https://doi.org/10.26749/rstpp.113.29

Papers and Proceedings of the Royal Society of Tasmania, Volume 113, 1979

(ms. received 22.2.1978)

TASMANOCYPRIS, A NEW MARINE OSTRACODE GENUS: AND A REVIEW OF THE FAMILY PARACYPRIDIDAE (CRUSTACEA; OSTRACODA)

by K.G. McKenzie
Riverina College of Advanced Education, Wagga Wagga, N.S.W.

(with 32 figures)

ABSTRACT

McKENZIE, K.G., 1979 (20 vii): *Tasmanocypris*, a new marine ostracode genus: and a review of the family Paracyprididae (Crustacea; Ostracoda). *Pap. Proc. R. Soc. Tasm.*, 113: 29-37. ISSN 0080-4703. School of Applied Science, Riverina College of Advanced Education, Wagga Wagga, New South Wales, Australia.

Tasmanocypris, a new marine ostracode genus with the type species *T. dartnalli* n.sp., is described. Relationships between subfamilies and genera in the family Paracyprididae, to which it belongs, are discussed based on the recent literature and re-examination of some type materials.

INTRODUCTION

Working at Oyster Harbour, near Albany, Western Australia, the author identified as ? *Aglaiella setigera* (Brady, 1880) a large cypridid ostracode which occurred in the marine influenced southern Harbour, but found only females (McKenzie 1964, 1969). The taxon continued to be of interest with the description of several related ostracodes from South Africa (Benson and Maddocks 1964, Hartmann 1974) and the discovery of a fossil Australian species (McKenzie 1974). Recently, a population which included several males was collected off Little Swanport, Tasmania, and it is at last possible to give a complete description. This necessitates the erection of a new genus and has led to a review of the family to which it belongs.

SYSTEMATIC DESCRIPTION

Subphylum	OSTRACODA Latreille, 1806
Class	PODOCOPIDA Müller, 1894
Order	METACOPINA Sylvester-Bradley, 1961
Superfamily	CYPRIDACEA Baird, 1845
Family	PARACYPRIDIDAE Sars, 1923
Subfamily	PARACYPRIDINAE Sars, 1923 (partim)

Genus *TASMANOCYPRIS* n. gen.

Synonymy: *Macrocypris* (partim) Brady, 1880 - ? *Aglaiella* McKenzie 1964, 1969, 1974.
Type Species: *Tasmanocypris dartnalli* n.sp.
Derivation of Name: From Tasmania and the generic suffix - *cypris*.
Diagnosis: Subtriangular paracypridinid; anterior and posterior margins subequally rounded; left valve slightly larger than right valve; valve surfaces smooth, micropunctate and pigmented (at least in the type species); relatively large, over 1 mm in all three known species; greatest height median; dorsal view, regularly elliptical; selvage weak; inner lamellae broad with large anterior and posterior vestibules; marginal (radial) pore canals numerous and branched; normal pore canals scattered, simple, open; hinge of ridge and groove type; adductor muscle scars clustered in the typical paracypridinid pattern, with an overlying elongate scar (sometimes divided)

plus three anterior and two posterior scars, and with two mandibular scars. Antennule 7-segmented with stout terminal spines; antenna with reduced 'natatory' setae; mandible coxale with 4-5 cuspate teeth; maxillule third lobe with three smooth Zahnborsten; maxilla (P I) endopod lobate, undivided in females, but a two-segmented clasping organ in males; walking leg (P II) powerful; P III with a distinct terminal segment and undivided long reflexed terminal bristle; furca with 2 serrate claws, an anterior bristle and two prominent posterior bristles; Zenkers Organ with five whorls of spines (Chitinrosettes); tubes of the testes forming near circles and opening dorsally.

Remarks

The size of this new genus and the ascription of a 'Challenger' species to *Macrocypris* (Brady 1880) led to an initial assignment of this taxon to Macrocyprididae. But the hinge, muscle scars and soft anatomy are all paracypridid-like. The new genus is closest to *Phlyctenophora* Brady, 1880 which is also a typical paracypridine genus in Australasian waters but differs from *Phlyctenophora* particularly in its regularly subtriangular shape because *Phlyctenophora* is more pointed posteriorly. Further, the posterior bristles on the furca differ between these genera (Brady 1880).

Probably, a neotype is required for *Phlyctenophora zealandica* since the available syntypes differ from the concept of this species given by Brady and do not include specimens from Wellington Harbour which the species name indicates as the type locality. Abundant material of the original sediment collected from Wellington Harbour during the 'Challenger' expedition is available at the British Museum (Natural History).

The short antennal 'natatory' setae and Zenkers Organ with five Chitinrosettes relate *Tasmanocypris* to Candonidae, but candonids are predominantly freshwater forms also have different radial pore canals and different furcae. Cyclocypridines are also related but typically much smaller and subcircular in shape. Thalassocypridines are smaller, have different marginal pore canals and characterise different habitats - estuarine or freshwater. These relationships are considered further after description of the type species.

Tasmanocypris dartnalli n.sp.
(figs 1-23)

Derivation of Name: from its collector, A.J. Dartnall, Zoology Department, the University of Tasmania.

Type Material:

Holotype: mature male; Australian Museum Reg. No. P.26683.
Paratype: ovigerous female; Australian Museum Reg. No. P.26684

Further paratypes are stored at the Tasmanian Museum, Hobart; the British Museum (Natural History), London; and the Smithsonian Institution, Washington.

Description

Carapace large; regularly subtriangular; anterior and posterior subequally rounded; dorsum convex; venter almost straight, slightly inflexed anteromedially; surface smooth, micropunctate, with scattered hairs; colour often dark brown at the extremities and near the dorsum; soft parts yellowish brown, ova orange brown; greatest height medial and less than half the length; in dorsal view, regularly elliptical; greatest breadth medial and over two-fifths the length. Internally: lamellae broad anteriorly and posteriorly, narrow ventrally; zone of concrescence relatively narrow throughout; selvage very weak, submarginal; radial pore canals typically branched, especially anteriorly and very numerous; normal pore canals scattered, simple, open; hinge weakly lophodont, with elongate low terminal elements in the right valve and an accommodation groove in the slightly larger and over-lapping left valve; adductor muscle scars clustered in a rosette comprising an elongate upper scar (sometimes divided), three anterior and two posterior scars, plus two mandibulars, other scars not observed.

Antennule 7-segmented; length ratios of the segments 80:15:25:20:17:16:12; dorsal/ventral chaetotaxy of the segments 1/2, 1/1, 1/1, 2/2, 2/2, 2/2, plus two terminal spine-like bristles. Antenna 5-segmented; length ratios of the three endopod segments 6:5:3; ventral sensory bristle of the first endopod segment sutured medially, 'natatory' setae short, 7 in number and sited distally on the segment, ventrodistally is a long bristle, serrate from its mid-length and terminating in a long sensory filament; second segment with the usual complement of bristles and two dorsodistal claws; third segment with four terminal claws and several bristles including a club bristle with a long sensory filament; exopod modified as a long spiky bristle sited proximodorsally on the first endopod segment. Mandible coxale with 4-5 cuspate teeth and small toothbrush bristles between at least the first two of these; endopod 4-segmented bearing an epipod with 5 Strahlen; chaetotaxy as illustrated and including 3 terminal claws. Maxillule palp and lobes normal; distal segment of the palp broad; third lobe with 3 smooth Zahnborsten; epipod with 18 Strahlen plus 3 downwards directed setae. Maxilla (P I) in females with an unsegmented endopod bearing three short terminal setae; epipod with 5 Strahlen; exopod with about 15 strong bristles; in males the palps are modified into the usual cypridacean clasping organs. P II 5-segmented; length ratios of the segments 50:65:40:30:12; chaetotaxy normal; margins of the three penultimate segments bearing several clumps of hairs, as illustrated; terminal claw powerful. P III reflexed; 4-segmented; length ratios of the last 3 segments 70:80:12; terminal segment distinct with two small hooked setae and a long reflexed seta which is hirsute from its mid-length and serrate for the last 25% of its length. Chitin support with a simple blunted tip, forked distally; the anterior branch straight, the posterior branch strongly recurved. Furca powerful; length:height ratio about 10:1 measured at the mid-length; armature of 2 large claws, the anterior:posterior claw ratio 4:3, both claws strongly serrate distally; bristles comprising one anterior and two posterior, the longest of these being the first posterior bristle. Labrum simple, labium with a tuft of hairs. In males: Zenkers Organ with 5 Chitinrosettes; hemipenis with a large tapering basal lobe and tongue-like anterior process. Cups of the nauplius eye fused.

Dimensions - Holotype, male: length 1.19 mm, height 0.56 mm, breadth 0.55 mm.
Paratype, female - length 1.21 mm, height 0.57 mm, breadth 0.57 mm.
Type Locality - Little Swanport, east coast of Tasmania, at about Lat. 42°17'S. Collected at eight stations, their depths varying from about 3.2 m to 18.5 m. The substrate is mostly well sorted sand with MD around 2.50 ϕ; specific permeability determinations demonstrate that most of these sands are two phase (A.J. Dartnall personal communication, December 1977).
Distribution - The species has also been collected from Bull Bay, NE Bruny Island, Tasmania.
Other Species - The only other living species in the genus appears to be *Tasmanocypris setigera* (Brady, 1880) which ranges from Oyster Harbour, near Albany, Western Australia, to Port Jackson, Sydney, New South Wales. Unfortunately, the syntypes of *T. setigera* deposited in the 'Challenger' collection at the British Museum (Natural History), London, do not match Brady's type description and selection of a neotype from the original sediment is necessary. Another species occurs fossil 2 m above the base of the type Mitchellian section at the Pumping Station locality, Bairnsdale, Victoria. It was previously identified as ? *Aglaiella* sp. (McKenzie 1974).
Geologic Range - Neogene-Recent.

RELATIONSHIPS IN THE FAMILY PARACYPRIDIDAE

Paracyprididae are a distinctive family of cypridacean ostracodes, comprising the subfamilies Paracypridinae, Thalassocypridinae and Cyclocypridinae with the following common features: an onion-shaped entrance to the Zenkers Organ; a two-segmented clasping organ in the male P I; and the occurrence of natatory setae on the antennae, although these are often reduced. These common characters separate them from Candonidae which otherwise are closely related (Hartmann and Puri 1974). Probably, Candonidae diverged from an ancestral paracypridid-like stock in the Late Mesozoic.

Some paracyprids are homeomorphic with genera in the family Macrocyprididae. In particular, *Tasmanocypris* is homeomorphic with *Macrocyprina* and *Phlyctenophora* with *Macrocyprissa.* Macrocypridids, however, have a well developed hinge structure with prominent crenulate terminal elements and a characteristic muscle scar pattern (Triebel 1960), criteria by which they can be readily distinguished from other Ostracoda. They differ very strongly from paracypridids in the soft anatomy also and research in hand will no doubt be definitive in establishing their relationships (Dr. R.F. Maddocks personal communication, October 1977).

As understood herein, the family Paracyprididae comprises the following subfamilies and genera:

1. Subfamily Paracypridinae Sars, 1923 with the living genera *Paracypris* Sars 1866; *Phlyctenophora* Brady 1880; *Aglaiella* Daday 1910; *Aglaiocypris* Sylvester-Bradley 1947; *Ghardaglaia* Hartmann 1964; *Coralliaglaia* Hartmann 1974; and *Tasmanocypris* n.gen.
2. Subfamily Thalassocypridinae Hartmann and Puri 1974 with the living genera *Thalassocypris* Hartmann 1955; *Thalassocypria* Hartmann 1957; *Pontoparta* Vavra 1901; *Parapontoparta* Hartmann 1955; *Paracypria* Sars 1910; *Dolerocypria* Tressler 1937; *Allocypria* Rome 1962; *Mecynocypria* Rome 1962; and *Mungava* Harding 1962.
3. Subfamily Cyclocypridinae Kaufmann 1900 with the living genera *Cyclocypris* Brady and Norman 1889; *Cyclocypria* Dobbin 1941; *Cyrpia* Zenker 1854; *Physocypria* Vavra 1898; and *Candocypria* Furtos 1933. In a later paper, Dobbin (1969) noted that she believed the type species of her genus *Cyclocypria* to be a late instar of a *Cyclocypris* species.

No fossil thalassocypridines are as yet known but fossil taxa which have been assigned to the other two subfamilies range from the early Mesozoic.

The approach used to determine the interrelationships between these taxa has been to re-examine type materials of some inadequately known genera and synthesise from the literature and the results of such re-examinations. This task has been simplified recently by the publication of well illustrated faunas from southern Africa and southwest Florida in which several relevant genera occur (Hartmann 1974, Keyser 1975).

There is no problem in distinguishing paracypridines from cyclocypridines because, whereas paracypridines are elongate or bean-shaped and relatively large (about 1 mm), the cyclocypridines are typically subcircular in outline and relatively small (about 0.5 mm). Further, cyclocypridines usually have long antennal natatory setae but these setae are reduced in paracypridines. The single known Australian exception to this last generalisation is a Tasmanian cyclocypridine which was collected in 1966 from moist forest moss at the edge of Arthur Plains, southwest Tasmania. When dissected it was found to be blind and to have reduced antennal natatory setae (presumably so adapted for its semiaquatic terrestrial habitat) although otherwise a typical cyclocypridinid.

The distinctions between paracypridines and thalassocypridines are less obvious because all thalassocypridine genera are more or less elongate or bean-shaped. With respect to other shell characters, paracypridines are well calcified and typically have numerous branched radial pore canals but thalassocypridines are thinner shelled and have less numerous straight (unbranched) radial pore canals. Usually, paracypridines are larger than thalassocypridines.

On soft parts, several characters are commonly used to distinguish between genera in the two subfamilies. Unfortunately, re-examination of types indicated that some of these characters were incorrectly observed and illustrated in the original generic descriptions. Such errors are corrected here.

All thalassocypridines have 7-segmented antennules (except *Thalassocypria aestuarina* Hartmann 1957 in which it is 6-segmented) whereas in paracypridines the number of antennular segments is 5 in *Ghardaglaia* and *Coralliaglaia*, 6 in *Aglaiella* and 7 in the four remaining genera. With the exception of *Dolerocypria*, the antennal natatory setae of all thalassocypridine genera are well developed, extending beyond the tips of the terminal claws; and even in *Dolerocypria* they extend to the mid-length of the claws. In all paracypridines these antennal natatory setae are reduced, reaching barely beyond the second endopod segment in *Ghardaglaia*, *Aglaiocypris*, *Aglaiella* and *Paracypris* and even shorter in *Phlyctenophora* and *Tasmanocypris* (in *Coralliaglaia* they are reduced in number also, to a single short seta).

In some other characters, the two subfamilies seem to have evolved in parallel. For example, both *Dolerocypria* a thalassocypridine, and *Tasmanocypris*, a paracypridine, carry three smooth Zahnborsten on the maxillule third lobe, while two toothed Zahnborsten are the usual complement of this lobe in the other genera of both subfamilies with minor variations in the type of toothing. In *Dolerocypria*, the penultimate segment of the cleaning limb is sutured medially (re-examination of holotype) and it is divided in *Paracypris*, *Coralliaglaia*, *Paracypria* and *Pontoparta* (Müller 1912, Sars 1923, Harding 1962, Hartmann 1974) but in other thalassocypridines and paracypridines it is neither divided nor sutured. The chitin supports of all paracypridines and thalassocypridines are very similar.

A character which is usually conceded importance in determining cypridacean relationships is the furca. In both subfamilies, the furcal shaft carries two powerful claws which are often coarsely serrate, e.g. *Parapontoparta*, *Tasmanocypris*, and in all genera there is a small bristle above the anterior claw. But the number of posterior bristles varies, being either one or two in most cases. Sometimes, they are reported as absent, e.g. *Thalassocypris*. In several taxa, one or two stiff hairs occur on the margin behind the posterior claw and seem to be homologous with the posterior bristles in other genera. These stiff hairs can be found in genera which were originally described as carrying only one or as lacking posterior bristles. Thus, the holotype of *Dolerocypria*, which was described as having a single posterior bristle (Tressler 1937) has in fact two stiff hairs behind the posterior furcal claw. Tressler's mention of a posterior bristle apparently confused Keyser (1975) who could not see a bristle on the holotype, whereas the stiff hairs are clearly visible under high power using a light microscope. In the original description of *Paracypria* also, it was recorded that the furca lacked posterior bristles but careful re-examination of the holotype slide has led to the discovery of a single stiff hair behind the posterior claw. Prominent single posterior bristles characterise the thalassocypridine genera *Mungava*, *Mecynocypria* and *Allocypria*. All paracypridines have two posterior bristles. In *Paracypris*, these are prominent and about equally long, in *Ghardaglaia*, *Aglaiocypris*, *Aglaiella* and *Coralliaglaia* they are small and equal, in *Phlyctenophora* both are prominent with the posterior longer than the anterior bristle and in *Tasmanocypris* this situation is reversed because the anterior bristle is longer.

Environmentally, thalassocypridines occur in estuaries, among mangroves, in saline oases or else are freshwater adapted (Hartmann 1955, 1957, Tressler 1937, Harding 1955, 1962, Rome 1962, Keyser 1975). All paracypridines, on the other hand, are marine adapted but some species have been described from marine estuaries, strongly brackish environments such as the Mareotis, near Alexandria, or the saline Red Sea (Daday 1910, Brady 1868, 1880, Sars 1923, Hartmann 1964, McKenzie 1967). These differing environmental preferences suggest that thalassocypridines evolved from paracypridines and represent a continuing continental invasion by descendants of that older stock.

ACKNOWLEDGEMENTS

Mr. A.J. Dartnall returned to the type locality when he knew of my interest in the taxon and collected at several stations. His material provided first specimens of the hitherto elusive males. The United States Museum of Natural History: Smithsonian Institution, Washington, D.C. (Dr. L.S. Kornicker), forwarded the types of *Dolerocypria taalensis* Tressler, 1937 - USNM 71515, Acc. No. 139464. The Zoological Museum, Oslo (Dr. M. Christiansen) provided the types of *Paracypria tenuis* (Sars, 1905) Reg. Nos. F 11756 (female) and F 11757 (male). The Hancock Museum, Newcastle-upon-Tyne (Mr. A. Tynan) loaned the types of *Aglaiocypris pulchella* (Brady, 1868) - No. B 62. The available material of *Tasmanocypris setigera* (Brady, 1880) and of *Phlyctenophora zealandica* Brady, 1880 in the 'Challenger' collection at the British Museum (Natural History) were examined some years ago when the author was a member of the staff. The Natural History Museum, Vienna (Dr. G. Pretzmann) loaned the types of *Aglaiella stagnalis* Daday, 1910. Mrs. A. Perry typed the manuscript. The research was partially supported by A.R.G.C. grant D 76/15127.

REFERENCES

Benson, R.H. and Maddocks, R.F., 1964: Recent ostracodes of Knysna Estuary, Cape Province, Union of South Africa. *Univ. Kansas Paleont. Contribs., Arthropoda,* 5: 1-22.

Brady, G.S., 1868: 'LES FONDS DE LA MER Part I'. 316 pp. Folin and Perrier, Paris.

__________, 1880: Report on the Ostracoda dredged by H.M.S. Challenger during the years 1873-1876. *Challenger Reps., Zool.,* 1(3): 1-184.

Daday, E. von, 1910: Ergebnisse der mit subvention ans der Erbschaft traits unternommenen zoologischen forschungsreise Dr. Franz Werner's nach dem Aegyptischen Sudan und Nord-Uganda. XV. Beitrage zur Kenntnis der Mikrofauna des Nils. *Akad. Wiss., Wien, Math. Nat. Kl.,* 119: 537-568.

Dobbin, C., 1969: Designation of lectotypes of freshwater species described by Dobbin, 1941 (Ostracoda, Crustacea). In Neale, J.W. (Ed.): THE TAXONOMY, MORPHOLOGY AND ECOLOGY OF RECENT OSTRACODA. Oliver and Boyd, Edinburgh. 491-494.

Harding, J.P., 1955: The Armstrong College Zoological Expedition to Siwa Oasis (Libyan Desert) 1935. Crustacea: Branchiopoda and Ostracoda. *Proc. Egypt. Acad. Sci.,* 10: 58-68.

__________, 1962: *Mungava munda* and four other new species of ostracod crustaceans from fish stomachs. *Nat. Hist. Rennell Island, British Solomon Islands,* 4: 51-62.

Hartmann, G., 1955: Neue marine Ostracoda der familie Cypridae und der subfamilie Cytherideinae der familie Cytheridae aus Brasilien. *Zool. Anz.,* 154(5/6): 109-127.

__________, 1957: Zur Kenntnis des Mangrove-Estero-Gebietes von Salvador und seiner Ostracoden - fauna II. *Kiel.Meeresforsch.,* 13(1): 134-159.

__________, 1964: Zur Kenntnis der Ostracoden des Roten Meeres. *Kiel.Meeresforsch.,* 20: 35-127.

__________, 1974: Zur Kenntnis des Eulitorals der afrikanischen Westkuste zwischen Angola und Kap der Guten Hoffnung und der afrikanischen Ostkuste von Sudafrika and Mocambique unter Berucksichtigung der Polychaeten und Ostracoden. Teil III. Die Ostracoden des Untersuchungsgebiets. *Mitt. Hamburg. Zool. Mus. Inst.,* 69: 229-520.

Hartmann, G. and Puri, H.S., 1974: Summary of Neontological and Paleontological classification of Ostracoda. *Mitt. Hamburg. Zool. Mus. Inst.,* 70: 7-73.

Keyser, D., 1975: Ostracoden aus den Mangrovegebieten von Sudwest-Florida. *Abh. Verh. naturwiss. Ver. Hamburg,* 18/19: 255-290.

McKenzie, K.G., 1964: The ecologic associations of an ostracode fauna from Oyster Harbour, a marginal marine environment near Albany, Western Australia. *Pubbl. staz. zool. Napoli,* 33 suppl.: 421-461.

__________, 1967: Recent Ostracoda from Port Phillip Bay, Victoria. *Proc. R. Soc. Vict. n.s.,* 80(1): 61-106.

McKenzie, K.G., 1969: Species list. In Neale, J.W. (Ed.) THE TAXONOMY, MORPHOLOGY AND ECOLOGY OF RECENT OSTRACODA, Oliver and Boyd, Edinburgh, 11-13.

______________ 1974: Cenozoic Ostracoda of southeastern Australia with the description of *Hanaiceratina* new genus. *GeoScience and Man*, 6: 153-182.

Müller, G.W., 1912: Ostracoda. *Das Tierreich*, 31: 1-434.

Rome, Dom R., 1962: Ostracoda. *Result. sci. Explor. hydrobiol. Lac Tanganika*, 3(8): 1-305.

Sars, G.O., 1905: Pacifische plankton - crustaceen (Ergebnisse einer reise nach dem Pacific. Schauninsland 1896-1897). II Brackwasser - crustaceen von den Chatham-Inseln. *Zool. Jb. Abt. Syst. Geog. Biol.*, 21: 371-414.

__________, 1923: Ostracoda. In AN ACCOUNT OF THE CRUSTACEA OF NORWAY. 9(3/4): 33-72 (Bergen Museum: Bergen).

Tressler, W.L., 1937: Ostracoda. *Internat. Rev. ges. Hydrobiol. Hydrog.* 34(3/5): 188-207.

Triebel, E., 1960: Die taxionomische Stellung und die Gattungen der Unterfamilie Macrocypridinae (Ostracoda). *Senck. biol.*, 41(1/2): 109-124.

FIGURE EXPLANATIONS

Tasmanocypris dartnalli n.gen., n.sp., adult male, holotype, AM P.26683. Figure 2, adductor muscle scars; fig. 5, detail serrate bristle and club-shaped bristle antennal endopod; fig. 8, detail sensory bristle, proximoventral first antennal endopod segment; fig. 11, maxillule third lobe with 3 Zahnborsten; fig. 13, hemipenis; fig. 14, left palp P I; fig. 15, right palp P I; fig. 17, Zenker's Organ; fig. 23, P III.

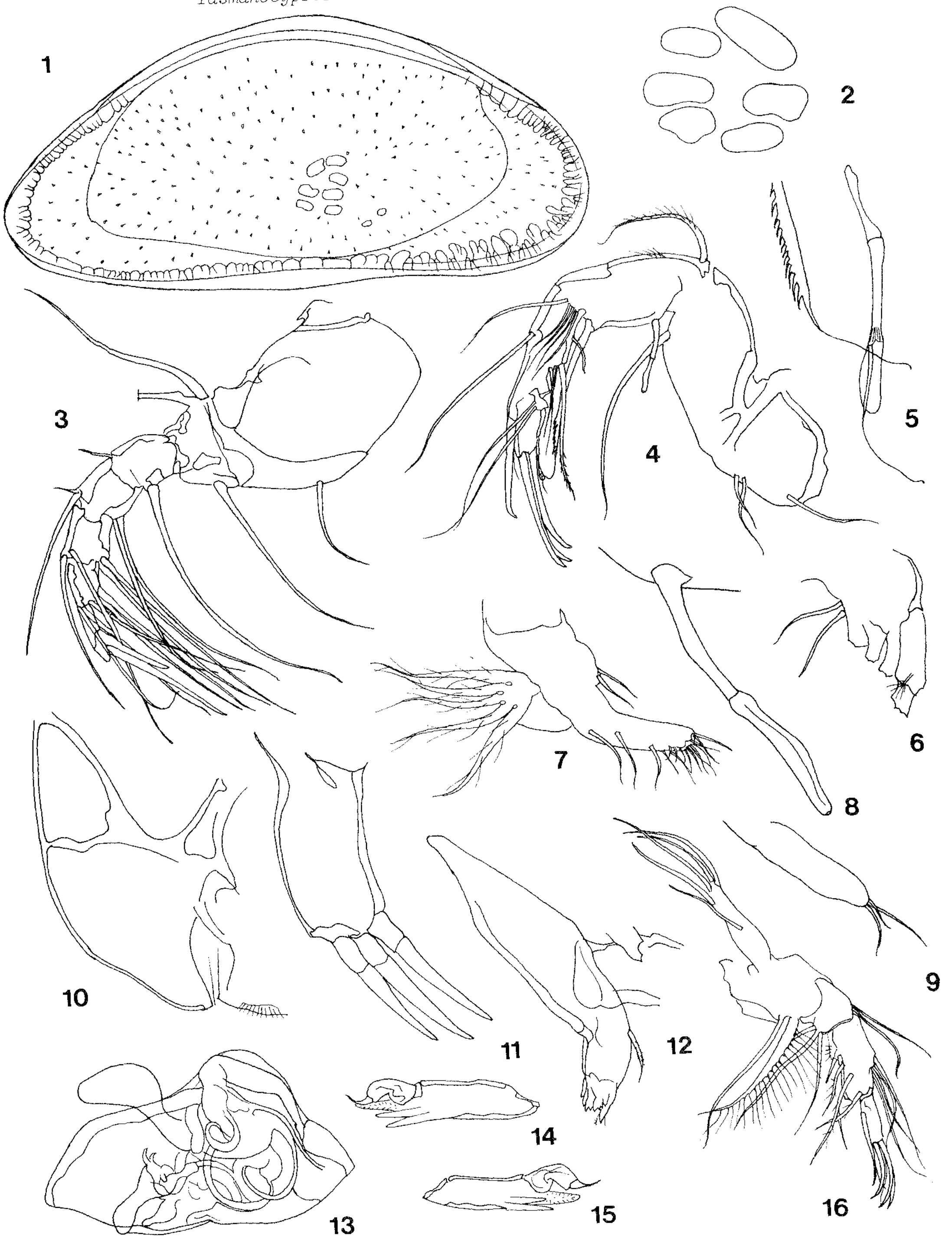
Adult female, paratype, AM P.26684. Figure 1, internal view carapace left valve; fig. 3, antennule; fig. 4, antenna; fig. 6, maxillule palp and lobes (segments only); fig. 7, P I; fig. 9, P I endopod; fig. 10, labrum; fig. 12, mandible coxa; fig. 16, mandible endopod; fig. 18, chitin support; fig. 19, furca; fig. 20, detail, end of long reflexed bristle, P III; fig. 21, P II endopod; fig. 22, P II protopod.

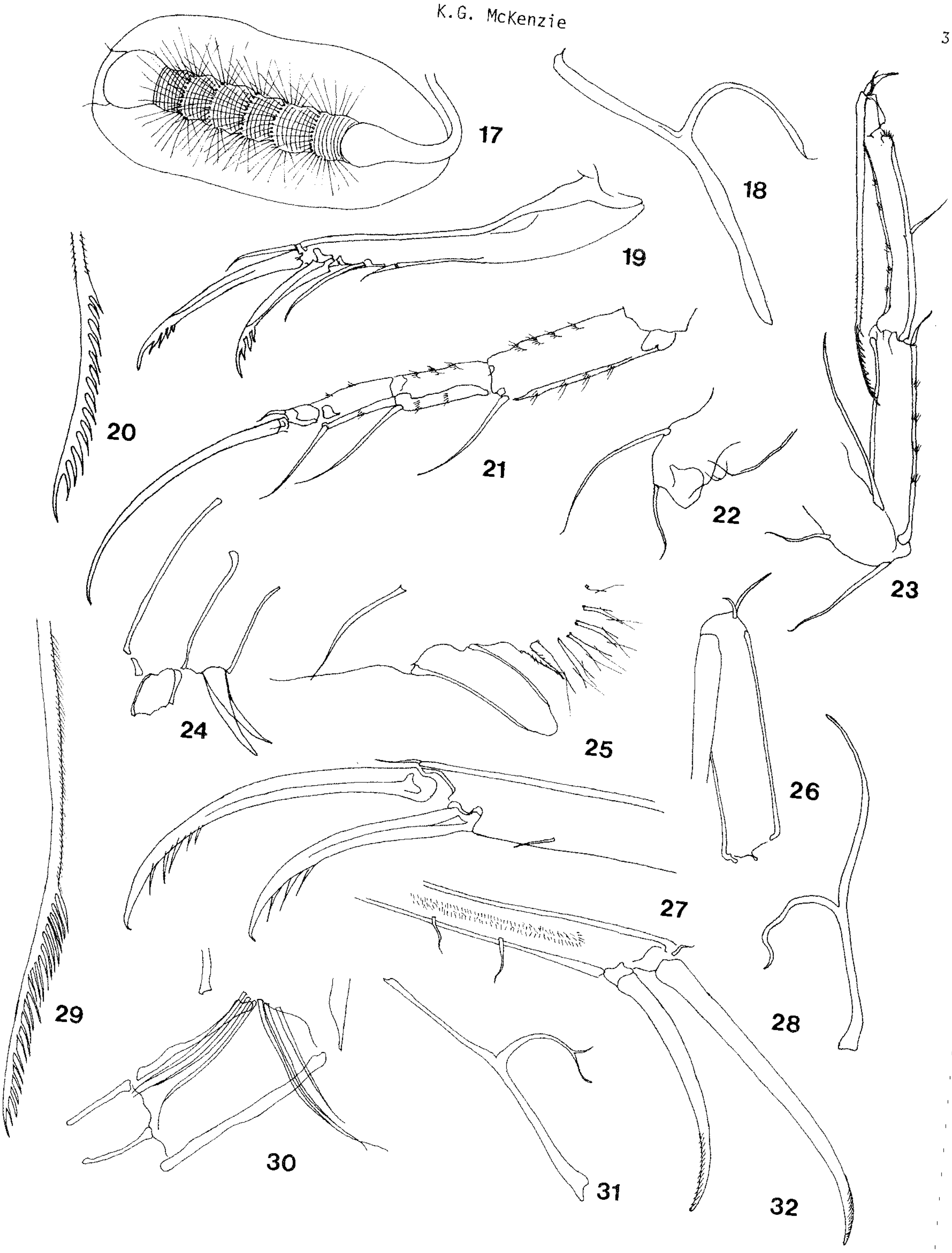
Aglaiella stagnalis Daday, 1910, adult female, co-type, Natural History Museum, Vienna. Figure 24, maxillule palp and third lobe with Zahnborsten; fig. 25, P I (part only); fig. 26, detail, terminal segment, P III; fig. 29, detail, end of long reflexed bristle, P III; fig. 30, antenna, detail showing 'natatory' setae; fig. 32, anterior furca.

Paracypria tenuis (Sars, 1905), adult male, co-type, Zoological Museum, Oslo, Reg. No. 11757. Figure 27, anterior furca; fig. 31, chitin support.

Adult female, co-type, Zoological Museum, Oslo, Reg. No. 11756. Figure 28, chitin support.

Magnifications: Fig. 1-x 80.
Figs 2-4, 6, 7, 9, 10, 12-19, 21-23, 28, 31-x 200.
Figs 24, 25, 27, 30, 32-x 400.
Figs 5, 8, 11, 20, 26, 29-x 800.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16


17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32