliquely; from the ventrally situated *fenestra ovalis* it is inclined both forwards and downwards. In the ventral view the stapes is seen to present two distinct faces. The ventral face is elongate with a central waist, a knoblike proximal end firmly fixed in the *fenestra ovalis* and an expanded distal end, which has a long pointed postero-lateral process terminating just above the tubercle on the posterior face of the quadrate and wedged in between the quadrate ramus of the pterygoid and the paroccipital. The posterior face, which is perforated by the round stapedial foramen, is triangular in outline, with its base applied to the quadrate, after passing outwards above the downwardly grown antero-ventral corner of the paroccipital.

By this rather complex system of wedging it is clear that the distal end of the stapes is all but wholly immovable.

The tabulars (T.), interparietal (I.P.) and the supraoccipital (S.O.) are visible in ventral view, because the occiput-face is inclined somewhat anteriorly from above downwards. These bones lie well posterior to the basioccipital condyle with the first two forming the posterior edge of the skull, which is slightly concave in *Tapinocephalus* and *Mormosaurus*, convex in *Phocosaurus* and

Keratocephalus (except in one specimen), whereas in the Struthiocephalids this edge is nearly straight or convex, in Moschopids convex and deeply concave in the Titanosuchia and very deeply concave in the Anteosauria.

The Braincase in Lateral View

Hitherto the braincase of a specimen of *Tapinocephalus atherstonei* has been figured[1] and now a specimen of *Keratocephalus*, in which both sides of the braincase have been exposed, is to be described.

The braincase in *Keratocephalus* is short and low with the nearly horizontal *basis cranii* formed by the basioccipital and basisphenoid.

The posterior part of the side wall is formed by inwardly directed plates of the squamosal, supraoccipital and paroccipital. The antero-ventral corner of the paroccipital meets the basioccipital to form the posterior part of the rim of the *fenestra ovalis*. The anterior half of the rim of the *fenestra ovalis* is formed by the basisphenoid.

Anterior to the plates of the squamosal, supraoccipital and paroccipital lie the prootic and epipterygoid, but the sutures here cannot be determined with certainty, but appear to lie where indicated in broken line in the figure (fig. 15).

The epipterygoid (Ep.) appears to be incorporated into the side wall with the obliteration of the *cavum epiptericum*. Its base rests on the pterygoid with possibly a small contact with the basisphenoid.

The posterior edge of the epipterygoid has not been determined with any degree of certainty, but probably lies where indicated by broken line in the figure, in which case it is firmly applied to the antero-internally directed plates of the paroccipital and supraoccipital.

Dorsally the dumbbell-shaped vacuity for the trigeminal nerve (V.) causes the epipterygoid to bifurcate; the posterior *processus oticus* meets the prootic, whereas the anterior *processus ascendens* meets the under surface of the parietal with its upper edge and the sphenethmoid with the upper part of its anterior edge. The lower half of the anterior edge of the epipterygoid forms the posterior edge of the fenestra leading into the *fossa hypophyseos*.

The prootic (Pot.), as I have tentatively determined its limits, is a small bone wedged into the dorso-posterior corner of the side wall of the braincase. Dorsally it meets the parietal just mesial to this bone's contact with the postorbital. Posteriorly its edge is applied to the plate of the squamosal. Its ventral edge meets the supraoccipital and the upper edge of the *processus oticus* of the epipterygoid. Its anterior edge is applied to the posterior edge of the *processus ascendens* of the epipterygoid. The prootic forms the upper edge of the trigeminal foramen.

Of the parasphenoid (Ps.) only the dorsal branch is present, the anterior horizontal branch is not preserved. It stands with its thickened base on the upper surface of the basisphenoid and also, anteriorly, on the pterygoids. Immediately above its base the bone narrows and then thickens in dorsal direction so that its two lateral faces diverge to where the sphenethmoids rest on its outer dorsal edges. Its dorsal edge forms the anterior border of the fenestra of the *fossa hypophyseos*. In lateral view its dorsal edge meets the sphenethmoid in a long curved suture.

The sphenethmoid (Se.) forms a large part of the lateral wall of the braincase. In their postero-dorsal part the two sphenethmoids diverge to form a fairly narrow space to house the fore-end of the brain. Antero-dorsally the two thin sphenethmoidal plates are applied to each other to form a thin median septum, which apparently extends far anteriorly. Lateral to this median septum the sphenethmoid thus forms a recess, with the *tractus olfactorius* emerging in its posterior part. Dorsally of the recess in the sphenethmoid the under surface of the prefrontal is also deeply excavated and in this hollow the *bulbus olfactorius* was apparently housed.

Openings in the Side Wall of the Braincase

The fenestra (Hyp.) in the side wall for the *fossa hypophyseos* is fairly large, narrowly oval and is bounded by the parasphenoid, sphenethmoid, epipterygoid and ? pterygoid.

The fenestra for the trigeminus and abducens nerves (V.) is in outline dumbbell-shaped and it lies in the upper part of the epipterygoid and causes this bone to bifurcate into a *processus oticus* and *processus ascendens*.

The *truncus olfactorius* (I) emerges from the posterior corner of the recess in the sphenethmoid.

The foramen for the *n. trochlearis* (IV) pierces the sphenethmoid near its upper edge, just below its contact with the under surface of the frontal.

The foramen for the *n. opticus* (II) emerges from the upper part of a shallow depression lying in the sphenethmoid above the large *fenestra hypophyseos*.

A venous foramen (Ven.) pierces the prootic near its dorso-anterior corner just under this bone's contact with the parietal.

A foramen (Ca.) for the exit of the accessory branch of the carotid lies at the base of the parasphenoid.

The *fenestra ovalis* (F.O.) lies very low down and its rim is formed by the basioccipital, basisphenoid and paroccipital.

The Lower Jaw

In all the known Tapinocephalid genera the lower jaw is only adequately known in one specimen (S.A.M. 9082) of the genus *Mormosaurus*. Owing to deformation due to a simple shear the disposition of the elements of the lower jaw has been disturbed in that by telescoping the dentary has been forced backwards over the posterior bones.

Because of the great forward shift of the quadrate the lower jaw is very short, viz. at most only 60% of the maximum skull length. It is massive with a strong symphysis and the articulatory facets on the articular lie far ventrally—not much above the plane of the lower border of the jaw.

The dentary (D.) is the largest bone of the jaw with a strong, fairly square mentum and it forms by far the greater part of the strong symphysis. Its dorso-posterior end forms a very low coronoid process. On its alveolar border the dentition is very poorly preserved, with only three roots of teeth present anteriorly, but what appear to be emply sockets indicate that in life a fairly regular row of teeth must have been developed, with the anterior ones much larger than the posterior ones.

The splenial (S.) is a small bone with a weak symphysis with its fellow. At the symphysis there is a deep groove between dentary and splenial.

The angular (An.) presents a large external face. There is a deep angular notch and the reflected lamina (*lamina reflexa*) is a robust sheet of bone, which in its posterior part lies well away from the inner sheet of the angular to form a roomy *recessus angularis*. The reflected lamina forms the free postero-ventral edge of the jaw immediately anterior to the articular.

The surangular (S.A.) forms the curved dorso-posterior border of the jaw and this edge is rounded and robust. Dorsally the surangular abuts against the dentary and ventrally overlaps the articular. Internally the surangular presents a large face between the postero-ventral edge of the dentary, the articular and the postero-dorsal edge of the prearticular. This is the area of insertion of the *m. temporalis*.

The prearticular (Pa.) is a long sheet of bone anteriorly intercalated between the dentary and splenial, and posteriorly overlapping and strongly supporting the articular. The anterior half of its upper edge meets the coronoid and then posteriorly it has a free edge lingual to the insertion of the *m. temporalis*. Its ventral edge overlaps the inner face of the angular.

The articular (Ar.) is a robust bone wedged in and securely clasped externally by the surangular from above and the angular anteriorly, and internally by the prearticular. The articulatory facets on its dorso-posterior surface are situated low down. The outer transversely oval concave facet is separated by a low ridge from the inner nearly circular concave facet. A strong but short retroarticular process is directed postero-ventrally and to it was inserted a strong *m. depressor mandibulae*.

The coronoid (C.) is a flat sheet of bone applied to the inner face of the dentary and meeting the upper edge of the prearticular; it does not extend far posteriorly and the dorso-posterior corner of the lower jaw is formed by the dentary.

TAXONOMIC

TAPINOCEPHALIDAE

Skull Characters of the Family

Skull large (length 488–585? mm.; breadth 400–540 mm.); relatively short and broad to fairly long and fairly narrow (length varies from 104–127?% of the breadth); relatively low to fairly low (height varies from 46–69% of the length); snout short to fairly short (snout length varies from 51–67% of the total skull length); the snout is low to fairly high and fairly broad to broad (height of snout from 44–76% of the width of the snout).

The orbit lies in the posterior half of the skull.

The transition from the facial to the cranial surface sloping or very abrupt.

The dorsal cranial bones are strongly pachyostosed with the centres of thickening coalesced in all but one genus (*Keratocephalus*); this thickening occupies from 48–63% of the total median length of the skull. Postorbital bar wide to very wide and massive; the postfrontal does not form a prominent boss but its surface curves evenly on to the generally thickened dorsal surface; temporal fossa small with small to fairly small antero-posterior diameter; intertemporal region moderately to very wide (120–240 mm.); parietals enter upper border of temporal fossa; frontal excluded from the orbital border; lacrimal not reaching nasal.

Quadrate ramus of pterygoid is short.

Dentition in most cases feeble and undifferentiated.

TAPINOCEPHALUS

Skull Characters of the Genus

1. The preorbital length is 51–52% of the total median length; the snout is thus short (preorbital length 273 mm.) and it is broad (330 mm.) and low (144 mm.), with the height 44% of the width; the dorsal facial surface of the snout is short and does not extend to the plane of the anterior orbital border; the transition from the facial to the cranial surface is very abrupt.

2. The dorsal cranial bones are very strongly pachyostosed, with the centres of thickening coalesced and the transition on to the face is by an abrupt step along a U-shaped line; the thickening extends very far forward—well anterior to the plane of the anterior orbital border; along the median line the pachyostotic cranial roof is 339 mm. in length and this is 58–63% of the total median length of the skull; this great anterior extension is due to the greatly thickened naso-frontal boss, which does not, however, stand out dorsally above the general cranial surface. On the sharply up-bent face of the posterior end of each nasal there is a fairly deep hollow. The prefrontal is greatly thickened and this is confluent with the pachyostosis of the nasal and frontal and it overhangs the orbit forming the greatly thickened antero-dorsal part of the orbital border and limits direct anterior vision. The area around the pineal foramen is raised, but its general surface is lower than that of the surrounding bones.

3. The postorbital bar is very wide and very massive.

4. The posttemporal arch is very thick and the temporal fossa is small with its antero-posterior diameter greatly reduced.

5. The dorsal parietal surface is very broad (210-240 mm.) with in one specimen a narrow constricted bay to the temporal fossa; and the interorbital width is 88–100% of the intertemporal width.

6. Antero-posterior length of the parietal is fairly long (105–114 mm.); frontal fairly large.

7. The intersquamosal width is very great (495–540 mm.), and is 99–100% of the median length and the skull is thus nearly or quite as broad as long.

8. The quadrate is situated well forward; the mandibular length is 57% of the median length of the skull; the quadrate ramus of the pterygoid, although it extends to well posterior of the condyles of the quadrate and underlies the distal end of the stapes, is short; the lateral pterygoid rami form a weak transverse bar of small width.

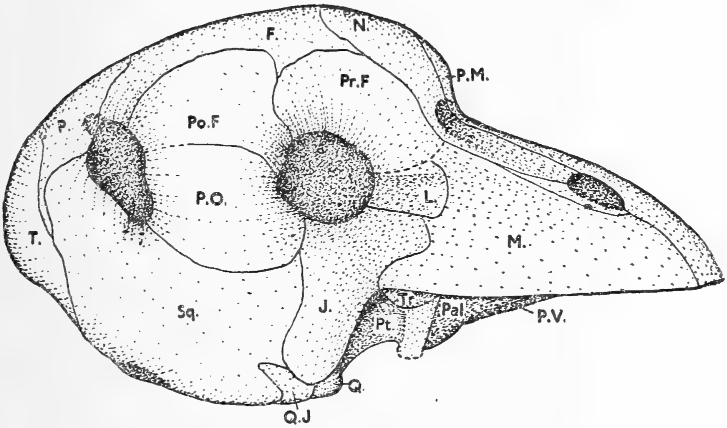

FIG. 1. *Tapinocephalus atherstonei.* Lateral view of skull. × $\frac{1}{6}$. S.A.M. 2344. Slight dorso-ventral compression not corrected.

Note.—All the figures in this paper are not perspective drawings but projections obtained by pantograph. Those labelled 'lateral view' are orthoprojections on to the median plane; 'dorsal' and 'ventral views' are orthoprojections on to the plane in which the alveolar borders of the maxillaries lie; the 'occipital views' are orthoprojections at right angles to the plane in which the maxillary alveolar borders lie.

9. The dentition is poorly preserved but probably feeble.

Genotype. *Tapinocephalus atherstonei,* Owen 1876.

Specific diagnosis as for the genus.

Holotype. B.M. R.1705. Snout (there are also other parts of the skull associated). Near Janwillemsfontein, Prince Albert. Low *Tapinocephalus* zone. Coll. Atherstone.

Referred Specimens

A.M.N.H. 5626. Posterior half of a weathered skull. Ganskraal, Prince Albert. High *Tapinocephalus* zone. Coll. van Wyk.

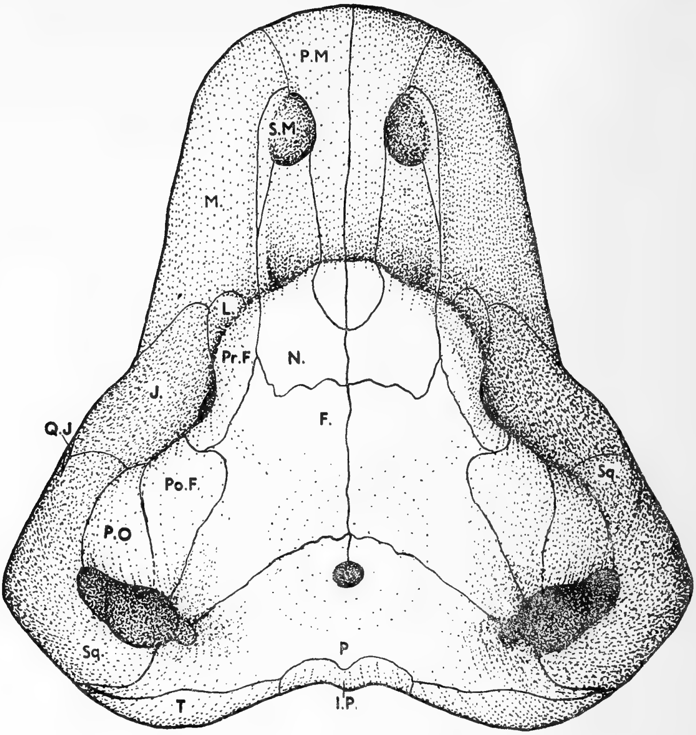

FIG. 2. *Tapinocephalus atherstonei.* Dorsal view of skull. × 1/6. S.A.M. 2344.

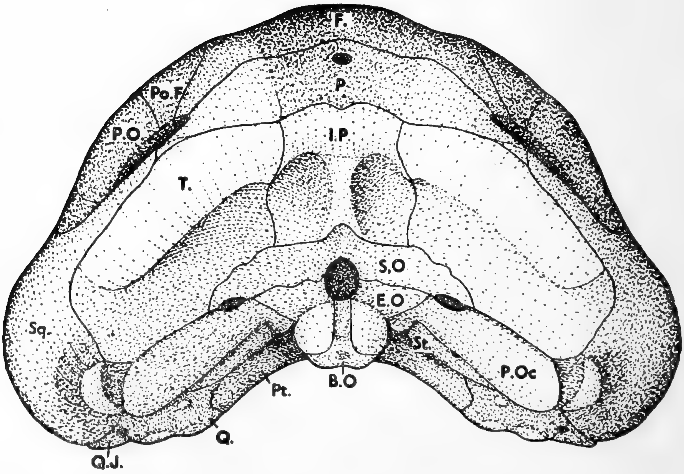

FIG. 3. *Tapinocephalus atherstonei.* Occipital view of skull. × 1/6. S.A.M. 2344. Slight dorso-ventral compression not corrected.

S.A.M. 2344 (figs. 1–4). A good skull without lower jaw (with parts of the postcranial skeleton associated). Uitkyk, Beaufort West. Low *Tapinocephalus* zone. Coll. le Roux.

S.A.M. 11998 (fig. 5). Weathered piece of skull-roof. Sandriver, Beaufort West. Low? *Tapinocephalus* zone. Coll. Jack.

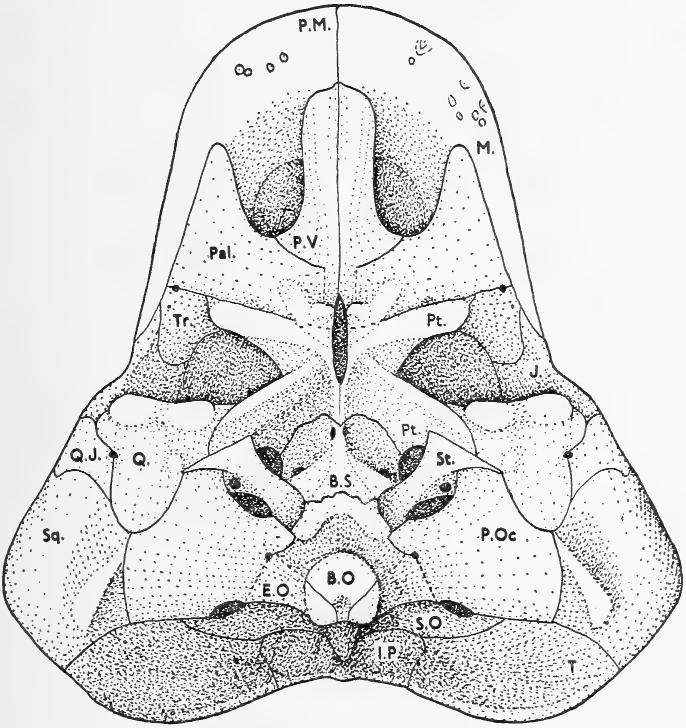

FIG. 4. *Tapinocephalus atherstonei*. Ventral view of skull. × $\frac{1}{6}$. S.A.M. 2344.

PHOCOSAURUS

Skull Characters of the Genus

1. The preorbital length is 54% of the total median length as reconstructed; the snout as reconstructed is thus fairly short (preorbital length 282? mm.) and it is fairly narrow (222 mm.) and fairly high (168 mm.) with the height 76% of the width; the facial surface of the snout is not very short and extends to the plane of the anterior orbital border; the transition from the facial to the cranial surface is not abrupt but slopes up evenly.

2. The dorsal cranial bones are strongly pachyostosed, with the centres of thickening coalesced and the transition on to the face is by a slope along an

indistinct indented line; the cranial thickening does not extend very far forward —just reaching the plane of the anterior orbital border; along the median line the pachyostotic cranial roof is 267 mm. in length and this is 51% of the total median length; this small anterior extension of the thickening is due to the fact that the naso-frontal swelling is situated posterior to the plane of the anterior orbital border and to the fact that the anterior third of the prefrontal is unswollen; the naso-frontal boss is not very prominent, although it is higher than the general cranial surface. On the sloping face of the posterior part of the nasals there are a pair of shallow grooves. The posterior two-thirds of the prefrontal is strongly thickened and this is confluent with the pachyostosis of the nasal and frontal and overhangs the orbit, but the anterior orbital border is not greatly thickened. The surface around the pineal surface is depressed and lies lower than that of the surrounding bones.

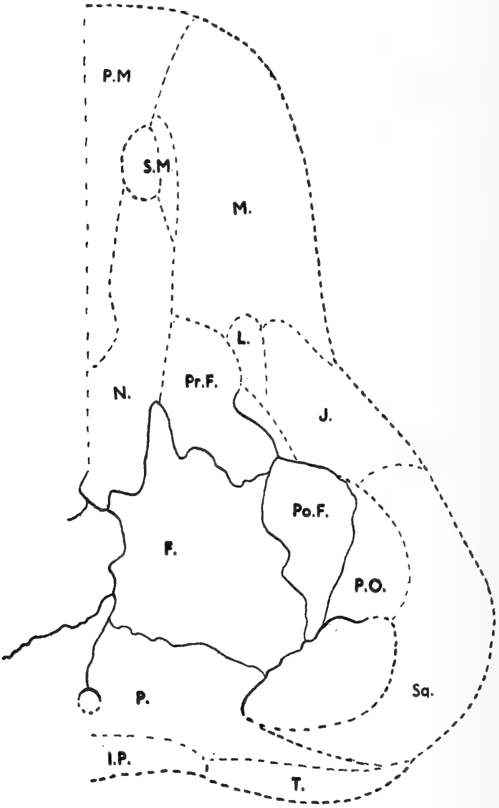

FIG. 5. *Tapinocephalus atherstonei.* Dorsal aspect of a weathered piece of the skull-roof. × $\frac{1}{6}$. S.A.M. 11998.

3. The postorbital bar is fairly wide and massive.

4. The posttemporal arch is moderately thick and the temporal fossa is small and slitlike with its antero-posterior diameter very small.

5. The dorsal parietal surface is only moderately wide (177 mm.) and the interorbital width is 107% of the intertemporal width.

6. The antero-posterior length of the parietal is small (72 mm.); the frontal is not large.

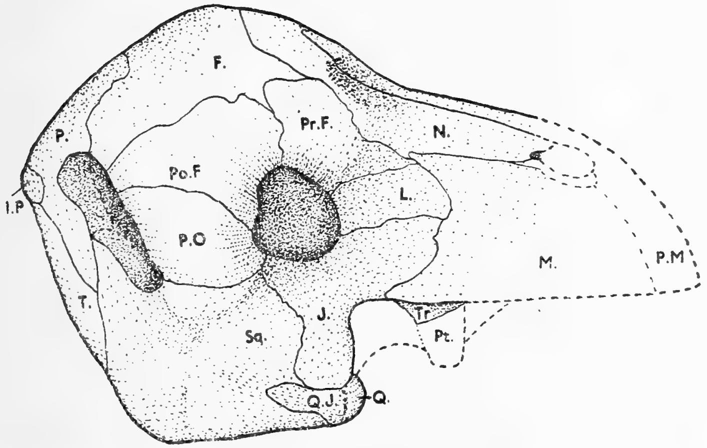

Fig. 6. *Phocosaurus megischion.* Lateral view of skull. × $\frac{1}{6}$. S.A.M. 11997.

7. The intersquamosal width is moderate (456 mm.); and the median length as reconstructed is 115% of the intersquamosal width and the skull is thus appreciably narrower than long.

8. The quadrate is situated very far forward; as reconstructed the mandibular length would be about 53% of the median length of the skull.

9. Dentition poorly known but probably feeble.

Genotype. *Phocosaurus megischion*, Seeley 1888.

Specific diagnosis as for the genus.

Holotype. B.M. 43525. Incomplete coraco-scapulae, humeri, ulna, incomplete pelvis and proximal half of the right femur. Varsfontein, Prince Albert. Middle *Tapinocephalus* zone. Coll. Atherstone.

Referred Specimens

S.A.M. 11997. Skull lacking tip of snout and without lower jaw (figs. 6, 7) with the distal end of a femur and radius and an incomplete ilium recently figured by me.[4] Locality and collector unknown.

S.A.M. 9103. A piece of the occiput and skull-roof. Droëfontein, Prince Albert. Low? *Tapinocephalus* zone. Coll. Boonstra.

MORMOSAURUS

Skull Characters of the Genus

1. The preorbital length is 57–58% of the total median length; the snout is thus fairly long (preorbital length 270–318 mm.) and fairly narrow to fairly broad (222–279 mm.) and fairly high (150–186 mm.), with the height 67–68% of the width; the facial surface of the snout is fairly short and it does not extend to the plane of the antorbital border; the transition from the facial to the cranial surface is abrupt.

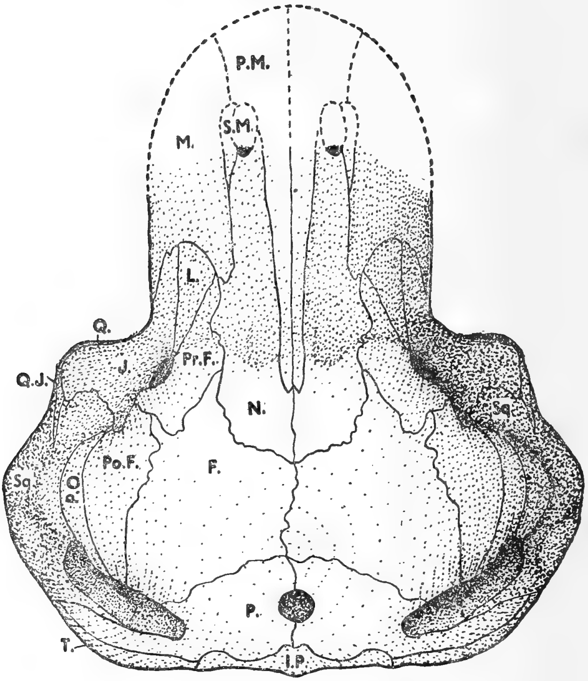

Fig. 7. *Phocosaurus megischion.* Dorsal view of skull. × $\frac{1}{8}$.
S.A.M. 11997.

2. The dorsal cranial bones are strongly pachyostosed, with the centres of thickening coalesced and the transition on to the face is by an abrupt step along a curved transverse line; the thickening extends far forward—anterior to the plane of the anterior orbital border; along the median line the pachyostotic cranial roof is 252–267 mm. in length and this is 48–55% of the total median length of the skull; this moderate anterior extension is due to the

thickened naso-frontal boss, which stands out well above the general cranial surface. On the upwardly sloping face of the posterior part of the nasals there are a pair of shallow depressions. The prefrontal is greatly thickened in its posterior three-quarters but not in its anterior one-quarter and it overhangs the orbit, but the antero-dorsal orbital border is not greatly thickened. The surface around the pineal foramen is lower than that of the surrounding bones.

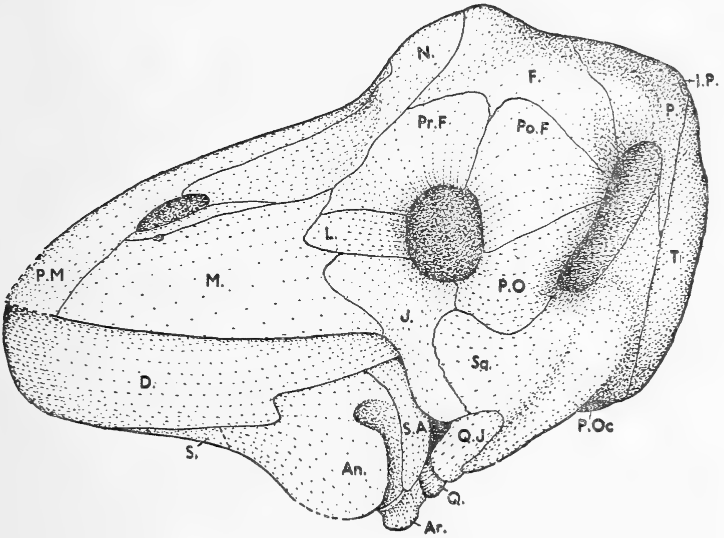

Fig. 8. *Mormosaurus seeleyi.* Lateral view of skull and lower jaw. × $\frac{1}{6}$. S.A.M. 9082. With correction of the simple shear the skull has suffered.

3. The postorbital bar is fairly wide and massive.

4. The posttemporal arch is thick and the temporal fossa is small with its antero-posterior diameter small to moderate.

5. The dorsal parietal surface is moderate to broad (150–200 mm.) and the interorbital width is 88–97% of the intertemporal width.

6. The antero-posterior length of the parietal is small (75 mm.) and the frontal is fairly large.

7. The intersquamosal width is moderate to great (438–477 mm.); and the median length is 105–115% of the intersquamosal width and the skull is thus slightly to appreciably narrower than long.

8. The quadrate is situated fairly far forward; the mandibular length is 59–64% of the median length of the skull; the lateral pterygoid rami weak but fairly wide.

9. The dentition is poorly preserved, but the anterior teeth in one specimen fairly robust.

Genotype. *Mormosaurus seeleyi*, Watson 1914.

Specific diagnosis as for the genus.

Holotype. B.M. R.3594. Skull without lower jaw. Koup. Low? *Tapinocephalus* zone. Coll. Seeley.

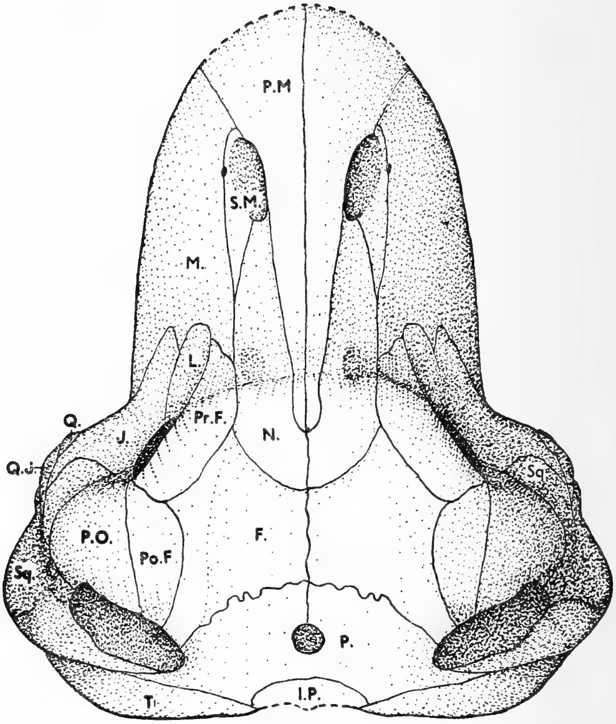

Fig. 9. *Mormosaurus seeleyi*. Dorsal view of skull. × 1/6. S.A.M. 9082. With correction of the simple shear the skull has undergone.

Referred Specimen

S.A.M. 9082. A good but sheared skull with the left mandibular ramus (figs. 8–10). Klein-Koedoeskop, Beaufort West. Low *Tapinocephalus* zone. Coll. Boonstra.

KERATOCEPHALUS

Skull Characters of the Genus

1. The preorbital length is 51–67% of the total median length as reconstructed; no snout is fully known but the transition from the facial to the cranial surface is fairly abrupt.

2. The dorsal cranial bones strongly pachyostosed from centres which do not coalesce and the transition on to the face is not along a continuous line, being in parts abrupt, whereas in others gently sloping; along the median line the pachyostotic cranial roof is 260–330 mm. in length and this is 50–59% of the total median length as reconstructed; the great anterior extent of this thickening is concentrated in the high isolated naso-frontal boss, which stands out very prominently above the general cranial surface and also from the prefrontal swelling from which it is sharply demarcated by a shallow groove. The sloping face of the posterior part of the nasals does not appear to house any groove or

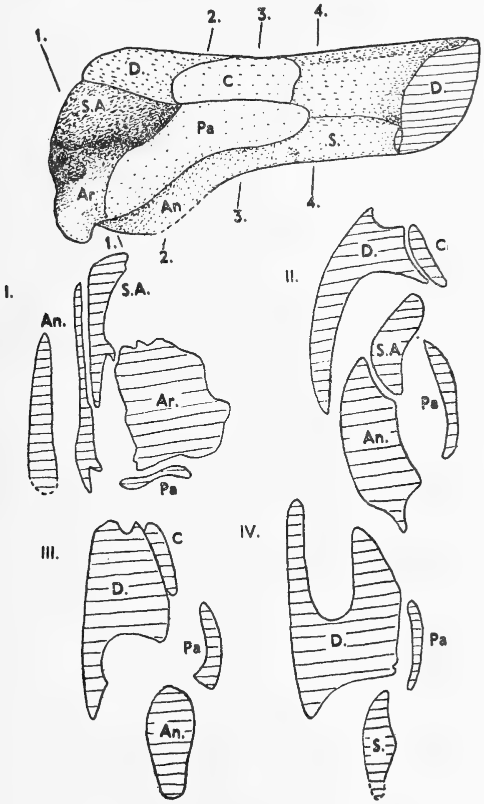

FIG. 10. *Mormosaurus seeleyi*. S.A.M. 9082.
Above. Lingual view of lower jaw. × $\frac{1}{6}$. With the telescoping of the bones corrected.

I–IV. Sections of the jaw, without correction of the telescoping the constituent bones have suffered from a simple shear. The levels of the sections are indicated by the figures 1–1, 2–2, 3–3, 4–4 in the top figure. × $\frac{1}{3}$.

deep hollow. The prefrontal, although thickened and overhanging the orbit, lies in a plane much lower than the naso-frontal boss, from which it is separated by a shallow, broad groove, and the antero-dorsal part of the orbital border is not greatly thickened.

The area around the pineal foramen forms a low to fairly high mound and this lies higher than the surface of the surrounding bones.

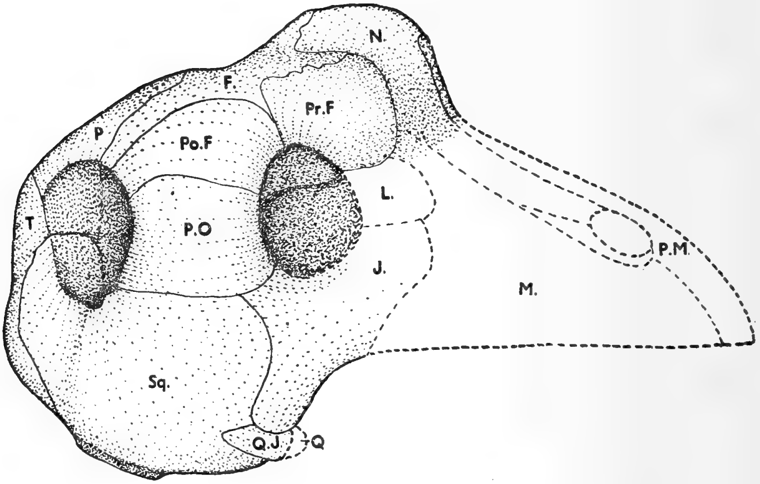

Fig. 11. *Keratocephalus moloch.* Lateral view of skull, with correction of the simple shear it has suffered. × $\frac{1}{6}$. S.A.M. 11937.

3. The postorbital bar is wide to very wide and massive.

4. The posttemporal arch is moderately thick to thick and the temporal fossa is fairly large with a fairly large antero-posterior diameter.

5. The dorsal parietal surface is fairly narrow to moderately wide (120–171 mm.) and the interorbital width is 106–130% of the intertemporal width. In one specimen the lateral edge of the parietal surface is definitely pinched in as in some specimens of *Struthiocephalus*.

6. The antero-posterior length of the parietal is fairly long to long (102–135 mm.); the frontal is fairly short to fairly long.

7. The intersquamosal width is moderate to large (400?–480 mm.); the median length as reconstructed is 111–127% of the intersquamosal width and the skull is thus appreciably to much narrower than long.

8. The quadrate is situated fairly far forward.

9. In one specimen (S.A.M. 8946), where part of the jaw is preserved, the preserved sockets indicate a dentition as well developed as in some of the Struthiocephalids.

Genotype. *Keratocephalus moloch*, von Huene 1931.
Specific diagnosis as for the genus.
Holotype. Tübingen University No. ?. Parts of the skull and postcranial elements. Abrahamskraal, Prince Albert. Low *Tapinocephalus* zone. Coll. von Huene.

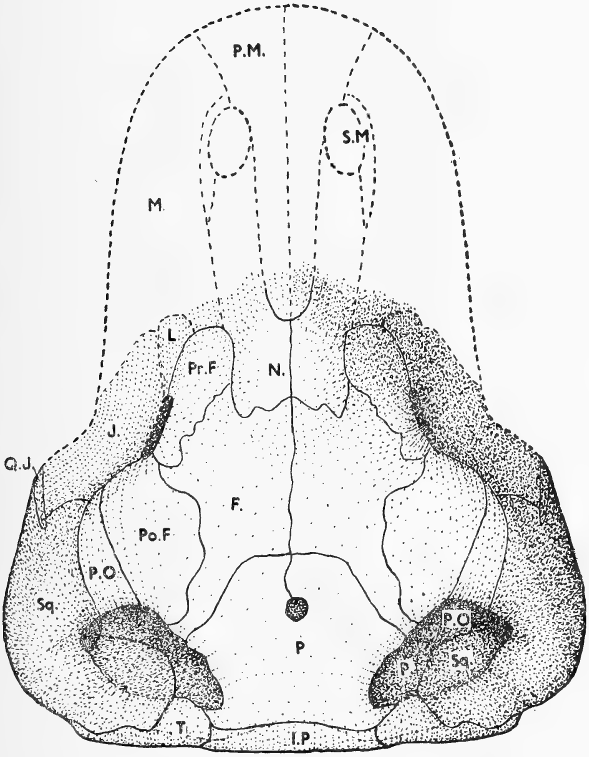

Fig. 12. *Keratocephalus moloch.* Dorsal view of the skull, with correction of the distortion caused by a simple shear. × 1/6. S.A.M. 11937.

Referred Specimens

S.A.M. 10557. Good skull-roof. Fraserburg Boad, Prince Albert. Low *Tapinocephalus* zone. Coll. Boonstra. This specimen was figured by me in 1951.[2]

S.A.M. 11937. The posterior two-thirds of a skull (figs. 11, 12) with parts of the postcranial skeleton recently figured by me.[4] Buffelsvlei, Beaufort West. Low *Tapinocephalus* zone. Coll. Boonstra and Marais.

S.A.M. 11294. The weathered and incomplete posterior part of a skull with the sides of the braincase exposed (figs. 13–15). Boesmansrivier, Beaufort West. Middle *Tapinocephalus* zone. Coll. Boonstra.

S.A.M. 8946. The incomplete posterior half of the skull (figs. 16, 17) with some limb bones. Mynhardtskraal, Beaufort West. Low *Tapinocephalus* zone. Coll. Boonstra.

TAUROPS

As only the snout of this genus is known it can only, because of its size, be tentatively placed in the Tapinocephalidae.

The teeth, 14 in number, are typically Tapinocephalian with the largest three implanted in the premaxilla and the others regularly decreasing in size in posterior direction. This apparently regular set is accompanied by a set of replacing teeth. The lower jaw teeth are very similar to the upper set.

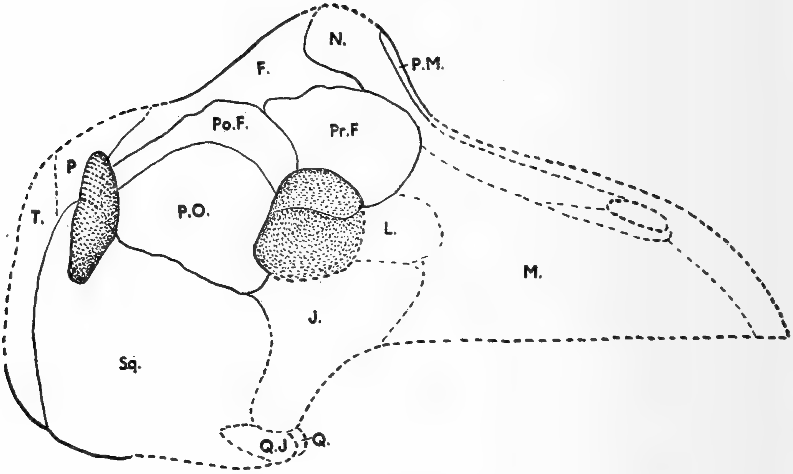

FIG. 13. *Keratocephalus moloch.* Lateral view of skull. × $\frac{1}{6}$. S.A.M. 11294.

If this specimen has been correctly referred to the Tapinocephalidae then there is further indication that in some genera, at least, the teeth are not degenerate as they appear to be in those genera where good skulls are known.

Genotype. *Taurops macrodon*, Broom 1912.

Specific diagnosis as for the genus.

Holotype. A.M.N.H. 5610. A snout with teeth. Boesmanshoek, Laingsburg. Low? *Tapinocephalus* zone. Coll. Whaits.

PELOSUCHUS

On the basis of some features exhibited by the bones of the postcranial skeleton preserved I have recently[4] included *Pelosuchus* in the Tapinocephalidae.

Of the skull only a weathered dentary is preserved and this shows that in the dentary, at least, the dentition is typically Tapinocephalian, with large anterior teeth, and that in posterior direction the teeth evenly decrease in size.

If this dentary is thus correctly referred to the Tapinocephalidae then in one genus of the family at least a full set of regularly placed teeth is present.

Genotype. *Pelosuchus priscus*, Broom 1905.

Specific diagnosis as for the genus.

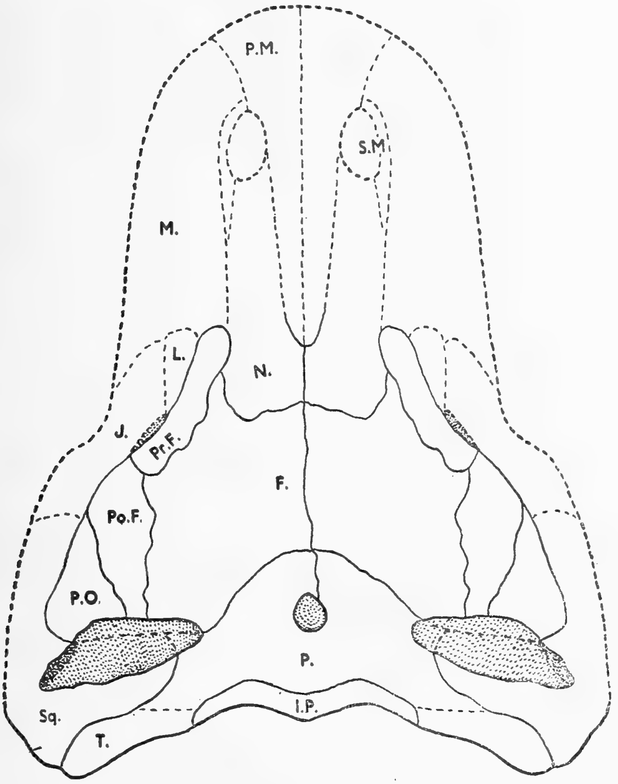

FIG. 14. *Keratocephalus moloch.* Dorsal view of skull. × $\frac{1}{8}$. S.A.M. 11294.

Holotype. S.A.M. 918. A dentary, with part of a scapula, coracoid, a fairly good femur and a distorted tibia. Bokfontein, Prince Albert. Middle? *Tapinocephalus* zone. Coll. du Plessis.

DISCUSSION

As I am nearing the completion of my study of the cranial structure in the other groups of the South African Tapinocephalia and hope to have a comparative account ready in the near future, only some points in the structure of the skull of the Tapinocephalidae call for discussion at this stage.

Age in the Skull of the Tapinocephalidae

In the Moschopid, *Moschops* and the Struthiocephalid, *Struthiocephalus*, where a fair number of skulls is available for comparative study, there is evidence (somewhat obscured by the possibility of sexual dimorphism) that with increasing age the pachyostosis is intensified. But there is also evidence that the increased pachyostosis during the lifetime of the individual is paralleled by a very similar increased pachyostosis during the evolution of the group.

In the Tapinocephalids we still have insufficient material to supply the necessary evidence on these matters.

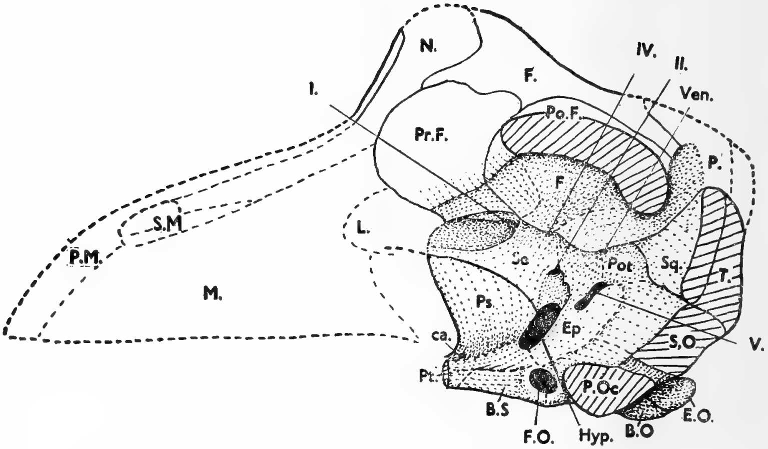

Fig. 15. *Keratocephalus moloch.* Lateral view of braincase, incorporating features of both right and left sides. × $\frac{1}{6}$. S.A.M. 11294.

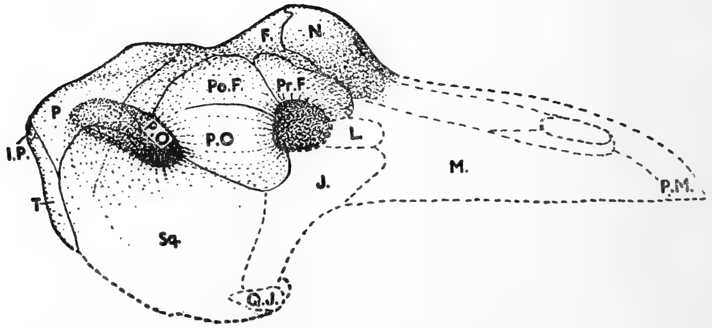

Fig. 16. *Keratocephalus moloch.* Lateral view of skull. × $\frac{1}{6}$. S.A.M. 8946. Dorso-ventral compression uncorrected.

It is quite clear that the skull S.A.M. 2344 is that of an old reptile. The sutures are all very much closed, and the poor preservation of the dentition is due to gerontism and not to the postmortem loss of teeth prior to petrifaction, in which case the alveoli would be matrix-filled and clearly determinable, whereas in fact separate alveoli are rarely visible. Now, the pachyostosis in this skull is very great and can also be considered to be due to its old age, but in A.M.N.H. 5626 and S.A.M. 11998, with very open sutures, the pachyostosis is also very great so that it would appear that the great pachyostosis is not a function of age but a phyletic character.

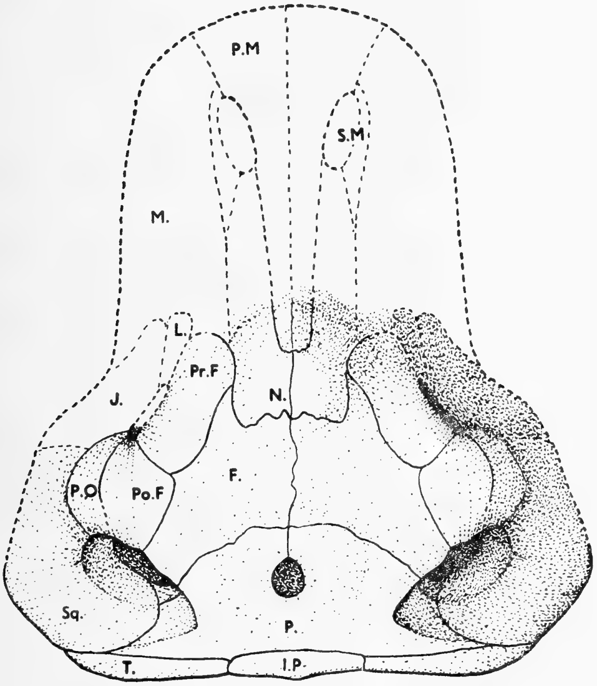

FIG. 17. *Keratocephalus moloch.* Dorsal view of skull. × $\frac{1}{8}$.
S.A.M. 8946.

In the one well-known skull of *Phocosaurus*, although the sutures are fairly open, the pachyostosis is fairly great and this again points to the phyletic character of the pachyostosis.

In the two known skulls of *Mormosaurus* the sutures are not open, the teeth are not strongly developed (especially posteriorly) and the pachyostosis is great, which apparently points to the pachyostosis being a character of old age.

In the five known skulls of *Keratocephalus* the dentition is apparently well developed, with no indication of degeneracy or gerontism; the sutures are mostly fairly open and the centres of pachyostosis tend to remain uncoalesced. But, although these skulls may thus be thought to be of fairly young animals, there is a considerable difference in size (length as reconstructed varying from 488–585 mm. and breadth from 400–480 mm.) which, apart from possibly indicating males and females, would point to stages of growth or age within the species.

My conclusion is that the genera *Keratocephalus*, *Mormosaurus*, *Phocosaurus* and *Tapinocephalus* cannot be considered to represent growth stages of a single genus, but represent distinct directions of phyletic development.

Some Palaeobiological Conclusions

In my recent account[4] of the Deinocephalian girdles and limbs I pointed out that these skeletal parts indicate that the Tapinocephalidae were chiefly marsh dwellers, spending most of their time in the shallow ponds and pools and but seldom moving far on solid ground.

The nature of the dentition and the massiveness of the skulls described above lend further support to this view. With such a cumbersome body, a locomotor apparatus so ill adapted to efficient terrestrial ambulation and an extremely unwieldy masticating mechanism, with its rather feeble mandible hinged on to such a heavy and massive cranium, feeding on dry ground and chewing tough vegetable matter would have been extremely unlikely, whereas, with the heavy body and head buoyed up in the water, feeding on soft and luscious marsh vegetation would be not only possible but imperative.

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3 (4)

5. *Pareiasauriër-studies.* Deel XII. 'n Lewensrekonstruksie van *Bradysaurus seeleyi. Deur* Lieuwe Dirk Boonstra. (Met plaat IV.)

Tussen die jare 1927 en 1935 het ek die Pareiasauriërs van ons Karoo baie deeglik ondersoek en die resultate, veral die osteologiese en miologiese bevindinge, is hoofsaaklik in die reeks „Pareiasaurian Studies" in die Annale van die Suid-Afrikaanse Museum gedruk.

Nou laat ek hier 'n foto afdruk van 'n rekonstruksie van een van die soorte van die *Tapinocephalus*-sone, waarvan daar, veral uit die Koup, 'n hele aantal vry volledige geraamtes in die Museum bewaar word. Met hierdie lewenstoneel word die reeks „Pareiasauriër-studies" dan afgerond.

Die rekonstruksie van *Bradysaurus seeleyi* is lewensgroot gemaak en is 'n getroue weergawe van al die gegewens wat deur genoemde „Studies" byeengebring is.

Die plantegroei is nagemaak volgens die gegewens, ongelukkig maar karig, wat deur paleobotanikers beskikbaar gestel is.

Dat die tuiste van die Pareiasauriërs 'n laagliggende moerasagtige gebied was, weet ons van die anatomiese bou van hierdie diere, van die aard van die plantegroei en dit is, ten laaste, gegrond op die gegewens wat deur geoloë beskikbaar gestel is aangaande die aard en metode van die neersetting van die sedimente waaruit ons vandag die versteende geraamtes van die Pareiasauriërs kap.

Met die opstelling van hierdie paleobiologiese toneel is ek gehelp deur mnr. C. W. Thorne, wat verantwoordelik was vir die maak en opstel van die plante op die voorgrond, en deur dr. A. J. Hesse wat so geslaagd die agtergrond geskilder het.

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* Met S. H. Haughton.

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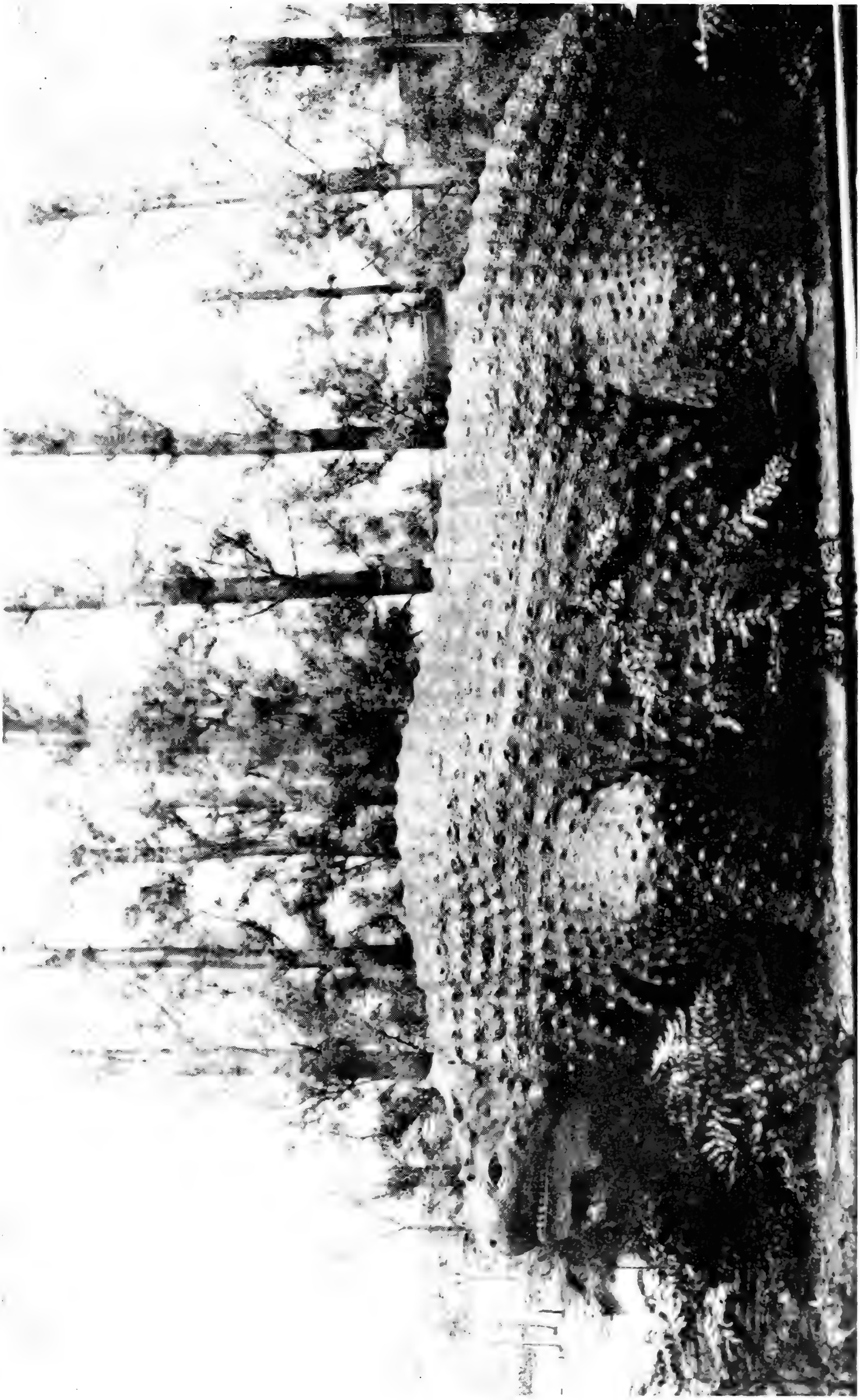

Foto: *Nas. Pers., Bpk.*

'n Lewensgrootte-rekonstruksie van *Bradysaurus seeleyi* in sy natuurlike omgewing soos opgestel in die Suid-Afrikaanse Museum.

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XX.	1924–1926	Zoology		2	12	3
XXI.	1925–1927	Zoology	(excl. Part 1)	1	16	0
XXII.	1925–1928	Palaeontology		2	0	3
XXIII.	1925–1926	Zoology		1	15	5
XXIV.	1929–1938	Anthropology and Ethnology	(excl. Part 2)	2	9	10
XXV.	1927–1928	Zoology		1	19	0
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XXVII.	1929	Anthropology		1	10	0
XXVIII.	1929–1932	Palaeontology		2	12	3
XXIX.	1929–1931	Zoology		2	8	0
XXX.	1931–1935	Zoology		3	13	10
INDEX of papers, authors, and subjects, published in Vols. I–XXX				0	1	6
XXXI.	1934–1950	Palaeontology	(Part 4 only)	0	14	0
XXXII.	1935–1940	Zoology		3	3	7
XXXIII.	1939	Zoology		2	2	0
XXXIV.	1938	Zoology		2	8	0
XXXV.	1956	Zoology		6	0	0
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XXXVII.	1947–1952	Archaeology		1	16	0
XXXVIII.	1950	Zoology		3	15	0
XXXIX.	1952	Zoology		2	14	6
XL.	1952–1956	Botany	(excl. Index)	1	6	6
XLI.	1952–1955	Zoology		4	0	0
XLII.	1953–1956	Palaeontology		3	7	6
XLIII	1955–	Zoology	Part 1 £1 0s. 0d. Part 2	0	5	0

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PART IV, *containing:—*

6. *The Hydrozoa of False Bay, South Africa.* By N. A. H. MILLARD, PH.D., Zoology Department, University of Cape Town. (With fifteen text-figures.)

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6. *The Hydrozoa of False Bay, South Africa.* By N. A. H. MILLARD, PH.D., Zoology Department, University of Cape Town. (With fifteen text-figures.)

SUMMARY

This paper records a total of sixty-five species of Hydrozoa from False Bay. Of these seven are new records from South Africa, and eight are new species. The latter include *Hydractinia canalifera, Eudendrium deciduum, Campanularia morgansi, Lovenella chiquitita, Hebella furax, Synthecium hians, Sertularella capensis* and *Sertularella falsa.*

INTRODUCTION

The literature on South African hydroids is extremely scattered, most of it in reports on expeditions and museum collections in various parts of the world. Of the early authors, only one, Professor E. Warren, was actually living in the country with free access to the shore and the hydroids in their living condition. It is not surprising, therefore, that a very large proportion of the species, and particularly the more inconspicuous ones, should have escaped notice, and that the existing records should be scattered and incomplete.

Of the early workers the main contributors were Busk (1851), Kirchenpauer (1864, 1872, 1876 and 1884), Allman (1876, 1886 and the Challenger Reports of 1883 and 1888), Marktanner-Turneretscher (1890), Warren (1908 and other papers), Jäderholm (1903, 1917 and 1923), Ritchie (1907a and 1909: Scottish National Antarctic Expedition), Vanhöffen (1910: Deutschen Südpolar-Expedition), Broch (1914: Fauna of West Africa), and Stechow (several papers including the reports of the Deutschen Tiefsee-Expedition). In 1925 Stechow published a check-list of the hydroids reported from South Africa up to that date. This included 153 species, of which 56 were collected by the Valdivia.

Since that date Manton (1940) has described one new species, Ewer (1953) one, and Millard (1955) three. Vervoort (1946a) has recorded eleven species (none of them new) from the Union.

This paper represents the first of what is hoped to be a comprehensive series describing the hydroids of South Africa. It is proposed for convenience to describe the species of different sections of the coast separately, and False Bay has been chosen as a start because of the very large collection which we possess from that area. The material has accumulated from several different sources.

In the first place there is material collected by the old Government survey vessel, the s.s. *Pieter Faure*, at the beginning of the century. This material was submitted to the author for identification by the South African Museum and is referred to by the reference letters PF. Its preservation is not all that might be desired, but most of the Calyptoblast species can be identified on their skeletal parts.

Secondly, there is a small amount of material collected by Professor T. A. Stephenson and his colleagues in their ecological survey of the coast, and lodged in the Zoology Department of the University of Cape Town. This was all collected in the littoral area at St. James, and is referred to by the reference letter F.

Lastly, the great bulk of the material was collected during the last ten years by members of the Zoology Department working under Professor J. H. O. Day. The littoral material is referred to by the reference letters CP, and the sublittoral material by the letters FB and FAL. The sublittoral material was collected by dredging and by diving with a frogman's outfit. The latter is entirely the result of the enthusiastic work of Mr. J. C. Morgans, who has been conducting a survey of the bottom fauna, and whose results will be published shortly.

The author is indebted to the members of the Zoology Department for their co-operation and help in collecting specimens, and to the Royal Scottish Museum, Edinburgh, and the Zoologische Sammlung des Bayerischen Staates, Munich, for the loan of valuable type material.

Financial aid includes grants from the Staff Research Fund of the University of Cape Town for the purchase of microscope lamps and drawing apparatus, while grants awarded by the C.S.I.R. and the Carnegie Corporation have made possible the purchase of a van and dredging equipment used in the various expeditions. The cost of publication was partly defrayed by a special grant from the publications fund of the University of Cape Town.

STATION LIST

	DATE	POSITION	DEPTH	BOTTOM
*PF 337	27/9/98	34°13′S/18°33′E	57 m.	Sand
PF 351	28/9/98	34°19′S/18°31′E (off Buffel's Bay)	58–62 m.	
PF 396	6/10/98	Off Buffel's Bay		
PF 405	8/10/98	Off Buffel's Bay		
PF 5013	8/6/00	34°14′S/18°30′ E (off Miller's Point)	42 m.	Rock
PF 15608	8/10/02	34°25′S/18°35′ E (Rocky Bank)	33 m.	Rock
PF 15675	9/10/02	34°28′S/18°32′E	73 m.	Rock
PF 16287	9/12/02	34°20′S/18°32′E	59 m.	Sand
PF 18232	11/11/03	34°27′S/18°45′E	110 m.	Green mud
PF 18293	7/12/03	34°5·5′S/18°39′E (off Swartklip)	15–18 m.	Rock
CP 15–16	1/5/38	Froggy Pond		
CP 18	30/4/38	Clovelly		
CP 19–20	4/4/38	St. James		
CP 224	29/10/32	St. James		

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* The *Pieter Faure* stations have been converted from the compass bearings given in the records, and are given to the nearest minute.

	DATE	POSITION	DEPTH	BOTTOM
CP 258	–/4/44	St. James		
CP 259	22/3/47	St. James		
CP 324	22/5/48	St. James		
CP 326	30/12/48	Strandfontein		
CP 332	23/8/49	Clovelly		
CP 333–334	25/8/49	Dalebrook		
CP 356	23/2/51	Buffel's Bay		
CP 377, 380	31/3/53	St. James		
CP 392	27/9/54	Oatland Point		
CP 410	28/9/54	Froggy Pond		
CP 415	29/9/54	Froggy Pond		
CP 426	12/10/54	Oatland Point		
FB 101	8/7/46	34°9′S/18°28′E (off Fish Hoek)	22 m.	Sand
FB 102	8/9/46	34°8·5S/18°27·5′E (off Fish Hoek)	13 m.	?Shell and stones
FB 103	24/11/46	34°8·5′S/18°27·5′E (off Fish Hoek)	15 m.	Shell and sand
FB 104	8/7/46	34°9′S/18°28′E (off Fish Hoek)	22 m.	Sand
FB 105	24/11/46	34°8·5′S/18°27·5′E (off Fish Hoek)	15 m.	Shell and sand
FB 106	8/9/46	34°8·5′S/18°27·5′E (off Fish Hoek)	13 m.	?Shell and stones
FB 107–110	24/11/46	34°8·5′S/18°27·5′E (off Fish Hoek)	15 m.	Shell and sand
FB 111	8/9/46	34°8·5′S/18°27·5′E (off Fish Hoek)	13 m.	?Shell and stones
FB 112	24/11/46	34°8·5′S/18°27·5′E (off Fish Hoek)	15 m.	Shell and sand
FB 113	8/7/46	34°9′S/18°28′E (off Fish Hoek)	22 m.	Sand
FB 114	22/2/47	34°7·5′S/18°31′E (off Muizenberg)	27–28 m.	Rock
FB 115	22/2/47	34°8′S/18°31·5′E (off Muizenberg)	27–28 m.	Sand
FB 116	22/2/47	34°7·7′S/18°31·5′E (off Muizenberg)	23–24 m.	Sand
FB 117	22/2/47	34°7·5′S/18°29·2′E (off Muizenberg)	19–20 m.	Sand
FB 119	21/4/47	34°8·5′S/18°34·5′E (near Seal Is.)	27 m.	Rock
FB 120–121	18/6/47		23–27 m.	Sand and shell
FB 122	28/4/47	34°10′S/18°27·8′E (off Glencairn)	24 m.	Sand
FB 123	28/4/47	34°9·5′S/18°27′E (off Glencairn)	15–19 m.	Sand
FB 126	20/8/47	?Off Strandfontein		
FB 127	26/9/48	34°8′S/18°29·6′E (off Kalk Bay)	18 m.	Sand
FB 128	26/9/48			
FB 129	26/9/48	34°7·1′S/18°29·1′E (off Muizenberg)	19 m.	Rock, shell and sand
FB 130	6/8/47	34°6·9′S/18°30′E (off Muizenberg)	17·5 m.	Sand
FB 131	13/12/49	34°9′S/18°26·7′E (off Glencairn)	5–8 m.	
FB 132	9/3/50	34°8·5′S/18°27′E (off Fish Hoek)	14 m.	Sand
FB 133	18/3/50	34°11′S/18°27·3′E (off Simonstown)	25 m.	Sand
FB 134	5/4/50	34°8·9′S/18°27·4′E (off Glencairn)	15 m.	Sand
FB 136	27/8/51	34°9·6′S/18°26·6′E (off Glencairn)	17 m.	Rock
FB 137	27/8/51	34°10·2′S/18°26·2′E (off Glencairn)	14 m.	Shell and sand
FB 138	27/8/51	34°10·1′S/18°26·1′E (off Glencairn)	9 m.	Sand
FB 139	27/8/51	34°10·0′S/18°26·1′E (off Glencairn)	10 m.	
FB 140	27/8/51	34°9·3′S/18°26·4′E (off Glencairn)	11 m.	Rock

	Date	Position	Depth	Bottom
FB 141	20/9/50	34°7·5′S/18°29′E (off St. James)	14·5 m.	?Sand and rock
FB 142	20/9/50	34°7·5′S/18°29′E (off St. James)	16·5 m.	Sand and stones
FB 143	27/8/51	Off Glencairn	8 m.	Rock
FB 144	29/4/48	34°10·2′S/18°27·8′E (Roman Rock)	26–29 m.	Sand
FB 145	29/4/48	34°9·2′S/18°26·8′E (off Glencairn)	20–23 m.	Sand and shell
FB 146	26/9/48	34°8·5′S/18°30′E (off Muizenberg)	24 m.	Shell and sand
FB 147	26/9/48	34°7·5′S/18°29·5′E (off Muizenberg)	14 m.	Sand
FAL 6, 7 and 13	22/2/52	34°8·2′S/18°35·3′E (near Seal Is.)	24 m.	Rock
FAL 15	5/3/52	34°12·5′S/18°28′E (SE of Oatland Point)	8–9 m.	Sand and rock
FAL 20, 23	5/3/52	34°13′S/18°28′E (off Spaniard Rock)	11–12 m.	Shell and rock
FAL 26	5/3/52	34°13′S/18°29′E (off Miller's Point)	15–21 m.	?Sand and shell
FAL 34	18/6/52	34°5′S/18°44′E (off Kromhout Rock)	7 m.	Sand and rock
FAL 42	25/6/52	34°9·6′S/18°49·2′E (off Gordon's Bay)	21–22 m.	Sand and rock
FAL 51–52	25/6/52	34°9·3′S/18°49·6′E to 34°9′S/18°50·1′E (off Gordon's Bay)	18 m.	Rock and sand
FAL 56	25/6/52	34°9·4′S/18°50·8′E to 34°9·5′S/18°50·9′E (off Gordon's Bay)	8 m.	Rock
FAL 58	25/6/52	34°9·4′S/18°50·4′E (off Gordon's Bay)	12 m.	Sand and rock
FAL 60	29/7/52	34°17·8′S/18°49·3′E (off Rooi Els)	7–10·5 m.	Sand
FAL 61–62	29/7/52	34°17·5′S/18°49·2′E (off Rooi Els)	22 m.	Sand
FAL 64	29/7/52	34°17·3′S/18°48·7′ E (off Rooi Els)	37–38 m.	Shell and ?sand
FAL 66	29/7/52	34°17·2′S/18°49·4′E (north of Rooi Els)	16–19 m.	Rock
FAL 78, 82	19/8/52	34°16·5′S/18°49·5′E (north of Rooi Els)	14–17 m.	Rock
FAL 95	17/9/52	34°10·6′S/18°47·3′E (off Gordon's Bay)	36 m.	Rock and sand
FAL 108	23/1/53	34°9·3′S/18°51′E (Gordon's Bay)	8–12 m.	Rock and sand
FAL 115	12/2/53	34°11′S/18°25·6′E (Simon's Bay)	3–5 m.	Shell and sand
FAL 123	17/2/53	34°10′S/18°26′E (off Glencairn)	7 m.	Rock and sand
FAL 125	17/2/53	34°10′S/18°26′E (off Glencairn)	2–4 m.	Rock
FAL 132	27/2/53	34°12·5′S/18°28′E (Oatland Point)	0–2 m.	Rock
FAL 137	4/3/53	34°9·8′S/18°51·5′E (Gordon's Bay Pier)	0–4 m.	Rock
FAL 141	9/3/53	34°12·5′S/18°28′E (Oatland Point)	0–5 m.	Rock
FAL 148	12/3/53	34°12·5′S/18°28′E (Oatland Point)	5·5–6·5 m.	Stones, rock and sand
FAL 153, 154, 159	21/4/53	34°12·5′S/18°28′E (Oatland Point)	0–3 m.	Rock

	DATE	POSITION	DEPTH	BOTTOM
FAL 160	23/5/53	34°12·5′S/18°28′E (Oatland Point)	0–3 m.	Rock
FAL 165, 167	10/6/53	34°12·5′S/18°28′E (Oatland Point)	2–4 m.	Rock
FAL 169, 174	10/6/53	34°12·5′S/18°28′E (Oatland Point)	4–6·5 m.	Rock
FAL 176	10/6/53	34°12·5′S/18°28′E (Oatland Point)	0–2 m.	Rock
FAL 177	9/8/53	34°12·5′S/18°28′E (Oatland Point)		
FAL 183	11/9/53	34°22·1′S/18°35·2′E (north of Rocky Bank)	73 m.	Shell and sand
FAL 186	10/9/53	34°12·8′S/18°36·5′E	46 m.	Shell and sand
FAL 205	10/9/53	34°17·6′S/18°39·2′E	62 m.	Shell and ?sand
FAL 207	10/9/53	34°9·9′S/18°42·4′E	36·5 m.	Rock and sand
FAL 209	10/9/53	34°6·8′S/18°40·3′E (off Swartklip)	29 m.	Shell and sand
FAL 211	9/9/53	34°7·1′S/18°35·6′E (off Strandfontein)	22 m.	Rock, sand and shell
FAL 214	10/9/53	34°12·4′S/18°43·5′E	42 m.	Rock
FAL 217	9/9/53	34°7·0′S/18°32·5′E (NW of Seal Is.)	18 m.	Rock, sand and shell
FAL 222–223	9/9/53	34°13·9′S/18°31·6′E (off Miller's Point)	40 m.	Sand and shell
FAL 230	9/9/53	34°17·3′S/18°31·4′E (off Buffel's Bay)	49 m.	
FAL 238	10/9/53	34°20·6′S/18°39·4′E	82 m.	?Shell, sand and green mud
FAL 258	21/11/53	34°12·5′S/18°28′E (Oatland Point)		Shell and sand
FAL 262	21/11/53	34°11·6′S/18°27·3′E (Noah's Ark)	11–14 m.	Rock
FAL 268	18/9/54	34°10·9′S/18°27·2′E (Roman Rock)	15–18 m.	Rock
FAL 274	21/9/54	34°10·9′S/18°27·2′E (Roman Rock)	14–17 m.	Rock
FAL 279, 282	23/9/54	34°10·9′S/18°27·2′E (Roman Rock)	12–14 m.	Rock
FAL 288	15/10/97	34°9·6′S/18°49·8′E (off Gordon's Bay)	18 m.	?Rock
FAL 289–290	–/9/97		40 m.	
FAL 291	24/3/98			
FAL 292	21/10/03	Kalk Bay		
FAL 311	11/4/55	34°12·5′S/18°28′E (Oatland Point)	0–2 m.	Rock

List of Species

Gymnoblastea

Corynidae

Coryne sp.

Tubulariidae

Tubularia solitaria Warren
Tubularia sp.

Bougainvilliidae

Hydractinia altispina Millard
Hydractinia canalifera n. sp.
Hydractinia carnea (M. Sars)
Hydractinia sp.
Leuckartiara octona (Fleming)
Hydrocorella africana Stechow

Eudendriidae

Eudendrium ?antarcticum Stechow
Eudendrium deciduum n. sp.

Myriothelidae

Myriothela capensis Manton

Calyptoblastea

Haleciidae

Hydrodendron caciniformis (Ritchie)
Halecium beanii (Johnston)
Halecium dichotomum Allman
Halecium parvulum Bale
Halecium tenellum Hincks

Campanulariidae

Campanularia integra MacGillivray
Campanularia morgansi n. sp.
Clytia gracilis (M. Sars)
(*Clytia raridentata* (Hincks))
Obelia dichotoma (Linnaeus)
Obelia geniculata (Linnaeus)

Campanulinidae

Lovenella chiquitita n. sp.

Lafoeidae

Hebella furax n. sp
Hebella scandens (Bale)
Scandia mutabilis (Ritchie)
Reticularia serpens (Hassall)
Zygophylax cornucopia Millard

Syntheciidae

Synthecium ?elegans Allman
Synthecium hians n. sp.

Sertulariidae

Dictyocladium coactum Stechow
Salacia articulata (Pallas)
Sertularella africana Stechow
Sertularella abuscula (Lamouroux)
Sertularella capensis n. sp.
Sertularella falsa n. sp.
Sertularella flabellum (Allman)
Sertularella fusiformis (Hincks)
Sertularella goliathus Stechow
Sertularella mediterranea Hartlaub
Sertularella megista Stechow
Sertularella polyzonias (Linnaeus)
Sertularella xantha Stechow
Symplectoscyphus macrogonus (Trebilcock)
Amphisbetia bidens (Bale)
Amphisbetia minima (Thompson)
Amphisbetia operculata (Linnaeus)
Sertularia distans (Lamouroux)
Sertularia marginata (Kirchenpauer)

Plumulariidae

Antennella africana Broch
Halopteris constricta Totton
Halopteris valdiviae (Stechow)
Paragattya intermedia Warren
Plumularia lagenifera Allman
Plumularia pulchella Bale
Plumularia setacea (Ellis and Solander)
Plumularia spinulosa Bale
Kirchenpaueria pinnata (Linnaeus)
Pycnotheca mirabilis (Allman)
Nemertesia cymodocea (Busk)
Nemertesia ramosa Lamouroux
Antennopsis scotiae Ritchie
Aglaophenia pluma (Linnaeus)
Thecocarpus giardi Billard.
Lytocarpus filamentosus (Lamarck)

Family **Corynidae**

Coryne sp.

Records. FAL 311 T. CP 326 F.

Description. Several branching stems reaching 0·8 cm. in length, one with young gonophores, but too small to determine structure. Stem smooth or irregularly corrugated in parts, pedicels of hydranths annulated at base. Hydranths approximately 1 mm. in length.

Remarks. There is nothing in the appearance of the colony to exclude it from *Coryne eximia* Allman, but in the absence of mature gonophores the specimens cannot be finally identified.

Family **Tubulariidae**

Tubularia solitaria Warren 1906a.

Tubularia solitaria Warren 1906a; p. 83; Pl. X and XI.

Records. F 231 (recorded by Eyre 1939). CP 326 D.

Description. Gonophores present in December.

Tubularia sp.

Records. CP 326 E. FAL 153 X.

Description. A few small specimens with well-developed perisarc, and hydranths without gonophores.

Remarks. Due to the paucity of the material and the absence of gonophores the identification cannot be completed.

Family: **Bougainvilliidae**

Hydractinia altispina Millard 1955

Hydractinia altispina Millard 1955; p. 215; fig. 1.

Records. F 274. CP 258, 377. FAL 7 Z. (Recorded by Millard 1955.)

Hydractinia canalifera n. sp.

Fig. 1

Type. Holotype CP 332 in University of Cape Town.

Description. A single colony growing on weed in the littoral area. Hydrorhiza forming an intimately anastomosing feltwork, encrusted in centre of colony, but not at periphery.

Gastrozooids large, reaching 2–3 mm. in height (preserved), with 10–14 tentacles in a single whorl. Manubrium conical when contracted, but capable of great expansion and even of turning completely inside-out.

No spines. No spiral zooids, but a very few tentacular filaments scattered amongst the gastrozooids.

Gonozooids smaller than gastrozooids, each with a mouth and a single whorl of 6–9 short tentacles, bearing a cluster of 4 or 5 sporosacs on the upper half

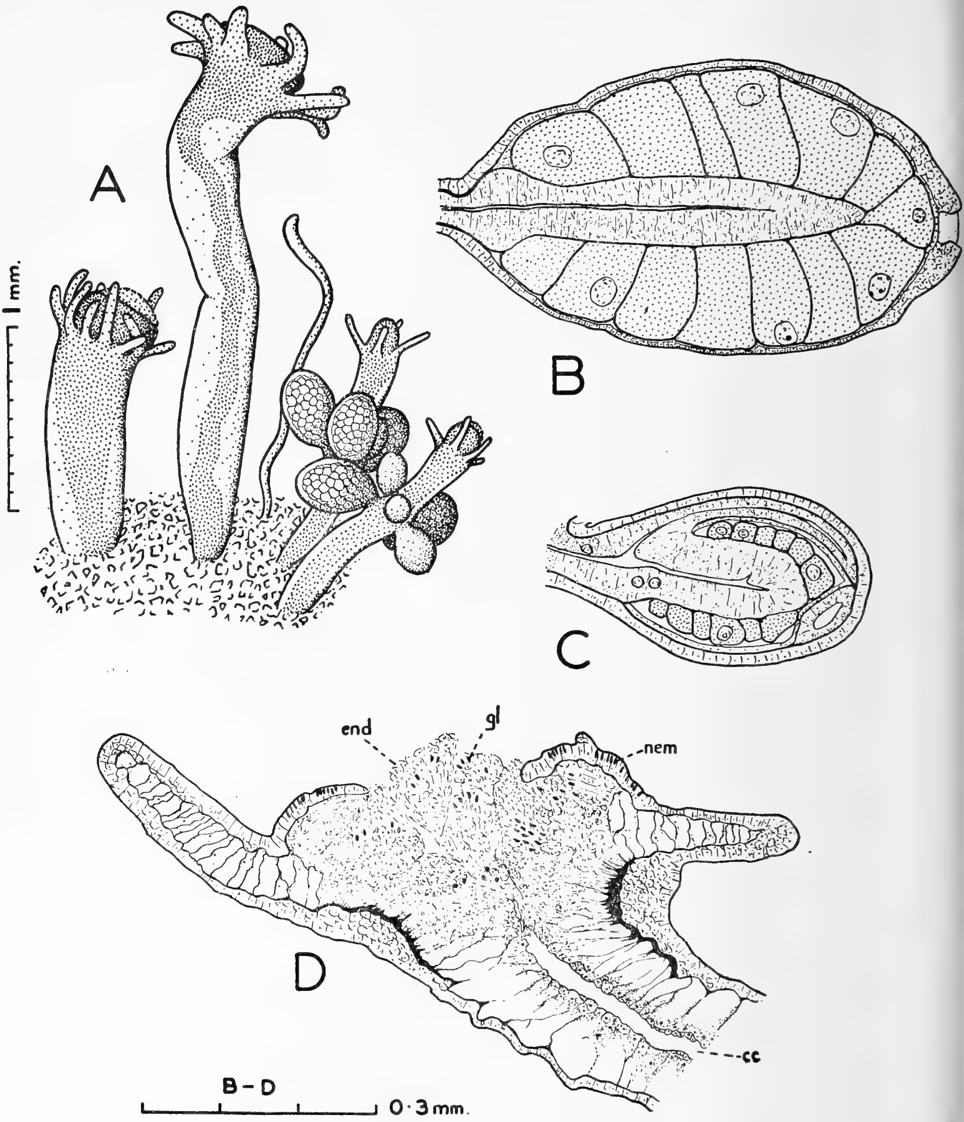

Fig. 1. *Hydractinia canalifera* n. sp. from the holotype.

A. Portion of a colony, showing 2 gastrozooids, a tentacular filament, and 2 female gonozooids bearing sporosacs. B. Longitudinal section through mature female sporosac. Radial canals not visible. C. Longitudinal section through young female sporosac, passing through one radial canal and the circular canal. D. Longitudinal section through gastrozooid, showing central canal (*cc*) of stem, and endodermal plug (*end*) blocking the mouth. *gl*, gland cells; *nem*, nematocysts.

of the stem. Female sporosacs only present, ovoid, containing many eggs (estimated as well over 50). Radial canals and circular canal present in young sporosacs, though not visible in older ones. Manubrium with a very restricted cavity. No vestige of tentacles.

Detailed Anatomy. The structure of the zooids is interesting and unusual. Under the dissecting microscope and in whole mounts a distinct central tube can be seen passing up the stem to expand into a mass of solid tissue within the tentacle-ring and completely blocking the mouth. Sections reveal that the narrow central canal is formed by the massing of the cytoplasm in the inner ends of enormously elongated endoderm cells. The outer ends of the cells resting on the mesogloea are swollen and vacuolated, and tend to run together to form a system of open spaces surrounding the central canal.

Near the top of the stem the central canal merges with a solid mass of small endoderm cells which fills all the cavity within the tentacle-ring. Large darkly staining gland cells are visible in the mass. Sometimes a series of crevices puts the central canal or even the outer space into communication with the exterior, but in most cases there is no communication whatever. In a few zooids the central plug of endoderm is actually extruded beyond the level of the manubrium, and in cases where the manubrium has turned inside-out, a large area of endoderm is exposed to the exterior.

Measurements (preserved material)

Gastrozooids reaching 3·16 mm. to origin of tentacles. Gonozooids reaching a maximum height of 1·25 mm. to origin of tentacles.

Female sporosac, maximum length	0·76 mm.
maximum diameter	0·53 mm.

Remarks. H. canalifera is very close to *H. kaffraria* Millard 1955, but can be distinguished by its larger and more robust zooids, and particularly by the internal modifications of the endoderm.

The only other hydroid known to the author in which the digestive cavity is blocked by endoderm is *Eudendrium angustum* Warren 1908, in which food matter is directly ingested by the endoderm cells. It is probable that a similar method of feeding is employed by *H. canalifera*, and the extrusion of the endoderm and eversion of the manubrium suggests that secretions may also be poured over the food outside the body.

Hydractinia carnea (M. Sars) 1846

Podocoryne carnea Hincks 1868; p. 29; Pl. V.

?*Hydractinia parvispina* Vanhöffen 1910, p. 291.

Hydractinia carnea Vervoort 1946, p. 126, fig. 49.

Records. FB 108, 121 B. FAL 64 W, 205 C, 209 D, 238 B.

Description. Colonies fairly common in dredgings on shells of *Hinia speciosa* (Adams). Hydrorhiza an open meshwork in younger parts of colony, completely encrusted in older parts, spines present only in fully encrusted areas.

Ripe gonophores, however, may be present in areas which are not fully encrusted.

The development of the medusoid individuals at the time of liberation varies considerably and does not seem to depend on the season. I have seen a gonozooid bearing two gonophores, one of which was a small but perfectly developed medusa with 4 tentacles and no sexual products, and the other much larger and filled with spermatogenic cells, yet with the tentacles undeveloped. Female medusoids are often packed with eggs at the time of liberation, the number varying from 27 to 40. Gonophores present in June, July, September and November.

Remarks. It is highly probable that the material reported from Simonstown as *H. parvispina* on *Nassa* by Vanhöffen is the same species with precociously developed sexual products.

Hydractinia sp.

Records. FAL 183 N.

Description. Hydrorhiza encrusted. Spines smooth, long and hollow, reaching a maximum length of 1·5 mm. Gastrozooid about 4 mm. long. Gonozooids smaller, tentacular. Gonophores in the form of fixed sporosacs, no radial canals visible. Smaller ones female, containing tightly packed eggs. Larger ones male or hermaphrodite, the latter containing a few scattered eggs packed amongst masses of spermatogenic material.

Remarks. The material is in a very poor state of preservation, and the nature of the gastrozooids and gonozooids cannot be determined. The species appears to be closely related to *Hydractinia altispina* Millard 1955, although hydranths and spines are somewhat longer. The sporosacs are better preserved than the hydranths, and appear to be unique in their hermaphroditic nature.

Leuckartiara octona (Fleming) 1823

Eudendrium repens Wright 1858.

Leuckartiara octona Rees 1938, p. 12 (synonymy), figs. 3–5.

Records. FB 121 C, 136 C, 138 A, all on *Bullia annulata* (Lamarck). FAL 60 C, 61 B, 115 E, 209 C, on *Bullia annulata* (Lamarck); FAL 238 C on *Nassarius circumtectus.*

Description. Colonies fairly common on the shells of certain gastropods. The form of the colony is very similar to that described by Rees 1938 from the shell of a *Turritella* inhabited by a hermit crab.

On the 'under' side of the shell the stems are low and the hydranths small, the whole colony not exceeding 1 mm. in height. No gonophores are present in this region and often no hydranths, the shell being covered only by the reticular hydrorhiza.

On the 'upper' side of the shell and round the tip of the spire the colony is much better developed and reaches a height of 3–5 mm. The stems are long and occasionally branched, and bear numerous gonophores. Only once was a gonophore seen to arise from the hydrorhiza.

Perisarc annulated or coarsely wrinkled at base of stem, widening distally and continued over hydranth to bases of tentacles where it ends abruptly. Hydranths with 6–12 tentacles, usually held alternately elevated and depressed.

Gonophores with short annulated pedicels, completely invested by transparent perisarc. Medusae with 2 long tentacles when ready to leave. Gonophores present from June to September.

Measurements (in mm., preserved material)

Hydrorhiza, diameter	0·04–0·07
Stem, diameter at base	0·045–0·07
Pseudohydrotheca, length	0·22–0·37
maximum diameter	0·19–0·38
Hydranth, length to tip of manubrium	0·30–0·51
Gonophore, length	0·30–0·60
diameter	0·18–0·45

Hydrocorella africana Stechow 1921c

Hydrocorella africana Stechow 1925, p. 409.

Records. FB 114 B, 115 C, 122 B, 123 B, 125 B, 136 D, 137 B, 143 A, 144, 145.

Description. Fertile colonies growing on empty gastropod shells. Gonophores borne in clusters on gonozooids which are smaller than the gastrozooids and possess about 6 rudimentary tentacles. Gonophores present in February.

Family: **Eudendriidae**

Eudendrium ?antarcticum Stechow 1921a

Eudendrium antarcticum Stechow 1925, p. 415, fig. 5.

Records. FAL 288 H.

Description. Hydrorhiza creeping on other hydroids. Stem unbranched or sparingly branched, reaching a maximum height of 3 mm.; annulated at base, on origins of branches and occasionally for short distances in other regions. Perisarc terminating abruptly below hydranth. Hydranth with about 20 tentacles (19–23 in 8 counts) and a distinct annular groove near base.

Male gonophores borne in clusters on completely atrophied hydranths which arise from the stem or, more frequently, direct from the hydrorhiza. Pedicel annulated. Gonophore one-chambered, with a distinct tubercle at distal end. Present in October. Female gonophores absent.

Measurements (in mm., preserved)

Stem, diameter	0·055–0·075
Hydranth, length to tip of manubrium	0·20–0·30
diameter at tentacle roots	0·11–0·16
Gonophores, male, length	0·15–0·22

Remarks. This species cannot be definitely diagnosed in the absence of female gonophores. The trophosome and its measurements, however, agree well with Stechow's description.

The species is excluded from *E. parvum* Warren and *E. capillare* Alder by the smaller diameter of the stem and the one-chambered male gonophores. It is close to *E. simplex* Pieper 1884, which, however, is said to have hermaphroditic gonophores.

Totton, 1930, gave the name *E. antarcticum* to a group of small antarctic forms which had previously been assigned to several different species. Totton's species differs from that of Stechow in its taller growth (reaching 6 cm.), in the presence of a weakly fascicled stem in the larger specimens, and particularly in the greater diameter of the stem. It is obviously a separate species, and was renamed *E. tottoni* by Stechow in 1932.

Eudendrium deciduum n. sp.

Fig. 2

Types and Records. Holotype FAL 52 V in University of Cape Town. Further records: PF ?351 D, ?18232 A. FAL 13 E, 82 W, 108 N, 154 A, 169 S, 183 K, 288 G.

Description. Rugged tree-like colonies reaching a maximum height of 16 cm. Main stem thick and woody at base, reaching a diameter of 8 mm. Main stem and principle branches fascicled. Branching irregular and in all planes, hydranth-bearing pedicels with a tendency to arise from one side of branches. Annulations present on origins of all branches and pedicels, and groups of annulations at irregular intervals on stem and branches, pedicels annulated to a varying extent but generally smooth in terminal portion, gonophore-bearing pedicels more or less completely annulated. Perisarc terminating abruptly below hydranths, hydranth with basal circular groove and about 26 tentacles (22–30 in 23 counts).

Male gonophores 2–3 chambered, on atrophied hydranth. Female gonophores borne in whorl at base of hydranth, which later atrophies; spadix branching and later shed.

The material shows all stages in the development of the female gonophores (fig. 2, E–H). In the earliest stage the spadix curves round the egg as in the typical gonophores of *E. ramosum*, later it develops 3 to 4 pairs of lateral projections, and eventually the whole spadix peels away from the embryo and is discarded. At about this stage, too, the tentacles of the gonophore-bearing hydranth atrophy. The young embryo remains enclosed in a transparent capsule which typically bears warty protuberances on the surface.

Remarks. This species is almost impossible to distinguish from several others in the absence of gonophores. It is closely related to *E. ramosum* (Linn.) and *E. rameum* (Pallas), neither of which, however, has been recorded from South Africa. It is also close to *E. angustum* Warren, which was recorded off Algoa Bay at 40 fath., but differs from it in the presence of a groove round the base

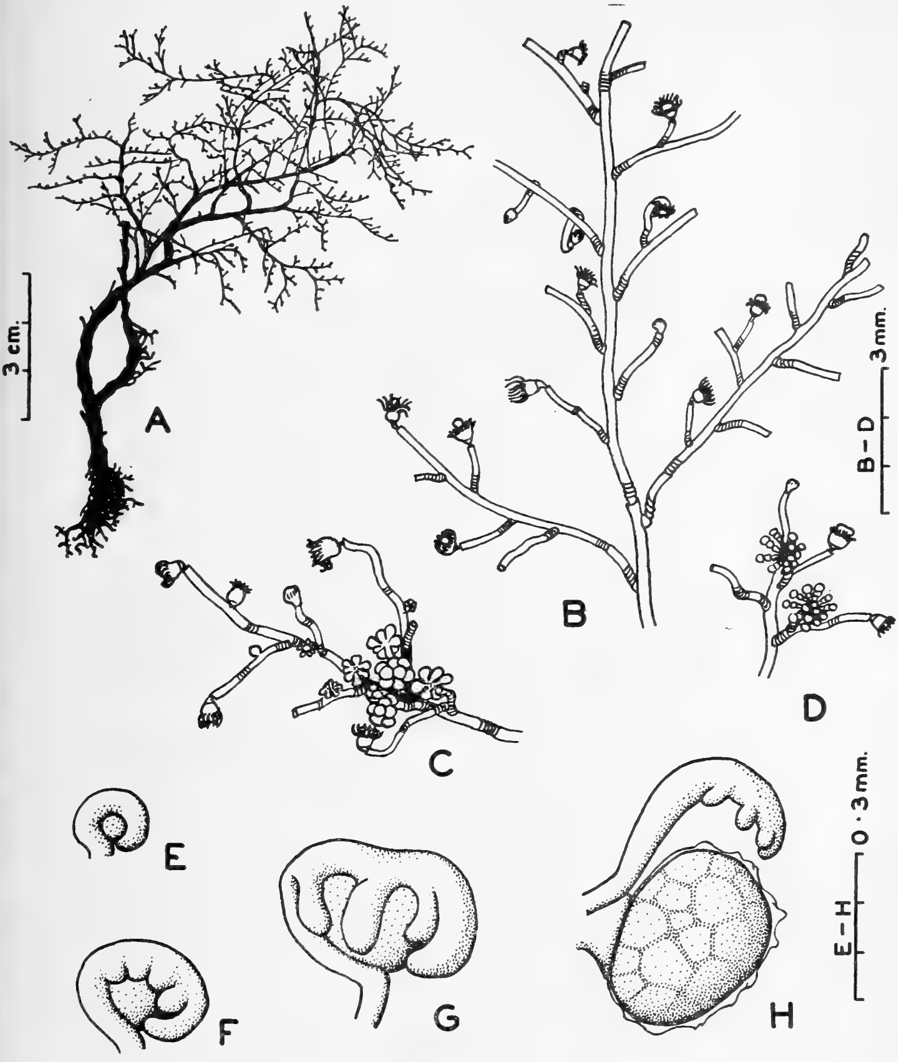

FIG. 2. *Eudendrium deciduum* n. sp. from the holotype.

A. Whole colony. B. Portion of sterile colony. C. Branch bearing female gonophores in various stages of development. D. A branch bearing two groups of male gonophores. E–H. Stages in development of the female gonophore (see text).

of the hydranth, and in the absence of an endodermal plug in the gastral cavity. *E. racemosum* (Gmelin) differs in the form of the female gonophore, which has a forked spadix.

Gonophores of *E. deciduum* have been observed in April, June and October. The main stem of the colony is dark brown, the smaller branches clear brown to horn-colour, and the female gonophores bright orange when living.

Family: **Myriothelidae**

Myriothela capensis Manton 1940

Myriothela capensis Manton 1940, p. 276, figs. 7, 8b, 9, Pl. I, figs. 12, 13.

Records. FB 119 G.

Description. A single small specimen measuring 0·65 cm. (preserved), with gonophores containing eggs.

Family: **Haleciidae**

Hydrodendron caciniformis (Ritchie) 1907

Fig. 3

Ophiodes caciniformis Ritchie 1907, p. 500; Pl. XXIII, figs. 11 and 12; Pl. XXIV, fig. 1.

Records. FAL 268 J.

Description. A small colony growing on weed and reaching a maximum height of 9·5 mm. Hydrorhiza forming a loose network on surface and strengthened by internal chitinous projections; giving rise to upright stems, solitary hydrophores, and a few scattered nematophores.

Stem sometimes weakly fascicled at base and occasionally branched, divided into fairly regular internodes which bear the hydrophores alternately to right and left, each on a short apophysis near the distal end. A suggestion of an annulation above and below each node. Branches, when present, exactly similar to main stem. Ritchie states that 'a secondary hydrotheca, borne on a relatively long peduncle, may arise from the lower portion of the peduncle of a primary hydrotheca'. This occurs quite commonly in the False Bay material, and a branch is simply the continuation of this process of budding. The two rows of hydrophores are not always in the same plane, but sometimes converge slightly to one side.

Hydrophores elongated, flaring towards margin, which is everted, separated from stem apophysis by one or more nodes. No reduplications observed. An indication of a pseudodiaphragm sometimes evident near base of hydrophore as an annular thickening of the perisarc. Hydrotheca with a well-defined diaphragm at base, and a row of puncta about one third of the height above it. Polyps not well preserved, but apparently can be almost retracted into hydrothecae.

Nematothecae irregular and scarce, about 4 or 5 to a stem; borne on stem internodes, bases of hydrophores, or from hydrorhiza; sessile, goblet-shaped, with everted margin. No refringent dots observed.

Gonangia absent.

Measurements (mm.)

Stem, diameter at node	0·12–0·16
length of internode	0·33–0·54

Hydrophore, margin to stem apophysis (unbranched examples only)	0·26–0·58
margin to diaphragm	0·085–0·12
margin to puncta	0·06–0·08
diameter at margin	0·21–0·24
Nematophore, length	0·15–0·20
diameter at margin	0·10–0·12

Remarks. This comparatively rare species has been reported from the Cape Verde Islands, the West Indies and the Mediterranean. This is the first record from South Africa.

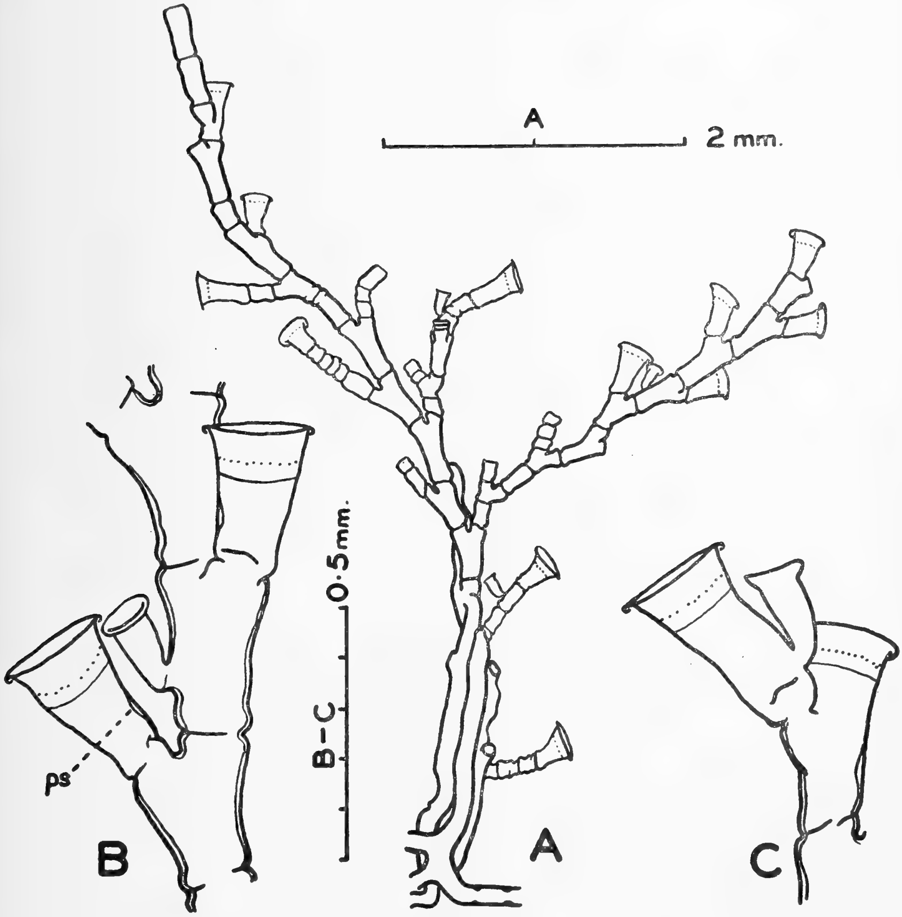

Fig. 3. *Hydrodendron caciniformis* (Ritchie). FAL 268 J.

A. A complete upright stem. B and C. Enlarged portions showing hydrophores and nematothecae. In C a secondary hydrophore is branching from a primary one. *ps*, pseudodiaphragm.

Halecium beanii (Johnston) 1838

Halecium Beanii Hincks 1868, p. 224; Pl. XLIII, fig. 2. Broch 1918, p. 38, fig. XIII.
Halecium beani Stechow 1925, p. 419.

Records. CP 356 H. FB 119 F. FAL 66 S, 78 Y, 153 Z, 183 L, 186 E, 282 Y, 288 B, 311 V.

Description. There is little further to add to the description of this well-known species. Abundant material with male and female gonangia has been collected from various localities. Colonies are generally short and bushy, reaching a maximum height of 5·0 cm. The primary hydrothecae are sessile and adnate to the stem, and often the two rows are not quite in the same plane but inclined to one side. Ripe gonangia have been found in April and from August to October.

Halecium dichotomum Allman 1888

Halecium dichotomum Allman 1888, p. 13; Pl. VI. Stechow 1925, p. 419.

Records. PF 15608 J. FAL 78 Z, ?64 N.

Description. Colonies short and scrubby with strongly fascicled stems, and hydrophores shorter and more annulated than those figured by Allman. Hydrothecal walls straight for the major part, with the extreme edge bent sharply outward.

Female gonangia of the typical annulated type, and male gonangia (not previously described) present on the same colonies. The latter smaller than the female, elongated, slender, smooth, but often with several longitudinal creases near distal end. Gonangia present in August and October.

Some of the material (FAL 64 N) is assigned with some doubt to this species. The form of the colony and structure of the hydrophores is indistinguishable, but the female gonangia, although annulated in the typical manner, show no trace of a lateral opening.

Measurements (in mm., excluding FAL 64 N)

Hydrophore, length from origin on previous hydrophore	0·34–0·95
Hydrotheca, length, diaphragm to margin	0·03–0·045
puncta to margin	0·02–0·03
diameter at margin	0·19–0·23
diameter at level of diaphragm	0·16–0·20
Gonotheca, female, length	1·03–1·25
maximum diameter	0·46–0·50
Gonotheca, male, length	0·52–0·73
maximum diameter	0·15–0·19

Halecium parvulum Bale 1888

Fig. 4A

Halecium parvulum Bale 1888, p. 760; Pl. XIV, figs. 4–5. Marktanner-Turneretscher 1890, p. 218; Pl. III, fig. 22.

Halecium gracile Bale 1888, p. 759; Pl. XIV, figs. 1–3. Jäderholm 1903, p. 266; Pl. XII, figs. 2–3. Billard 1906b, p. 163.

Helecium flexile Bale 1915, p. 246.

Records. CP 324, 334, 356 D. PF 15608 H, 15675 F. FB 129 C. FAL 66 P, 78 W, 132 V, 141 B, ?154 C, 165 Z, 174 X, 183 R, 288 A.

Description. Bushy colonies up to 5·9 cm. in height, with stem and main branches fascicled. Stem a scorpioid cyme, with branches arising singly from the bases of the hydrophores and often anastomosing. Stem straight or zigzag, with nodes of varying length, and sometimes an athecate internode interpolated between two thecate ones. Hydrophores strongly everted, as described and figured by Bale 1888, but often with a 'pseudodiaphragm' below the hydrotheca. This is always better developed on the adcauline side. Secondary hydrophores quite smooth or annulated at base. Margin of hydrotheca more strongly everted on adcauline side.

Gonothecae arising from bases of hydrophores on main stem and branches, flattened in the plane at right angles to the branch. Female gonotheca notched at distal end as in Bale 1888, Pl. XIV, fig. 5, and Jäderholm 1903, Pl. XII, fig. 3. Blastostyle branching at the base, distal end swollen and pear-shaped, not completely filling gonotheca, with its blunt end pressed against the opening; bearing about 6 eggs. Male gonotheca smaller than female, resembling Bale's figure (1888, Pl. XIV, fig. 1) in front view, and Allman's figure of *H. flexile* (1888, Pl. V, fig. 2a) in side view; younger gonothecae more flattened and tapering distally to a sharp edge. Containing a central mass of spermatogenic tissue, supported by a blastostyle which continues to the distal end, where it spreads out giving a cap-like appearance. Male and female usually on separate colonies, but may occur on the same one. Gonangia present in February, March, July, August and October.

Measurements (mm.)

Stem, diameter	0·09–0·175
length of internode	0·34–0·85
Hydrophore (primary only), length from origin on internode	0·115–0·28
Hydrotheca, length, puncta to margin	0·02–0·05
diameter at margin	0·13–0·21
Gonotheca, female, length	1·05–1·45
width	0·66–1·06
Gonotheca, male, length	0·52–0·98
width	0·255–0·61

Remarks. *H. gracile* Bale 1888 and *H. parvulum* Bale 1888 are accepted as synonyms, but since *H. gracile* is preoccupied by *H. gracile* Verrill 1874, the name *H. parvulum* must be used. There seems to be some doubt as to whether Bale's species is synonymous with *H. flexile* Allman 1888, the synonymy being accepted by Hartlaub 1905, Ritchie 1911, Bale 1915 and Stechow 1919; and rejected by Totton 1930. Female gonophores of *H. flexile* have not been described, and so in the meantime it seems better to keep the two species apart.

The measurements of the False Bay material agree well with those given by Billard 1906b, and with the size of *H. gracile* and *H. parvulum* in Bale's illustrations, except that the female gonothecae of Bale's specimens are somewhat smaller.

H. parvulum occurs in Australia, South America and Morocco, but this is the first record from South Africa.

var. *magnum*, n. var.

Fig. 4, B–O

Types and Records. Holotype FAL 274 R in University of Cape Town, male and female. Paratypes FAL 159 L in University of Cape Town, PF 405 A and PF 16287 A, part in University of Cape Town and part in S.A. Museum. Further records: FAL 82 V, 214 H, 268 H, 288 C.

Description. Stiff bushy colonies, differing from the typical form only in the much larger dimensions. The stem internodes, the hydrothecae and the female gonothecae are approximately double those of the typical form, and the two varieties can be distinguished at a glance.

Measurements (mm.)	*Holotype*	*Paratypes*
Stem, diameter	0·23–0·31	0·21–0·33
length of internode	0·82–1·10	0·61–1·34
Hydrophore (primary only), length from origin on internode	0·10–0·37	0·15–0·35
Hydrotheca, length, puncta to margin	0·04–0·07	0·04–0·07
diameter at margin	0·33–0·37	0·26–0·36
Gonotheca, female, maximum length	2·28	3·05
maximum width	2·05	2·38
Gonotheca, male, maximum length	0·99	1·31
maximum width	0·67	0·79

Remarks. The maximum height of the holotype material is 6·4 cm., but paratypes PF 405 A and 16287 A are both very much more luxurious, the latter reaching 17·3 cm. Gonangia have been recorded in September, October and December.

From the abundant fruiting material collected it has been possible to follow the development of the gonangia, which has not previously been described for this species. The development is interesting since the gonothecae differ in

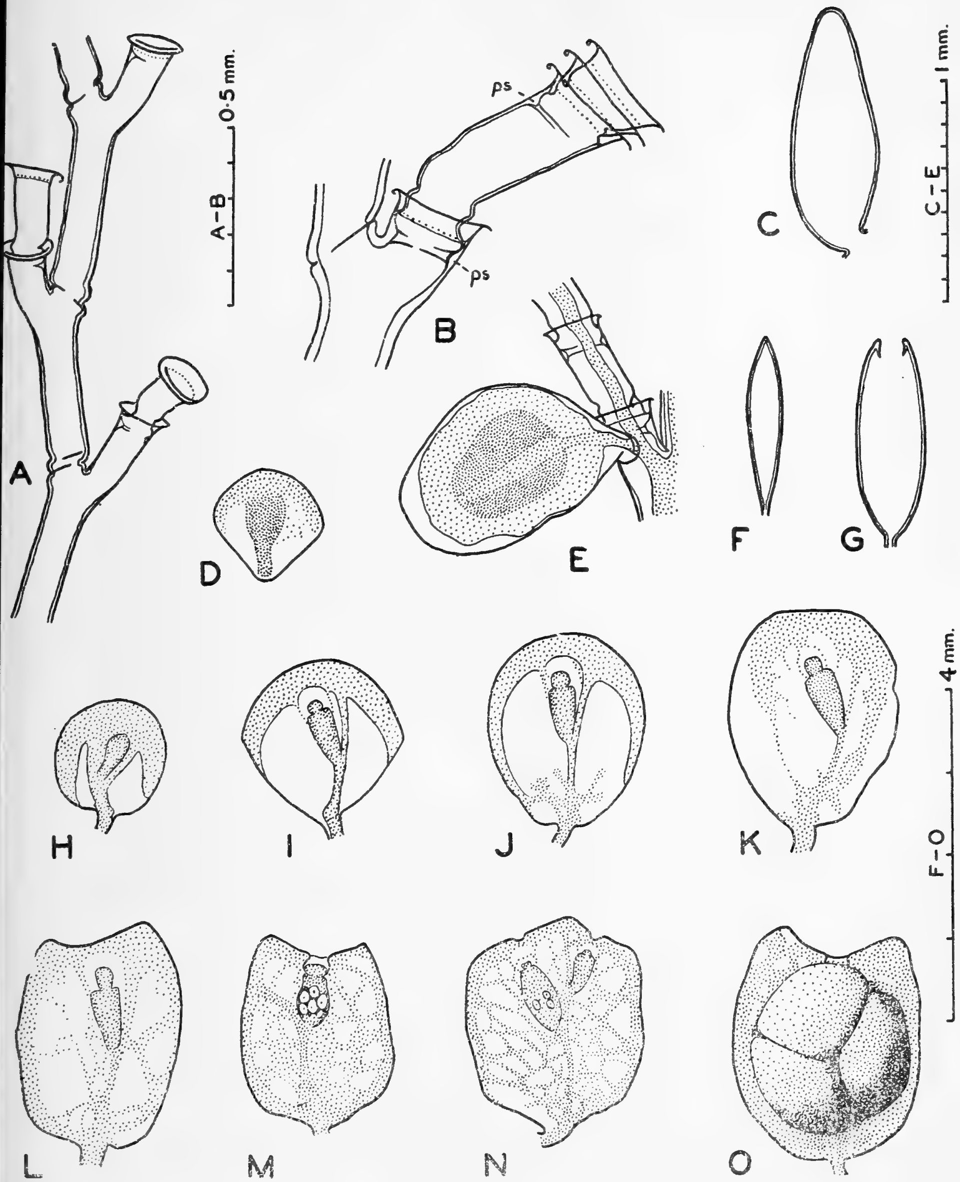

FIG. 4. A. *Halecium parvulum* Bale, typical form.

B–O. *Halecium parvulum* Bale, var. *magnum* n. var.

B. A single hydrophore from the holotype, on same scale as A. C–E. Male gonangia from the paratype PF 405 A; C is a mature gonotheca in longitudinal section; D a young gonangium, and E a mature gonangium, both in front view. F–O. Female gonangia; F a young gonotheca and G a mature gonotheca in longitudinal section; H–O successive developmental stages in front view. N is an abnormal gonangium with two hydranths. F–M from the holotype, N and O from the paratype FAL 159 L. *ps*, pseudodiaphragm.

appearance at different stages in their development, and were it not that all stages have been observed on one colony, they might have been assigned to different species. The following description is based primarily on the holotype, but is supplemented and confirmed by the paratypes.

The youngest female gonotheca observed is disc-shaped, with a sharp edge and slightly bulging centre, and a diameter of about 1·4 mm. (fig. 4, F and H). Within it is a blastostyle which expands into a sickle-shaped cap at the distal end. Below the cap the blastostyle gives rise on one side to a bud resembling a hydranth, but without tentacles. At a later stage (fig. 4, I), when the bud is larger, the resemblance to a hydranth is even more striking—the rounded distal end, or manubrium, is contained in a transparent capsule, and is separated from the broad proximal region by a deep constriction. In stained preparations ectoderm and endoderm layers are clearly visible, the manubrium is solid and has no mouth, but the body has a capacious gastral cavity. Later (fig. 4, J), the blastostyle gives off a number of branching processes from the base. These apparently grow outwards until they fuse with the distal cap and partly obscure the hydranth in a netlike ramification. When the width has reached about 2 mm. the shape of the gonotheca has changed. The distal end expands into two earlike outgrowths, between which the edge is thick and truncated. In the centre of this blunt edge is a circular opening around which the margin is inturned to form a delicate internal collar (fig. 4, G, L–O). Hence the notched appearance characteristic of the species. The flattened manubrium of the hydranth now plugs the opening, and a number of eggs are visible on the body. After this the whole structure becomes very thick and dense due to further growth of the network of the blastostyle, and within it 3 or 4 eggs enlarge to form bulky larvae eventually filling the gonotheca (fig. 4, O). Occasionally abnormal gonothecae occur, containing two hydranths and possessing two openings (fig. 4, N).

The development of the gonangia in the typical form of *H. parvulum* is probably identical, but so far well-preserved material of the younger stages is lacking.

The relationship of this species to others, such as the well-known *H. beanii*, where fully formed hydranths arise from the blastostyle, is easily apparent. The sexual products in both cases are borne on a modified hydranth, which in *H. parvulum* is without mouth or tentacles, and entirely contained in the gonotheca.

The male gonangia start their development in very much the same way as the female (fig. 4, C–E). The young gonotheca is almost circular and flattened, with sharp edges. The blastostyle grows through the centre to expand into a sickle-shaped cap at the distal end. In this case, however, it forms no hydranth, but bears the sexual products directly on its proximal part. Mature gonothecae are oval rather than circular, and the edges more blunt. They presumably burst to set free the spermatozoa.

Halecium tenellum Hincks 1861

Fig. 5

Halecium tenellum Hincks 1868, p. 226; Pl. XLV, fig. 1. Ritchie 1907a, p. 525; Pl. II, fig. 4. Broch 1918, p. 46, fig. 20. Stechow 1919a, p. 41, figs. J-K; 1925, p. 418.

Records. FAL 290 C.

Description. Delicate monosiphonic colonies growing on other hydroids and reaching 4 mm. in height. Stems annulated above and below nodes, otherwise smooth. Stem internodes very irregular in length and often devoid of hydrophores—the proximal part of the stem may bear as many as 7 athecate internodes before the typical sympodial branching commences. Branches often arising in pairs, giving a dichotomous appearance. Secondary hydrophores annulated at base, margin everted. Gonangia (probably male) flattened in plane at right angles to stem, oval to circular in front view (very similar to those figured by Broch), borne on short stalk, which may be segmented, from stem or hydrorhiza.

Measurements (mm.)

Stem, diameter	0·04–0·07
length of internode	0·09–0·38
Hydrotheca, length, diaphragm to margin	0·03–0·04
length, puncta to margin	0·02–0·035
diameter at margin	0·12–0·17
Gonotheca, length, maximum	0·71
width, maximum	0·38

Family: **Campanulariidae**

Campanularia integra MacGillivray 1842

Campanularia caliculata Warren 1908, p. 338, fig. 19.
Campanularia integra Broch 1918, p. 159 (synonymy).

Records. F 267. CP 259. FB 101, 102, 103, 113 (growing on crab *Dehaanius dentatus* (M. Edw.)), 123, 131 G, 134 B, 137 A, 138 B, 140 C. FAL 174 Z, 258 F.

Description. Colonies abundant on weed in littoral area and shallow water of certain regions. Pedicels annulated, but last segment much more definite than the rest. Hydrothecae variable in size, shape and thickness of perisarc.

Gonangia with smooth or faintly annulated walls, flattened from side to side and elongate-oval in cross-section. Pedicel short and smooth. Containing 1–3 gonophores which bear eggs in the female. The gonophores sometimes resemble degenerate medusae with 4 minute tentacles. Present in March, and July to September.

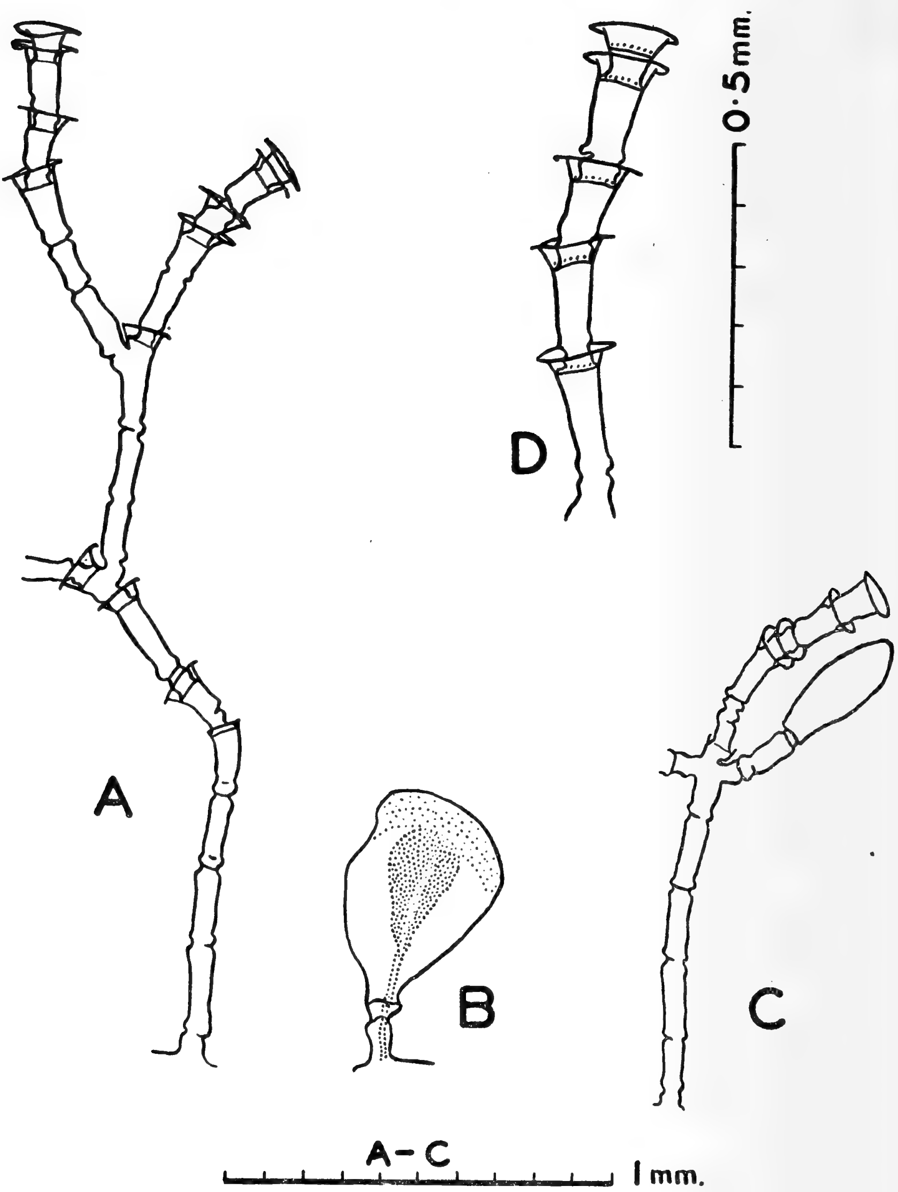

FIG. 5. *Halecium tenellum* Hincks. FAL 290 C.

A gonangium (male?) is shown in front view arising from the hydrorhiza in B, and in side view arising from the stem in C.

Campanularia morgansi n. sp.

Fig. 6

Types and Records. Holotype PF 15675 B in University of Cape Town. Paratypes PF 351 C, FB 119 L, and FAL 26 L in University of Cape Town; PF 18232 B in S.A. Museum. Further records: FAL 289 B.

Description. Colony stolonial, creeping on other hydroids. Pedicels of hydrothecae unbranched, arising direct from hydrorhiza, not distinctly annulated but corrugated, with one distinct, somewhat flattened segment below hydrotheca in which diameter is usually less than that of pedicel.

Hydrotheca long and narrow, tapering at base, not widening markedly to margin, but with a raised and sometimes strongly thickened rim just below margin. Marginal teeth 10 to 13 in number (although one specimen with 9

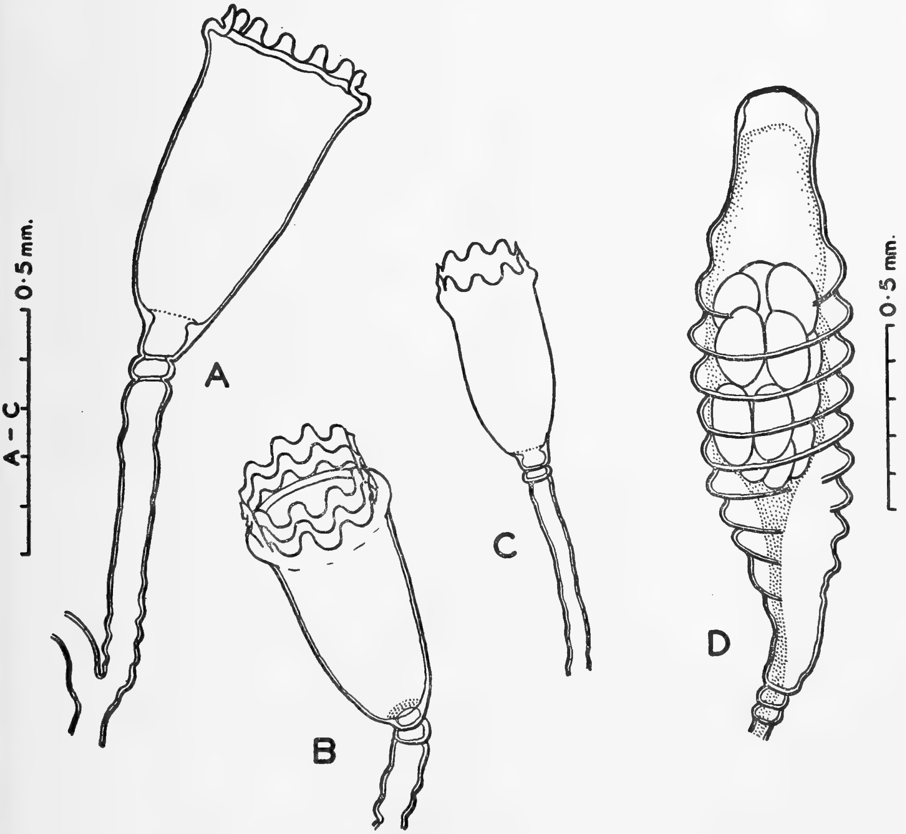

Fig. 6. *Campanularia morgansi* n. sp. from the holotype.

A–C. Three hydrothecae drawn to same scale. Reduplications shown in B. D. A female gonotheca.

teeth observed among paratypes), sharply pointed to bluntly rounded, separated by rounded bays. Hydrotheca not striated, and margin smooth and quite round when seen end-on. No diaphragm, but an annular thickening near base of hydrotheca, and a row of refringent dots just above it. Reduplications may occur, involving both the margin and the row of refringent dots. Hydranth with about 16 tentacles and rounded manubrium.

Gonothecae borne direct from hydrorhiza on short annulated pedicels (2–6 annulations), slender and elongated, deeply annulated (5—9 annulations) for over ¾ length, and terminating in a smooth narrowed neck. Margin inturned, smooth and slightly thickened, with a convex operculum. Containing numerous eggs or planulae larvae attached to a central blastostyle. The holotype has only female gonothecae, but one of the paratypes has 2 male gonothecae, which are similar in shape to the female, but slightly smaller.

Measurements (mm.)	*Holotype*	*Paratypes*
Pedicel, length	0·49–1·15	0·26–2·22
maximum diameter	0·05–0·10	0·05–0·08
Hydrotheca, length	0·46–0·72	0·43–0·71
maximum diameter	0·21–0·37	0·21–0·27
length/diameter	1·76–2·32	1·77–3·00
Gonotheca, female, length	0·84–1·72	
maximum diameter	0·33–0·50	
Gonotheca, male, length		0·77
maximum diameter		0·26

Remarks. This species is named after J. C. Morgans who collected the first material examined off Miller's Point. Later, material rich in gonophores was found among the *Pieter Faure* collection and was chosen as the holotype. Gonophores have been recorded from September to November.

The species is close to *Campanularia africana* Stechow 1923b, which, however, lacks the raised rim below the hydrothecal margin, and has smooth gonothecae.

The general shape of the hydrotheca is similar to a number of other Campanulariidae, including *Campanularia hicksoni* Totton 1930, *Clytia ulvae* Stechow 1919a, and *Eucalyx paradoxus* Stechow 1923b. It is excluded from *Clytia* and *Eucalyx* by the absence of a diaphragm, whereas *Campanularia hicksoni* has a striated hydrotheca and a smooth gonotheca.

Clytia gracilis (M. Sars) 1851

Gonothyraea gracilis Hincks 1868, p. 183; Pl. XXXVI, fig. 1.
(?)*Gonothyraea gracilis* Hartlaub 1905, p. 583, figs. F^2–J^2.
Laomedia gracilis Broch 1918, p. 170.
Clytia gracilis Stechow 1925, p. 431, figs. 9–10.

Records. PF 15608 K. FB 119 M, 131 F. FAL 23 Q, 26 L, 66 Q, 82 Y, 279 H, 288 D, 290 D.

Description. Stem unbranched or sparingly branched, reaching a maximum height of 0·6 cm., usually annulated at top and bottom only, but occasionally throughout.

Hydrothecae extremely variable in size, shape and number of teeth. Shape inversely conical, or with almost parallel sides. Marginal teeth sharp or acutely rounded, with rounded bays between them, 8–15 in number. Margin undulating when seen end-on, but not sufficiently so to show striations in side view, except near the edges.

Gonotheca with truncated top and constriction just below the rim. Containing up to 4 medusa-buds, each with 4 well-developed tentacles when mature. Present in March, July, August, October and December.

Measurements (mm.)

Pedicel, length	0·66–5·72
maximum diameter	0·05–0·11
Hydrotheca, length	0·39–0·89
maximum diameter	0·18–0·61
length/diameter	1·28–2·89
Gonotheca, length	0·56–1·07
maximum diameter	0·25–0·41

Remarks. From the preliminary sorting of material this species appears to be common all round the South African coast from Table Bay to Natal. In spite of the variable nature of the hydrotheca it is easily recognized by its gonotheca.

Stechow 1925 has reported divided marginal teeth in material from Cape Agulhas. Possibly he is mistaken over this point, for due to the extreme delicacy of the hydrothecae the impression of divided teeth is often obtained in microscopic preparations when the teeth of one side are superimposed on those of the other, especially since the teeth sometimes lean slightly to one side.

Clytia raridentata (Hincks) 1861

Campanularia ?raridentata Hincks 1868, p. 176; Pl. XXVI, fig. 2.

Clytia raridentata Vanhöffen 1910, p. 301, fig. 22.

Thaumantias raridentata Stechow 1925, p. 426.

Remarks. The previous records of this species from South Africa should be regarded with caution, as none had gonophores. Vanhöffen's material from Simonstown might well be *Clytia gracilis*, which is common in False Bay, and which often has as few as 8 marginal teeth. The same might apply to Stechow's material which was not illustrated.

Further, there is some confusion over the appearance of the gonophore of *C. raridentata*, Fraser 1944 describing a smooth gonotheca from North America similar in shape to *C. gracilis*, and Stechow 1923c describing an annulated one from the Mediterranean. It is possible that two species are involved: Fraser may have been dealing with *C. gracilis*.

Obelia dichotoma (Linn.) 1758

Obelia dichotoma Hincks 1868, p. 156; Pl. XXVIII, fig. 1.
Laomedia dichotoma Vervoort 1946, p. 292, fig. 128; 1946b, p. 344.

Records. CP 16. FB 106, 119 K, 120 B. FAL 23 N, 34 B, 78 X, 108 P, 123 M, 125 S, 148 H, 160 X, 165 X, 169 Z, 279 J.

Description. Colonies usually less than 2 cm. in height and scantily branched, but sometimes reaching 2·9 cm. and more profusely branched in the typical pseudo-dichotomous manner. Stem straight, or slightly geniculate, due to curvature within the internodes rather than bending at the nodes.

Hydrotheca margin very delicate and almost invariably damaged or worn. Only rarely can the typical marginal indentations be distinguished. No longitudinal striations. Diaphragm straight or slightly oblique.

Gonangia borne profusely on stem or hydrorhiza. Medusae with 16 tentacles at time of liberation. Gonangia observed in January to March, May, June and August.

Obelia geniculata (Linn.) 1758

Obelia geniculata Hincks 1868, p. 149; Pl. XXV, fig. 1.

Records. CP 356 C.

Description. A single colony with gonangia reaching a maximum height of 0·7 cm.

Remarks. The colony approaches var. *subsessilis* Jäderholm 1904, but since the internodes of a stem may vary from this form (short and thick, giving rise to pedicels with only one annulation) to the typical form (elongated, giving rise to pedicels with several annulations), no distinct varieties have been distinguished.

Family: **Campanulinidae**

Lovenella chiquitita n. sp.

Fig. 7

Types. Holotype FAL 288 J, epizootic on *Eudendrium deciduum* n. sp., in University of Cape Town. Paratypes FB 131 F, epizootic on *Sertularella falsa* n. sp., and FAL 108 O, growing on weed, in University of Cape Town.

Description. Hydrorhiza creeping on weeds or other hydroids, smooth, reticulate. Hydrothecae borne on pedicels which arise direct from hydrorhiza, or from a stem which is sparingly branched in a sympodial manner. Maximum height of colony 1·48 mm. Pedicels and stems annulated throughout. Pedicels of varying length, widening gradually towards hydrothecae, from which they are not sharply demarcated.

Hydrothecae minute, delicate, tubular, slightly constricted in distal half and widening again at margin. Margin sinuous, with low pointed teeth alternating with opercular segments. Operculum of 8–10 segments, leaving a small circular opening between their central points. Diaphragm delicate, but quite distinct. Perisarc exceedingly delicate throughout. Hydrothecae occasionally regenerated. Hydranth with over 12 tentacles.

Gonothecae arising from hydrorhiza on short annulated pedicels; smooth, elongated, tapering below, truncated above, containing two medusa buds, present in October. Structure of medusa not discernible.

Measurements	*Holotype*	*Paratypes*
Pedicel, length	0·04–0·38	0·05–0·35
diameter at base	0·035–0·06	0·04–0·06
diameter at distal end	0·04–0·075	0·045–0·07
Hydrotheca, length from diaphragm	0·13–0·25	0·14–0·30
diameter at margin	0·09–0·14	0·09–0·12
height/diameter	1·18–1·92	1·22–2·74
Gonotheca, length, including pedicel	0·51–0·63	
maximum diameter	0·21–0·29	

Remarks. In one of the paratypes (FB 131 F) the hydrothecae are slightly longer and the proportion of length to diameter greater, but the measurements

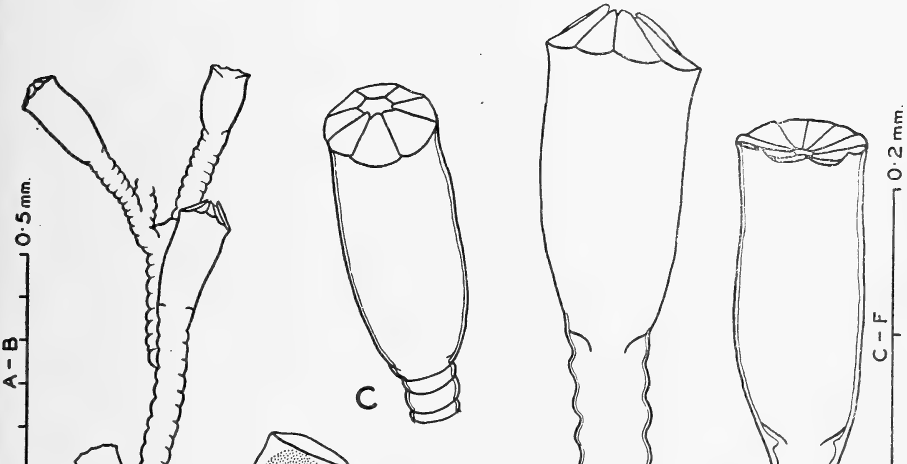

Fig. 7. *Lovenella chiquitita* n. sp.

A. A branching stem bearing hydrothecae. B. A gonotheca. C–F. Solitary hydrothecae from different aspects; F showing an annular thecal thickening below the diaphragm. A, B and E from the holotype, C and F from the paratype FB 131 F, D from the paratype FAL 108 O.

overlap those of the holotype. In the same sample some, but not all, of the hydrothecae possess a slightly thicker perisarc and an annular thecal thickening just below the attachment of the diaphragm. Since this seems to be a variable character it cannot be used to distinguish a separate species. No gonophores were present in this sample.

The species recorded by Vanhöffen 1910 from Simonstown as *Campanulina turrita* Hincks is very similar and may prove to be the same species, although the illustration shows no demarcation between the hydrotheca and the opercular segments.

Of the few species of *Lovenella* described, *L. chiquitita* resembles most closely *L. clausa* (Loven), in which, however, the pedicel is not so distinctly annulated.

Family: **Lafoeidae**

Hebella furax n. sp.

Fig. 8

Types. Holotype PF 18293 B, part in University of Cape Town, part in S.A. Museum. Paratype FAL 58 Y in University of Cape Town.

Description. Colony stolonial. Hydrorhiza parasitic or epizootic on *Lytocarpus filamentosus* (Lamarck). Hydrothecae arising direct from the hydrorhiza on short annulated pedicels, tubular, widening very slightly towards margin; margin smooth, everted. No diaphragm, but a pronounced annular thickening at base of hydrotheca and above it a row of refringent dots.

The species exists in two forms, both of which may occur in the same colony. In the normal, free-living form the hydrorhiza creeps over the stems or hydrocladia of the host, giving rise at intervals to the hydrothecal pedicels. The pedicels bear from 3 to 6 (usually 5) annulations which are twisted in a spiral manner. The hydrotheca is usually somewhat asymmetrical, with the aperture oblique and the margin flaring gracefully.

In the parasitic form the hydrorhiza invades the hydrocladium of the host, obtaining entry apparently through the mamelon at the base, and destroys and replaces the coenosarc. The infected hydrocladia are always dead and broken off short in sharp contrast to the other healthy hydrocladia of the colony. The hydrorhiza of the parasite is naked and has no perisarcal covering of its own while in the body of the host. At a different level it emerges through a hydrotheca or through the broken end of the hydrocladium to give rise to a hydrotheca of its own. The pedicel of such a hydrotheca acquires a perisarcal covering immediately on emergence; it is much shorter than that of the free-living form, sometimes giving rise at once to a hydrotheca, and sometimes bearing 1 or 2 twisted annulations first. The hydrotheca shows no difference in shape and proportion from the free-living form, but is on the whole smaller.

In both forms reduplications of the margin occasionally occur, and in one example (the paratype FAL 58 Y), two hydrothecae were seen to arise from one pedicel. The polyps are strongly contracted in the material and it was not possible to determine accurately the number of tentacles, although there appear to be about 17.

No gonophores are present, so that the placing of the species in the genus *Hebella* is provisional.

Measurements (mm.)

	Holotype		*Paratype*
	Free-living	*Parasitic*	*Parasitic*
*Pedicel, length	0·21–0·66	0·03–0·15	0·04–0·17
maximum diameter	0·08–0·14	0·06–0·11	0·08–0·10
*Hydrotheca, length	0·77–1·18	0·65–0·84	0·60–0·85
diameter at margin	0·36–0·61	0·32–0·54	0·31–0·47
length/diameter	1·54–2·14	1·50–2·17	1·81–1·94

* The base of the hydrotheca is taken as the first indentation below the annular thecal thickening.

Remarks. The parasitic condition resembles that found in *Hebella dispolians* (Warren 1909). Here also the hydrorhiza may creep over the surface of the

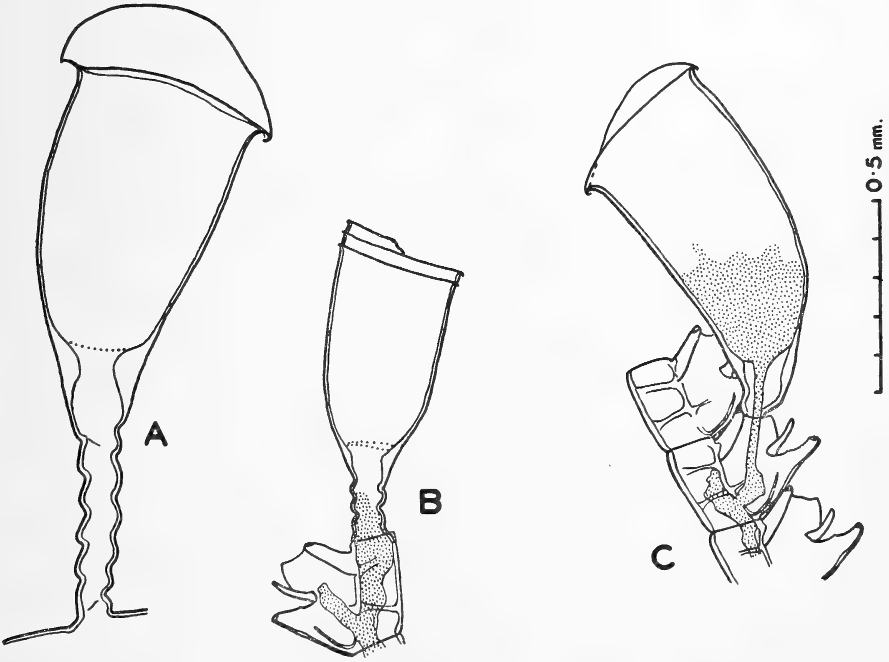

FIG. 8. *Hebella furax* n. sp.

A. The free-living epizootic form, from the holotype. B and C. The parasitic form growing on *Lytocarpus filamentosus*, from the paratype FAL 58 Y.

host and give rise to normal hydrothecae, and may also enter the perisarc of the host and invade its hydrothecae. There are, however, a number of differences; in *H. dispolians* the parasitic hydranths are usually devoid of hydrothecae of their own, the free-living forms have smooth or only slightly wrinkled pedicels, the hydrothecal margin is not everted, the size is smaller, and finally the living coenosarc of the host (a species of *Sertularia*) continues to exist side by side with the parasite, a condition which has not been observed in *H. furax*.

The form and size of the hydrotheca of the non-parasitic form of *H. furax* are very similar to those of *H. parasitica* (Ciamician) but since the latter is not parasitic but epizootic, it is considered advisable to establish a new species for the False Bay material.

Hebella scandens (Bale) 1888

Lafoea scandens Bale 1888, p. 758; Pl. XIII, figs. 16–19. Warren 1908, p. 341, fig. 21.

Hebella scandens Bale 1913, p. 117; Pl. XII, fig. 10. Stechow 1919a, p. 77, fig. Z.

Hebellopsis scandens Stechow 1925, p. 442.

Records. PF 337 D, 15608 B, 15675 E. FAL 66 J, 78 E, 159 M, 169 V, 207 E, 214 F, 217 S, 223 W, 268 E, 274 Q, 279 M.

Description. Dense colonies growing on *Sertularella arbuscula* and other hydroids. Hydrothecae similar to those described by Bale. Gonothecae abundant in some colonies, containing as many as 4 medusae one above the other in successive stages of development. Medusae deep, with 3 long tentacles at time of liberation. Margin of gonotheca with 4 emarginations, each with an opercular flap. Gonangia present in April and September.

Scandia mutabilis (Ritchie) 1907

Campanularia mutabilis Ritchie 1907, p. 504; Pl. XXIII, figs. 3–5.

Lafoea magna Warren 1908, p. 342, fig. 22.

Scandia mutabilis Stechow 1919a, p. 79. Fraser 1944, p. 208; Pl. 39, fig. 187.

Records. PF 396B.

Description. Colony growing on *Thecocarpus giardi.* Numerous hydrothecae borne on pedicels with 6–11 spiral annulations. Near the base of the hydrotheca is an annular thickening of the perisarc similar to that in *Hebella* and *Campanularia,* attached to the upper region of which is a thin, membranous diaphragm. Gonophores absent.

Measurements (mm.)

Pedical, length	0·43–1·04
maximum diameter	0·14–0·19
Hydrotheca, length	1·12–1·54
diameter at margin	0·61–0·90
length/diameter	1·47–1·97

Remarks. The hydrothecae of this species are very similar to those of *Hebella parasitica* and *H. furax*. However, the measurements of the hydrothecae are somewhat greater, and the pedicel longer.

Reticularia serpens (Hassall) 1848

Filellum serpens Hincks 1868, p. 214; Pl. XLI, fig. 4. Stechow 1925, p. 458.
Coppinia arcta Hincks 1868, p. 219; Pl. XLI, fig. 5.

Records. FAL 20 S, 26 N, 290 E.

Description. Colonies growing on *Amphisbetia operculata*, *Aglaophenia pluma* var. *typica*, and *Nemertesia cymodocea*. Hydrothecal margin very slightly everted, and usually with several reduplications. No coppiniae present.

Measurements (mm.)

Hydrotheca, length of free part, without reduplications	0·09–0·28
length of free part, with reduplications	0·16–0·42
diameter at margin	0·09–0·15

Zygophylax cornucopia Millard 1955

Zygophylax cornucopia Millard 1955, p. 219, fig. 3.

Records. F 299 B. FB 131 B. FAL 78 S, 169 X, 217 N, 279 E. (Recorded by Millard 1955.)

Family: **Syntheciidae**

Synthecium ?elegans Allman 1872

Fig. 9, D

Synthecium elegans Allman 1876, p. 266; Pl. XV, figs. 1–3. Billard 1925, p. 129, fig. 5.
Synthecium subventricosum Bale 1914, p. 5; Pl. I, figs. 3–5. Stechow 1925, p. 462.

Records. PF 15675 G. FAL 66 H.

Description. One colony of about a dozen pinnate stems reaching a maximum height of 1·9 cm., and another very young colony without hydrocladia reaching a height of 0·7 cm. Arrangement of lower stem internodes very irregular, some bearing one pair of hydrocladia, others one pair of hydrothecae, and others one pair of each. Arrangement in upper part also sometimes irregular, but usually each internode bears one pair of proximal and one pair of distal hydrothecae with a pair of hydrocladia in the centre.

Hydrocladia divided into regular internodes, but the nodes are sometimes indistinct; occasionally bearing a pair of sub-branches. These arise from the proximal part of a much-elongated internode. Hydrocladia often continued as stolons which anastomose with other parts of the colony. Thecal pairs sub-opposite in proximal parts of hydrocladia, becoming opposite in the 2nd to 3rd pair.

Hydrothecae ventricose below, adnate for over two-thirds of height, those on proximal part of hydrocladium more adnate than those in distal part.

Margin forming an angle of about 45° with hydrocladium, reduplications sometimes present.

Gonophores absent.

Measurements (mm.)

Hydrocladium, length of internode	0·60–0·73
Hydrotheca, length abcauline	0·34–0·44
length adcauline, adnate part	0·43–0·54
length adcauline, free part	0·06–0·20
diameter near base	0·14–0·18
diameter at margin	0·20–0·23

Remarks. In the absence of gonophores it is not possible to identify this species with certainty, for the trophosome of *S. elegans* is almost indistinguishable from that of *S. patulum* (Busk.). The branching of the hydrocladia shows some resemblance to *S. ramosum* Allman, but is not developed to anywhere near the same extent.

Synthecium hians n. sp.

Fig. 9, A–C

Types. Holotype FAL 214 G in University of Cape Town.

Description. A single colony of about half a dozen upright stems reaching a maximum height of 3·8 cm., and several fragments. Colour: light brown.

Hydrorhiza tangled, thick, with diameter of stolons equal to that of stem. Stem unfascicled, thick at base, thin and transparent at tip, pinnate, segmentation indistinct in older parts. Arrangement of hydrothecae and hydrocladia very variable, but usually each internode bears 3 pairs of equally spaced hydrothecae and one pair of opposite hydrocladia arising immediately below the second pair of hydrothecae. Hydrothecae in older parts of stem empty and usually eroded, leaving only stumps or scars. Basal part of stem without hydrothecae or hydrocladia.

Hydrocladia unbranched, bearing up to 13 pairs of hydrothecae. Hydrothecae opposite, but often sub-opposite in proximal parts of hydrocladia. There are 2 distinct arrangements. In the younger parts of the colony the hydrocladia arise direct from the stem with no dividing node, and there is always one unpaired hydrotheca at the base, followed by sub-opposite pairs which gradually change to opposite. In the older parts of the colony there is a well-marked transverse node near the base of the hydrocladium, followed immediately by hydrothecal pairs which are opposite or very nearly so. Segmentation of hydrocladium irregular, with a node after 1–4 pairs of hydrothecae.

Hydrotheca narrow at base, widening strongly to margin, adnate for most of its length, only very slightly bent outwards, with the margin forming an angle of between 50° and 90° with the hydrocladium. Margin smooth, everted, often reduplicated. Diaphragm oblique, with outer edge reaching sometimes

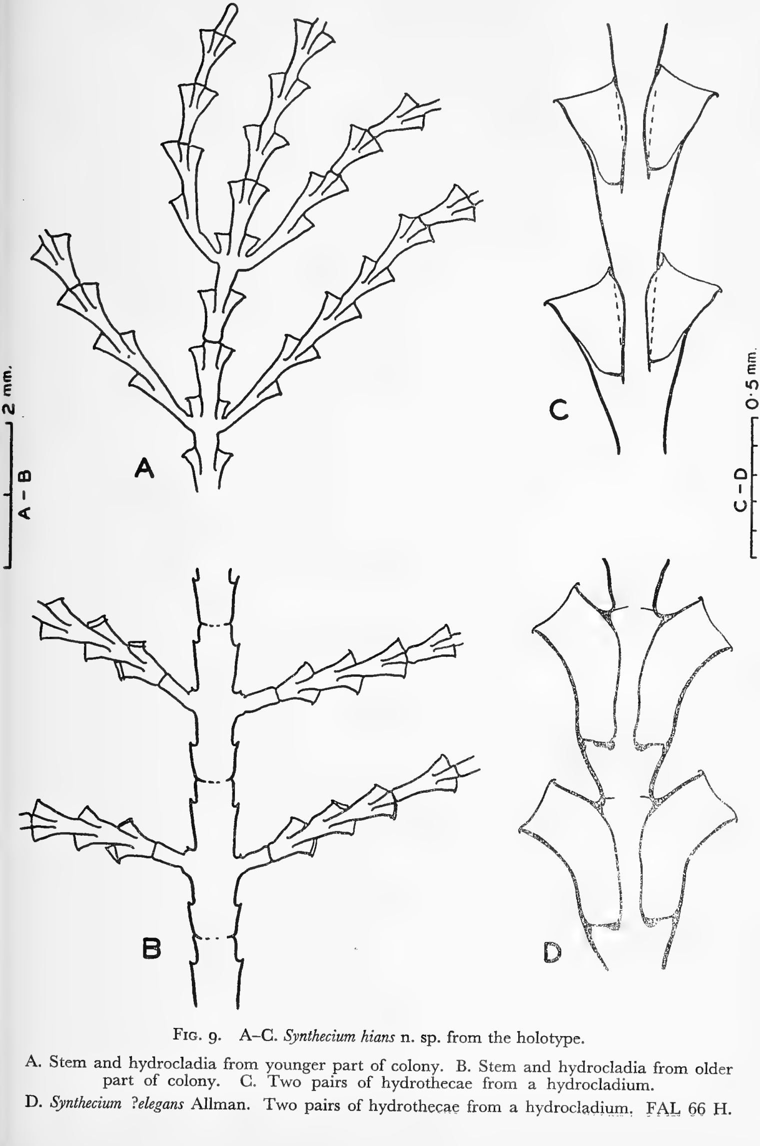

Fig. 9. A–C. *Synthecium hians* n. sp. from the holotype.

A. Stem and hydrocladia from younger part of colony. B. Stem and hydrocladia from older part of colony. C. Two pairs of hydrothecae from a hydrocladium.

D. *Synthecium* ?*elegans* Allman. Two pairs of hydrothecae from a hydrocladium. FAL 66 H.

as far as half-way up the abcauline wall. Perisarc thin, sometimes thickened below margin on abcauline wall.

Gonophores absent.

Measurements (mm.)

Stem, diameter	0·18–0·74
Hydrocladium, distance between 2 consecutive pairs of hydrothecae	0·51–0·74
Hydrotheca, length abcauline, from diaphragm attachment	0·14–0·26
length adcauline, adnate part	0·30–0·37
length adcauline, free part	0·03–0·05
adnate part/adcauline length	0·86–0·92
diameter at level of abcauline diaphragm attachment	0·13–0·17
diameter at margin	0·23–0·27

Remarks. This species is very close to *S. chilense* Hartlaub 1905 (which is possibly a synonym for *S. robustum* Nutting 1904). It is, however, smaller in all its measurements, the hydrothecae being approximately half the size, and this fact together with minor differences of shape and proportions make it advisable to establish a new species. The smaller differences between the two species are summarized as follows.

	S. hians	*S. chilense*
1.	Hydrorhiza thick, same diameter as stem.	Hydrorhiza considerably thinner than stem.
2.	Hydrotheca with about $\frac{1}{10}$ of adcauline wall free.	Hydrotheca with about $\frac{1}{4}$ to $\frac{2}{5}$ of adcauline wall free.
3.	Margin distinctly everted.	Margin not, or only slightly everted.
4.	Hydrotheca only slightly bent outwards. Margin forms angle of 50–90° with hydrocladium.	Hydrotheca strongly bent outwards. Margin forms angle of 20–45° with hydrocladium.

Family: **Sertulariidae**

Dictyocladium coactum Stechow 1923b

Dictyocladium coactum Stechow 1925, p. 466, fig. 27.

Records. FAL 52 S, 78 C, 95 P, 141 D, 153 U, 174 Y, 183 M, 214 E, 274 W, 288 E.

Description. Numerous colonies with normally unbranched stems, reaching a maximum height of 2·2 cm. Rarely a stem will give off one or more side-branches which arise from within the hydrothecae. Anastomoses between different parts of the colony are occasionally present, but the arrangement is not quite the same as in the genotype of *Dictyocladium* (*D. dichotomum* Allman 1888). Tendril-like structures arise from the tips of the stems, and attach themselves, not to hydrothecae, but to other parts of the hydrorhiza.

The gonophores are surrounded by separate annulations and not by a continuous spiral as in *D. dichotomum.* They arise usually from the base of the stem, but sometimes higher up, usually just above the nodes. Some of the gonophores were definitely female, in others the sex was not distinguishable. Present from August to September.

Salacia articulata (Pallas) 1766

Thuiaria persocialis Allman 1876, p. 271; Pl. XVII, figs. 4–6.

Thuiaria pectinata Allman 1888, p. 69; Pl. XXXIII, fig. 1.

Thuiaria articulata Ritchie 1909, p. 84, fig. 6.

Salacia articulata Stechow 1925, p. 465.

Dymella articulata Vervoort 1946a, p. 320.

Records. F 254. CP 333 A. PF 351 B, 5013 A, 15608 A. FB 107, 140 D, 141 C. FAL 20 Q, 26 M, 42 S, 52 P, 62 P, 78 B, 95 N, 207 C, 222 D, 268 C, 279 K, 289 A.

Description. Common in False Bay, though only occasionally as rich colonies. Gonophores present from July to October.

Sertularella africana Stechow 1919a

Figs. 10 I; 11 F.

Sertularella fusiformis Warren 1908, p. 295, fig. 5, C and D.

Sertularella africana Stechow 1919a, p. 83; 1923c, p. 179, fig. V.

Records. F 296 (reported by Eyre 1939). FAL 56 E, 78 V, 125 W.

Description. Colonies of solitary, upright and usually unbranched stems. Occasionally a stem bears one or more branches, which may arise from within a hydrotheca or from immediately below it. Maximum height 1·1 cm.

Hydrotheca adnate about one half, with adcauline wall convex and usually weakly striated. In occasional hydrothecae the striations extend all the way round. Abcauline wall varying from slightly convex to straight or even slightly concave, elongated so that the margin of the hydrotheca is not perpendicular to the hydrothecal axis but tilted slightly towards the stem. No internal teeth.

Gonophores spindle-shaped, with narrow opening and 3 marginal teeth. Female larger than male, with wider opening and shorter marginal teeth. External marsupium present. Present in February and August,

Measurements (mm.)

Internode, length	0·29–0·79
diameter across node	0·13–0·20
Hydrotheca, length abcauline	0·47–0·63
length adcauline, adnate part	0·24–0·32
length adcauline, free part	0·25–0·37
adnate part/adcauline length	0·41–0·54
diameter at mouth	0·22–0·27
maximum diameter	0·25–0·33
Gonotheca, male, length	1·86
maximum diameter	0·83
Gonotheca, female, length	1·93–2·36
maximum diameter	0·81–1·03

Remarks. This species can easily be distinguished from *S. polyzonias* by its habit of growth and short, normally unbranched stems. The habit of growth is similar to that of *S. fusiformis* and *S. tenella*. From the former it can be distinguished by the complete absence of internal hydrothecal teeth, and from the latter by the striations on the hydrotheca which normally occur on the adcauline wall only. *S. africana* also differs from all other species without internal teeth in the shape of the hydrotheca, in which the margin is not perpendicular to the axis, but is always tilted at least slightly towards the stem, never away from it as in *S. polyzonias*.

Sertularella arbuscula (Lamouroux) 1816

Figs. 10 B, 11 C

Sertularella crassipes Allman 1886, p. 133; Pl. VIII, figs. 4–5.
Sertularella cuneata Allman 1886, p. 134; Pl. IX, figs. 1–2.
Sertularella arborea Marktanner-Turnetscher 1890, p. 221. Ritchie 1907a, p. 534.
Sertularella tumida Warren 1908, p. 297, fig. 6 A and C, not B.
Sertularella arbuscula Stechow 1925, p. 487.

Records. PF 337 C, 15608 C, 15675 C. FB 119 B, 131 E, 133 D. FAL 13 D, 26 G, 42 T, 52 T, 56 C, 62 N, 64 K, 66 K, 78 D, 153 K, 169 U, 183 H, 207 D, 217 R, 268 D, 274 V, 279 N, 292 A.

Description. There is nothing to add to the description of this well-known species. It can easily be recognized by its tendency to branch in one plane, forming fan-shaped colonies, by the distinct outward bend in the hydrotheca, the three internal teeth, and the elongated and practically smooth gonotheca. The amount of bend in the hydrotheca, however, varies, and in some individuals the abcauline wall is practically straight. The species is extremely common in False Bay, usually reaching a height of 4–6 cm., although a maximum height of 15·0 cm. has been observed. The colour varies from horn-colour to brown or even black. Gonophores occur in April, and June to October.

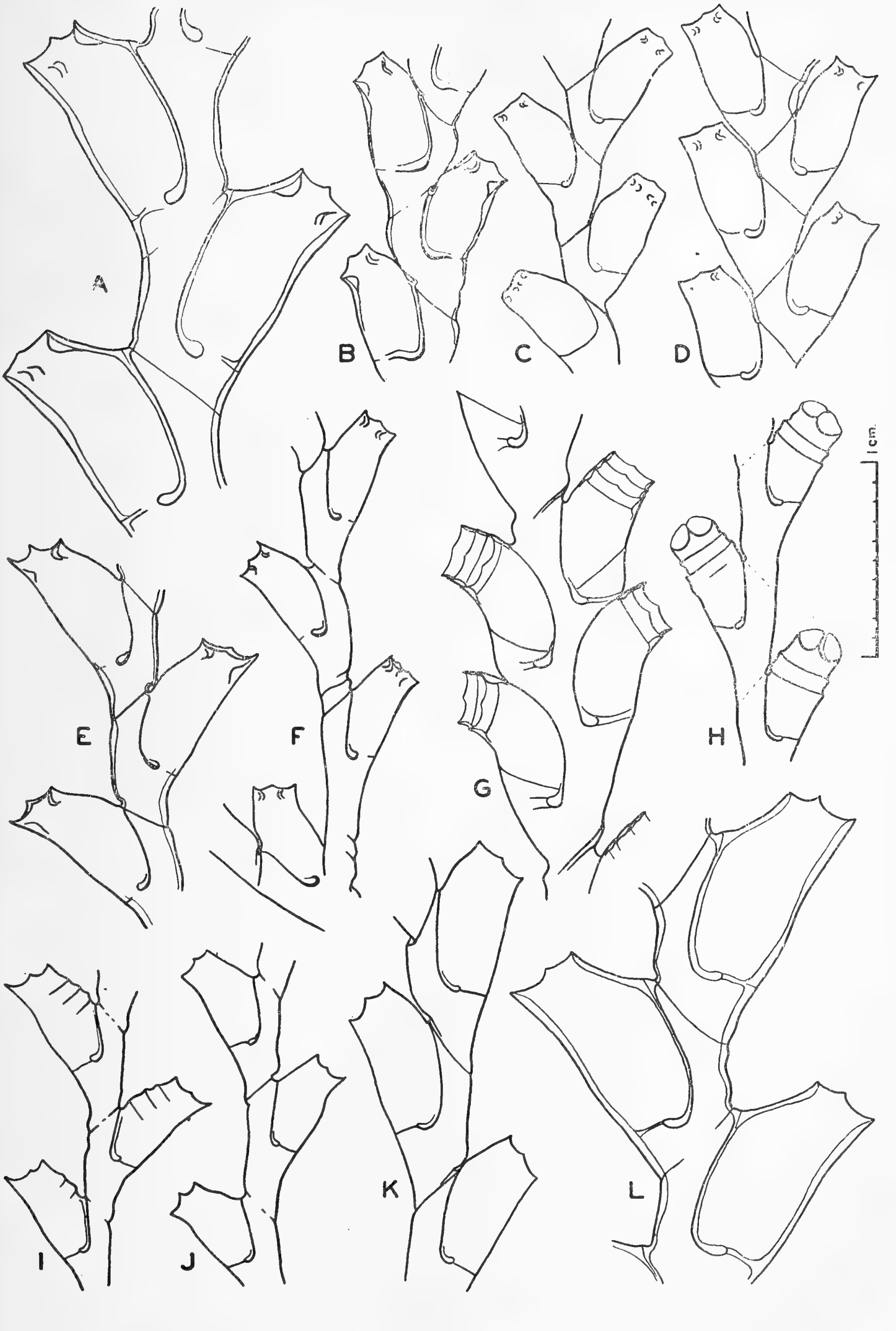

FIG. 10. The False Bay species of *Sertularella*.

A. *S. goliathus* Stechow; FAL 222 C. B. *S. arbuscula* (Lamouroux); FB 131 E. C. *S. fusiformis* (Hincks); FAL 52 U. D. *S. fusiformis* (Hincks), form with crowded hydrothecae; FAL 176 V. E. *S. mediterranea* Hartlaub; FAL 66 M. F. *S. falsa* n. sp. from the holotype. G. *S. flabellum* (Allman); FAL 95 Q. H. *S. capensis* n. sp. from the holotype. I. *S. africana* Stechow; FAL 56 E. J. *S. polyzonias* (Linnaeus); FAL 207 F. K. *S. xantha* Stechow; FAL 186 D. L. *S. megista* Stechow; FAL 66 L.

Measurements (mm.)	
Internode, length	0·38–0·71
diameter across node	0·23–0·41
Hydrotheca, length abcauline	0·41–0·61
length adcauline, adnate part	0·27–0·44
length adcauline, free part	0·26–0·41
adnate part/adcauline length	0·42–0·62
diameter at mouth	0·15–0·31
maximum diameter	0·27–0·38
Gonotheca, length	2·60–2·84
maximum diameter	0·82–0·92

Sertularella capensis n. sp.

Fig. 10 H

Types. Holotype FB 114 A; paratypes FB 115 D and FAL 64 L, all in University of Cape Town.

Description. Rich colonies reaching a height of about 4 cm. Stem unfascicled, flexuous and straggling. Branching irregular and profuse, with most of the branches ending in tendrils which attach to other parts of the colony or to the substratum, uniting the whole into a complex tangled mass. In unattached stems the branching is roughly alternate, each branch arising from below a hydrotheca and forming an angle varying from about 30° to 90° with the stem. The two rows of hydrothecae lie in one plane.

Hydrotheca with a little over half the adcauline wall adnate, broad and squat, with wide mouth. Diameter at mouth only very slightly less than that in widest part. Margin perpendicular to hydrothecal axis or tilted very slightly away from stem, sides straight to slightly convex, distal half with 1–3 distinct annulations equally developed all round hydrotheca. 4 well-developed marginal teeth of equal size. Operculum of 4 pieces. No internal teeth. Hydranth with abcauline blind pouch.

Gonophores absent.

Measurements (mm.)	*Holotype*	*Paratype* *FAL* 64 *L*
Internode length	0·59–0·75	0·50–0·85
diameter across node	0·19–0·26	0·17–0·25
Hydrotheca, length abcauline	0·41–0·47	0·36–0·44
length adcauline, adnate part	0·31–0·35	0·28–0·33
length adcauline, free part	0·24–0·31	0·22–0·27
adnate part/adcauline length	0·53–0·56	0·51–0·58
diameter at mouth	0·25–0·30	0·23–0·27
maximum diameter	0·28–0·35	0·29–0·31

Remarks. The habit of growth and form of the colony is somewhat similar to *S. polyzonias* and *S. falsa*. From the latter it is distinguished by the absence of internal hydrothecal teeth, and from both by the shape of the hydrotheca and its striations.

The species is very close to *S. spirifera* Stechow 1931, but lacks the dichotomous branching and has a broader hydrothecal margin.

Sertularella falsa n. sp.

Figs. 10 F, 11 D.

Types and Records. Holotype FB 119 C, and paratypes FB 131 H, CP 333 B all in University of Cape Town. Further records: FB 133 B. FAL 153 S, 274 U.

Description. Hydrorhiza creeping over the surface of other hydroids or weeds, sometimes so thickly as to hide the latter and give the appearance of a fascicled stem. Stem unfascicled, lax, flexuous, and straggling; reaching a maximum height of 2·9 cm., branching irregularly. Terminal parts of stem or branches often with abnormally elongated nodes, and sometimes ending in tendrils which anastomose with other parts of the hydrorhiza. Branches arising from below hydrothecae, sometimes faintly annulated at origin. The two rows of hydrothecae in one plane, nodes distinct and constricted.

Hydrotheca smooth, with approximately half adcauline wall adnate, and with free part bending gently away from stem. Margin not perpendicular to hydrothecal axis, but tilted away from stem, adcauline wall convex, abcauline wall concave in distal half. Mouth not constricted, with 4 marginal teeth of equal size and an operculum of 4 pieces. 4 small and very regular internal teeth, alternating with marginal teeth. Perisarc not exceptionally thick. Hydranth with about 25 tentacles and abcauline blind pouch.

Gonophores elongated, spindle-shaped, smooth in proximal part and with a number of shallow annulations in distal part, and 3 or 4 marginal teeth. Very similar to those of *S. mediterranea.* Present in March, April, August, September and December.

Measurements (mm.)	*Holotype*	*Paratypes*
Internode length, excluding abnormal elongated internodes	0·54–0·78	0·52–0·87
diameter across node	0·14–0·22	0·17–0·27
Hydrotheca, length abcauline	0·45–0·52	0·40–0·54
length adcauline, adnate part	0·30–0·36	0·26–0·41
length adcauline, free part	0·29–0·35	0·28–0·36
adnate part/adcauline length	0·47–0·55	0·45–0·61
diameter at mouth	0·20–0·23	0·19–0·26
maximum diameter	0·24–0·30	0·24–0·32
Gonotheca, male, length	1·62–2·38	1·61–1·97
maximum diameter	0·60–0·81	0·59–0·66
Gonotheca, female, length		2·22–2·55
maximum diameter		0·78–0·90

Remarks. *S. falsa* is practically identical with *S. polyzonias* in its form of growth, and the shape and size of the hydrotheca. It differs only in the presence of internal teeth. The number, position and size of the internal teeth are remarkably constant in this species. In only one specimen out of the many examined (FAL 153 S) were a few obviously badly worn hydrothecae at the base of the stem found to lack internal teeth.

Sertularella flabellum (Allman) 1886

Figs. 10 G, 11 G

Thecocladium flabellum Allman 1886, p. 149; Pl. XIX, figs. 4–5. 1888, p. 81; Pl. XXXVIII.

Sertularella flabellum Stechow 1925, p. 476.

Records. FAL 95 Q.

Description. A single group of stems reaching a maximum height of 2·4 cm., apparently a young colony since no stem has more than one branch. Number

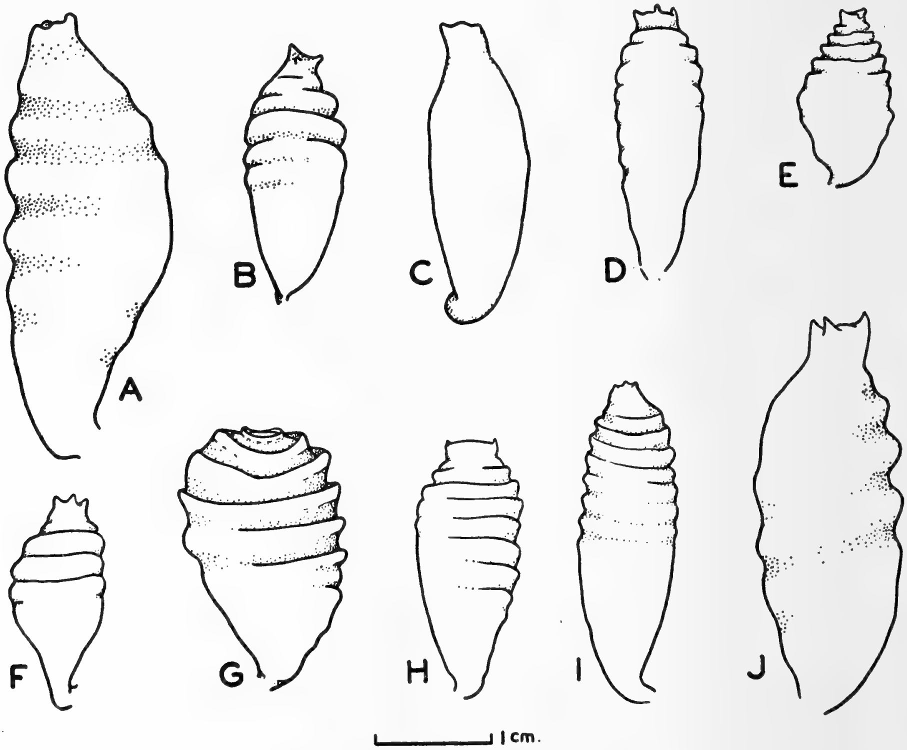

Fig. 11. The gonophores of the False Bay species of *Sertularella*.

A. *S. goliathus* Stechow, male; FAL 222 C. B. *S. mediterranea* Hartlaub, male; FAL 66 M. C. *S. arbuscula* (Lamouroux); FAL 52 T. D. *S. falsa* n. sp. from the holotype. E. *S. fusiformis* (Hincks), male; FAL 52 U. F. *S. africana* Stechow, male; FAL 125 W. G. *S. flabellum* (Allman), female; FAL 95 Q. H. *S. polyzonias* (Linnaeus); FAL 207 F. I. *S. xantha* Stechow (not from False Bay material). J. *S. megista* Stechow, male; FAL 66 L.

of hydrothecae per internode varying from 1–9, but usually between 3 and 6. Hydrotheca with perisarcal thickening around margin, and usually with 2 or more reduplications, which may almost double the length. Otherwise arrangement and shape of hydrothecae exactly as in previous descriptions.

Gonophores present in September, female, each containing one large planula larva.

Measurements (mm., the hydrothecal length is measured straight across the curves, and exclusive of reduplications).

Internode length	1·56–3·65
Hydrotheca, length abcauline	0·45–0·54
length adcauline, adnate part	0·43–0·72
length adcauline, free part	0·06–0·27
adnate part/adcauline length	0·63–0·92
length of reduplicated part	0·00–0·46
diameter at margin	0·27–0·32
maximum diameter	0·28–0·34
Gonotheca, length	1·89–2·23
maximum diameter	1·13–1·43

Sertularella fusiformis (Hincks) 1861

Figs. 10 C and D, 11 E

Sertularella fusiformis forma *glabra* Broch 1933, p. 69, fig. 27.
Sertularella lineata Stechow 1923b, p. 109; 1925, p. 469, fig. 29.
Non *Sertularella fusiformis* Warren 1908, p. 295, fig. 5, C and D.

Records. CP 336 B, 356 G. FB 109. FAL 52 U, 153 N, 176 V, 311 R.

Description. Stem unfascicled, unbranched or occasionally with 1 or 2 branches, reaching a maximum height of 2·2 cm. Stem smooth or with a slight indication of annulation above and below each node. The two rows of hydrothecae in one plane, or approaching one another very slightly on one side.

Hydrothecae very much more close-set than those figured by Broch, usually smooth, but ocasionally with suggestion of annulations, $\frac{1}{3}$ to $\frac{1}{2}$ adnate, ventricose, with abcauline wall slightly convex and not elongated, margin perpendicular to hydrothecal axis. Internal teeth present, small, usually 4, alternating with marginal teeth, sometimes one or more wanting.

Gonothecae annulated completely or nearly so, spindle-shaped, with narrow mouth and 3 or 4 marginal teeth. Present in February, April and June.

Measurements (mm.)	*False Bay Material*	*S. lineata Stechow**
Internode, length	0·31–0·53	0·40–0·60
diameter across node	0·15–0·29	0·13–0·16

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* Measurements taken from Stechow's type material loaned by the Munich Museum.

Hydrotheca, length abcauline	0·44–0·60	0·38–0·55
length adcauline, adnate part	0·16–0·32	0·21–0·29
length adcauline, free part	0·28–0·44	0·28–0·34
adnate part/adcauline length	0·30–0·50	0·40–0·46
diameter at mouth	0·20–0·25	0·17–0·23
maximum diameter	0·26–0·33	0·26–0·32
Gonotheca, male, length	1·46–2·12	
maximum diameter	0·78–1·89	
Gonotheca, female, length	1·73–2·16	
maximum diameter	0·80–0·99	

Remarks. As Broch has pointed out, *S. fusiformis* is an exceedingly variable species. The False Bay material resembles Broch's forma *glabra* rather than his forma *ornata*, in that the hydrothecal wall is smooth or nearly so, but differs from both in the shorter internodes and more crowded hydrothecae. All degrees of this crowding can be found, in some stems the margin of one hydrotheca barely reaches the base of the next one, in others the margin of one hydrotheca reaches nearly half-way up the length of the next one and practically to the base of the following one on the same side (fig. 10 D). In these extreme forms no sign of the normal annulation above and below the internode can be seen.

S. fusiformis includes *S. lineata* Stechow 1923b. Stechow's material, of which I have been able to examine a prepared slide, has more definite annulations on the hydrotheca, and above and below the nodes of the stem. The thecal annulations are not so well defined as in forma *ornata*, although approaching this condition. The hydrothecae are somewhat smaller than the False Bay material, but more variable in size than suggested by Stechow, and the range overlaps that of the False Bay material. The perisarc is described as being of 'sehr beträchtlicher Dicke', but the thickness in fact varies from 0·01 to 0·04 mm. in different parts of the colony. The False Bay material is similarly variable (under 0·01 to 0·05 mm.). The annulations described at the base of the stem in *S. lineata* are present in some stems of *S. fusiformis*, but usually the hydrothecae commence immediately.

Broch has remarked also on the variable nature of the internal teeth in *S. fusiformis*. In the False Bay material the normal condition appears to be 4 minute internal teeth alternating with the marginal teeth. But these teeth are apparently extremely delicate, and very easily become lost or eroded, with the result that many hydrothecae have some or all of them missing. It is often necessary to examine a large number to find a perfect hydrotheca with all teeth in position. However, any remaining teeth always have their correct position, i.e. they alternate with the marginal teeth, and there is no danger of confusing the species with a 3-toothed one such as *S. mediterranea*.

S. fusiformis can be distinguished from other closely related species with internal teeth by the shape of the hydrotheca. The margin is more or less perpendicular to the axis, whereas in *S. mediterranea* the lengthening of the abcauline wall causes the margin to be tilted towards the stem, and in *S. arbuscula* and *S. falsa* the margin is tilted away from the stem. From *S. pulchra* it differs in the simple stem and generally smaller proportions.

Sertularella goliathus Stechow 1923b

Figs. 10 A, 11 A

Sertularella goliathus Stechow 1923 b, p. 112; 1925, p. 481, fig. 37.

Records. PF 15608 D. FAL 52 Y, 222 C.

Description. A few fascicled stems reaching a maximum height of 3·4 cm., and a number of broken fragments. Nodes of stem and branches usually very faint or invisible, though quite distinct on occasional branches. Three large internal teeth in hydrotheca, of which 1 is adcauline and 2 abcauline. Hydrotheca with $\frac{1}{2}$ to $\frac{2}{3}$ adcauline side adnate.

Gonothecae (not previously described) borne on the branches immediately above the hydrothecae, large, spindle-shaped, with about 5 deep and smoothly rounded rings around distal portion, and 3 bluntly rounded teeth at margin. Present in June and September.

Measurements (mm.)

Internode, length	0·67–0·95
diameter across node	0·40–0·76
Hydrotheca, length abcauline	0·90–1·14
length adcauline, adnate part	0·50–0·94
length adcauline, free part	0·33–0·59
adnate part/adcauline length	0·46–0·73
diameter at margin	0·32–0·41
maximum diameter	0·48–0·61
Gonotheca, length	2·90–3·98
maximum diameter	1·22–1·58

Remarks. This species differs from *S. arbuscula* in the position of the internal hydrothecal teeth. In the latter species 1 tooth is abcauline and 2 adcauline. Stechow is not clear on this point, since in his figure of *S. goliathus* he shows some of the hydrothecae with one adcauline tooth, and some with one abcauline tooth. Examination of Stechow's type material shows that the former condition always prevails. In the False Bay material the abcauline length of the hydrotheca is slightly greater than that recorded by Stechow.

Sertularella mediterranea Hartlaub 1901

Figs. 10 E, 11 B

Sertularella polyzonias Warren 1908, p. 291, fig. 5 A, B; Pl. XLVII, figs. 18–20.

Sertularella mediterranea Stechow 1923c, p. 189, fig. C^1 and D^1a. Broch 1933, p. 76. Vervoort 1946a, p. 312; 1949, p. 150, fig. 5.

Records. FAL 66 M, 78 F, 153 P, 183 J.

Description. Colonies with unfascicled stems reaching a maximum height of 3·4 cm., branching occasionally in an irregular fashion. The two rows of hydrothecae in one plane.

Hydrothecae with $\frac{1}{3}$ to a little over $\frac{1}{2}$ of adcauline wall adnate, abcauline wall elongated, so that margin is not perpendicular to hydrothecal axis but inclined towards the stem. Internal teeth 3, 1 abcauline and 2 adcauline, large.

Male gonotheca elongated, annulated in distal half, although the degree of annulation varies considerably, some specimens being almost smooth; narrowing to margin which bears 3 or 4 teeth. Present in April, and July to September.

Measurements (mm.)

Internode, length	0·44–0·69
diameter across node	0·25–0·36
Hydrotheca, length abcauline	0·65–0·86
length adcauline, adnate part	0·33–0·46
length adcauline, free part	0·33–0·64
adnate part/adcauline length	0·37–0·58
diameter at mouth	0·22–0·35
maximum diameter	0·31–0·39
Gonotheca, male, length	2·25–3·00
maximum diameter	0·85–1·15

Remarks. The author follows Stechow, Broch and Vervoort in maintaining *S. mediterranea* Hartlaub and *S. polyzonias* (Linnaeus) as separate species, the former being distinguished by the presence of internal teeth in the hydrotheca. *S. mediterranea* can be distinguished from *S. arbuscula* and *S. fusiformis* by the fact that the abcauline wall of the hydrotheca is elongated so that the margin is tilted towards the stem.

The number and position of the internal hydrothecal teeth is constant in all the material examined. In one example, however (FAL 153 P), 2 minute extra teeth were observed, one on each side of the abcauline one.

One of the colonies (FAL 153 P) bears enlarged hydrothecae similar to those described by Warren 1908 and ascribed by him to the parasitic larva of a pycnogonid.

Sertularella megista Stechow 1923b

Figs. 10 L, 11 J

Sertularella megista Stechow 1925, p. 480, fig. 36.

Records. FAL 52 R, 66 L, 153 M, 169 T, 183 G, 274 T, 279 L.

Description. Stiff, erect colonies reaching a maximum height of 8·7 cm. Stem fascicled and about 3 mm. thick at base, branching irregularly. The terminal branchlets show a tendency to an alternate arrangement in one plane, but there is no regularity in this system. Individual branches are often enormously elongated and may stretch for over 3 cm. without bearing sub-branches.

Unfascicled branches straight and of equal thickness throughout. Nodes usually clearly visible, but sometimes becoming obscure in the lower parts of the colony. The two rows of hydrothecae in one plane.

Hydrothecae as described by Stechow, very large, adnate for over half adcauline side, then bending sharply outwards narrowing towards margin which forms an angle of about 45° with hydrocladium. Free part of adcauline side and distal part of abcauline side both slightly concave. Perisarc of variable thickness, varying from about 0·025 to 0·05 mm. thick on abcauline side of hydrotheca. No internal teeth.

Gonophores (not previously described) very large, spindle-shaped, with 4 or 5 broad and deep annulations in distal part, margin with 3 or 4 pointed teeth. Sex probably male in those examined.

Measurements (mm.)

Internode, length	0·71–0·98
diameter across node	0·40–0·69
Hydrotheca, length abcauline	0·90–1·13
length adcauline, adnate part	0·67–0·90
length adcauline, free part	0·39–0·55
adnate part/adcauline length	0·55–0·69
diameter at mouth	0·33–0·45
maximum diameter	0·47–0·61
Gonotheca, length	3·33–3·80
maximum diameter	0·85–1·50

Remarks. Under *S. megista* Stechow described an unfascicled stem reaching a maximum height of 3·5 cm. It is evident that he had before him young colonies of the species. Such stems have often been observed growing side by side with strongly fascicled stems. Young colonies appear to reach a height of 1½ to several cms. before they produce the first branch and develop the accompanying tubes of the stem. In the present material some of the colonies are characteristically marked by dark tips to the branches. Gonophores were observed from June to September.

In general appearance and in size *S. megista* is almost exactly like *S. goliathus*, and the only sure way of distinction is by the absence of internal teeth. In general appearance it is also like *S. longa* (= *S. xantha*), but the size of the hydrothecae and gonothecae is much greater.

Sertularella polyzonias (Linnaeus) 1758

Figs. 10 J, 11 H

Sertularella polyzonias Hincks 1868, p. 235; Pl. XLVI, fig. 1. Hartlaub 1905, p. 655, figs. T^4 and U^4. Broch 1918, p. 101; 1933, p. 65, fig. 24. Stechow 1923c, p. 194, fig. D^{1}c. Vervoort 1946, p. 224, fig. 96.

Non *Sertularella polyzonias* Warren 1908, p. 291, fig. 5, A and B; Pl. XLVII, figs. 18–20.

Records. ?CP 20. PF 15608 E, 15675 D. FAL 207 F, 282 Z.

Description. Stem flexuous, straggling, unbranched or branched irregularly, usually growing on other hydroids. Ends of branches often forming tendrils which reunite with the hydrorhiza. Both rows of hydrothecae in one plane or directed slightly to one side. Hydrotheca smooth, with about ½ adcauline side adnate, bending gently away from stem, abcauline wall not elongated and margin making an angle of about 45° with stem. No sign of internal teeth.

Gonotheca spindle-shaped, annulated for distal ⅔, with 3–5 pointed teeth at margin. Female larger than male, with external marsupium. Present in September and October.

Measurements (mm.)

Internode, length	0·48–1·21
diameter across node	0·13–0·20
Hydrotheca, length abcauline	0·45–0·59
length adcauline, adnate part	0·27–0·38
length adcauline, free part	0·23–0·35
adnate part/adcauline length	0·44–0·61
diameter at mouth	0·19–0·27
maximum diameter	0·25–0·32
Gonotheca, male, length	1·57–1·69
maximum diameter	0·60–0·66
Gonotheca, female, length	2·21–2·23
maximum diameter	0·92–0·93

Remarks. The False Bay material, in the light of its slender, unfascicled stems, belongs to the cosmopolitan forma *typica* (discussion: Broch 1918), rather than to forma *gigantea.*

Sertularella xantha Stechow 1923b

Figs. 10 K, 11 I

Sertularella xantha Stechow 1925, p. 472, fig. 32.

Sertularella longa Stechow 1923b, p. 110; 1925, p. 483, fig. 38.

Records. FAL 186 D, 217 T.

Description. Straggling stems reaching a maximum height of 6·4 cm., weakly fascicled at base, irregularly branched. Hydrocladia borne on stem and branches, arising immediately below hydrothecae, alternate, usually with 3 hydrothecae between 2 branches, up to 2 cm. in length. Segmentation indistinct on lower parts of stem, distinct on distal extremities and on hydrocladia. Internodes very variable in length, usually long on stem and branches, but becoming shorter towards the extremities and on hydrocladia. Both rows of hydrothecae in same plane. Perisarc fairly thick on stem, much thinner on hydrocladia; perisarc of hydrothecae also thicker on stem than on hydrocladia. Hydrotheca with ½ to ⅔ adcauline wall adnate; abcauline wall slightly concave, with a perisarcal thickening below margin; level of margin not quite perpendicular to hydrothecal axis, but tilted slightly away from hydrocladium, forming an angle of 45° with hydrocladium. No internal hydrothecal teeth.

Gonotheca borne on side of hydrocladium and opposite the base of a hydrotheca, very large, spindle-shaped, with 5–10 distinct annulations in distal part, and 3–4 small blunt teeth at margin. An external marsupium observed once only. Present in September.

Measurements (mm.)

Internode length	0·67–1·09
diameter across node	0·16–0·38
Hydrotheca, length abcauline	0·57–0·66
length adcauline, adnate part	0·42–0·51
length adcauline, free part	0·30–0·40
adnate part/adcauline length	0·51–0·62
diameter at mouth	0·25–0·31
maximum diameter	0·31–0·36
Gonotheca, length	3·03–3·58
maximum diameter	0·99–1·34

Remarks. Stechow's *S. longa* is considered to be a synonym for *S. xantha.* The only real feature which distinguishes the two in his description is the length of the internodes which are said to be 'ziemlich kurz' (0·7 mm.) in *S. longa*, and 'lang' (1 mm.) in *S. xantha.* In the present material the internode length varies in different parts of the colony, and the range of variation includes both Stechow's figures. Further, examination of prepared slides of Stechow's types shows that here too the internode length is in fact variable, ranging from 0·72 to 1·13 mm. in *S. longa* and from 0·90 to 1·16 mm. in *S. xantha.* In other details too the False Bay material combines features of both species, thus the hydrothecae are solid as in *S. longa* in the older parts of the colony, delicate as in *S. xantha* in the younger parts; the angle which the hydrocladium makes with the stem varies and may be almost a right angle as in *S. xantha*, or sharp as in *S. longa*; the hydrothecae are adnate for $\frac{1}{2}$ to $\frac{2}{3}$. Although the height of the colony in this material is less than that of either of Stechow's species, other material from the Agulhas Bank (to be described in a future paper) exceeds that of *S. longa* (23 cm., Stechow). It seems, therefore, that there is no justification for keeping the two species apart, and of the two *S. xantha* has priority.

Symplectoscyphus macrogonus (Trebilcock) 1928

Sertularella macrogona Trebilcock 1928, p. 11; Pl. I, fig. 4.

Records. F. 268. CP 326 B, 356 F, 380, 426 M. FAL 78 H, 132 W, 141 C, 153 T, 160 V.

Description. Hydrorhiza creeping, usually on weeds, forming a loose network. Stem usually unbranched and about 0·8 cm. in height. Occasionally, however, branching forms occur, resulting in a shrubby colony about 3·2 cm. in height.

Here the stem is often interrupted by densely annulated regions devoid of hydrothecae. Anastomosing tendrils often arise from within the hydrothecae, and in the branching form unite the colony into a dense mesh-work.

The angle which the two rows of hydrothecae make with one another varies. In some cases the two rows are exactly opposite and lie in the same plane, in others the two rows are inclined towards one another forming an angle between them which may be as small as 45°. The two extremes are seldom present in one colony, some colonies tending towards a large angle, and others to a small one, but all intermediate stages occur.

Hydrothecal aperture occasionally at right angles to the stem as described by Trebilcock, but more usually directed away from the stem. Three internal teeth usually present, alternating with marginal teeth. Margin often reduplicated.

Gonothecae as described by Trebilcock, present in February to May, July, August and December.

Measurements (mm.)

Internode length	0·21–0·29
Hydrotheca, length abcauline	0·24–0·32
length adcauline, adnate part	0·08–0·17
length adcauline, free part	0·16–0·24
adnate part/adcauline length	0·25–0·52
diameter at mouth	0·11–0·145
Gonotheca, length	1·20–1·42
maximum width	0·79–1·14

Remarks. This is the first record of this New Zealand species from South Africa, and in view of its fairly common distribution here it is surprising that it has not been reported before.

The False Bay material differs from that of Trebilcock in the presence of internal hydrothecal teeth. However, this is apparently not a constant feature for the species, for although internal teeth are normally present, they may be absent in several hydrothecae on a stem, or even on a complete stem. It cannot therefore be used to establish a separate species. In other respects (including the general appearance of the colony, the annulated base of the stem and the structure of the gonotheca) the material conforms to Trebilcock's description.

Amphisbetia bidens (Bale) 1884

Sertularia bidens Bale 1884, p. 70; P. VI, fig. 6; Pl. XIX, fig. 1. Warren 1908, p. 310, fig. 10.

Records. FAL 66 N.

Description. One fragment 2·5 cm. long, without rootstock or basal part of stem. Nodes of stem faint, but quite definite. Hydrocladia long, bearing as many as 16 pairs of hydrothecae, and in one case branched. Internodes bearing up to 12 pairs hydrothecae.

Hydrothecae with comparatively short marginal teeth. Operculum of 2 membranous valves, of which the adcauline is the larger, meeting in the form of a low pyramid above the aperture. The valves are not attached to the marginal teeth, but are hinged to the margin of the hydrotheca in the bays between the teeth. When the marginal teeth are short they do not reach the level of the top of the pyramid, but when longer project beyond it.

Gonophores absent.

Amphisbetia minima (Thompson) 1879

Sertularia minima Allman 1886, p. 138; Pl. XIII, figs. 3–4. Bale 1884, p. 89; Pl. IV, figs. 9–10; Pl. XIX, figs. 12–13. 1915, p. 269. 1924, p. 248.
Sertularia crinoidea Allman 1886, p. 141; Pl. XVI, figs. 1–2.

Records. FAL 153 V.

Description. One small colony, without gonothecae, reaching a maximum height of 0·3 cm. Hydrorhiza with very thick perisarc and internal chitinous supports. Stem with 2 or 3 hinge-joints in basal part (as described by Allman for *S. crinoidea*) and up to 9 pairs of hydrothecae. Nematothecae visible on some internodes as low tubular structures, slightly expanding towards aperture. No nematophores visible. Operculum too badly preserved to see detail.

Amphisbetia operculata (Linnaeus) 1758

Sertularia operculata Hincks 1868, p. 263; Pl. LIV. Bale 1884, p. 67; Pl. VI, fig. 1; Pl. XIX, fig. 3. 1915, p. 274.

Records. FB 104, 105, 119 J, 122, 133 C. FAL 20 P, 52 Q, 62 M, 78 A, 108 H, 153 L, 217 Q.

Description. Common in dredgings, reaching a maximum height of 14·8 cm. Branching very variable: dichotomous, but one fork often of much longer growth than the other, resulting in a long-drawn-out colony. The 2 rows of hydrothecae not always in one plane, but often shifted slightly on to one side of the stem, although never in contact except in the axils of the branches. Hydrothecae almost completely adnate, marginal teeth of unequal size. Operculum of 2 membranous valves but, unlike *A. bidens*, they appear to be attached to the marginal teeth at the sides. Adcauline valve divided into two by a median line. Gonophores present in April, June to September, and November.

Sertularia distans (Lamouroux) 1816 var. *gracilis* Hassall 1848

Fig. 12

Sertularia gracilis Hincks 1868, p. 262; Pl. LIII, fig. 2. Stechow 1913a, p. 146, figs. 121–124.
Dynamena gracilis Marktanner-Turneretscher 1890, p. 240; Pl. V, fig. 3.
Tridentata gracilis Stechow 1923c, p. 208, fig. G[1].

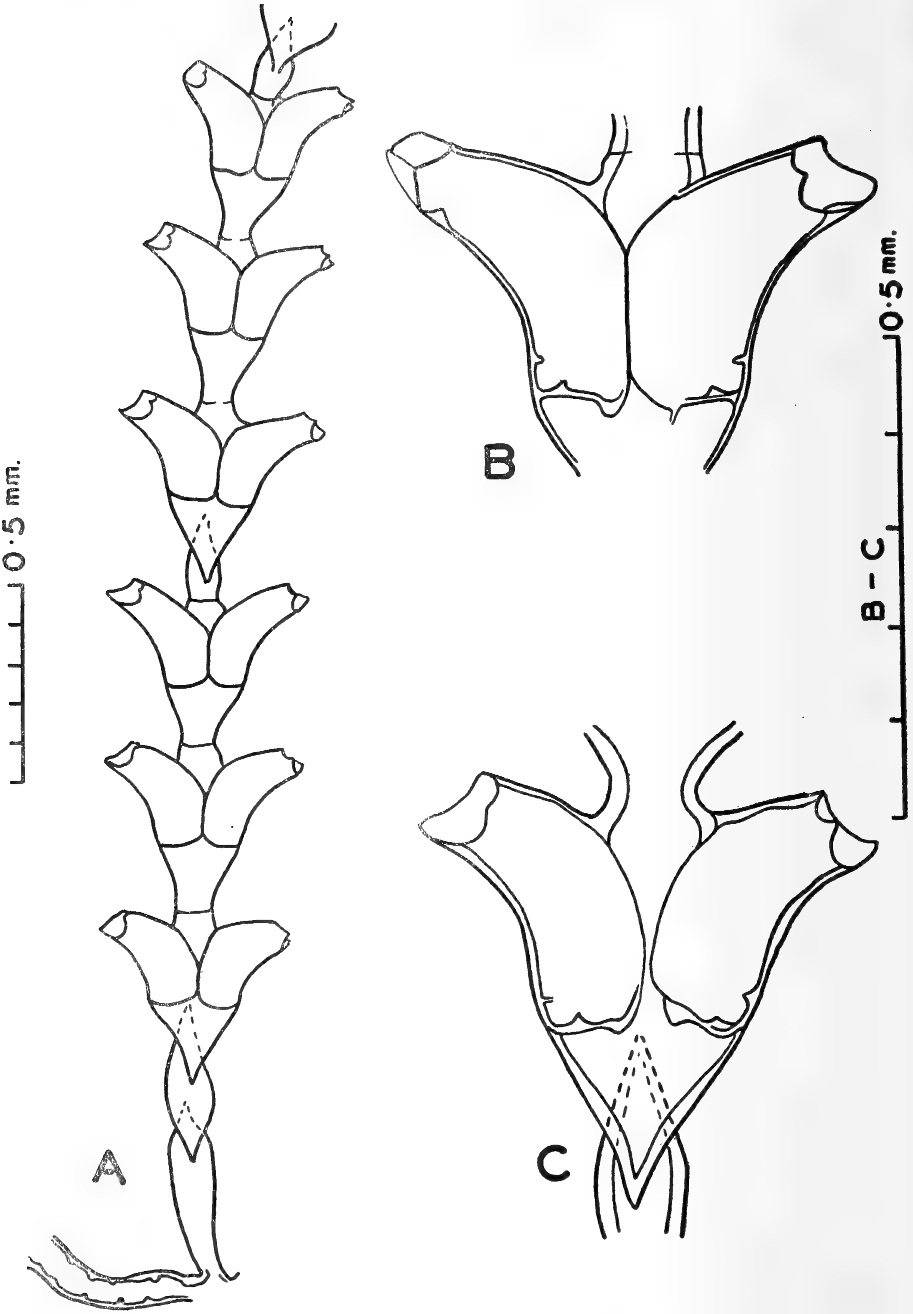

Fig. 12. *Sertularia distans* (Lamouroux) var. *gracilis* Hassall, FAL 78 J.

A. Portion of an upright stem. B. A pair of hydrothecae from the centre of the stem, and C. from the lower part of the stem.

Sertularia distans var. *gracilis* Billard 1925, p. 175, fig. 33. Leloup 1935, p. 47, figs. 28–29. 1937a, p. 105, fig. 8.

Records. FAL 78 J, 311 S.

Description. Hydrorhiza creeping, supported by internal thickenings of perisarc. Stem unbranched, reaching a maximum height of 0·8 cm., and bearing up to 17 pairs of hydrothecae (but usually about 5–8). Basal athecate part of stem terminated by 1 or 2 hinge-joints. Rest of stem divided into thecate internodes each bearing a pair of opposite hydrothecae and bounded by transverse nodes, which, however, are usually very faint or even invisible. Short athecate internodes interpolated at irregular intervals (after 1–4 thecate internodes), each bounded proximally by a transverse node and distally by an oblique node. Pairs of hydrothecae fairly close, generally separated by a distance approximately equal to height of hydrotheca, but tending to be closer in distal part of stem. Members of a pair in contact for a little under half their height on anterior surface, but first one or two pairs much less than this or not meeting at all; free on posterior surface. Line of contact straight, rest of hydrothecae diverging at an angle of about 45°.

Hydrothecae with parallel sides in lower part, narrowing towards margin in upper part, those on lower part of stem sometimes slightly shorter and wider than those on upper part. Margin with a prominent triangular tooth on each side and usually a small median one on adcauline side; often reduplicated. Operculum of 2 valves, the adcauline smaller and divided by a median line. An internal tooth sometimes present immediately below margin on abcauline side. Three peg-like processes of perisarc in basal region of hydrotheca, one on abcauline wall near base, one resting on outer part of base, and a third projecting downwards below adcauline wall. Hydranth with abcauline blind pouch.

Gonophores absent.

Measurements (in mm., exclusive of lateral teeth or reduplications)

Stem, length of basal part	0·41–0·64
Internode, thecate, length	0·34–0·42
thecate, diameter at node	0·06–0·09
athecate, length	0·15–0·25
Hydrotheca, length, abcauline	0·21–0·28
length adcauline, adnate part	0·20–0·24
length adcauline, free part	0·12–0·17
length adcauline, contiguous part	0·00–0·20
diameter at base	0·07–0·12
diameter at margin	0·08–0·09

Remarks. This is the first time this species has been recorded from South Africa.

Sertularia marginata (Kirchenpauer) 1864

Fig. 13

Sertularia marginata Totton 1930, p. 204 (synonymy), fig. 48b.

Records. PF 15608 F.

Description. A single colony reaching 3 cm. in height, including both pinnate and unbranched stems. Hydrorhiza creeping on alga and containing internal perisarcal supports in some regions only.

Pinnate stem with short athecate basal portion (under 1·5 mm.) containing 1, or occasionally 2, transverse nodes, and terminated by 1, or occasionally 2, hinge-joints. 1–4 pairs of hydrothecae (usually 1) present between hinge-joint and first hydrocladium. Rest of stem divided into regular internodes by very slightly oblique nodes which tend to be indistinct in lower parts. Each internode bearing one hydrocladium with a hydrotheca in its axil and above it a pair of alternate or subopposite hydrothecae. Occasionally an internode with one pair of hydrothecae and no hydrocladium, and occasionally a short athecate internode terminated by a hinge-joint. Hydrothecae below first hydrocladium and above last in opposite or subopposite pairs. Hydrothecae borne on front of stem, members of a pair not making contact with each other except in distal region.

Hydrocladium borne on a fairly long apophysis from stem internode and separated from it by a transverse node. First (and occasionally second) internode short, athecate, terminated by hinge-joint. Remainder divided by oblique nodes into regular internodes, each bearing a pair of hydrothecae. Occasionally an extra transverse node separates off the distal end of an internode. Members of a pair of hydrothecae usually contiguous.

Hydrocladia often branching again in an alternate and pinnate manner. Those internodes giving rise to branches arranged as stem internodes, i.e. each bears one branch with a hydrotheca in its axil, and above it a pair of subopposite hydrothecae. The internodes immediately below show a gradual displacement of the hydrothecal pairs to this arrangement. Structure of branches exactly as hydrocladia.

Simple stem with basal part similar to pinnate stem. Remainder divided by oblique nodes into fairly regular internodes, each bearing a pair of opposite hydrothecae. Occasionally an extra athecate internode terminating in a hinge-joint. Members of a pair of hydrothecae separate in lower part of stem, contiguous in distal part.

Hydrothecae swollen below, narrowing to mouth, adnate for over half height then bent outwards, with intrathecal ridge on abcauline wall which may be absent in distal parts of colony. Margin with 2 prominent, sharp, lateral teeth, and a small median adcauline tooth. No internal teeth, but margin sometimes thickened. Operculum of 2 delicate flaps, the adcauline smaller and divided by a median line. Hydranth with abcauline blind pouch.

Gonophores absent.

Measurements (mm.)

Pinnate stem, internode length	0·75–1·10
diameter at node	0·11–0·20
Hydrocladium, internode (without branch), length	0·44–0·66
internode (with branch), length	0·85–0·90
diameter at base of hydrothecae	0·22–0·34
Simple stem, internode length	0·49–0·72
diameter at base of hydrothecae	0·29–0·33
Hydrotheca, length, abcauline	0·20–0·26
length, adcauline, adnate part	0·23–0·31
length adcauline, free part	0·08–0·21
length adcauline, contiguous part	0·00–0·19
maximum diameter	0·16–0·26
diameter at mouth	0·12–0·19

Remarks. This is the first record of the species from South Africa. A full description has been given, since, in the absence of gonophores, the identification cannot be absolutely certain. Further, no types were available for

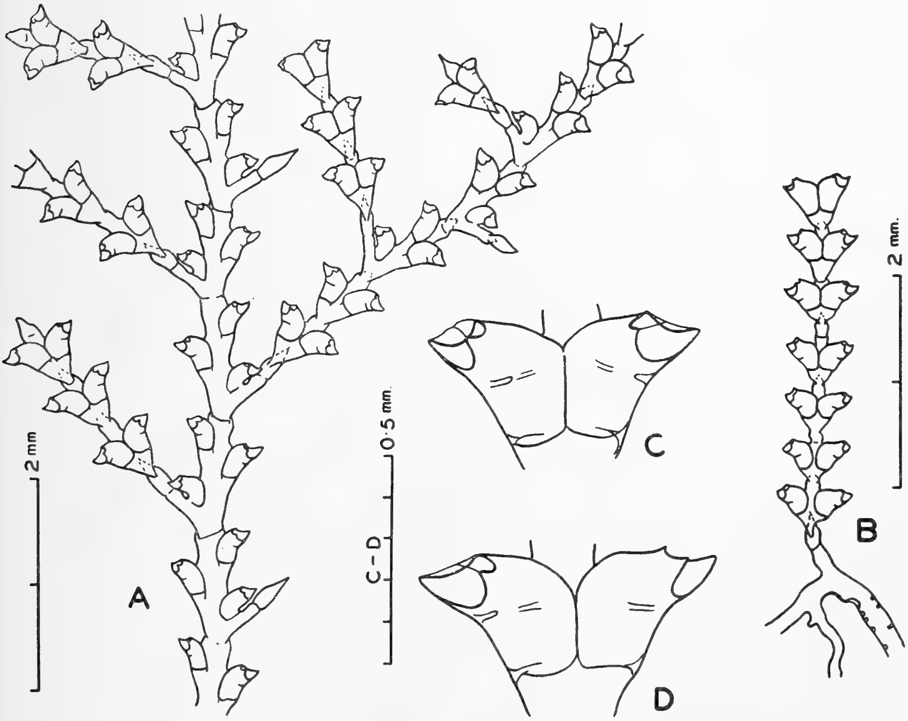

Fig. 13. *Sertularia marginata* (Kirchenpauer), PF 15608 F.

A. Portion of a pinnate stem with hydrocladia and sub-branches. B. A simple stem. C and D. Two pairs of hydrothecae from a hydrocladium.

comparison. Apparently there are two closely related species, *S. amplectens* Allman, and *S. inflata* (Versluys). The description of the latter was not available, while the illustrations of the former are vague and indefinite in the critical features. Totton states that *S. marginata* can be distinguished from *S. amplectens* by the greater length of the basal part of the stem and by the presence of many pairs of hydrothecae below the first hydrocladium. In the False Bay material the length of the basal part of the stem is intermediate between the two species, but closer to *S. amplectens*, yet there are always hydrothecae below the first hydrocladium, usually one pair, but sometimes as many as 4. In every other respect it agrees with *S. marginata*. An unusual feature of the False Bay material is the branching nature of the hydrocladia, which has not previously been described.

Family: **Plumulariidae**

Antennella africana Broch 1914

Antenella quadriaurita Ritchie f. *africana* Broch 1914, p. 26.
Antenella africana Stechow 1925, p. 492, fig. 41.

Records. F 299A (recorded by Eyre 1939). PF 337 B. FB 119 D, 129 B, 131 B. FAL 6 M, 23 M, 26 K, 66 B, 78 K, 169 W, 214 D, 217 M, 230 R, 279 D, 290 B.

Description. Clusters of erect, hair-like hydrocladia reaching a maximum height of 2·1 cm. Basal part of hydrocladium consisting of as many as 5 athecate internodes of irregular length, separated by transverse nodes, and terminated by an oblique node. The last of these segments with 2 or 3 nematothecae, sometimes as many as 6, arranged irregularly. Of the others, the shorter ones devoid of nematothecae, the longer ones with 2 or 3.

Remainder of hydrocladium divided into alternate thecate and athecate internodes, bounded distally by transverse and oblique nodes respectively. Oblique nodes very distinct, transverse ones less so and sometimes very faint. Internodes of variable length, generally athecate internodes longer than thecate in lower part of hydrocladium and thecate internodes longer in distal part.

Nematothecae as previously described, 5 on each thecate internode, one on each athecate internode. Occasionally an athecate internode bears 2 median nematothecae, one above the other; and occasionally there are two consecutive athecate internodes each with a median nematotheca.

Gonophores borne on hydrocladia, singly or in pairs, immediately below hydrothecae. Each arises on one side of the hydrocladial protuberance which bears the hydrotheca, about mid-way between the hydrotheca and the median nematotheca. Male and female on separate hydrocladia; or on the same one, the male distal and the female proximal. Present in March, and June to September. Male gonophore elongated, tapering to both ends, distal end closed by a round, deep-convex operculum; one nematotheca on side of lower part; pedicel of 1 segment. Female gonophore larger, broader, truncated at distal end, closed by a round, shallow-convex operculum; 2 nematothecae on sides of lower part; pedicel of 2 segments.

Measurements (mm.)

Hydrocladium, length of basal part	1·02–2·86
thecate internode, length	0·33–0·43
athecate internode, length	0·23–0·52
athecate internode, maximum diameter	0·07–0·13
Hydrotheca, length abcauline	0·19–0·27
diameter at margin	0·21–0·26
Gonotheca, male, length (without pedicel)	0·31–0·54
maximum diameter	0·13–0·23
Gonotheca, female, length (without pedicel)	0·68–0·77
maximum diameter	0·38–0·47

Remarks. The gonophores of this species have previously been incorrectly described. In the diagram given by Stechow 1925, the smaller gonophore is male, and the larger female.

The details and measurements of this species are very close to those of *A. serrata* Totton, 1930, from New Zealand, and the latter is possibly a synonym of the former.

Halopteris constricta Totton 1930

Fig. 14 A

Halopteris constricta Totton 1930, p. 217, fig. 56a.

Records. FAL 58 X, 66 G, 78 T.

Description. Colonies with both simple and pinnate stems, reaching a maximum height of 9 mm. The simple stems represent hydrocladia arising direct from the hydrorhiza. The structure of the pinnate form resembles that described and figured by Totton, except that the adcauline side of the hydrotheca is usually slightly more concave. The free adcauline part varies from $\frac{1}{2}$ to $\frac{1}{4}$ the abcauline length, but is usually in the neighbourhood of $\frac{1}{3}$. The basal athecate part of the stem varies in length and may reach 3 mm., and the oblique hinge-joint terminating this region is exactly similar to the other oblique joints of the stem. Additional short athecate internodes devoid of nematothecae may occur below the normal athecate internodes at almost any region of the stem or hydrocladia, one or two are invariably present below the first long athecate internode of the hydrocladium, and sometimes even 3. An extra median nematotheca may occur on the athecate internodes of the hydrocladia (making 2); or on the thecate internodes above the hydrothecae, such internodes being abnormally prolonged in this region. The hydrocladia may have as many as 6 hydrothecae, although the usual number is 2 or 3.

The larger pinnate colonies often have branching hydrocladia, the secondary hydrocladia arising from the primary ones at the sides of the hydrothecae in exactly the same manner as the primary hydrocladia arise from the stem.

There is no regularity in this branching, the secondary hydrocladia arising at any level from the primary, and sometimes 2 secondaries from one primary.

Gonophores not present.

Measurements (mm.)

Stem, thecate internode, length	0·20–0·32
athecate internode, length	0·15–0·42
diameter	0·04–0·105
Hydrocladium, first internode, length	0·045–0·07
second internode, length	0·15–0·28
normal athecate internode, length	0·115–0·23
thecate internode, length	0·205–0·29
diameter	0·035–0·06
Cauline hydrotheca, length abcauline	0·14–0·165
length adcauline, free part	0·04–0·05
width at mouth	0·12–0·16
Hydrocladial hydrotheca, length abcauline	0·14–0·16
length adcauline, free part	0·04–0·075
width at mouth	0·13–0·165
Nematotheca, medial, on athecate internode	0·05–0·08
lateral	0·055–0·08

Remarks. This is the first record of the species from South Africa. The only other recorded locality is New Zealand.

The species appears to be extremely variable in its growth-form, possessing simple stems, pinnate stems, and stems with branching hydrocladia, and variable also in the segmentation of its stem and hydrocladia.

Halopteris valdiviae (Stechow) 1923

Fig. 14 B

Thecocaulus(?) *valdiviae* Stechow 1925, p. 495, figs. 42–43.

Records. PF 15608 G.

Description. Two unattached plumes, the longer measuring 1·5 cm. Stem unfascicled, but showing the beginning of fasciculation at the base. Basal part of stem without hydrocladia, and in one specimen with several transverse nodes. This part terminated by 2 oblique hinge-joints, between which arises a pair of hydrocladia, one on each side of a cauline hydrotheca. Remainder of stem divided by oblique nodes into regular internodes each bearing one cauline hydrotheca and one hydrocladium.

Hydrocladia alternate, reaching 4 mm., and bearing up to 8 hydrothecae, borne on apophyses of stem internodes alternately on left and right of cauline hydrothecae. Details of hydrocladia exactly as described by Stechow: 1st internode short and without hydrotheca or nematotheca, 2nd internode (and on 1st pair of hydrocladia 3rd internode) longer and with one nematotheca, remaining internodes thecate. Occasionally the distal end of an internode is cut off by an extra node, but such intermediate internodes are always without nematothecae.

Hydrotheca deeper than wide, adnate for over $\frac{4}{5}$ of length, margin sinuated. Median nematotheca 2-chambered, short and broad. Median supracalycine nematotheca 1-chambered, reaching hydrotheca margin. Lateral nematothecae 2-chambered, long, not quite reaching the next node. Cauline nematothecae as in Stechow's fig. 43: one short, broad, 2-chambered nematotheca

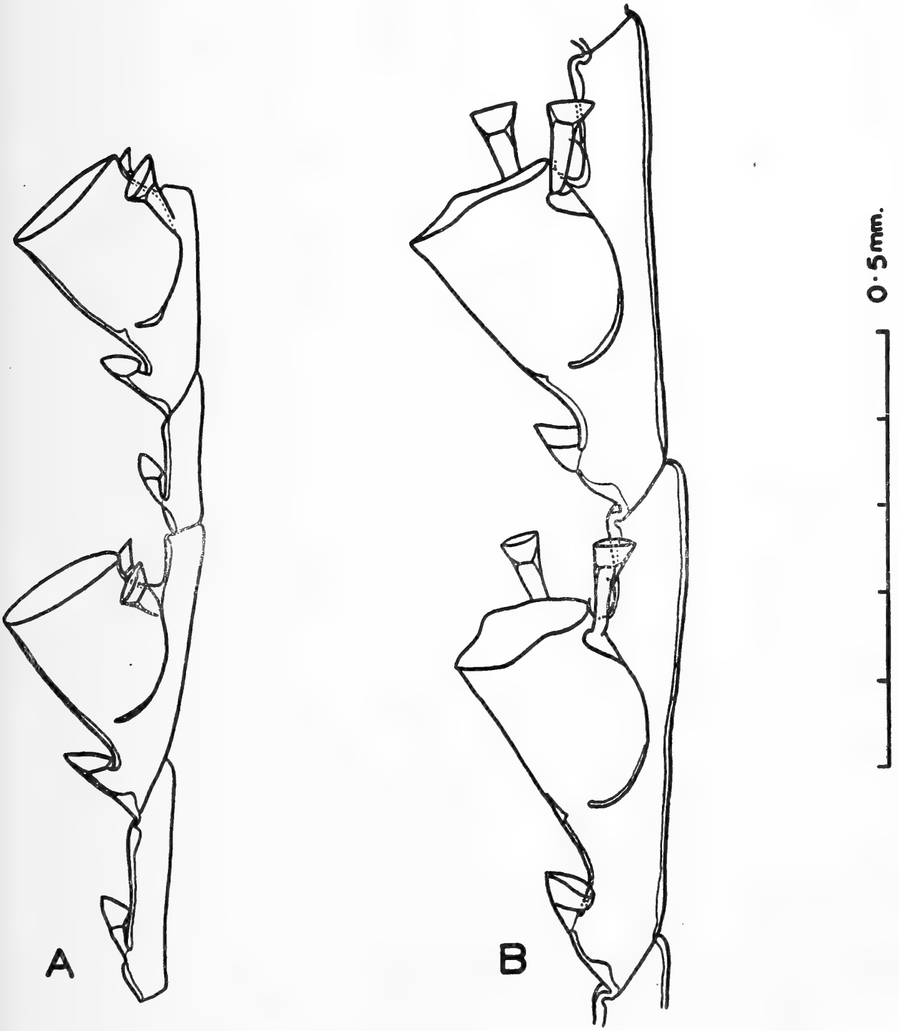

Fig. 14. A. *Halopteris constricta* Totton, FAL 58 X. B. *Halopteris valdiviae* (Stechow), PF 15608 G,

below cauline hydrotheca, and one pair lateral nematothecae, of which that on the opposite side to the hydrocladium is the longer.

Gonophores absent.

Measurements (mm.)

Stem, internode length	0·44–0·50
maximum diameter	0·14–0·20
Hydrocladium, first internode, length	0·05–0·09
second internode, length	0·20–0·27
thecate internode, length	0·48–0·57
Hydrotheca, length abcauline	0·18–0·24
length of free part	0·04
total length/length of free part	4·50–6·00
diameter at margin	0·135–0·20
Nematotheca, lateral, length	0·12–0·17
median, infracalycine, length	0·07–0·10

Remarks. This material agrees so closely with *H. valdiviae* (Stechow 1925, fig. 43) in its detailed structure that it must represent either a young colony or detached branches of the same species. In a heavily fascicled stem such as that described by Stechow the hinge-joints would undoubtedly be obscured. Stechow illustrates the median supracalycine nematotheca as 2-chambered, but describes it as 1-chambered, which it is in the False Bay material. Stechow also states that the lateral nematothecae are as long as the hydrotheca, but the length certainly varies in different parts of the colony as is shown by his own figures, being greater near the base, and less near the tip. The same tendency is shown even in the small fragments from False Bay.

Paragattya intermedia Warren 1908

Paragattya intermedia Warren 1908, p. 323, fig. 16; Pl. XLVII, fig. 27. Stechow 1923c, p. 234; 1925, p. 494.

Records. FAL 52 X (growing on corallines and also on back of crab, *Dehaanius dentatus*), 78 N, 108 M.

Description. Numerous colonies, generally growing on Corallines, and reaching a maximum height of 7 mm. The structure agrees exactly with Warren's description, except that the tip of the stem is often prolonged into a swollen tendril-like process which attaches to the substratum and forms a new hydrorhiza. Gonophores present in August.

Plumularia lagenifera Allman 1886

Plumularia lagenifera Allman 1886, p. 157; Pl. XXVI, figs. 1–3. Nutting 1900, p. 65; Pl. VI, figs. 6–10.

Plumularia californica Marktanner-Turneretscher 1890, p. 255; Pl. VI, fig. 4.

Plumularia lagenifera, var. *septifera* Ritchie 1909, p. 87, fig. 7.

Records. FAL 82 X, 108 L, 123 L, 167 P.

Description. Hydrorhiza reticular, growing on weeds and corallines, often with internal chitinous thickenings as described by Ritchie for var. *septifera.*

Stem unbranched, reaching 0·9 cm. Each internode bearing a hydrocladium on a long apophysis just above the centre; containing 2 or 3 septal ridges, with another in the distal end of the apophysis. Occasionally the proximal part of the internode is separated from the rest by an extra node. In some cases the distal end of the stem is broadened and curled over to form a new rooting stock.

Hydrocladia alternate, the two rows forming an angle of about 100° between them, each bearing one short athecate internode (occasionally 2), then alternate thecate and athecate internodes. One septal ridge in proximal internode, 2–4, or occasionally more, in thecate internode, and 1 or 2 in intermediate internode. Occasionally 2 consecutive athecate internodes occur, of which the 1st appears to be the distal end of the previous thecate internode which has been cut off by an extra node.

Hydrotheca borne on pronounced projection from internode, variable in height, but with the lateral and abcauline walls always convex and bending inwards towards mouth. Abcauline wall thickened, sometimes at margin only. Margin not at right angles to internode as figured by Nutting and Allman, but facing slightly away from it as figured by Marktanner-Turneretscher.

Nematothecae: 3 on thecate internode, mesial one borne on swelling of internode below hydrotheca, lateral pair attached below margin of hydrotheca and extending above margin, as figured by Marktanner-Turneretscher and Allman, not as described by Nutting; 1 on intermediate internode; none on proximal hydrocladial internode; 2 or 3 on stem internode, of which one is in the axil of the hydrocladial apophysis and the other(s) on the anterior surface.

Gonothecae borne on apophyses of stem internodes, laterally compressed, ovate in side view with a slender curved neck. In some cases the neck is only slightly curved as figured by Nutting, in others it is bent right over like the neck of a gourd, so that the opening faces downwards and outwards. Truncated forms containing young eggs also present. Present in January, February and June.

Measurements (mm.)

Stem internode, length	0·24–0·38
diameter	0·075–0·145
Hydrocladium, 1st internode, length	0·04–0·095
normal athecate internode, length	0·055–0·13
thecate internode, length	0·23–0·325
Hydrotheca, length adcauline	0·08–0·17
length abcauline	0·06–0·155
diameter at base	0·055–0·085
diameter in centre	0·09–0·14
diameter at margin	0·07–0·12

Nematotheca, length	0·06–0·075
(an extra large one 0·10)	
Gonotheca length (excluding truncated type)	0·625–0·91
maximum diameter	0·26–0·44

Remarks. As Bale has remarked, this species is closely related to *P. setacea*, but can be distinguished from it by the fact that the hydrothecal wall (or at least the abcauline side) is convex and narrows towards the mouth. Gonophores with recurved necks have never been observed in *P. setacea*.

The species is very variable and two extremes of form are found. In one the hydrotheca is deep, with the height exceeding the width, and the wall thickened only at the margin. In the other the hydrotheca is shallow, with the width exceeding the height, the entire abcauline wall thickened, and all septal ridges very much accentuated. The latter type corresponds to Torrey's var. *septifera*, described by Ritchie 1909, but since both types may occur in one colony, together with intergrading forms, it does not seem possible to separate them.

Plumularia pulchella Bale 1882

Plumularia pulchella Bale 1882, p. 30; Pl. XV, fig. 6. Totton 1930, p. 221, fig. 58.

Plumularia (*Monotheca*) *flexuosa* Stechow 1925, p. 499.

Records. FB 119 E. FAL 13 A, 23 P, 26 J, 66 F, 78 R, 132 X, 153 R, 311 Q.

Description. Sparse colonies from various regions of False Bay, reaching a maximum height of 0·7 cm. Stem unbranched or very occasionally with one lateral branch. Hydrocladia arising from apophyses on distal ends of internodes. No gonophores.

Plumularia setacea (Ellis and Solander) 1755

Plumularia setacea Hincks 1868, p. 296; Pl. LXVI, fig. 1.

Records. CP 15 B, 326 G, 327 B, 356 B. FB 131 C. FAL 6 L, 13 F, 15 Y, 66 D, 78 M, 125 T, 137 S, 141 A, 148 G, 153 W, 160 W, 165 Y, 169 Y, 177 M, 217 P, 222 F, 268 G, 274 S, 279 F, 311 P.

Description. Numerous colonies reaching a maximum height of 2·2 cm. Gonophores present in February to July, September and December.

Remarks. The material from False Bay all falls within Broch's forma *typica*.

Plumularia spinulosa Bale 1882, var. *obtusa* Stechow 1923c

Monotheca spinulosa var. *obtusa* Stechow 1923c, p. 224.

Records. FB 126.

Description. Stems reaching 5 mm. in height, and bearing up to 18 hydrocladia. Basal part of stem short, consisting usually of 2 internodes without hydrocladia or nematothecae. Internodal septa well marked, 1 or 2 in each stem internode, 1 in hydrocladial apophysis, 1 in first internode of hydrocladium, 1 or 2 in 2nd internode behind hydrotheca. Hydrocladium arising from middle or distal end of stem internode. Spine on end of hydrocladium short and bluntly pointed, barely reaching margin of hydrotheca. Gonophores absent.

Remarks. Although the typical variety of *P. spinulosa* is known from Natal (Warren 1908), this is the first record of var. *obtusa*. It has previously been recorded from Australia and Japan.

Kirchenpaueria pinnata (Linnaeus) 1758

Plumularia echinulata Ritchie 1907a, p. 540.
Plumularia pinnata Ritchie 1907a, p. 541.
Plumularia unilateralis Ritchie 1907a, p. 541; Pl. II, fig. 1.
Kirchenpaueria pinnata Broch 1918, p. 53. Vervoort 1946, p. 167, figs. 69–70.

Records. F 10, 244 (recorded by Eyre 1939). CP 15 A, 19, 326 A, 356 A, 410 Y. FB 131 D, 140 E, 141 A, 142 B. FAL 42 U, 66 E, 78 L, 108 K, 123 K, 125 U, 160 U, 176 W, 274 P, 288 F.

Description. Very common in intertidal region and shallow water, forming a short feathery growth reaching a maximum height of 2·5 cm. Many minor variations occur. In some colonies all the stem internodes bear one hydrocladium each, in others the lower stem internodes may bear as many as 4 hydrocladia. Very occasionally in young colonies hydrocladia may arise separately from the hydrorhiza. On the hydrocladia athecate internodes are occasionally present between 2 thecate ones; and sometimes an extra 1 or 2 athecate internodes may be present between the basal athecate internode and the first thecate one. These may be devoid of nematothecae, or may bear 1 or 2 each.

Gonophores very variable, younger ones normally smooth, older ones ribbed, with or without spines. Borne on stem or on hydrorhiza. Present in February, April to July, and September to October.

Remarks. Kirchenpaueria unilateralis (Ritchie 1907a) is considered to be a synonym for *K. pinnata*. This conclusion was reached after a careful study of type material kindly loaned by the Royal Scottish Museum, Edinburgh. Its distinguishing features are said to be:

(i) The stem internodes never bear more than one hydrocladium each. But this is the normal condition in many stems of *K. pinnata*. Further, careful study of the type material of *K. unilateralis* shows that at least two of the stem internodes bear two hydrocladia each.

(ii) The two rows of hydrocladia are borne on one side of the stem, and so lie in two planes. This unilateral arrangement is obviously only a growth-form of *K. pinnata*, and in False Bay is often found on stems growing in the same colony as the normal flattened type.

(iii) The hydrocladia occasionally branch. Branching hydrocladia have never again been observed in all the wealth of material examined, neither in the normal flat stems, nor in the unilateral type. If *K. unilateralis* were retained as a separate species, this would be its only distinguishing feature. I am inclined to regard it, however, as an abnormal condition and possibly due to injury.

In Ritchie's material the internodes of the stem and hydrocladia are rather shorter, and the hydrothecae more crowded than in the False Bay material (hydrotheca length/internode length = 0·40–0·59 mm.), but not sufficiently so for the maintenance of a separate variety. Broch gives the proportions for var. *typica* as $\frac{1}{3}$ to $\frac{1}{2}$. All the False Bay material falls well within the range of var. *typica.*

Pycnotheca mirabilis (Allman) 1883

Diplocheilus mirabilis Allman 1883, p. 49; Pl. VIII, figs. 4–7.
Kirchenpaueria mirabilis Bale 1894.
Pycnotheca mirabilis Totton 1930, p. 216, fig. 55.

Records. FAL 78 U, 108 J.

Description. A fair number of unbranched stems, reaching a maximum height of 3 cm. Basal 2–3 mm. of stem devoid of hydrocladia and containing 1–4 transverse nodes. Remainder with 2 hydrocladia per internode in lower part, and one in distal part.

Gonophores present in January, as described by Bale, borne on hydrorhiza and on basal part of stem replacing hydrocladia.

Measurements (mm.)	*False Bay*	*Richard's Bay*
Hydrocladium, internode length	0·34–0·42	0·32–0·35
Hydrotheca, height	0·25–0·30	0·20–0·21
diameter at margin	0·22–0·27	0·18–0·19
adcauline side, length of free part . .	0·08–0·13	0·06–0·08
Gonotheca, length	2·12–2·88	
maximum diameter	1·02–1·06	

Remarks. The material from False Bay agrees well both in size and structure of the hydrotheca with the typical form of the species as figured by Totton.

In the material previously reported from Richard's Bay, Natal (Millard and Harrison 1954) as *Kirchenpaueria mirabilis*, the hydrothecae are smaller, and the opening into the medial nematotheca is in an oblique position rather than vertical. This material must thus be referred to var. *warreni.* The measurements of the two forms are given for comparison.

Nemertesia cymodocea (Busk) 1851

Antennularia decussata Kirchenpauer 1876, p. 52; Pl. II, fig. 24; Pl. III, fig. 24; Pl. VII, fig. 24.
Antennularia hartlaubi Ritchie 1907a, p. 542; Pl. III, fig. 4.

Records. PF 337 A. FB 112, 115 A, 129 A, 131 A, 132, 134 A, 139 A, 146 B. FAL 95 R, 209 F, 211 F, 217 K, 222 E, 268 F, 274 N, 279 C, 290 A.

Description. Massive colonies abundant in shallow water and reaching a maximum height of 49 cm. The decussate arrangement, with the hydrocladia borne in alternate pairs, is found in the lower parts of the branches, and the hexastichous arrangement near the ends, i.e. just the opposite of the arrangement described by Marktanner-Turneretscher. In some colonies only the decussate arrangement is present, and in others only the hexastichous type. Occasionally the small branches arising near the base of the colony have only one hydrocladium to an internode, and these are arranged alternately, the two rows being in one plane. One or two athecate internodes may be present at the base of each hydrocladium. The hydrocladium-bearing apophysis bears one pair of bithalamic nematophores, and a 'mamelon' more or less in the centre of the upper surface.

Gonophores include the normal elongated type, and young ones which are shorter and truncated at the ends. Present in February, September and November.

Nemertesia ramosa Lamouroux 1816

Antennularia ramosa Hincks 1868, p. 282; Pl. LXII.
Nemertesia ramosa Broch 1933, p. 38.

Records. PF 351 A. FAL 207 G.

Description. Two specimens of unbranched fragments with a maximum length of 6·7 cm., some of them fascicled in lower region. Hydrocladia in whorls of 3 in upper parts, but becoming irregular lower down. Hydrocladial apophyses stouter than usually figured, but narrowing to distal ends where the diameter is the same as that of the hydrocladia. Athecate internodes not limited to distal ends of hydrocladia, but irregularly scattered in any region.

One specimen possesses male gonophores and the other female, and these are slightly different in appearance. The young male gonophore is elongated, with a rounded end, and is quite symmetrical. Older ones have open truncated ends which are sometimes at right angles to the stem and sometimes placed slightly oblique, facing towards the stem. Female gonophores always have the opening on the side facing the stem and practically parallel to it. They contain several large eggs or embryos. Both sexes present in September.

Antennopsis scotiae Ritchie 1907a

Antennopsis scotiae Ritchie 1907 a, p. 543; Pl. III, fig. 3. 1909, p. 90, fig. 8.

Records. PF 15675 A. FAL 64 M, 207 H, 211 G, 217 L, 222 G, 230 N, 291 A.

Description. Colonies reaching a maximum height of 13·7 cm. Gonophores present in March and September.

Aglaophenia pluma (Linnaeus) 1758

Aglaophenia pluma Hincks 1868, p. 286; Pl. LXIII, fig. 1. Broch 1933, p. 44.

General Discussion. A number of species of *Aglaophenia* have been recorded from South Africa, all closely related to *A. pluma*, namely *A. dichotoma* (M. Sars), *A. parvula* Bale, *A. conferta* Kirchenpauer, *A. heterodonta* Jäderholm and *A. chalerocarpa* Allman.

Of these *A. parvula, A. conferta* and *A. heterodonta* are accepted as synonyms by Ritchie 1909, Bedot 1921 and Stechow 1925. *A. chalerocarpa* is regarded as a synonym for *A. pluma* by Bedot 1921, Stechow 1925 and Vervoort 1946. This leaves three South African species:

(i) *A. pluma* var. *typica.*
(ii) *A. dichotoma.*
(iii) *A. parvula.*

A. dichotoma is distinguished from *A. pluma* by its dichotomous branching, and *A. parvula* by the double nature of the second paired tooth of the hydrotheca. However, there is some confusion about this distinction, for Ritchie 1909 includes both dichotomous and unbranched forms under *A. heterodonta,* saying that the minute characters are identical. Leloup 1937a describes a dichotomously branched form with the double hydrothecal tooth as *A. parvula* but suggests that the latter may be a variety of *A. dichotoma.* Bedot 1921 suggests that *A. parvula* is a variety of *A. pluma.*

Examination of a large series of specimens in the University collection suggests that the three forms should be regarded as varieties of the same species, for neither of the distinguishing features is clear-cut and there are many intermediate types. The 'parvula' form can, and does, branch dichotomously, although its stems generally form a short, dense turf in shallow water and intertidal regions. The 'dichotoma' form, with its long-drawn-out, dichotomously branched stems is more typical of deeper water and occurs abundantly in dredgings round the coast. But all intermediate stages occur.

The double point of the second hydrothecal tooth is most pronounced in the 'parvula' form (fig. 15), but by no means constant, the second point may be only a hump on the side of the tooth, or the tooth may be single-pointed and triangular. All variations may occur in the same colony, but in general the second point is better developed in the lower parts of the hydrocladia. A similar variation occurs in the 'dichotoma' form, where the second hydrothecal tooth is usually triangular, but may have an accessory point on one side. Only seldom does the 'pluma' type occur, where there is no sign of a double-pointed tooth.

The corbulae are sexually dimorphic and are identical in all three forms. Nor could any difference, other than minor variations in length and breadth, be found in the internodes of the stem or hydrocladia. The length of the median nematotheca is variable in each form, but in general is longer in the 'parvula' form than in the 'pluma' and 'dichotoma' forms.

For convenience a brief description of the composite species as now envisaged follows.

Description. Stem unfascicled, branched or unbranched, distinctly segmented. The basal part of the stem, which is of variable length and often very short, is devoid of hydrocladia and nematothecae, and divided into internodes of irregular length by transverse nodes. This region is terminated by 2 oblique hinge-joints (occasionally 3) with one extra large nematotheca between them. The rest of the stem is divided by slightly oblique nodes into regular internodes each bearing a hydrocladium. The first internode of this region is longer than the others and bears 2 hydrocladia.

The stem may branch in two ways, and both types may be present in the same colony:

(i) The hydrocladia-bearing part may divide dichotomously, the two branches being of equal diameter and arising from apophyses on a broad stem internode, which also bears a hydrocladium. The internodes of the branches all bear hydrocladia.

(ii) Subsidiary branches may be given off from the stem; these are always short and usually of smaller diameter. They do not arise dichotomously, but replace hydrocladia. On these branches the first few internodes are without hydrocladia, then follow 2 oblique hinge-joints and then hydrocladia-bearing internodes, exactly as on the base of the stem.

Hydrocladia alternately arranged, with the two rows directed towards one side of stem, divided into internodes by transverse or slightly oblique nodes. Each internode with 2 internodal septa and 1 hydrotheca.

Hydrotheca with 9 marginal teeth, including 1 median tooth on abcauline side directed inwards, and 4 pairs of lateral teeth, of which the second may be double.

Median nematotheca narrow at base, but widening distally, adnate for most of length and then free, reaching to hydrothecal margin or just below. Openings 2 (1 into hydrotheca, 1 extending along free adcauline edge on to distal end) or 3 (1 into hydrotheca, 1 on adcauline surface at base of free part, 1 on distal end). Supracalycine nematothecae swollen, reaching to hydrothecal margin or just below. Cauline nematothecae 4, of which one is on hydrocladial apophysis.

Corbula replacing hydrocladium, with one hydrotheca between it and stem. Female corbula closed, except for first rib, with 4–9 ribs on each side, each with about 10 nematothecae along one edge. First rib free at base, bearing about 6 nematothecae on each edge, and a free lateral branch on one side running parallel to the axis of the corbula and bearing about 6 nematothecae on each edge. The side of the free branch corresponds to the side of the corbula, i.e. when the corbula replaces a right-hand hydrocladium the free branch is on its right. Very occasionally female corbulae may lack the free lateral branch, though present in others of the same colony.

Male corbula partly or completely open, with 5–9 ribs on each side. Ribs usually fused in basal part (except for first rib which is free), and bearing nematothecae along one edge, free in distal part and bearing nematothecae along both edges. Old empty corbulae often with ribs free for entire length.

Normally no lateral branch on first rib, but very occasionally a small stunted one present. Male and female corbulae on separate stems.

var. *typica* Bedot 1919

Fig. 15 A

?*Aglaophenia chalerocarpa* Allman 1886, p. 150; P. XXI, figs. 1–4.
Aglaophenia pluma forma *typica* Broch 1933, p. 44, fig. 18a.
Aglaophenia pluma Vervoort 1946a, p. 335, fig. 8.

Records. FB 133 A. FAL 13 C, 20 R, 26 H.

Description. Stems short, usually about 5 cm., generally unbranched. Second paired tooth of hydrotheca triangular or truncated, but not double. Median nematotheca not reaching to hydrothecal margin. Stems dark brown, hydrocladia lighter. Ripe corbulae in March.

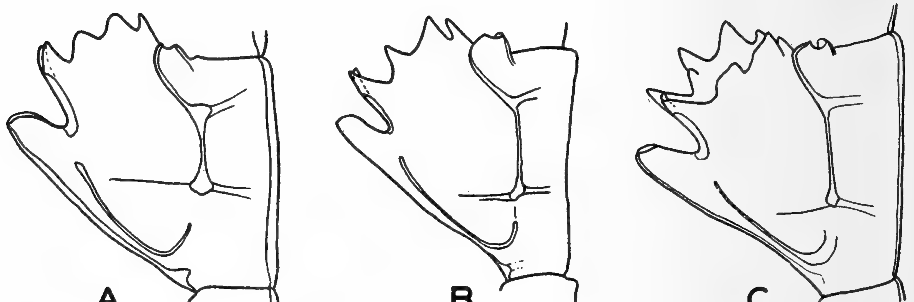

FIG. 15. *Aglaophenia pluma* (Linnaeus).

A. var. *typica* Bedot, FB 133 A. B and C. var. *dichotoma* (M. Sars), FB 116. In B the second paired tooth is single and triangular, in C it has a subsidiary point. D and E. var. *parvula* Bale (not from False Bay material). Second paired tooth bifid. F. var. *parvula* Bale, FAL 62 L. Subsidiary point of second paired tooth almost obsolete.

Measurements (mm.)

Stem internode, length	0·38–0·41
Hydrocladial internode, length	0·28–0·33
Hydrotheca, length	0·27–0·34
length above median nematotheca	0·09–0·12
width at margin	0·17–0·21

Remarks. Allman's specimens of *A. chalerocarpa* should probably be included here.

var. *dichotoma* (M. Sars) 1857

Fig. 15 B and C

Aglaophenia pluma var. β Hincks 1868, p. 287.

Aglaophenia dichotoma Kirchenpauer 1872, p. 30; Pl. I, fig. 7; Pl. II, fig. 7; Pl. III, fig. 7. Ritchie 1907a, p. 539; Pl. III, fig. 2. Vervoort 1946a, p. 338.

Aglaophenia tubiformis Marktanner-Turneretscher 1890, p. 269; Pl. VII, figs. 4, 5, 17.

Aglaophenia heterodonta Ritchie 1909 (pp.), p. 96.

Aglaophenia dichotoma f. *typica* Broch 1933, p. 54, fig. 18b.

Records. CP 326 C. FB 110, 111, 116, 117, 120 A, 121 A, 127, 128, 146 A, 147 A. FAL 209 E, 217 J.

Description. Stems elongated and branching profusely in a dichotomous manner, though diameter remains the same; often reaching 20–30 cm. in length. Second paired tooth of hydrotheca usually single-pointed and triangular, but often with a subsidiary point on one side. Median nematotheca not reaching hydrothecal margin. Colour somewhat lighter than var. *typica*, with hydrocladia cream. Ripe corbulae in February, September and November.

Measurements (mm.)

Stem internode, length	0·37–0·50
Hydrocladial internode, length	0·29–0·37
Hydrotheca, length	0·29–0·35
length above median nematotheca	0·09–0·11
width at margin	0·18–0·25
Corbula, male, length	1·99–3·53
width	0·84–1·25
Corbula, female, length	2·43–3·02
width	1·02–2·28

var. *parvula* Bale 1882

Fig. 15, D–F

?*Aglaophenia conferta* Kirchenpauer 1872, p. 32; Pl. I, fig. 4; Pl. II, fig. 4; Pl. III, fig. 4.

Aglaophenia parvula Bale 1882, p. 23; Pl. XIV, fig. 3. 1884, p. 165; Pl XIV, fig. 3; Pl. XVII, fig. 10. Stechow 1925, p. 516. Vervoort 1946a, p. 339, fig. 9b.

Aglaophenia heterodonta Jäderholm 1903, p. 296; Pl. XIII, figs. 10–12; Pl. XIV, fig. 1. Ritchie 1909 (pp.), p. 96.

Records. F 49, 253 (reported by Eyre 1939 as *A. dichotoma*). CP 18, 356 D, 392 P, 410 X, 415 X. FB 119 A, 130. FAL 62 L, 66 C, 78 Q, 125 V, 160 T, 176 X, 262 A, 279 G.

Description. Stems short and clustered, usually unbranched, but sometimes branching by either of the methods described above, seldom more than one branch to a stem. Length usually 3–5 cm., maximum length recorded 11·6 cm. Second paired tooth of hydrotheca usually double, though sometimes one point is much smaller than the other, and occasionally the tooth is single-pointed and triangular. Median nematotheca usually reaching hydrothecal margin. Colour darker than var. *dichotoma* and more like var. *typica*. Ripe corbulae in February, and April to September.

Measurements (mm.)

Stem internode, length	0·26–0·55
Hydrocladial internode, length	0·25–0·29
Hydrotheca, length	0·25–0·31
length above median nematotheca	0·06–0·10
width at margin	0·17–0·22
Corbula, male, length	1·97–2·75
width	0·96–1·07
Corbula, female, length	1·69–1·98
width	1·00–1·05

Thecocarpus giardi Billard 1907

Thecocarpus Giardi Billard 1907, p. 381, fig. 21; Pl. XXV, fig. 9; Pl. XXVI, figs. 11–16.

Thecocarpus giardi Vervoort 1946a, p. 335.

Records. PF 396 A.

Description. Colony reaching 23·8 cm. in height. Basal part of stem thick and woody with a maximum diameter of 15 mm., and branching irregularly. At about 12–15 cm. from the base each branch assumes the spirally twisted form described by Billard and gives off alternate pinnae which bear the hydrocladia.

Hydrocladial internodes with two well-developed internodal septa, the lower one continued as an intrathecal septum across the hydrotheca about a third from its base, the upper one opposite the base of the lateral nematotheca.

The lateral hydrothecal teeth are seldom bifurcated as in many of Billard's specimens, with the exception of the pair nearest the hydrocladium which is invariably double, so that one could more accurately describe the hydrotheca as having 4 pairs of lateral teeth, and 1 median tooth of variable length.

Corbulae as described by Billard, present in October.

Lytocarpus filamentosus (Lamarck) 1816

Lytocarpus filamentosus Billard 1907, p. 371; figs. 15–17.

Halicornaria segmentata Warren 1908, p. 328; Pl. XLVIII, figs. 33–36.

Records. CP 224. PF 18293 A. FAL 13 B, 42 V, 52 W, 58 W, 66 A, 78 P.

Description. Colonies reaching a maximum height of 9.9 cm. The gonocladium varies in length, possessing only 3 or 4 segments to the nematocladium in some specimens and as many as 10 in others. Gonophores present in October and December.

Measurements (mm.)

Hydrocladial internode, length	0·22–0·26
Hydrotheca, length, to tip of median tooth	0·25–0·28
width at margin	0·11–0·16
Median nematotheca, length abcauline	0·24–0·30
length adcauline, free part	0·08–0·14

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VOLUME XLIII

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7. *The South African Cladoceran* Euryalona colletti (*Sars*) *and another African species.* By J. P. Harding, Ph.D., British Museum (Natural History). (With four text-figures.)

8. *On the Lancelets of South and East Africa.* By J. E. Webb, Department of Zoology, University College, Ibadan. (With five tables and three text-figures.)

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7. *The South African Cladoceran* Euryalona colletti (*Sars*) *and another African species.* By J. P. Harding, Ph.D. British Museum (Natural History). (With four text-figures.)

The original description of the species was by Sars (1895) under the name of *Alonopsis colletti*, and he gives an additional description with further figures in a later work (Sars, 1916), in this case placing the species under the genus *Euryalona*.

The genus *Euryalona* was established by the same author (Sars, 1901) for the South American species *E. occidentalis*, the type species, which may be a synonym of *E. orientalis* described by Daday from Ceylon (Daday, 1898), under the genus *Alonopsis*.

Sars (1916) writes: 'I have convinced myself of the complete identity of the South African and South American forms.' However, this identity has been questioned since then (Brehm, 1935; Gauthier, 1930). This is because in the figures of neither 1895 nor 1916 did Sars show any denticles on the claw of the tail; these are clearly seen forming a comb along the proximal half of the dorsal edge of the claw of the South American specimens (Sars, 1901).

I have recently been examining some specimens belonging to the genus *Euryalona* from Lake Tanganyika, the property of the Musée Royal d'Histoire Naturelle de Belgique, which seem to me to be identical with Sars's type specimens of *E. occidentalis* from Brazil.

Dr. K. H. Barnard has kindly lent me for comparison the type specimens of *E. colletti* from Knysna which are mounted on a single microscope slide among the collections of the South African Museum, Cape Town. Rather to my surprise I find that this species, the first to be described, is quite distinct, the claw of the tail, the labrum and the length of the antennule relative to that of the rostrum being different in the two species. The claw of *E. colletti* has a very strongly developed basal spine which is about half as long as the claw itself (fig. 4) but the basal spine of the claw of *E. occidentalis* is only about as long as the width of the claw (fig. 3). The long basal spine of *E. colletti* has spinules along its outer edge while that of *E. occidentalis* is smooth. *E. occidentalis* has a conspicuous row of spinules forming a comb along the proximal half of the dorsal edge of the claw. These spinules increase in length distally until the terminal one (near the middle of the claw) is about as long as the basal spine. The spinules in a similar position on the claw of *E. colletti* are very much finer and can only be seen with the highest powers of the microscope.

The labrum of *E. colletti* has a very characteristic shape with even curves, and bulges in front (fig. 1). The shape of the labrum of a co-type of *E. occidentalis* from Brazil is shown in fig. 2. There is a curious lateral crease which makes the profile rather irregular. It is, however, very similar in the specimens from Lake Tanganyika, and also is shown in Gauthier's 1930 figure of a specimen from the Sahara. The antennule of *E. occidentalis* reaches almost to the tip of the rostrum but is distinctly shorter in *E. colletti* (figs. 2 and 1 respectively).

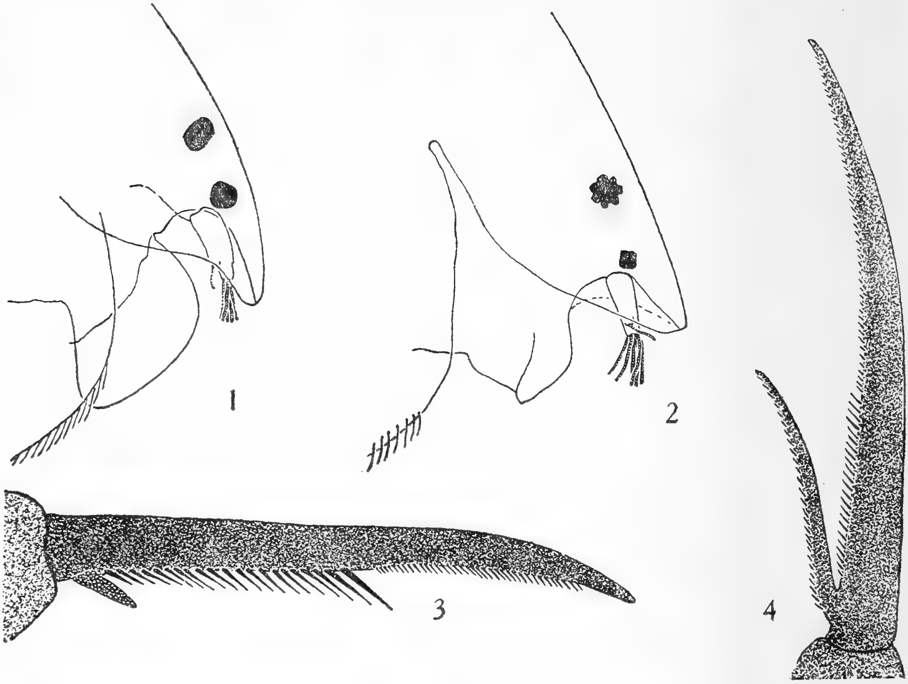

Fig. 1. Head of *Euryalona colletti*, cotype, × 85. Fig. 2. Head of *Euryalona occidentalis*, cotype, × 85. Fig. 3. Claw of the tail of *Euryalona occidentalis*, cotype, × 500. Fig. 4. Claw of the tail of *Euryalona colletti*, cotype, × 500.

Euryalona colletti is known by the type specimens from Knysna in the South African Museum and also by a single specimen from Mahlabatini, Zululand, in the British Museum collected by Mr. James Gibson early this century, and correctly identified by G. S. Brady.

E. occidentalis is known from South America and from East Africa (Daday, 1910, as *E. orientalis*), Kenya (Brehm, 1935), parts of the Sahara region (Gauthier, 1930) and Lake Tanganyika (Harding, 1957).

A third species (which may, however, be identical with *E. occidentalis*) is *E. orientalis*, found in Ceylon (Daday, 1898) and the East Indies (Stingelin, 1904).

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8. *On the Lancelets of South and East Africa.* By J. E. WEBB, Department of Zoology, University College, Ibadan. (With five tables and three figures in the text.)

INTRODUCTION

Lancelets of the genus *Branchiostoma* have been recorded from a number of localities along the coast of the Cape Province, on the East African and Arabian coasts and in Madagascar. In 1902 Gilchrist described *Branchiostoma capense* from specimens taken at Simons Bay, False Bay, Mossel Bay and Algoa Bay in the Cape Province and, in 1923, he described a second species, *B. bazarutense*, from the Bazaruto Islands off Portuguese East Africa. Franz (1922), examining material collected by the 'Prinz Adalbert' Expedition, reported the occurrence of both *B. belcheri* and a species of an allied genus, *Asymmetron cultellus*, at Bagamoyo opposite Zanzibar. In 1928 Prenant described specimens which he considered to be inseparable from *B. lanceolatum* taken on the north-west coast of Madagascar. Webb (1956) recorded another specimen of this species and described a new lancelet, *B. arabiae*, from material collected by the 'John Murray' Expedition in 1933. The specimen of *B. lanceolatum* and the collection of *B. arabiae* were taken in the same haul near the entrance to the Gulf of Oman. *B. arabiae* is not strictly an East African form, but it is related both to *B. bazarutense* and to *B. belcheri.*

As the recognition of species in the genus *Branchiostoma* depends chiefly on the numerical evaluation of characters often subject to considerable variation, it is natural that some controversy has arisen concerning the validity of many of the species described. Some workers consider the genus to comprise relatively few species most of which are very widely distributed (Prenant 1928, and Drach 1948), while others recognize as species a larger number of more circumscribed forms (Hubbs 1922, and Franz 1922). Apart from a difference in opinion as to what degree of differentiation should be recognized in the erection of a species, much of the difficulty arises from the shortcomings of many of the early descriptions. In these, the data given are frequently insufficient first to permit adequate comparisons with other species and, second, to enable the extent of the variation of the different characters to be assessed. A case in point involves the recognition of *B. capense* from the Cape, *B. tattersalli* from Ceylon, *B. californiense* from California and *B. elongatum* from Peru and the Galapagos Islands. Following Gilchrist's description of *B. capense*, Tattersall (1903) discussed the position of this lancelet at some length and concluded that *B. capense, B. californiense* and *B. elongatum* are probably varieties of one species. He reached this conclusion on the general similarity of the myotome formula and dismissed as trivial other characters such as the shape of the fins. In the same year Tattersall (1903a) examined a large collection of lancelets from the oyster beds of Ceylon and found in it a single specimen which he referred to *B. californiense*. If he considered *B. californiense* and *B. elongatum* to be the same species, however, he should have referred his Ceylon lancelet to *B. elongatum* as this species, described by Sundevall in 1852 and 1853, antedates *B. californiense* first recorded by Cooper (1868) and later described by Andrews (1893) (see also Hubbs 1922). Beebe and Tee-Van (1941) later recognized *B. elongatum* and *B. californiense* as distinct, but only on a difference of the total number of myotomes in each. Franz (1922, 1922a and 1930) followed Tattersall's lead in considering both *B. capense* and Tattersall's *B. californiense* from Ceylon as uncertain species and suggested that they may be geographical varieties of *B. elongatum*, although he had not seen Gilchrist's description of *B. capense*. *B. californiense* from California he came to recognize as distinct from *B. elongatum*. Meanwhile Hubbs (1922) took the opposite view and maintained that lancelets from so widely separated localities as the Cape, Ceylon, California and Peru, Chile and the Galapagos Islands are likely to be distinct. He therefore recognized *B. capense* and went so far as to rename Tattersall's Ceylon specimen *B. tattersalli* on little evidence other than geographical location. In 1934 Prashad described a series of specimens from Ceylon together with Tattersall's specimen as *B. gravelyi* but, as has already been indicated in a previous paper (Webb 1955), *B. gravelyi* must fall into synonymy with *B. tattersalli* which, from the myotome formula given by Prashad, appears to be a valid species distinct from *B. californiense*. Drach (1948) evidently accepts the view of Franz as *B. capense* does not appear in his list of species and *B. tattersalli* is similarly omitted, but *B. californiense* and *B. elongatum* he recognizes as distinct. The doubts concerning the validity of *B. capense*, therefore, date from Tattersall's (1903) rejection of the species on what must be considered to-day as inadequate grounds and since that time material of the Cape lancelet has never been critically examined to confirm or refute his contention. Thus a review of this lancelet and those with which it has been confused is badly needed.

The occurrence of *B. belcheri* at Bagamoyo and *B. lanceolatum* in Madagascar appears at first sight to be anomalous. *B. belcheri* is a species common in the China Seas and East Indies while *B. lanceolatum* is the European lancelet. The presence of these species on the East African coast, therefore, is of great interest, but requires confirmation. In this paper an attempt is made to clarify the systematic position of the Cape lancelet and to provide confirmation of the existence of *B. belcheri* and *B. lanceolatum* in East Africa. Dr. Keppel H. Barnard of the South African Museum has kindly lent the type specimens of *B. capense* and Professor J. H. Day of the University of Cape Town has provided a collection of lancelets from Cape Province and Portuguese East Africa made in recent years by members of his department in the course of an ecological survey of those regions. The author is grateful to Dr. Barnard and to Professor Day for their co-operation and also to the Trustees of the British Museum (Natural History) for permission to examine the collections of *B. californiense* and *B. elongatum* in that museum.

Systematic Account

Family Branchiostomidae

Branchiostoma capense Gilchrist (1902)

Material examined. The type specimens 'S.A.M. 13727, one of P.F. 722' (here designated holotype), a specimen 38 mm. in length stained and mounted on a slide; 'S.A.M. 13728' (here designated paratype) a specimen 36 mm. in length stained and mounted on a slide; 'Pieter Faure No. 4055 False Bay (Cape) 24 fathoms 1900' (here designated paratype) a specimen 43 mm. in length preserved in alcohol. These three specimens are deposited in the South African Museum, Cape Town.

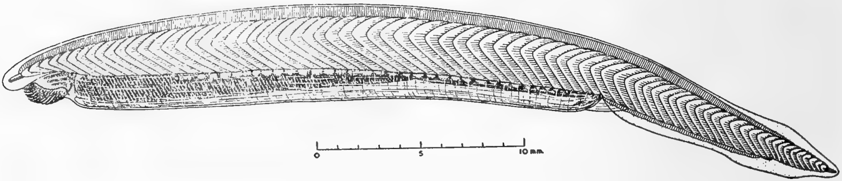
The following specimens lent by Professor Day: three specimens (F.B. 1104, 22.2.47) collected in False Bay 34° 08′ S. 18° 31′ 30″ E. by D-net at 27-28 metres, bottom fine shingle; two specimens (FAL. 5. S. 22.2.52) collected in False Bay, just south of Seal Island, by rock dredge at 35 metres, bottom broken shell; three specimens (LIZ. 25. K. 11.4.54) dredged in Algoa Bay 34° 00′ 24″ S. 25° 44′ 30″ E. at 39 metres, bottom coarse sand and shell; one specimen (M.B. 71. C. 19.1.56) dredged in Mossel Bay. These specimens are deposited in the Department of Zoology, University of Cape Town.

Distribution. South coast of the Cape Province, South Africa: at Simons Bay, False Bay, Mossel Bay and Algoa Bay.

Diagnosis. In the following diagnosis counts and measurements have been made on the specimens listed above and the results examined statistically. Although these specimens do not comprise a sample taken from one locality at the same time, they are, nevertheless, so uniform that they can be treated as a single series.

1. Dorsal fin chambers number 400–440: Mean 420·9: Standard Deviation 14·67: S.D. = 3·49 per cent of the Mean.
2. Preanal fin chambers number 62–80: Mean 71·2: Standard Deviation 6·11: S.D. = 8.58 per cent of the Mean.
3. Tallest of dorsal fin chambers 4·0–6·0 times as high as broad: Mean 4·55: Standard Deviation 0·64: S.D. = 14·0 per cent of the Mean.
4. Height of dorsal fin contained 7–11 times in the depth of the body in the mid-atrial region: Mean 9·4: Standard Deviation 1·36: S.D. = 14·49 per cent of the Mean.

5. Postatrioporal region 0·38–0·43 the length of the preatrioporal region: Mean: 0·405: Standard Deviation 0·014: S.D. = 3·4 per cent of the Mean.
6. Myotomes from anterior end to atriopore 44–48: Mean 46·0: Standard Deviation 1·26: S.D. = 2·75 per cent of the Mean.
7. Myotomes from atriopore to anus 18–20: Mean 19·2: Standard Deviation 0·75: S.D. = 3·91 per cent of the Mean.
8. Myotomes posterior to anus 10–11: Mean 10·1: Standard Deviation 0·32: S.D. = 3·13 per cent of the Mean.
9. Total myotomes 73–77: Mean 75·3: Standard Deviation 1·45: S.D. = 1·92 per cent of the Mean.
10. Maximum length in sample examined 64 mm.; minimum length 36 mm.



BRANCHIOSTOMA CAPENSE

Fig. 1.

The following characters also assist in the recognition of this species and are illustrated in fig. 1 which has been prepared from *camera lucida* drawings of the holotype. The dorsal fin is approximately the same height throughout its length and is not separated from the rostrum by a post-rostral notch. The form of the rostrum and the oral region is almost identical with that of the West African species *B. nigeriense* (Webb, 1955 and 1956a). The caudal fin is also similar to that of *B. nigeriense* and in outline possesses the characteristic dorsal and ventral subterminal indentations. The preanal fin, however, differs from that of *B. nigeriense* as the fin chambers do not extend to one half the breadth of the fin. The anus lies before the centre of the lower lobe of the caudal fin.

Comparison of Branchiostoma capense *with other species of the genus*

The species with which *B. capense* is compared are selected on grounds either of similarity of structure or of occurrence in adjacent geographical locations. Thus a comparison is made with *B. californiense* and *B. elongatum* as it is with these species that *B. capense* shows similarities and has been considered synonymous in the past. *B. capense* is compared with *B. belcheri*, *B. bazarutense* and *B. arabiae* as these three species are found on the east coast of the African continent from Portuguese East Africa to Arabia. Finally a similar comparison is made with the Guinea Coast species of West Africa, *B. nigeriense*, *B. takoradii*, *B. leonense* and *B. africae*, a group near to *B. capense* both structurally and geographically. A comparison with *B. lanceolatum* which also now occurs on the east coast of Africa has not been made as the appearance of this species in the Arabian Sea and Indian Ocean is evidently very recent and the structural differences between *B. lanceolatum* and *B. capense* are considerable.

When *B. capense* is compared with *B. californiense* a number of differences are apparent which have not previously been appreciated. A single specimen of *B. californiense* from San Diego, California (B.M. reg. no. 1892.4.27.16–19), in the British Museum (Natural History) collection has been found to possess the following characteristics. The recorded range of variation in each character for this species is given in parenthesis after the figures for the specimen examined.

1. Dorsal fin chambers number 347. (312–374).
2. Preanal fin chambers number 45. (*c.* 50).
3. Tallest of dorsal fin chambers 4·0 times as high as broad. (5·0–8·0).
4. Height of the dorsal fin contained 8 times in the depth of the body in the mid-atrial region. (5–8).
5. Postatrioporal region 0·36 the length of the preatrioporal region. (0·30–0·38).
6. Myotomes from anterior end to atriopore 44. (43–48).
7. Myotomes from atriopore to anus 19. (16–19)
8. Myotomes posterior to anus 9. (8–10).
9. Total myotomes 72. (68–74).
10. Length of specimen 71 mm. (maximum length recorded elsewhere 84 mm.).

In general appearance this species resembles *B. elongatum* (see fig. 2) except that the oral cirri, although rather short, are more prominent and the dorsal fin is approximately the same height throughout the length of the body. The anus is situated behind the centre of the lower lobe of the caudal fin.

A comparison of the diagnoses for *B. capense* and *B. californiense* shows that the numbers of dorsal and preanal fin chambers are considerably higher in the former species. In *B. capense* the height of the dorsal fin tends to be relatively less than in *B. californiense* and the proportions of the dorsal fin chambers are accordingly slightly different. The relative length of the postatrioporal region in *B. californiense* is less than in *B. capense*. In the myotome formula, while the number of myotomes before the atriopore is similar in both species, the number behind the atriopore in *B. capense* is higher so that the total myotome number is also higher than in *B. californiense*. These differences appear to be quite sufficient to indicate that *B. capense* and *B. californiense* are distinct, but, in addition, differences in the form of the rostrum, the oral region, and the caudal and preanal fins support the separation of the two forms.

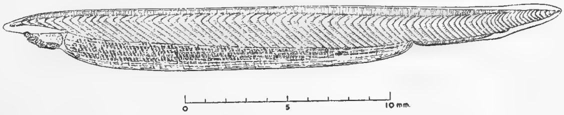
From figures recorded for *B. elongatum* by Sundevall (1852 and 1853), Snodgrass and Heller (1905), Hubbs (1922), Franz (1922, 1922a and 1930) and Beebe and Tee-Van (1941), a much higher degree of similarity in the numerical characters evidently exists between this species and *B. capense* than between *B. californiense* and the Cape lancelet. Indeed, from this published data, no clear distinction can be made between *B. capense* and *B. elongatum* and a re-examination of material of *B. elongatum* was essential before it could be determined whether, in fact, the two lancelets should be assigned to the same species. Fortunately *B. elongatum* is represented in the collections of the British Museum (Natural History) by good samples from Peru and from the Galapagos Islands. These samples have been examined and diagnoses for each are given.

Diagnosis of Branchiostoma elongatum *Sundevall* (*Peruvian sample*)

The following diagnosis is based on 16 specimens dredged from 5–8 fathoms at Lobos de Tierra, Peru, 6° 25′ S. 80° 57′ W. on 7th June 1912. They are part of a sample in the collection of the British Museum (Natural History), B.M. reg. nos. 1913.7.10.1–10. Counts and measurements have been made on these specimens and the results examined statistically.

1. Dorsal fin chambers number 350–410: Mean 381·0: Standard Deviation 18·50: S.D. = 4.86 per cent of the Mean.
2. Preanal fin chambers number 37–80: Mean 64·0: Standard Deviation 10·35: S.D. = 16·17 per cent of the Mean.
3. Tallest of dorsal fin chambers 2·7–6·0 times as high as broad: Mean 3·6: Standard Deviation 1·03: S.D. = 28·68 per cent of the Mean.
4. Height of dorsal fin contained 7–12 times in the depth of the body in the mid-atrial region: Mean 10·0: Standard Deviation 1·41: S.D. = 14·14 per cent of the Mean.
5. Postatrioporal region 0·34–0·42 the length of the preatrioporal region: Mean 0·387: Standard Deviation 0·021: S.D. = 5·31 per cent of the Mean.
6. Myotomes from anterior end to atriopore 47–51: Mean 49·0: Standard Deviation 1·03: S.D. = 2·11 per cent of the Mean.
7. Myotomes from atriopore to anus 18–20: Mean 18·7: Standard Deviation 0·79: S.D. = 4·24 per cent of the Mean.
8. Myotomes posterior to anus 11–13: Mean 12·25: Standard Deviation 0·69: S.D. = 5·59 per cent of the Mean.
9. Total myotomes 77–84: Mean 80·0: Standard Deviation 1·57: S.D. = 1·96 per cent of the Mean.
10. Maximum length in sample examined 64 mm.; minimum length 25 mm.

The following characters not suitable for numerical evaluation assist in the recognition of this species and are illustrated in fig. 2 which has been prepared from *camera lucida* drawings of a small specimen from the sample. The dorsal fin is distinctly taller at the posterior end than in the anterior region. The rostrum is angular rather than curved in outline and there is no post-rostral notch. The caudal fin is moderately well developed and without subterminal indentations in outline. The anus is situated well before the centre of the lower lobe. In the preanal fin the lamina is greatly reduced and the fin chambers occupy almost the full width of the fin. The oral region is relatively small and the buccal cirri considerably shorter than in other species of the genus. There are, however, differences between large and small specimens in this sample which indicate that changes occur with growth in the relative height of the dorsal fin and in the number of preanal fin chambers. In specimens under 40 mm. in length the tallest of dorsal fin chambers are 4·0–6·0 times as high as broad (Mean 4·9) and the height of the dorsal fin is contained 7–10 times in the depth of the body in the mid-atrial region (Mean 8·4). In specimens over 40 mm. in length the tallest of dorsal fin chambers are only 2·7–3·5 times as high as broad (Mean 3·0) and the height of the dorsal fin is contained 10–12 times in the depth of the body in the mid-atrial region (Mean 10·7). It is evident, therefore, that the dorsal fin grows rapidly in height in the young animal and that the rate of increase in height of the fin becomes relatively slight as the animal approaches maturity. Increase in length of the body and hence of the dorsal fin, however, occurs without a corresponding increase in the number of dorsal fin chambers so that the proportions of the individual chambers alter with age. In the preanal fin, the number of fin chambers in specimens less than 40 mm. in length is 37–60 (Mean 52·6) whereas, in specimens over 40 mm. in length there are 62–80 chambers (Mean 69·2). There is no overlap in the numbers of preanal fin chambers between these two arbitrarily chosen groups of large and small specimens so that it is evident that the number of chambers must increase with the age of the animal. The changes in the relative height of the dorsal fin, the proportions of the dorsal fin chambers and the number of preanal fin chambers account for the very wide range of variation in these characters (characters 2, 3 and 4) in the diagnosis (where the figures are based on the entire sample) and consequently for the high value of the Standard Deviation evident when this is expressed as a percentage of the Mean. The occurrence of differential rates of growth in the dorsal fin and the body and the increase in number of preanal fin chambers with age appears to be a peculiarity of *B. elongatum* and has not been observed in other species of the genus.



BRANCHIOSTOMA ELONGATUM (PERUVIAN SAMPLE)

FIG. 2.

Diagnosis of Branchiostoma elongatum *Sundevall* (*Galapagos sample*)

The following diagnosis is based on ten specimens taken by the Crossland Expedition from the Galapagos Islands on 25th July, 1924. They are part of a sample in the collection of the British Museum (Natural History), B.M. reg. nos. 1955. 12.13. 131–142. Counts and measurements have been made on these specimens and the results examined statistically.

1. Dorsal fin chambers number 356–420: Mean 383·6: Standard Deviation 21·21: S.D. = 5·53 per cent of the Mean.
2. Preanal fin chambers number 40–75: Mean 53·0: Standard Deviation 10·12: S.D. = 19·1 per cent of the Mean.
3. Tallest of dorsal fin chambers 4·0–7·0 times as high as broad: Mean 5·5: Standard Deviation 0·90: S.D. = 16·32 per cent of the Mean.
4. Height of dorsal fin contained 7–10 times in the depth of the body in the mid-atrial region: Mean 8·3: Standard Deviation 1·06: S.D. = 12·76 per cent of the Mean.
5. Postatrioporal region 0·33–0·41 the length of the preatrioporal region: Mean 0·36: Standard Deviation 0·029: S.D. = 8·18 per cent of the Mean.
6. Myotomes from anterior end to atriopore 47–50: Mean 48·9: Standard Deviation 1·0: S.D. = 2·05 per cent of the Mean.
7. Myotomes from atriopore to anus 17–19: Mean 18·3: Standard Deviation 0·67: S.D. = 3·69 per cent of the Mean.
8. Myotomes posterior to anus 9–11: Mean 10·1: Standard Deviation 0·88: S.D. = 8·73 per cent of the Mean.
9. Total myotomes 75–79: Mean 77·3: Standard Deviation 1·34: S.D. = 1·73 per cent of the Mean.
10. Maximum length in sample examined 29 mm.; minimum length 16 mm.

In general appearance the specimens of *B. elongatum* from the Galapagos Islands closely resemble those from Peru. As this sample, like that described by Snodgrass and Heller (1905), consists solely of small immature specimens, comparison of the shape and proportions of the fins and the number of preanal fin chambers can only be made with the smaller specimens in the Peruvian sample. It is not known whether changes in the proportions of the dorsal fin and in the number of preanal fin chambers occur in the Galapagos population of this species.

A comparison of the numerical characteristics of the Peruvian and Galapagos samples of *B. elongatum* is made in Table I where, for each of the characters numbered 1–9 in the diagnoses, the Mean and the Standard Deviation is given and from these '*t*' and hence '*P*', the degree of probability that such differences could occur between random samples of one population, have been calculated. In this table the Means and Standard Deviations are those given in the diagnoses of the two samples except for characters 2, 3 and 4 of the Peruvian sample where figures based on five specimens under 40 mm. in length have been substituted as offering a better comparison with the immature specimens of the Galapagos sample.

TABLE I

CHARACTER NUMBER	*B. elongatum* (Peruvian sample)		*B. elongatum* (Galapagos sample)		‘*t*’	‘*P*’
	MEAN	S.D.	MEAN	S.D.		
1	381·0	18·50	383·6	21·21	0·316	>0·25
2	52·6	9·64	53·0	10·12	0·068	>0·25
3	4·9	0·89	5·5	0·90	1·137	0·25
4	8·4	1·14	8·3	1·06	0·156	>0·25
5	0·387	0·021	0·36	0·029	2·638	0·02
6	49·0	1·03	48·9	1·0	0·234	>0·25
7	18·7	0·79	18·3	0·67	0·515	>0·25
8	12·25	0·69	10·1	0·88	6·666	<0·001
9	80·0	1·57	77·3	1·34	4·331	<0·001

A statistical analysis showing to what extent the differences between the Peruvian and the Galapagos samples of *B. elongatum* may be held to characterize the populations from which the samples were taken.

It is seen from Table I that the differences between the samples of *B. elongatum* from Peru and from the Galapagos Islands are not significant (assuming ‘*P*’ = 0·05 to be the limit of significance) except in characters 5, 8 and 9. In character 5, the relative length of the postatrioporal region, the difference, although significant, is not great, but in character 8, the number of myotomes in the tail, the difference is highly significant. In accordance with the greater number of myotomes in the tail in the Peruvian lancelet there is also a significant difference in the total number of myotomes (character 9) in the two samples. Ignoring, therefore, the rather slight difference in the relative lengths of the postatrioporal region, it is clear that the only important feature distinguishing the lancelets of Lobos de Tierra and those of the Galapagos is the number of myotomes in the tail. The difference in this character is equivalent to the population differences found in *B. lanceolatum* from different regions (Webb, 1956b) and is insufficient to justify the recognition of the Galapagos lancelets as a distinct species. The comparison shows that the sample of *B. elongatum* from Peru can be considered representative of the species and, as it contains a number of mature specimens, it is more suitable for comparison with the Cape lancelet than the Galapagos form. A statistical analysis of the Peruvian sample of *B. elongatum* and the sample of *B. capense* is given in Table II.

TABLE II

CHARACTER NUMBER	*B. capense*		*B. elongatum* (Peruvian sample)		'*t*'	'*P*'
	MEAN	S.D.	MEAN	S.D.		
1	420·9	14·67	381·0	18·50	5·766	<0·001
2	71·2	6·11	64·0	10·35	1·994	0·05
3	4·55	0·64	3·6	1·03	2·616	0·02
4	9·4	1·36	10·0	1·41	1·061	0·25
5	0·405	0·014	0·387	0·021	2·394	0·02
6	46·0	1·26	49·0	1·03	6·524	<0·001
7	19·2	0.75	18·7	0·79	1·587	0·1
8	10·1	0·32	12·25	0·69	9·282	<0·001
9	75·3	1·45	80·0	1·57	7.586	<0·001

A statistical analysis showing to what extent the differences between *B. capense* and the Peruvian sample of *B. elongatum* may be held to characterize the populations from which the samples were taken.

In Table II the Means and Standard Deviations for each of the nine diagnostic characters of *B. capense* and the Peruvian sample of *B. elongatum* are given and from them '*t*' and hence '*P*' have been calculated to show how far the differences between the samples are significant. The chief characters in which the Cape lancelet differs from *B. elongatum* are the number of dorsal fin chambers (character 1), the number of myotomes before the atriopore (character 6) and the total number of myotomes (character 9) for each of which the value of '*t*' is high and that for '*P*' correspondingly low. Nevertheless in all of these characters the range of variation is such that there is some degree of overlap between the Cape sample and either the Peruvian or the Galapagos samples. Thus, on these characters alone, individual specimens of the Cape lancelet cannot necessarily be separated from specimens from one or other of the populations of *B. elongatum.* In the number of preanal fin chambers the Cape lancelet, with a rather higher number, is different from the Peruvian lancelet, but the difference is barely significant. In character 3, the proportions of the dorsal fin chambers, the Cape lancelet is not significantly different from the small specimens of the Peruvian lancelet although it is different from the mature forms. The height of the dorsal fin relative to the depth of the body (character 4) is a very variable character in all forms and differences between them are not significant. A difference in the relative length of the postatrioporal region exists in the two forms, but again it is barely significant. In character 7, the number of myotomes between the atriopore and the anus, there is a close similarity between the Cape lancelet and the Peruvian and Galapagos lancelets. In character 8, the number of myotomes in the tail, the Cape lancelet is significantly different from the Peruvian lancelet, but not from the Galapagos form.

Although, as would be expected, there is a greater difference between the Cape and the Peruvian than between the Peruvian and the Galapagos lancelets, on numerical characteristics alone the differences between any of the samples are not such that individual specimens from each are readily distinguishable. As the numerical characters do not provide a clear basis for separation, it is necessary to take into consideration other features not conveniently assessed on a numerical basis. From a comparison of figures 1 and 2, it is seen that the form of the rostrum and the oral region, the dorsal fin and also the caudal and preanal fins is quite different in the two lancelets. In general appearance *B. elongatum* has resemblances with *B. belcheri* whereas the Cape lancelet resembles the West African forms. Moreover, the changes in the proportions of the dorsal fin chambers, the relative height of the dorsal fin and the number of preanal fin chambers which occur in *B. elongatum* with advancing age are features not found in the Cape lancelet where the characters of large and small specimens do not differ significantly. The writer attaches considerable importance to these characters and, in view of the fact that the two forms can be separated by them, is of the opinion that the Cape lancelet should be regarded as a distinct form in which the similarity of numerical characteristics with *B. elongatum* is fortuitous.

The comparison of *B. capense* with the Indo-Pacific species *B. belcheri*, *B. bazarutense* and *B. arabiae* can be dismissed very briefly. In each of these three species the number of dorsal fin chambers is much fewer and the height of the dorsal fin relatively less than in *B. capense*. In consequence, the dorsal fin chambers are short and broad in these species, but long and narrow in *B. capense*. In *B. bazarutense* and *B. belcheri*, but not in *B. arabiae*, the postatrioporal region is relatively longer than in *B. capense*. An outstanding difference, however, lies in the number of myotomes before the atriopore which is much higher in *B. capense* than in the other three species. The difference in the number of anterior myotomes is also largely responsible for the clear difference in the total myotome number (see Webb, 1955 and 1956). Moreover the form of the rostrum, the oral region and the caudal and preanal fins in *B. capense* gives this lancelet a general appearance by which it can be distinguished immediately from the three Indo-Pacific species. It has already been pointed out that close relationships exist between *B. belcheri*, *B. bazarutense* and *B. arabiae* (see Webb, 1956) and it is evident that *B. capense* does not belong to this group.

TABLE III

CHARACTER NUMBER	*B. capense*		*B. nigeriense*		'*t*'	'*P*'
	MEAN	S.D.	MEAN	S.D.		
1	420·9	14·67	344·3	15·30	11·195	<0·001
2	71·2	6·11	53·9	3·07	7·548	<0·001
3	4·55	0·64	4·1	0·74	1·421	0·25
4	9·4	1·36	9·3	1·06	0·178	>0·25
5	0·405	0·014	0·417	0·030	1·134	0·25
6	46·0	1·26	41·7	1·70	6·298	<0·001
7	19·2	0·75	15·4	0·52	12·714	<0·001
8	10·1	0·32	10·9	0·57	3·816	0·001
9	75·3	1·45	67·9	1·45	11·110	<0·001

A statistical analysis showing to what extent the differences between samples of *B. capense* and *B. nigeriense* may be held to characterize the populations from which the samples were taken.

The only other species with which *B. capense* can be compared with profit are the West African species *B. africae*, *B. nigeriense*, *B. takoradii and B. leonense* which form a closely related group from the Guinea Coast (see Webb 1955, 1956a and 1956b). It is worth noting that, in describing *B. africae*, Hubbs (1927) compared this species with *B. californiense*, *B. capense*, *B. lanceolatum* and *B. tattersalli* thus evidently recognizing a degree of relationship between *B. capense* and *B. africae*. Unfortunately specimens of *B. africae* from which a statistical analysis of the species can be prepared are not available. However *B. nigeriense* is a species very close to *B. africae* and for which there is an abundance of material. *B. nigeriense* occurs in two forms, one from the sea and the other from brackish water. An analysis of the marine form has already been published (Webb, 1956a) and these figures are here compared with those for *B. capense* in Table III. A detailed comparison of *B. capense* with *B. takoradii* and *B. leonense* is considered unnecessary in view of the close relationship existing between all the Guinea Coast lancelets.

In Table III, for each of the characters numbered 1–9 in the diagnoses for *B. capense* and *B. nigeriense*, the Mean and the Standard Deviation is given and from these '*t*' and hence '*P*' have been calculated as a measure of the extent of the differences between the samples. High values for '*t*' and correspondingly low values for '*P*' show that *B. capense* and *B. nigeriense* are significantly different in all characters except the height of the dorsal fin, the proportions of the dorsal fin chambers and the relative length of the postatrioporal region (characters 4, 3 and 5 respectively). In some characters (the number of preanal chambers, the number of myotomes before the anus and the total myotome number) the difference between the two samples is considerable. In the number of myotomes in the tail (character 8), however, it is not so great and in the number of dorsal fin chambers (character 1) there is a tendency among the Guinea Coast lancelets for this to be high, 400 chambers occasionally being exceeded in *B. leonense*. With regard to characters other than those treated numerically, it has already been mentioned that there is a striking similarity between the form of the rostrum, the oral region and the caudal fin in *B. capense* and that in *B. nigeriense* and *B. leonense*. In general appearance *B. capense* can be mistaken for *B. nigeriense* except for a difference in number and length of the preanal fin chambers. It seems, therefore, that these two lancelets possess a considerable number of identical characters which strongly suggests that they have diverged from a common stock. Thus, whereas there is no doubt that *B. capense* is distinct from the Guinea Coast lancelets, it is also evident that it is an extreme member of that series and is more closely related to *B. nigeriense* or perhaps *B. africae* than to any other known species. Lancelets have not yet been recorded from the coasts of French Equatorial Africa, Angola, or South West Africa where forms intermediate between *B. capense* and the Tropical West African species might be expected to occur. The proposed relationship between *B. capense* and the West African lancelets is in accordance with their geographical location and supports the contention that *B. capense* has no close affinities with *B. elongatum* in spite of the remarkable agreement between their numerical characteristics. The view, therefore, is taken that *B. capense* is a valid species not to be confused with the lancelets of the western seaboard of the Americas.

Branchiostoma belcheri (Gray)

Amphioxus belcheri Gray (1847)

Branchiostoma belcheri Gray (1851)

(for a full list of references see Franz, 1922, and Hubbs, 1922).

Material examined. Nine specimens (MOR. 43. K. 20.1.54) dredged at Linga-linga, Morrumbene Estuary, Portuguese East Africa, common on a sandy bottom. One specimen (P.E.A. 14S. –.11.55) dredged off Mozambique Island, Portuguese East Africa. These specimens are deposited in the Department of Zoology, University of Cape Town.

Distribution. Coasts of Borneo, China and Japan, Singapore, Philippine Islands, Torres Strait, Madras, Ceylon and East Africa.

Remarks. The nine specimens from Linga-linga are a uniform series, but the specimen from Mozambique Island shows minor differences from these. It has therefore been considered desirable to give a separate diagnosis for each sample.

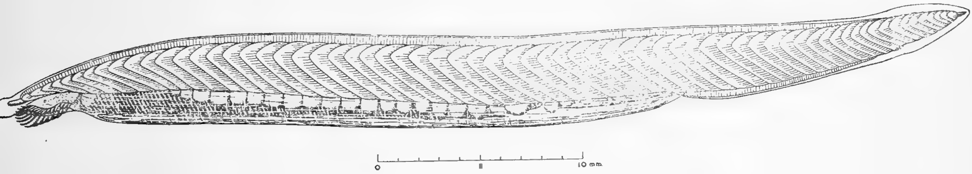
Diagnosis of the Linga-linga lancelet. In the following diagnosis counts and measurements have been made on the 9 specimens in this sample and the results have been analysed statistically.

1. Dorsal fin chambers number 258–306: Mean 287·0: Standard Deviation 15·1: S.D. = 5·26 per cent of the Mean.
2. Preanal fin chambers number 70–88: Mean 80·6: Standard Deviation 5·61: S.D. = 6·96 per cent of the Mean.
3. Tallest of dorsal fin chambers 3·0–3·6 times as high as broad: Mean 3·17: Standard Deviation 0·24: S.D. = 7·48 per cent of the Mean.
4. Height of the dorsal fin contained 7–10 times in the depth of the body in the mid-atrial region: Mean 8·8: Standard Deviation 0·97: S.D. = 11·05 per cent of the Mean.
5. Postatrioporal region 0.43–0·47 the length of the preatrioporal region: Mean 0·450: Standard Deviation 0·012: S.D. = 2·72 per cent of the Mean.
6. Myotomes from anterior end to atriopore 36–39: Mean 37·1: Standard Deviation 0·79: S.D. = 2·13 per cent of the Mean.
7. Myotomes from atriopore to anus 17–19: Mean 17·7: Standard Deviation 0·71: S.D. = 4·0 per cent of the Mean.
8. Myotomes posterior to anus 9–11: Mean 9·9: Standard Deviation 0·60: S.D. = 6·07 per cent of the Mean.
9. Total myotomes 63–66: Mean 64·7: Standard Deviation 1·12: S.D. = 1·73 per cent of the Mean.
10. Maximum length in sample examined 48 mm.; minimum length 42 mm.

Diagnosis of the Mozambique Island lancelet.

1. Dorsal fin chambers number 276.
2. Preanal fin chambers number 68.
3. Tallest of dorsal fin chambers 4·0 times as high as broad.
4. Height of the dorsal fin contained 8 times in the depth of the body in the mid-atrial region.
5. Postatrioporal region 0·46 the length of the preatrioporal region.
6. Myotomes from anterior end to atriopore 34.
7. Myotomes from atriopore to anus 17.
8. Myotomes posterior to anus 11.
9. Total myotomes 62.
10. Length of specimen 62 mm.

The following characters also assist in the recognition of this species and are illustrated in fig. 3 which has been prepared from *camera lucida* drawings of the Linga-linga lancelet. The rostrum is of moderate size and is separated from the dorsal fin by a post-rostral notch. The comparatively low dorsal fin is of approximately the same height throughout the length of the body. The caudal fin is rather small and lacks the subterminal indentations in outline present in *B. capense*. The anus is situated in advance of the centre of the lower lobe of the caudal fin. The preanal fin is long but comparatively narrow and the preanal chambers extend almost the full width of the fin. Seen from the ventral aspect the preanal fin chambers are broad and, in some specimens, there is incipient doubling of the fin either at the anterior end only or throughout its entire length. The presence of a double preanal fin has been mentioned by Gilchrist (1923) as a character of *B. bazarutense*. The anterior end of the body is slender and the oral hood comparatively shallow dorso-ventrally. In all the specimens examined well-formed gonads were present. The body is more or less circular in cross-section in contrast with the marked lateral flattening of most species other than *B. belcheri*.



BRANCHIOSTOMA BELCHERI (PORTUGUESE EAST AFRICAN SAMPLE)

FIG. 3.

These Portuguese East African lancelets agree in all characters with *B. belcheri* and do not differ very greatly from *B. bazarutense*. The occurrence of *B. belcheri* on the coast of East Africa is of special interest as this species seems to be predominantly an Asiatic form. It has already been mentioned that Franz (1922) recorded *B. belcheri* from a locality near Zanzibar, but that this record badly needed confirmation. The present collection from Linga-linga and Mozambique Island provides that confirmation and suggests that *B. belcheri* is probably well established on the East African coast as a distinct population. To determine how far the East African form differs from the Asiatic members of *B. belcheri*, a comparison is made between the Linga-linga sample and another from Amoy on the coast of China, a statistical analysis of which has already been published (Webb, 1956). In Table IV, from the Means and the Standard Deviations for the nine diagnostic characters of the Linga-linga and Amoy lancelets, '*t*' and hence '*P*' has been calculated to show how far the samples may be considered representative of distinct populations. It is clear from the low values of '*t*' and the high values for '*P*' obtained, that the Linga-linga and the Amoy lancelets are not significantly different except in the number of dorsal fin chambers, the relative length of the postatrioporal region and the number of myotomes between the atriopore and the anus (characters 1, 5 and 7). Moreover in only one of these three characters, the relative length of the postatrioporal region of the body, can the difference between the samples be considered highly significant. The measure of agreement, therefore, is greater between the Linga-linga samples than has been shown to exist between samples of *B. lanceolatum* taken from Naples, Plymouth and the Kattegat (Webb, 1956b). In general appearance, also, the Linga-linga lancelet and the Amoy lancelet are almost identical (compare fig. 3 with Webb, 1956, fig. 2). There is no longer any doubt, therefore, that *B. belcheri* is represented in East Africa, although there are population differences between the East African and the Asiatic forms.

TABLE IV

CHARACTER NUMBER	Linga-linga lancelet		Amoy lancelet		'*t*'	'*P*'
	MEAN	S.D.	MEAN	S.D.		
1	287·0	15·10	305·0	23·64	2·130	<0·05
2	80·6	5·61	78·1	5·26	1·165	0·25
3	3·17	0·24	2·96	0·31	1·788	0·1
4	8·8	0·97	9·08	0·96	0·726	>0·25
5	0·45	0·012	0·50	0·024	5·808	<0·001
6	37·1	0·79	36·5	0·82	1·844	0·1
7	17·7	0·71	17·0	0·76	2·339	>0·02
8	9·9	0·60	10·0	0·54	0·448	>0·25
9	64·7	1·12	63·56	1·00	2·746	0·01

A statistical analysis showing to what extent the differences between samples of *B. belcheri* from Linga-linga in Portuguese East Africa and Amoy in China may be held to characterize the populations from which the samples were taken.

The single specimen from Mozambique Island has been shown to differ from those from Linga-linga more particularly in the rather low number of myotomes before the atriopore. Whereas it is impossible to draw any conclusions from such differences in a single specimen, the occurrence of this specimen does suggest that there might be other populations of *B. belcheri* on the East African coast where isolation may have given rise to slight differences which are maintained. It is also possible that Gilchrist's species *B. bazarutense* should more properly be referred to as a variant of *B. belcheri*. In his description of *B. bazarutense* Gilchrist was more concerned with separating his species from *B. capense* and *B. elongatum* than any other species, and he overlooked the similarity with *B. belcheri*, the existence on the East African coast of this species not being suspected at that time. Gilchrist placed some weight on the peculiar form of the preanal fin in *B. bazarutense*, but the approach to a similar condition in the Linga-linga lancelet shows that this character is, in fact, a further link with *B. belcheri*. Nevertheless *B. bazarutense* can be recognized from a number of slight differences which involve most of the characters, but whether these differences are sufficient to warrant specific recognition is another matter which, as the types of this species appear to have been lost, can only be settled when a new sample has been obtained.

Branchiostoma lanceolatum (Pallas)

Limax lanceolatus Pallas (1774)
Branchiostoma lubricus Costa (1834)
Amphioxus lanceolatus Yarrell (1836)
Branchiostoma lanceolatum Gray (1851)

Material examined. Two specimens (MOR. 43.K. 20.1.54) dredged at Linga-linga, Morrumbene Estuary, Portuguese East Africa, from sandy bottom. These specimens are deposited in the Department of Zoology, University of Cape Town.

Distribution. Norwegian coast, North Sea, Kattegat, Heligoland, English Channel, Irish Sea, Mediterranean Sea, Suez Canal, Arabian Sea, Madagascar, Portuguese East Africa.

Remarks. These two specimens of *B. lanceolatum* were included in the same sample as the nine specimens of *B. belcheri* from Linga-linga, Portuguese East Africa. Apparently the two species have been taken from the same locality at the same time.

Diagnosis of the Portuguese East African sample of Branchiostoma lanceolatum

1. Dorsal fin chambers number 270 and 280.
2. Preanal fin chambers number 32 and 34.
3. Tallest of dorsal fin chambers 2·5 times as high as broad.
4. Height of dorsal fin contained 11 and 12 times in the depth of the body in the mid-atrial region.
5. Postatrioporal region 0·40 and 0·42 times the length of the preatrioporal region.
6. Myotomes from anterior end to atriopore 34 and 35.
7. Myotomes from atriopore to anus 13.
8. Myotomes posterior to anus 10.
9. Total myotomes 57 and 58.
10. Length of the specimens examined 31 mm.

The two specimens examined were not in a very good condition, but, as far as could be determined, in general appearance and in the form of the rostrum and the caudal fin they resembled *B. lanceolatum* from the central Mediterranean region (see Webb, 1956b).

This is the third record of *B. lanceolatum* from a region east of the Suez Canal where this species is said to occur in abundance (Gruvel, 1933). Prenant (1928) first recorded lancelets which he held to be *B. lanceolatum* from the north-west coast of Madagascar. In 1933 the ‘John Murray’ Expedition collected a single specimen of the species in a haul containing a large number of *B. arabiae* (Webb, 1956). The present record from Portuguese East Africa is similar in that the two specimens were taken together with another species, but this time *B. belcheri*. This sporadic occurrence of *B. lanceolatum* outside European waters suggests that this species is spreading from the Suez Canal to the Arabian Sea and Indian Ocean.

TABLE V

CHARACTER NUMBER	Range of variation in Indian Ocean and Arabian Sea samples of *B. lanceolatum*			Total range of variation in European samples of *B. lanceolatum*
	Portuguese East Africa	Madagascar	Arabia	
1	270–280	220–280	264	200–270
2	32–34	35	47	29–48
3	2·5	—	1·6	1·4–2·7
4	11–12	—	12	8–16
5	0·40–0·42	—	0·52	0·38–0·51
6	34–35	35	37	33–38
7	13	15	13	12–16
8	10	12	14	10–14
9	57–58	62	64	58–65

A comparison of the recorded range in variation of the numerical diagnostic characters in the Indian Ocean and Arabian Sea samples of *B. lanceolatum* with the total range in variation in the European samples of that species.

In Table V the diagnoses for the Portuguese East African, Madagascan and Arabian samples of *B. lanceolatum* are compared with that of the European samples of the species. It is seen that the total range in variation in each character in the European samples covers the range for the Indian Ocean and Arabian Sea forms with very few exceptions. These exceptions are a rather high number of dorsal fin chambers in the Portuguese East African and the Madagascan samples (character 1), the relatively long postatrioporal region in the Arabian specimen (character 5) and a low total number of myotomes in one of the Portuguese East African specimens (character 9). In each case, however, these figures fall outside the European range by so little that it is doubtful how far they can be considered significant. Two facts emerge from this comparison which may be of value. First the diagnoses for the Indian Ocean and Arabian Sea samples do not conform to any of the populations of the European lancelet for which detailed figures are available (Webb, 1956b). They may be similar, however, to the Suez Canal population a diagnosis for which has not been published. Second, the numerical range shown by the characters of the three samples from East of the Suez Canal, when taken together, exceeds in certain respects that of any of the European populations determined from larger samples. The probability is, therefore, that the Portuguese East African, Madagascan and Arabian samples are not all taken from the same population. The first two of these samples probably belong to one population, taking into account both the similarity of the diagnoses and their geographical location, but the Arabian specimen almost certainly belongs to another. On the assumption that the populations of *B. lanceolatum* in the Indian Ocean and Arabian Sea have been derived from the eastern Mediterranean population at a time subsequent to the opening of the Suez Canal in 1869, it can be presumed that any differences between populations in the Indian Ocean and in the Arabian Sea have arisen during a period of about sixty years. It is known that the English Channel population of *B. lanceolatum* has remained stable for more than seventy years (Webb, 1956b), so that any changes that may have occurred in the eastern Mediterranean lancelets since their migration through the Red Sea may be due either to the change in environmental conditions accompanied by isolation or to some degree of hybridization with the endemic lancelets. In the Arabian Sea *B. lanceolatum* is sympatric with *B. arabiae* and in Portuguese East Africa with *B. belcheri*. Hybridization with *B. arabiae* might account for rather higher numbers of dorsal and preanal fin chambers than are commonly found in lancelets at Naples, but not, perhaps, for the relatively long postatrioporal region. Similarly, hybridization with *B. belcheri* could account for a high dorsal fin chamber number and a rather tall dorsal fin. The evidence, however, is not at all clear and further samples of *B. lanceolatum* from Portuguese East Africa, the Arabian Sea and, in particular, the Suez Canal are required before an opinion can be given.

Conclusions

An examination of the types of *Branchiostoma capense* and new collections from South Africa of this species has been made. It is concluded that *B. capense* is a valid species and is not synonymous with *B. californiense* or *B. elongatum* as has been proposed by Tattersall (1903) and Franz (1922, 1922a and 1930). The remarkable similarity between many of the characters of *B. capense* and *B. elongatum* is thought to be due to convergence and not to close affinity of these geographically widely separated forms. Comparisons have been made between *B. capense* and the neighbouring species *B. belcheri*, *B. bazarutense* and *B. arabiae* from the east coast of the African continent and *B. africae*, *B. nigeriense*, *B. takoradii* and *B. leonense* from West Africa. *B. capense* has been shown to be related to the Guinea Coast lancelets of West Africa and to be an extreme member of that series. The Cape lancelet extends in range from the south-west tip of the Cape Province (Simons Bay and False Bay) eastward to Port Elizabeth (Algoa Bay).

On the east coast of Africa a different species, *B. belcheri*, is established and has been recorded from the Morrumbene Estuary and Mozambique Island in Portuguese East Africa and also by Franz (1922) from a locality near Zanzibar. The population of *B. belcheri* at the Morrumbene Estuary is very similar to that at Amoy on the China coast and the two forms can only be distinguished by minor differences. *B. bazarutense*, described by Gilchrist (1923) from the Bazaruto Islands off Portuguese East Africa, is a close relative of *B. belcheri* differing from the Morrumbene form, but not, perhaps, sufficiently to warrant specific distinction. Another species, *B. arabiae*, which is related to *B. belcheri*, has been described by Webb (1956) from the Arabian coast. Sympatric with *B. arabiae* and *B. belcheri* from the Morrumbene Estuary are populations of *B. lanceolatum* which have evidently been derived from a Suez Canal population of that species. A further record of *B. lanceolatum* has also been made by Prenant (1928) from the north-west coast of Madagascar.

The lancelets of South and East Africa, therefore, appear to have been derived from several different sources and consequently do not form a closely related group as, for instance, seems to be the case with the lancelets of the west Atlantic or, to a lesser extent, those of the east Atlantic. An explanation of the occurrence of such a variety of different lancelets on these coasts is probably to be found in the pattern of currents in the Indian Ocean. *B. capense*, being related to the lancelets of the west side of the continent, is probably endemic. Its distribution seems to be limited to a region of the Cape coast just beyond the reach of the south-west warm Agulhas Current which is formed from components from the north-south Mozambique Current, running between Madagascar and Portuguese East Africa, and the east-west Equatorial Current from Australia to the south of Madagascar. The direction of flow of the Agulhas Current may well prove a barrier to the spread of the planktonic larvae of *B. capense* northward beyond Port Elizabeth. The reason for the abrupt termination of the range of this species to the west at the Cape (Simons Bay and False Bay) might be due to the presence of the cold water of the Benguela Current which originates south of this point and passes up the west coast of the continent. The Benguela Current, however, provides a connection between the Cape and the Guinea Coast of tropical West Africa which could account for a relationship between *B. capense* and the Guinea Coast lancelets as there must be some intermixing of waters between the Benguela and the

Guinea Coast Current at the level of the equator. From the direction of flow of the Benguela Current it would seem more likely that the Guinea Coast lancelets are derived from the Cape lancelet than that the reverse is true.

B. belcheri, which is an Asiatic form common in the China Seas, East Indies and North Australia, appears to have been carried to East Africa by the broad east-west Equatorial Current which strikes the east coast of Madagascar and turns both to the north and to the south, passing around the island. The direction of flow of this current could account for the occurrence of *B. belcheri* at Zanzibar and in Portuguese East Africa, and, perhaps, elsewhere on the East African coast north of Port Elizabeth. This species should also occur in Madagascar. The close similarity between the East African and the Amoy forms of *B. belcheri* suggests that a migration from east to west in the Equatorial Current is made with some frequency and that the East African populations are not fully isolated from the Asiatic. *B. arabiae* is connected with the East African population of *B. belcheri* by the seasonal north-east Monsoon Drift, but has come to occupy a somewhat isolated position on the Arabian coast at the entrance to the Gulf of Oman. *B. bazarutense* similarly has only been recorded once from the Bazaruto Islands. Both of these forms have evidently been derived from *B. belcheri* and presumably could only have arisen through occupation of an isolated area. There must, therefore, be regions along the East African coast where such isolation is possible.

The mode of distribution of *B. lanceolatum* in the Arabian Sea and Indian Ocean can be similarly explained. Once the species reached the Gulf of Aden from Suez by means of the reciprocal currents of the Red Sea, one current runs along the coast of Somaliland to meet the seasonal south-west Monsoon Drift passing the East African coast to Madagascar and the Mozambique Current, while another runs north-east along the Arabian coast. Thus the south-west Monsoon Drift could account for the presence of *B. lanceolatum* on the north-west coast of Madagascar and in Portuguese East Africa, and the Arabian Current for the presence of that species in the locality of *B. arabiae*. The distribution of lancelets on the East African coast, therefore, is in accordance with the ocean currents, and may give an indication of the geographical range of other marine organisms similarly distributed by means of planktonic larvae in the Indian Ocean.

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