

Deep-sea Amphipoda of the
Genus *Lepechinella*
(Crustacea)

J. LAURENS BARNARD

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ABSTRACT

Barnard, J. Laurens. Deep-sea Amphipoda of the Genus *Lepechinella* (Crustacea). *Smithsonian Contributions to Zoology*, number 133, 31 pages, 12 figures, 1973.—*Lepechinella*, now a member of Dexamindae, is perhaps the most diverse gammaridean genus confined to the deep sea. All 23 species, including 9 new species, are reviewed. *Atylus aberrantis* J. L. Barnard is transferred to *Lepechinella*. Except for inner lobes on the lower lip of the latter genus, *Atylus* and *Lepechinella* scarcely differ from each other because of several species with intergrading characters. *Lepechinella* and *Paralepechinella* are the only dexamimid genera in the deep sea; *Atylus*, the sublittoral genus, contains the logical ancestors to *Lepechinella*. Most species of *Lepechinella* are probably ooze dwellers or are weakly epibenthic (demersal); many have bizarre ornaments and a few have the rare attribute of spinose bodies.

The diversity of *Lepechinella* is undoubtedly much higher than now understood but collections are sparse and intact specimens difficult to obtain because of their fragility. They offer an excellent focus for studies of speciation in the deep sea because of a higher number of measurable taxonomic characteristics.

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Deep-sea Amphipoda of the Genus *Lepechinella* (Crustacea)

J. Laurens Barnard

Introduction

Lepechinella Stebbing (1908) and *Paralepechinella* Pirlot (1933) formerly constituted the Lepechinellidae, the only gammaridean family confined to the deep sea. Recently J. L. Barnard (1970) transferred these genera to the Dexaminidae, thus synonymizing the junior Lepechinellidae and abolishing its distinction. This move was not unprecedented; it had been suggested by K. H. Barnard (1925), although Dahl (1959) had advanced arguments to distinguish *Lepechinella* from the Atylidae (= Dexaminidae). The presence of inner lobes on the lower lip provided the main distinction for *Lepechinella*. Now that Atylidae are also synonymous with the Dexaminidae (J. L. Barnard, 1970) the presence of inner lobes on the lower lip is considered insignificant because dexaminids in general vary in this condition.

This paper presents the diverse morphology of *Lepechinella* by reviewing all known species and by describing new species found in collections made by the research vessels *Vema* and *Eltanin* and by various expeditions of the New Zealand Oceanographic Institution. The species now total 23.

Specimens of *Lepechinella* are fragile and easily broken by the shipboard removal of biota from deep sea sediments. Only the best materials available have been analyzed while numerous fragments

and broken bodies have been stored for future studies. Perusal of those fragments suggests numerous taxa in this group remain to be described but the prospects of obtaining more good deep-sea samples in the near future seem bleak in the present decline of marine expeditions aimed at these discoveries. Hence, this paper is published as a contemporary synthesis and hopefully a stimulus to future explorers, rather than as a terminal definition of the genus in alpha taxonomy.

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Evolution of *Lepechinella*

Virtually no external distinctions (unhidden from lateral aspect) occur between certain species of *Atylus* and several of the primitive species of *Lepechinella*. The hierarchy of specialization outlined by J. L. Barnard (1970) in the family

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Dexaminidae placed *Atylus* at the primitive end of the family and suggested that the 12 other genera of the family could logically be derived from *Atylus* in 2 or more sequences. This is undoubtedly an oversimplification as the precursors of *Atylus* can only be hypothesized and several dexaminids may actually have descended from proto-*Atylus* species. Except for the presence of teeth, cusps, and spines on the body, and inner lobes on the lower lip, several species of *Atylus* represent the primitive grade of structure in Dexaminidae, because these species bear many characteristics modified in descendent genera by loss or simplification of structure. The unmodified species bear a mandibular palp, 2-articulate palp of maxilla 1, strong mandibular lobes on the lower lip, well-developed incisors and spines on the mandible, a 4-articulate palp on the maxilliped, fully cleft telson, short and poorly armed pereopods, basic uropods, and only a partially pygidized urosome. *Atylus* and dexaminids in general differ from the basic gammaridean, as represented by several genera in Gammaridae, only by the reduction of the accessory flagellum and the fusion of urosomites 2-3. The sexual differences in gnathopods are also lost to a great extent and male gnathopod 2 reduced in size, but this recurrent feature is present in various genera of the Gammaridea.

Atylus, *Lepechinella*, and *Paralepechinella* are the only dexaminids retaining a mandibular palp, and even a few species of *Atylus* have lost this appendage. The main accretions in the evolution of other dexaminid genera involve the development of teeth and cusps on body segments or the elongation and diversification of pereopods 3-5. In subsequent evolutionary events these characteristics are then lost again, as may be illustrated in the probable descent of *Syndexamine* from *Paradexamine*. Tooth development is seen in species of *Atylus*, some of which may have more teeth than several species of *Lepechinella*. The vertically extended ocular lobe of *Atylus* and *Lepechinella* is a marked character of relationship. The ocular lobe is elongate dorsoventrally and in certain species of *Atylus* and perhaps all species of *Lepechinella* is produced forward in two points often extended as long cusps. The ultimate member of *Lepechinella* has very long processes on the ocular lobe and body segments and has highly elongate

antennae, pereopods, and accessory flagella; the latter remains essentially 1-articulate. Presumably the elongation of appendages is functionally analogous to conditions known in Melphidippidae where the body hangs upside down in its cradle of legs while the organism rests on a bottom of ooze (Enequist, 1950). The legs are spread out in the fashion of a spider to increase the support on the soft substrate by an increase in the surface presented. The extreme lepechinellid is thus well adapted to a demersal or epibenthic life in the deep sea but *L. aberrantis*, with short appendages, must be presumed to live on hard substrate or have other adaptations against sinking in oozes.

The occurrence of inner lobes on the lower lip of *Lepechinella* has no known intermediate connection to *Atylus*, although the problem has not been thoroughly explored in *Atylus*. The occurrence of these lobes in at least five other dexaminid genera is an ultimate morphological reason to synonymize the Lepechinellidae with the Atylidae; the latter monotypic family is so clearly variable in its characters of mandibular palp, coxal acumination, body cuspidation, and degree of pygidization that it cannot remain distinct from Dexaminidae. Gnathopods, telson, maxillipeds, and uropod 3 also conform among the taxa now synonymized.

Because J. L. Barnard's *Atylus aberrantis* is now recognized as a *Lepechinella*, no *Atylus* is known to occur in the deep sea and no *Lepechinella* occurs in the sublittoral, though *Lepechinella* ascends to depths under 1000 m in high latitudes. *Lepechinella* may therefore be both cold-adapted, substrate-adapted, and because the species lack eyes, dark-adapted. *Atylus* is light-adapted because it bears eyes, is eurythermic because it occurs in both high and low latitudes, but in contrast to *Lepechinella*, must also be adapted to coarse sediments or nestling niches of the shallow sea. The eurytopicity of *Atylus* suggests, however, that the main advance towards dispersal in the deep sea involves the loss of eyes and development of fleshy lobes on the lower lip rather than in any implied thermal adaptations or development of slender appendages. Loss of eyes is apparently no revolutionary event in certain gammarideans, as many genera have oculate and anoculate species, and a few species are believed to have both oculate and anoculate populations.

No correlation between food-gathering capabilities and the presence of inner lobes on the lower lip can be ascertained because inner lobes occur in a diversity of dexaminiids, some of which are benthic nestlers. One, *Polycheria osborni*, however, burrows into compound ascidians for shelter and then filters diatoms from water pumped into its domicile by its own pleopods (Skogsberg and Vansell, 1928). Perhaps the inner lobes increase the sucking capability of the mouthfield by added closure of buccal channels; this might facilitate the processing of extremely fine particles of deep-sea sediments.

Long teeth and so-called ornamental cusps have been both a puzzle and a highly useful taxonomic tool to amphipod systematists. Very little functional morphology has been explored in amphipods, but undoubtedly many of these features have uses, such as, nonskid devices, aids to ecdysis, storage of waste products, repositories for glands, predator protection, and balance. No explanation for the variety of ornaments and teeth in *Lepechinella* can be offered. Spinosity of the body surface seen in several species of the genus is rare in marine amphipods; these dense clusters of articulate spines are known mainly in the genus *Uschakoviella* Gurjanova of the family Paramphithoidae.

CONCLUSIONS.—One may hypothesize that by the loss of eyes and the development of inner lobes on the lower lip, one or more species of *Atylus* or proto-*Atylus* found a habitat open in the deep sea, not available, before or since, to dexaminiids. The adaptability of *Lepechinella* to life on oozes is increased by the extension of appendages, the increase in number or size of body processes, and the proliferation of articulate spines on the body surfaces. These highly variable characteristics obviously altered during the processes of speciation, but how allopatric isolation took place in abyssal depths is unknown. To date *Lepechinella* has been collected in only a few regions of the deep sea and virtually nothing is known of intraspecific variability, clines, subspeciation, or the extent of distribution of any one species.

Speciation in *Lepechinella*

Many of the specific differences now attributed to species of *Lepechinella* are extensively quantitative. The low level of knowledge and exploration

in this genus presents the taxonomist with the quandary of whether or not morphological intergradation occurs among several of the species now described. The sparsity of qualitative characters in the genus suggests that the future taxonomic elaboration of *Lepechinella* will be fraught with difficulties; however, the high diversity of attributes (few of which presently are good taxonomic characters) should make *Lepechinella* a model genus for study of speciation in the deep sea.

Characters having qualitative value as now known in *Lepechinella* are as follows: (1) simple or bifid spines of body segments; (2) presence or absence of lateral spines on anterior body segments; (3) presence or absence of dorsal teeth and accessory teeth on various body segments; (4) presence or absence of cusps on certain coxae; (5) hooking of coxal cusps; (6) presence or absence of cleft on coxa 1 (also subject to variation in degree); (7) presence or absence and lineal organization of facial setae on epimera; (8) number of apical setae and aesthetascs on accessory flagellum (not yet studied in the genus); (9) presence or absence of subapical setae on article 3 of mandibular palp (also not yet studied).

Characters involving degree of length ratios, proportions, patterns, and shapes are as follows: rostrum; cephalic teeth; length of accessory flagellum; size of dorsal teeth and nodules; degree of body setation; articles of mandibular palp; depth of clefting and length of cusps on coxae; shape of coxae; length of pereopods and their dactyls; degree of setation on pereopods (often unclear as many setae lost by sandblasting effects of sample processing); posterior bulge and teeth of epimera; setal patterns on epimera; ramal lengths of uropods; overall reduction of uropod 2 compared with uropod 1; size of article 2 on outer ramus of uropod 3 (poorly studied, often missing); depth of cleft on telson, degree of gape; number, size, and placement of telsonic spines.

The group of species containing *L. arctica*, *L. turpis*, *L. eupraxiella*, and *L. chrysotheras* is not well known but the species appear very closely related to each other. *Lepechinella eupraxiella*, formerly identified by Gurjanova (not Schellenberg) as *L. arctica*, is described as a new species, despite the close relationship among the several species, because *L. eupraxiella* and *L. arctica* Schellenberg are grossly sympatric yet differ in a

PHYLETIC KEY TO THE SPECIES OF *Lepechinella*

The species of *Lepechinella* can be loosely arranged in a progression commencing with the stage resembling *Atylus*:

1. Dorsal teeth present only on pereonite 7 to pleonite 4; pereopods 3-5 short; rostrum fully lanceolate; epimera 2-3 with lateral ridge *L. aberrantis* (TA)
- 2a. At least pereonites 1-4 lacking teeth, or pereonite 1 with one small tooth; pereopods 3-5 hereafter elongate; rostrum hereafter not completely lanceolate; epimera hereafter poorly ridged; coxa 1 not bifid
..... *L. raua* (s), *L. cachi* (RE), *L. ultraabyssalis*, *L. cetrata* (T), *L. huaco* (E)
- 2b. Coxa 1 bifid *L. auca* (RTA)
3. Pereonites 1-4 with small teeth; pereonite 1 with two teeth; coxa 1 not or weakly bifid *L. pangola*, *L. oclo* (E)
- 4a. Pereonites 1-4 with large teeth but pereonite 1 with only one tooth; coxa 1 not bifid *L. monocuspidata* (UT)
- 4b. Coxa 1 bifid *L. uchu* (SURT)
5. Pereonites 1-5 with large teeth, pereonite 1 with two teeth; coxa 1 not bifid
..... *L. cura* (s), *L. lechinata* (s), *L. drygalskii*, *L. bierii*, *L. sucia* (E), *L. wolffi* (RS), *L. curvispinosa* (DSR)
6. Pereonites 1-4 with large teeth, pereonite 1 with two teeth; coxa 1 bifid
..... *L. manco* (AES), *L. chrysotheras*, *L. arctica* (AE), *L. turpis* (E), *L. eupraxiella*

SYMBOLS: A=accessory flagellum not greatly elongate; D=dorsal teeth of pleon enlarged; E=lateral row of setae on at least one epimeron; R=rostrum weak; s=body spination or setation extensive; T=telson poorly lepechinellid, gape weak; U=one or more uropods heavily modified.

degree sufficient to suggest they are not phenotypes of a single species. In its juvenile stages, *Lepechinella turpis*, herein raised to full specific rank, is very similar to *L. arctica*. The minor differences among these species suggest they may have no specific value. Because of the early stage of exploration in this genus, however, the referral of these morphs to distinct species is justified until more can be learned of morphological variations and the geography of speciation in *Lepechinella*.

Methods of Presentation

Diagnoses are based on characteristics well described throughout the genus; many characters are probably overlooked because fine details have not been reported on many species. For example the tooth on pleonites 5-6 (coalesced) is ignored because its presence or absence may be especially dependent on damage. The pair of lateral pocket setules on each lobe of the telson is ignored in describing the armament of the telson. The rami of uropods 1-2 are called ordinary if both reach equally. The first cephalic tooth is the dorsalmost next to the rostrum on each side of the head.

Diagnostic values stated in percentages, such as the length of the rostrum, are not absolute but simply approximate.

The following terms are briefly defined: (1) "active margins" of pereopods refer to the edges of article 6 pointing in the same direction as the dactyls; (2) "locking" refers to the spines on

pereopods at the bases of dactyls; (3) "pygidized" and "pygidization" refer to any adaptations lending strength or rigidization to the urosome and its appendages, such as fusion of segments; (4) "softly" is used as a term intermediate between sharply and bluntly; (5) a "lepechinellid telson" (T) is best seen in Figures 3,4,5,6,7, and 10; the base of the telsonic lobes is solid, the lobes extended rigidly and gaping, with apposite margins each slightly concave.

Except for one so noted, new names of species, despite their geographic origin, are taken from figures in mythology of the Inca nation and are nouns standing in apposition to the generic name.

Relationships of the species are not extensively discussed as they are best seen in the three keys.

Abbreviations are as follow: AMNH, American Museum of Natural History; NZOI, New Zealand Oceanographic Institute; USNM (United States National Museum collections), National Museum of Natural History, Smithsonian Institution.

Number of specimens examined from each sample is indicated in parentheses after the sample numbers.

Capital letters on the figures designate a part of an animal and a lower-case letter modifies the description of that part: B=head; D=dactyl; E=epimeron; F=accessory flagellum; G=gnathopod; I=inner plate or inner ramus; J=pleon; K=palp; L=molar; M=mandible; O=coxa; P=pereopod; Q=outer plate or outer ramus; R=uropod; T=telson; V=upper lip; W=epi-

stome; X=maxilla; Y=maxilliped; Z=lower lip. s=setae removed; t=right; z=broken. All other letters are described in the figure legends.

Small circles drawn on bodies and appendages in the figures mark the bases of missing spines or setae. On bodies and pereopods these spines and setae are missing on the specimens but on gnathopods these armaments have been omitted for clarity of underlying structure. Pleopods are usually omitted from body drawings.

Family DEXAMINIDAE

DIAGNOSIS.—Like the basic gammaridean (see diagnosis, J. L. Barnard, 1969), but accessory flagellum reduced to two or fewer articles and at least two urosomites coalesced.

Other families or genera with these two characters in combination have additional modifications, for example, corneal eyes in Ampeliscidae, especially elongate pereopod 5 and uncleft, linguiform telson in *Paracalliope* (Eusiridae), uniramus uropod 3 (several families), reduced coxa

1 (several families), uncleft fleshy telson (several families), elongate article 3, and mitten of gnathopod 2 (Lysianassidae).

Subfamily DEXAMININAE

DIAGNOSIS.—Dexaminid with pereopods 3–5 similar among themselves in shapes of articles 2–6.

The alternative Prophliantinae have pereopods 3 and 5 highly dissimilar in shapes of articles 2–5.

Lepechinella Stebbing

Lepechinella Stebbing, 1908:191–192.—J. L. Barnard, 1961:98–99 [key].

Dorbanella Chevreux, 1914:1–4.

DIAGNOSIS.—Dexaminin with vertically extended ocular lobe bearing two cusps pointing anteriorly; eyes absent; mandible with palp; lower lip with large fleshy inner lobes; palp of maxilla 1 biarticulate; palp of maxilliped 4-articulate; large processes of body always located on dorsal midline, never slightly subdorsal; only pleonites 5–6 coalesced.

TYPE-SPECIES.—*L. chrysotheras* Stebbing (1908).

Key I to Species of *Lepechinella*

1. One or more of pereonites 1–3 lacking sharp dorsal teeth, or teeth rudimentary..... 2
Pereonites 1–3 with long dorsal teeth, one-fifth or more as long as coxa 2..... 8
2. Pleonite 4 with dorsal notch and accessory tooth, epimera 2–3 with side ridge, pereopods 3–5 very short, dactyls of pereopods 1–5 short *L. aberrantis*
Pleonite 4 lacking dorsal notch and accessory tooth, epimera 2–3 lacking side ridge, pereopods 3–5 and their dactyls elongate..... 3
3. Coxae 1–3 definitely bifid *L. auca*, new species
Coxae 1–3 not bifid 4
4. Body densely covered with setae and spines, many spines bifid *L. raua*, new species
Body not densely covered with setae and spines..... 5
5. Pereonite 1 with small anterodorsal tooth *L. huaco*, new species
Pereonite 1 lacking tooth 6
6. Rostrum very short, extending less than 25 percent along article 1 of antenna 1, faciolateral setae of epimera 1–2 in definite row *L. cachi*, new species
Rostrum extending 40 percent or more along article 1 of antenna 1, faciolateral setae of epimera 1–2 not in row or absent..... 7
7. Telson cleft 40 percent of its length, epimeron 2 with side setae (not in rows), first cephalic tooth about 67 percent as long as rostrum, dactyls of pereopods 1–2 less than 1.4 times as long as article 6 *L. ultraabyssalis*
Telson cleft 75 percent of its length, epimeron 2 lacking facial setae, first cephalic tooth vestigial, dactyls of pereopods 1–2 nearly twice as long as article 6..... *L. cetrata*
8. Pereonite 1 with only one tooth, outer ramus of uropod 1 immense or enlarged 9
Pereonite 1 with two dorsal teeth, outer ramus of uropod 1 ordinary..... 10
9. Body naked, epimeron 1 softly rounded posteroventrally, coxae 1–2 scarcely or not bifid, rami of uropod 2 extending equally *L. monocuspidata*
Body covered with setae, epimeron 1 with medium-sized tooth posteroventrally, coxae 1–2 deeply bifid nearly halfway, inner ramus of uropod 2 about one-third as long as outer ramus *L. uchu*, new species

10. Dorsal teeth of pereonites 1-2 less than one-fourth as long as coxa 2 11
 Dorsal teeth of pereonites 1-2 half or more as long as coxa 2 12
11. Body covered with large spines, coxa 2 bifid, inner ramus of uropod 2 longer than outer ramus *L. oclo*, new species
 Body naked, coxa 2 pointed, inner ramus of uropod 2 half as long as outer ramus *L. pangola*
12. Body covered evenly with setae or spines 13
 Body not covered evenly with setae or spines, these usually sparse or absent 15
13. Pleonites with several accessory nodules besides main teeth 14
 Pleonites lacking accessory nodules *L. cura*, new species
14. Rostrum reaching 87 percent along article 1 of antenna 1, coxa 1 deeply bifid *L. manco*, new species
 Rostrum reaching 33 percent along article 1 of antenna 1, coxa 1 not bifid *L. echinata*
15. Dorsal teeth on pleonites 1-3 twice as long as those on pereon, tooth of pleonite 4 obsolescent *L. curvispinosa*
 Dorsal teeth of pleonites 1-3 not enlarged, tooth on pleonite 4 well developed 16
16. Coxa 1 bifid usually one-third its length 17
 Coxa 1 not bifid 20
17. First cephalic tooth much longer than rostrum, anterior tooth of coxa 5 much longer than limbs of coxa 4, anterior tooth of coxa 6 hooked *L. eupraxiella*, new species
 First cephalic tooth not longer than rostrum, anterior tooth of coxa 5 not longer than limbs of coxa 4, anterior tooth of coxa 6 not hooked 18
18. Accessory teeth on pleon large, coxa 1 scarcely bifid *L. turpis*, new status
 Accessory teeth on pleon very small, coxa 1 deeply bifid 19
19. Epimeron 2 with horizontal row of facial setae, mandibular palp article 1 longer than article 3, article 2 about 4 times as long as article 3, accessory teeth of pleon forming nobs, accessory flagellum weakly elongate *L. arctica*
 Epimeron 2 lacking row of facial setae, mandibular palp article 1 shorter than article 3, article 2 about 3 times as long as article 3, accessory teeth of pleon distinctly elevated, accessory flagellum elongate *L. chrysotheras*
20. Pereon and pleon with 1-6 accessory teeth in form of spiniform cusps or humps, special dorsal rows of spines on pleon, first cephalic tooth much longer than short thick rostrum *L. wolffi*
 These characteristics absent 21
21. Epimera 1-2 with strong row of lateral setae *L. sucia*
 Epimera 1-2 without lateral setal rows 22
22. Telson with long apical spine on each lobe, anterior dorsal teeth only half length of coxa 2, latter evenly tapering *L. drygalskii*
 Telson with short apical spine on each lobe, anterior dorsal teeth two-thirds length of coxa 2, latter abruptly tapering *L. bierii*

Key II to Species of *Lepechinella*

(Partial key concerning only those species with body covered by spines and setae)

1. Dorsal teeth of pereonites 1-2 absent, many body spines bifid *L. raua*, new species
 Dorsal teeth of pereonites 1-2 present, no body spines bifid 2
2. Dorsal teeth of pereonites 1-2 small, one-fifth as long as coxa 2, epimeron 2 with horizontal row of lateral setae *L. oclo*, new species
 Dorsal teeth of pereonites 1-2 large, half or more as long as coxa 2, epimeron 2 lacking facial row of setae 3
3. Coxa 1 bifid one-third its length 4
 Coxa 1 scarcely or not bifid 5
4. Inner rami of uropods 1-2 at least 67 percent as long as outer rami *L. manco*, new species
 Inner rami of uropods 1-2 one-third or less as long as outer rami *L. uchu*, new species
5. Inner rami of uropods 1-3 half as long as outer rami, dorsal teeth of pereonites 1-2 fully as long as coxa 2 *L. echinata*
 Inner rami of uropods 1-2 between 67 and 87 percent as long as outer rami, dorsal teeth of pereonites 1-3 half as long as coxa 2 *L. cura*, new species

Key III to Species of *Lepechinella*

(Partial key concerning only those species with coxa 1 bifid at least one-fourth its length)

1. Rostrum reaching 25 percent along article 1 of antenna 1, pereonites 1-2 lacking dorsal teeth *L. auca*, new species
 Rostrum reaching 33+ percent along article 1 of antenna 1, pereonites 1-2 with dorsal teeth 2
2. Coxa 2 bifid, inner rami of uropods 1-2 only 33 percent or less as long as outer rami
 *L. uchu*, new species
 Coxa 2 not bifid, inner rami of uropods 1-2 about 67+ percent as long as outer rami 3
3. Rostrum extending 87 percent along article 1 of antenna 1, body covered with articulate spines, inner ramus of uropod 2 reaching only 67 percent along outer ramus
 *L. manco*, new species
 Rostrum extending 50 percent or less along article 1 of antenna 1, body nearly naked, inner ramus of uropod 2 reaching 87 percent along outer ramus 4
4. Epimeron 2 with faciolateral row of setae *L. arctica*
 Epimeron 2 lacking faciolateral row of setae 5
5. First cephalic tooth much longer than rostrum, anterior tooth of coxa 5 much longer than limbs of coxa 4, anterior tooth of coxa 6 hooked *L. eupraxiella*, new species
 First cephalic tooth not much longer than rostrum (actually unknown but presumed could not be overlooked if longer than rostrum), anterior tooth of coxa 5 not longer than limbs of coxa 4, anterior tooth of coxa 6 not hooked *L. chrysotheras*

Lepechinella aberrantis (J. L. Barnard)

FIGURES 1, 2

Atylus aberrantis J. L. Barnard, 1962:69, figs. 66, 67.

DIAGNOSIS.—Pereonites 1-6 without teeth, pereonite 7 with rudimentary posterodorsal tooth, pleonites 1-3 with small tooth, pleonite 4 with medium tooth and weak anterior tooth separated by deep sinus from main tooth; body setae weak or absent; epimera 1-3 with strongly convex posterior margin, each with tiny posteroventral cusp, epimeron 2 without lateral row of setae, epimera 2-3 each with lateral ridge (also on epimeron 1 in certain specimens); rostrum short, thick, extending along 50 percent of article 1 on antenna 1, first cephalic tooth half as long as rostrum, second tooth half or a third as long as rostrum; mandibular palp article 3 as long as article 1, article 2 twice as long as article 3; anterior coxae short and broad, coxa 1 slightly slipper-shaped, as broad at apex as at base, not bifid, coxae 2-3 as long as coxa 1, broad and apically truncate, coxa 4 scarcely concave ventrally, coxa 5 with soft, minute anterior lobe, coxae 5-7 with rounded posteroventral corners; or pointed on coxa 7; accessory flagellum very short, as broad as long or 1.67 times as long as broad in male, 1-articulate; telson cleft two-thirds, lobes not gaping but appressed [artificially spread in figures], each

apex with one small spine; uropod 1 ordinary; outer ramus of uropod 2 reaching 67 percent along inner ramus; inner ramus of uropod 3 slightly shorter than outer ramus; pereopods short.

DESCRIPTION.—Mouthparts as shown for *Lepechinella oclo*, new species, except as follows: NZOI-709, upper lip only slightly emarginate, inner plate of maxilla 1 with three setae, outer plate of maxilliped with six medial and five distal spines and setae; *Vema* 14-38, upper lip evenly rounded below, palp article 3 of mandible with three terminal setae and no middle seta, molar seta very long, inner lobes of lower lip smaller.

Vema 14-38: Article 2 of antenna 1 twice as long as article 1, article 3 half as long as article 1, flagellum broken; articles 4-5 of antenna 2 equal to each other in length, flagellum as long as articles 4-5 of peduncle; uropod 3 as in *Lepechinella cachi*, new species, including article 2 (also on NZOI E-709); differing from holotype in slight cusp on coxa 7, slightly larger tooth on epimera 1-3 and bevelment of coxae 3-4.

NZOI E709: Differing from holotype in longer first cephalic tooth but second tooth shorter than on holotype; dorsal teeth longer on pereonites 6-7 and pleonites 1-6; pleonite 6 bearing tooth; coxa 7 with sharp posteroventral tooth perhaps overlooked or damaged in type; presence of facial ridge on epimeron 1.

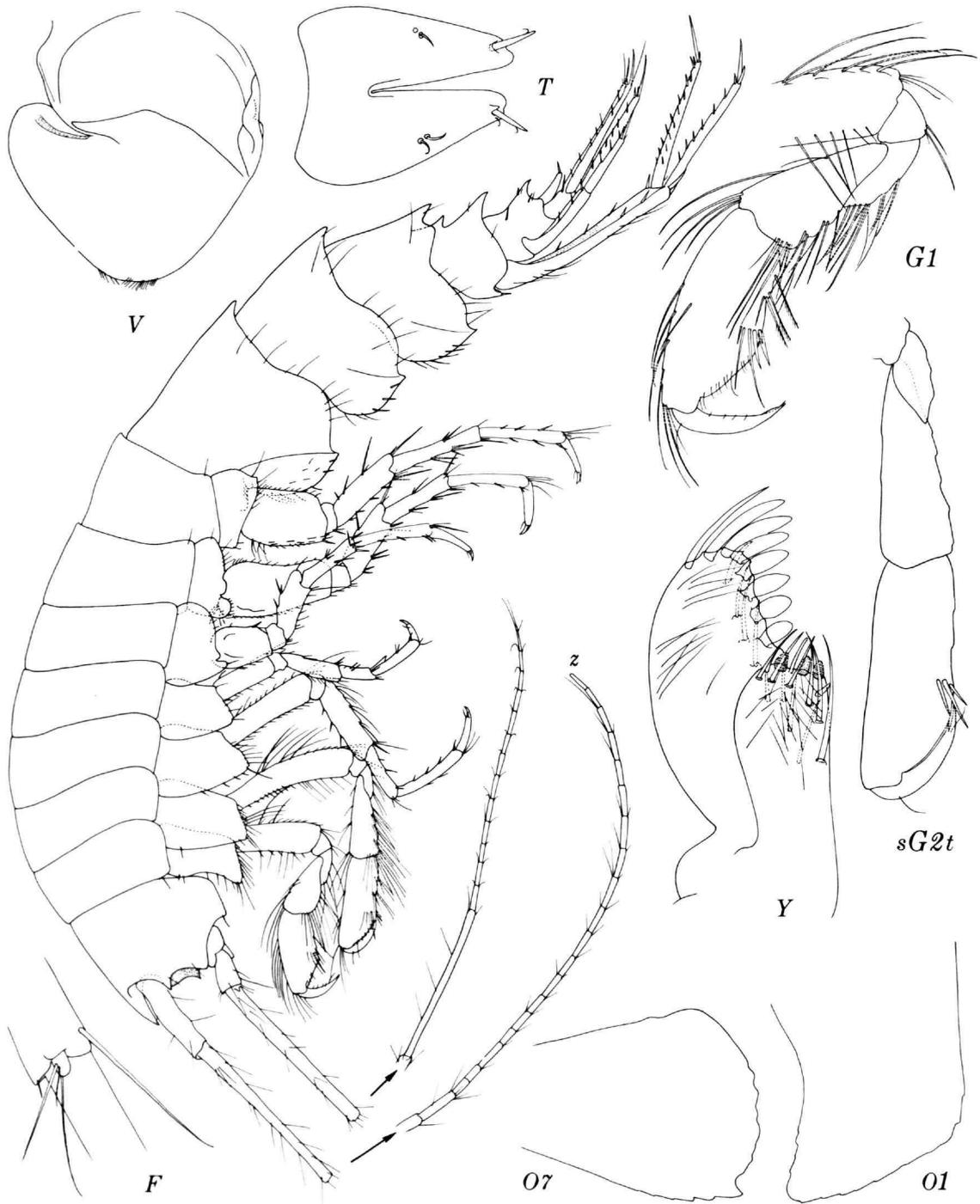


FIGURE 1.—*Lepechinella aberrantis* (J. L. Barnard), female, 4.8 mm, *Vema* 14-38.

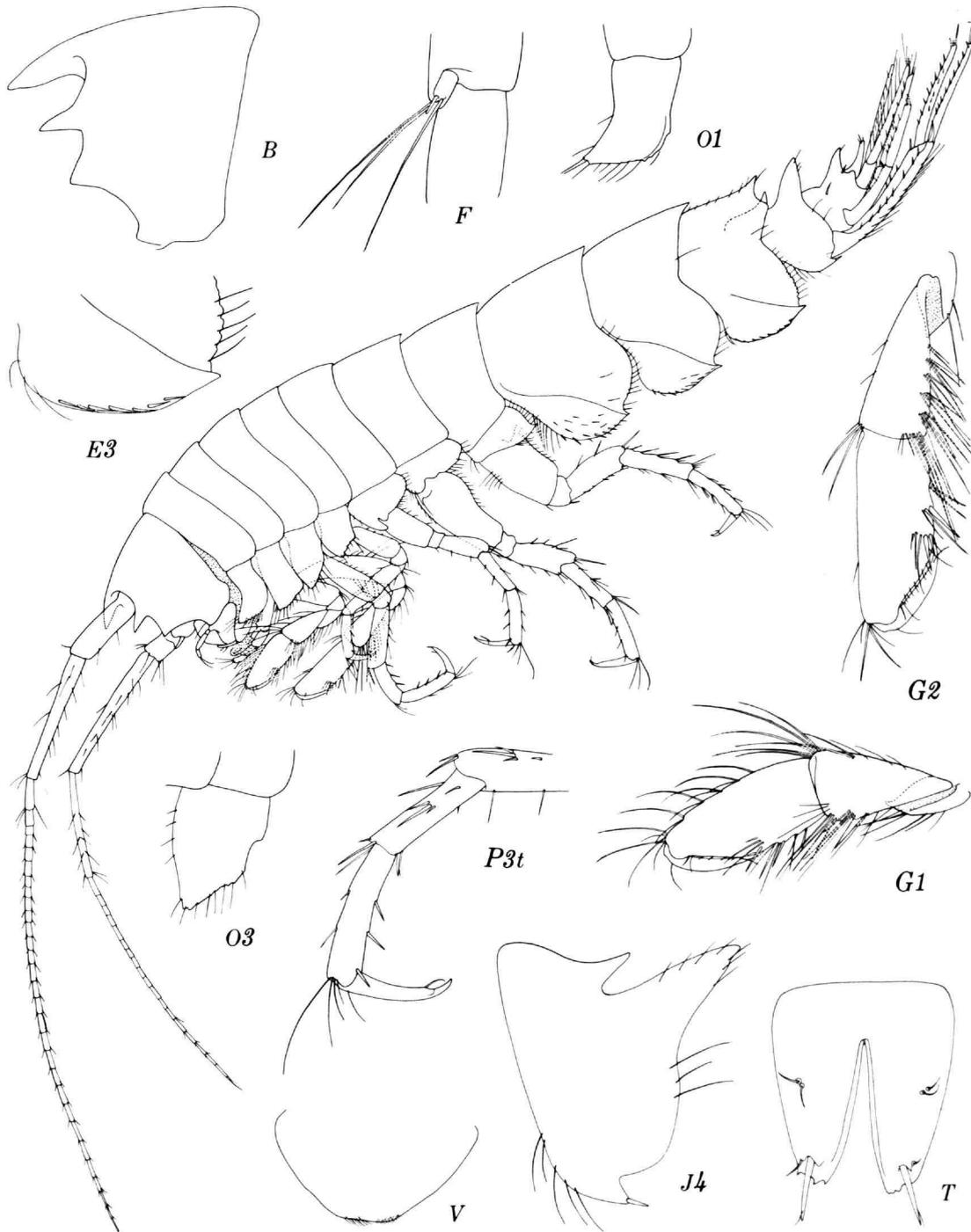


FIGURE 2.—*Lepechinella aberrantis* (J. L. Barnard), male, 6.1 mm, NZOI E709.

MATERIAL.—*Vema* 14–38 (female, 4.8 mm); NZOI E709 (male, 6.1 mm).

REMARKS.—This species is as close to *Atylus* as it is to the type-species of *Lepechinella* and is especially like *Atylus* in its head, accessory flagellum, coxae, dorsal teeth, short pereopods, and epimera, but unlike *Atylus* it bears inner lobes on the lower lip.

DISTRIBUTION.—South Africa, 4893 m; New Zealand, 1683 m; east of Madagascar, 1421–1750 m.

Lepechinella arctica Schellenberg

Dorbanella spcz. Schellenberg, 1925:206–207, fig. 6.

Lepechinella arctica Schellenberg, 1926:394 [footnote].—Gurjanova, 1951:677–678, fig. 465.

?*Lepechinella schellenbergi* Stephensen, 1944:19–20, fig. 11.

DIAGNOSIS.—Anterior dorsal teeth slightly less than half as long as coxa 2, posterior teeth about two-thirds as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one large posterior tooth, pleonites 1–3 with small accessory nobs, vestigial on pereonites 3–7; body dorsally with sparse setae or thin spines; epimera 1–3 nearly straight posteriorly, each with small sharp posteroventral tooth, no sinuses, epimeron 2 with horizontal row of lateral setae; rostrum long and thin, extending along half of article 1 on antenna 1, both cephalic teeth extending as far as rostrum; mandibular palp article 1 longer than article 3, article 2 about 4 times as long as article 3; coxa 1 bifid about one-fourth its length, each point simple, coxa 2 as long as coxa 1, lanceolate, coxa 3 weakly bifid, posterior limb cuspiform and small, coxa 4 evenly, weakly, and softly bifid, coxa 5 with blunt anterior cusp as long as coxa 4, coxa 6 with small anterior cusp, coxae 5–6 with rounded posteroventral corners, coxa 7 with slightly acute posteroventral corner, accessory flagellum of medium elongation, 1-articulate; telson cleft halfway, each lobe with one apical spine about as long as remainder of telson; uropods 1–3 ordinary.

REMARKS.—Stephensen (1944) did not dissect the mouthparts of his material so we do not know if the mandibular palp of *L. schellenbergi* fits *L. arctica*.

DISTRIBUTION.—North of Spitsbergen, 1000 m; ?Norwegian Basin, 66°N 56°W, 599–682 m.

Lepechinella auca, new species

FIGURE 3

DIAGNOSIS.—Anterior teeth obsolete, only humps present, pereonite 1 with two humps, pereonites 2–6 with one hump or sinuous dorsal margin, pereonite 7 with definite tooth, pleonites 1–4 with medium-sized and sharp tooth, no accessory teeth; one tubercle present on ventrolateral margins of pereonites 1–6; pleon with sparse dorsal setae, posterior margin of epimeron 1 convex, of epimeron 2 scarcely convex, of epimeron 3 straight, each with sharp, medium-sized posteroventral tooth, epimera 2–3 excavate ventrally, no facial rows of setae; rostrum small, thin, extending along 20 percent of article 1 on antenna 1 [antenna 1 slightly disjointed from head in Figure 3] first cephalic tooth about half as long as rostrum, second tooth slightly longer than rostrum; mandibular palp article 3 twice as long as article 1, article 2 twice as long as article 3; coxa 1 slipper-shaped, bifid one-fourth its length, coxa 2 as long as coxa 1 and bifid, coxa 3 as long as coxa 1 and asymmetrically bifid, coxa 4 asymmetrically bifid, anterior limb sharp, posterior limb rounded and obsolescent, coxa 5 with sharp anteroventral lobe as long as coxa 4, coxa 6 with blunt anteroventral lobe as long as coxa 4, coxa 7 slightly bifid, limbs rounded; accessory flagellum slightly longer than broad, 1-articulate; telson cleft two-thirds, gaping but apposing margins straight, submedial apex of each lobe with one long spine; inner ramus of uropod 1 extending 75 percent along outer ramus, uropod 2 ordinary; inner ramus of uropod 3 extending 85 percent along outer ramus, including short barrel-shaped article 2; dactyl of pereopods 1–2 nearly 1.5 times as long as article 6.

DESCRIPTION.—Mouthparts as shown for *Lepechinella oclo*, new species, but outer plate of maxilliped lacking proximalmost medial spine; accessory flagellum like that of *L. oclo*, bearing two long apical and one long, one short medial setae.

HOLOTYPE.—USNM 139124, immature female, 4.3 mm. Unique.

TYPE-LOCALITY.—*Eltanin* 72, off Chile, 31°06.5'S, 71°48.5'W, 480–510 fms, 24 June 1962, Menzies Trawl.

RELATIONSHIP.—This species differs from *L. ultraabyssalis* Birstein and Vinogradova (1960) in the shorter rostrum, longer second cephalic tooth, shorter article 3 of the mandibular palp, bifid

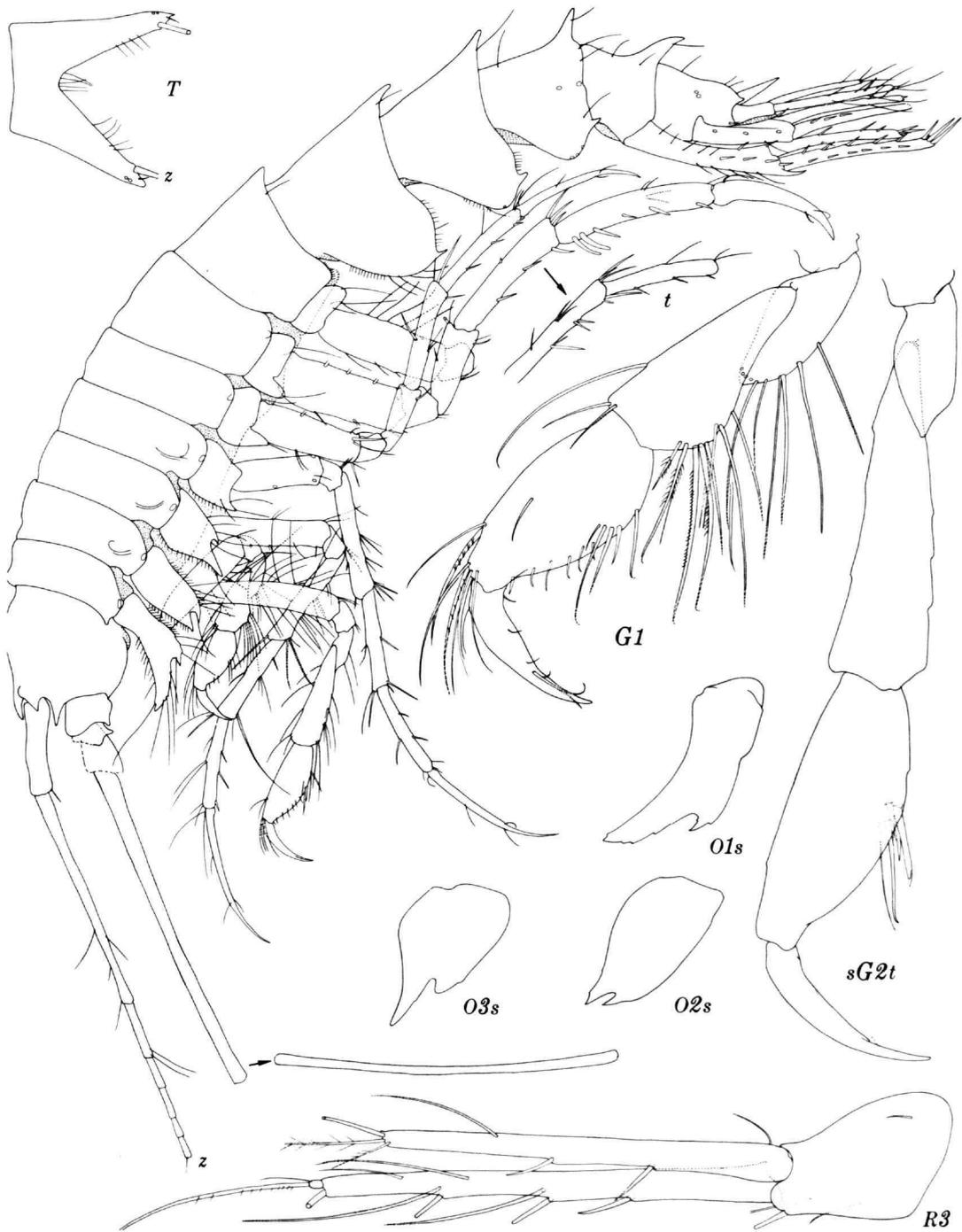


FIGURE 3.—*Lepechinella auca*, new species, holotype, female 4.3 mm, *Eltanin* 72.

coxae 1-3, deep cleft of the telson and slight ventral excavation on epimera 2-3.

Lepechinella auca differs from *L. cetrata* K. H. Barnard (1932) in the presence of a tooth on epimeron 1, the small rostrum and the strongly bifid coxae 1-3.

DISTRIBUTION.—Chile, 878-933 m.

Lepechinella bierii J. L. Barnard

Lepechinella bierii J. L. Barnard, 1957:17-20, pls. 4, 5.

DIAGNOSIS.—Anterior dorsal teeth two-thirds length of coxa 2, posterior teeth three-fourths as long as coxa 2, pereonite 1 with two teeth; pereonite 2 to pleonite 4 with one tooth, no accessory teeth; body with sparse setae dorsally; epimeron 1 much larger than epimera 2-3, epimera 1-2 with slightly convex posterior margin, epimeron 3 with margin nearly straight, each with medium to small, sharp posteroventral tooth and slight sinus, no lateral setae on epimeron 2; rostrum and cephalic side teeth extending evenly about halfway along article 1 of antenna 1, rostrum slightly erect; mandibular palp article 3 scarcely longer than article 1, article 2 about 3 times as long as article 3; anterior coxae short and broad, coxae 2-4 with sharp midanterior bulge, coxa 1 not bifid, apically truncate and serrate, coxa 2 shorter than coxa 1, broad, narrowing abruptly in distal third, with weak posteroventral cusp indicating bifidation, coxae 3-4 moderately bifid, coxa 5 with sharp anterior cusp as long as coxa 4, coxa 6 softly bifid, coxa 7 with long sharp posteroventral hook; accessory flagellum very elongate, 1-articulate; telson cleft halfway, each lobe with short apical spine; inner ramus of uropod 1 reaching 67 percent along outer ramus; uropods 2-3 ordinary; dactyl of pereopods 1-2 about 1.5 times as long as article 6.

DISTRIBUTION.—California, ca. 1000 m.

Lepechinella cachi, new species

FIGURE 4

DIAGNOSIS.—Anterior dorsal teeth absent, pereonites 4-5 with slight hump, sharper on pereonites 6-7, pleonites 1-4 with definite, small to medium tooth, no accessory teeth except pleonites 2 and 4 with extremely weak hump; pleon with sparse dorsal setae; epimera 1-3 convex posteriorly, with

weak to small posteroventral tooth, weak sinus above tooth, epimera 1-2 with lateral row of setae; rostrum small, sharp, extending along 20 percent of article 1 on antenna 1, first cephalic tooth very small, second intermediate in size between rostrum and first tooth; mandibular palp article 3 about 3.5 times as long as article 1, article 2 about 1.4 times as long as article 3; coxa 1 slightly slipper-shaped, with definite ventral margin, not bifid, coxae 2-4 with anterior bulge, coxa 2 slightly shorter than coxa 1, tapering but subtruncate, coxa 3 nearly rectangular, weakly concave ventrally, coxa 4 similar, coxa 5 with anterior lobe as long as coxa 4 but no posterior lobe, coxa 6 with weak anterior lobe, slightly extended and rounded posteriorly, coxa 7 rounded posteroventrally; accessory flagellum elongate, 1-articulate; telson cleft about 30 percent, each lobe with long apical spine and one midlateral spine; inner ramus of uropod 1 extending 67 percent along outer ramus; outer ramus of uropod 2 extending 75 percent along inner ramus; inner ramus of uropod 3 extending 75 percent along outer ramus (including article 2).

DESCRIPTION.—Mouthparts and pereopodal dactyls generally like those drawn for *Lepechinella oclo*, new species, except for mandibular palp (which see), apical protrusion on palp of maxilla 1 more rounded, spines on outer plate strongly serrate, outer plate of maxilliped with more spines on inner margin like *Lepechinella aberrantis*.

Juvenile, 2.6 mm, *Eltanin* 112-33: Rostrum and dorsal body processes more rudimentary than in adult, spines and setae of appendages sparse.

HOLOTYPE.—USNM 139125, ovigerous female, 7.4 mm.

TYPE-LOCALITY.—*Eltanin* 112, Drake Passage, 56°02'S 61°56'W, 4008 m, 20 July 1962.

REMARKS.—This species differs from *L. cetrata* K. H. Barnard (1932) in the shorter rostrum, the subequally extending cephalic teeth, the short cleft of the telson and the rounded anteroventral corner of the head.

It differs from *L. pangola* J. L. Barnard (1962) in the absence of minute dorsal points on pereonites 1-6, the lack of a posterior tooth on coxa 7 and the shorter cleft on the telson.

Lepechinella cachi is similar to *L. ultraabyssalis* Birstein and Vinogradova (1960) but differs in coxae 1, 2, and 5, in the short outer ramus of uropod 2 and in the shorter telsonic cleft.

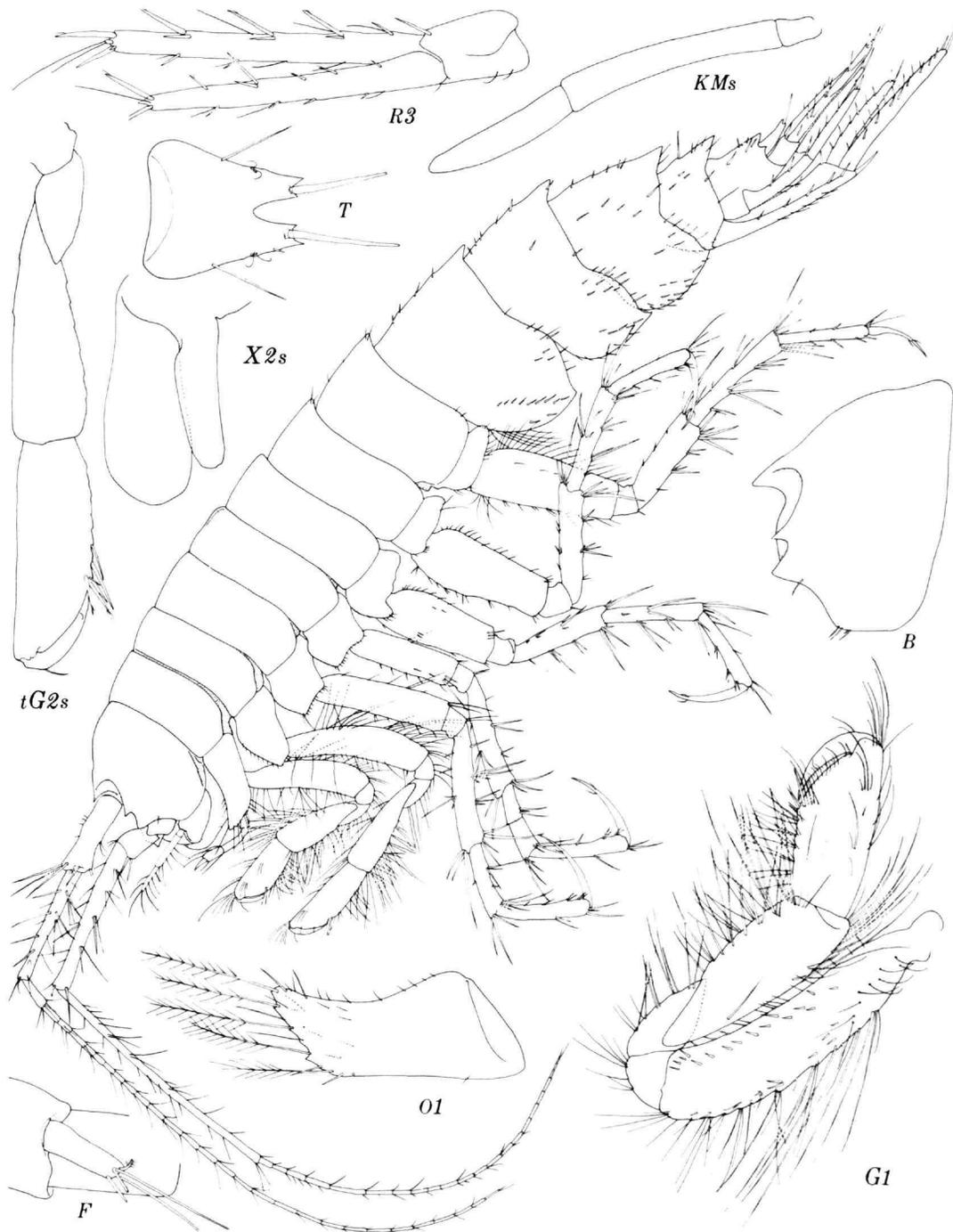


FIGURE 4.—*Lepechinella cachi*, new species, holotype, female, 7.4 mm, *Eltanin* 112.

MATERIAL.—*Eltanin* 112 (10); *Vema* 15–118 (1), 15–119 (1).

DISTRIBUTION.—Drake Passage, 3777–4008 m.

***Lepechinella cetrata* K. H. Barnard**

Lepechinella cetrata K. H. Barnard, 1932:186–187, fig. 114.

DIAGNOSIS.—Pereonites 1–6 with weak dorsal humps, pereonite 1 with two humps, pereonite 7 with low, thick, slightly sharp tooth, pleonites 1–4 with increasingly larger and sharper dorsal teeth, no accessory teeth; pleon with sparse dorsal setae; epimera 1–3 scarcely convex posteriorly, epimeron 1 with sharp posteroventral corner, epimera 2–3 with slightly sharp tooth and weak sinus, no lateral setae on epimeron 2; rostrum large and elongate, relationship to antenna 1 unknown, first cephalic tooth extremely small, second tooth twice as long as first and about 25–33 percent as long as rostrum; mandibular palp unknown; anterior coxae short to medium in length, coxa 1 slipper-shaped, with extended anteroventral corner, ventrally truncate, not bifid, coxae 2–3 as long as coxa 1, weakly bifid, coxa 4 slightly shorter than 1–3, weakly concave ventrally, coxa 5 with soft anterior lobe as long as coxa 4, coxa 6 with sharper and smaller anteroventral lobe, softly quadrate posteroventrally, coxa 7 slightly sharpened at posteroventral corner; accessory flagellum “minute”; telson cleft three-fourths its length, lobes not gaping as apposing margins tumid, each lobe with “short” apical spine; uropods said to be as in *L. chrysotheras*; dactyls of pereopods 1–2 nearly twice as long as sixth articles.

DISTRIBUTION.—South Shetland Islands, 342 m.

***Lepechinella chrysotheras* Stebbing**

Lepechinella chrysotheras Stebbing, 1908:192–193, pl. 27.—K. H. Barnard, 1925:356–357.—Stephensen, 1944:19.

DIAGNOSIS.—Anterior dorsal teeth half as long as coxa 2, posterior teeth two-thirds as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one main tooth, pereonites 6–7 with one small accessory tooth, pleonites 1–3 with two small accessory teeth; body naked; epimera 1–3 posteriorly convex, each posteroventral corner with medium sharp tooth, sinus well developed on epimeron 3, slightly on epimera 1–2; rostrum extending along 40 percent of article 1 on antenna

1, cephalic teeth either absent or overlooked; mandibular palp article 3 slightly longer than article 1, article 2 about 3 times length of article 3; coxa 1 evenly bifid one-third or more its length, coxa 2 with long anterior spike reaching apex of coxa 1, with posterior extension near base but not bifid, coxae 3–4 bifid but anterior limb as long as coxae 1–2 and posterior limb very short, coxae 3–4 with slight anterior bulge, coxae 5–6 bifid, 6 evenly, 5 with posterior limb shorter than anterior, coxa 7 with rounded anterior lobe and sharply extended posteroventral corner; accessory flagellum elongate, apparently 1-articulate; telson cleft halfway, lobes thin, each with one long apical setal spine; uropods 1 and 3 with inner ramus slightly shorter than outer ramus; uropod 2 ordinary.

REMARKS.—K. H. Barnard's South African specimens differ in the obsolescence of posterior cusps or limbs of coxae 3–7 and epimera 1–3; possibly they represent a subspecies.

DISTRIBUTION.—North of British Isles, 59°41'N, 03°08'W, 850 m; 61°15'N, 09°35'W, 900 m; off South Africa, 700 fms.

***Lepechinella cura*, new species**

FIGURE 5

DIAGNOSIS.—All dorsal teeth about half as long as coxa 2; pereonite 1 with two teeth but posterior tooth shorter than anterior, one tooth each on pereonite 2 to pleonite 4, no accessory teeth; body densely covered with small setae and spines; epimera 1–3 with slightly convex posterior margin, each with medium to large, sharp posteroventral tooth, no facial rows of setae; rostrum thin, extending along 40 percent of article 1 on antenna 1, first cephalic tooth 1.2 times as long as rostrum, second tooth as long as rostrum; mandibular palp article 3 about 2.2 times as long as article 1, article 2 about 1.7 times as long as article 3; coxa 1 slightly slipper-shaped, ventrally serrate and scarcely marked as bifid, coxa 2 slightly shorter than coxa 1, weakly and asymmetrically bifid, coxa 3 strongly and asymmetrically bifid, coxa 4 evenly and strongly bifid, coxa 5 with long anterior lobe as long as coxa 4, posteroventral corner with sharp cusp, coxa 6 with antero and posteroventral corners rounded, coxa 7 with sharp and extended posteroventral corner; accessory flagellum elongate and 1-articulate; telson

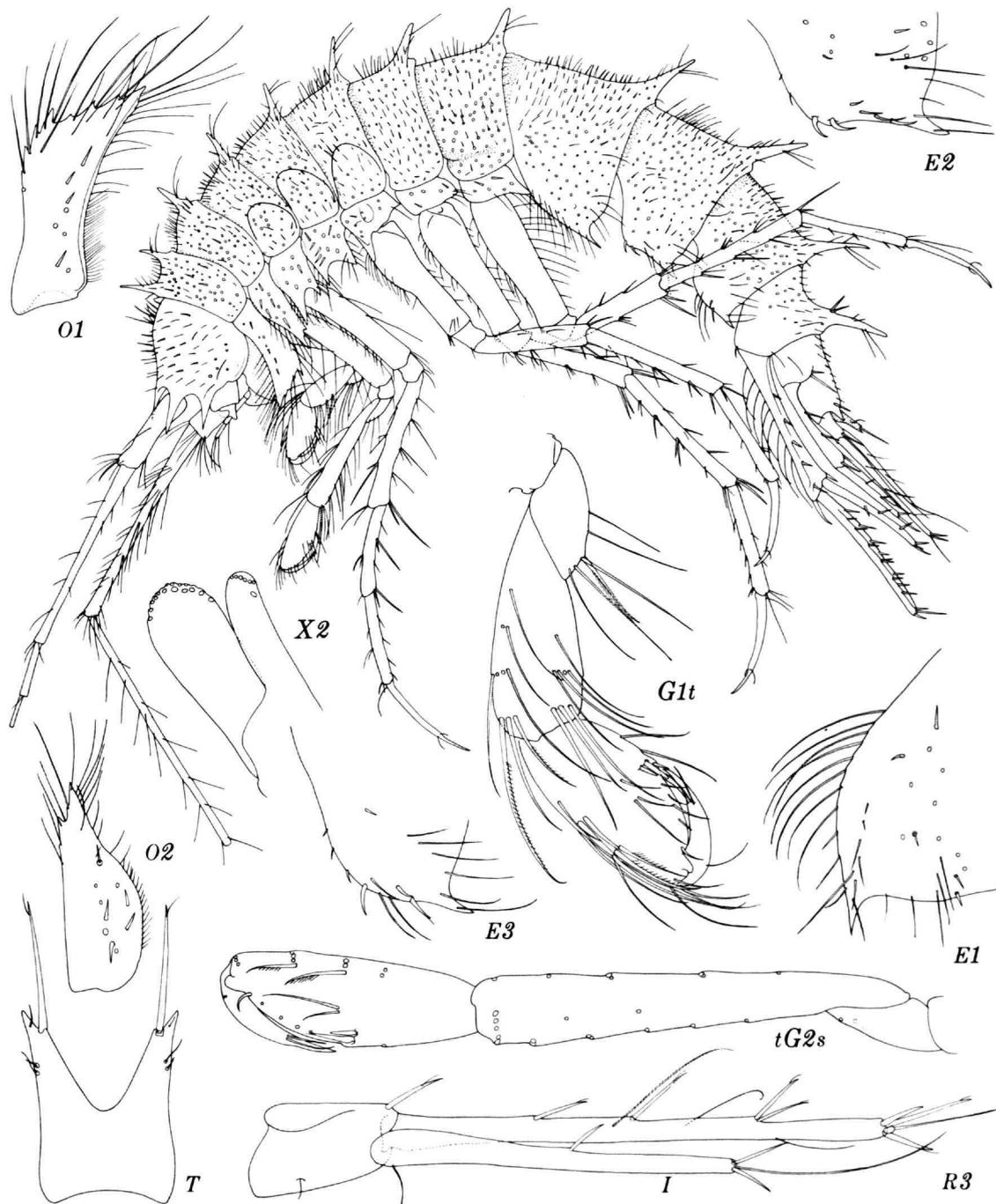


FIGURE 5.--*Lepechinella cura*, new species, holotype, female, 6.9 mm, *Vema* 15-35, pereopod 2 missing.

cleft halfway, each subdistal and medial apex with long spine; inner ramus of uropod 1 extending 67 percent along outer ramus; inner ramus of uropod 2 extending 90 percent along outer ramus; inner ramus of uropod 3 extending 70 percent along outer ramus.

DESCRIPTION.—Mouthparts like those of *Lepechinella oclo*, new species, but upper lip more strongly bilobed; right molar with long seta, left with vestigial seta; inner lobes of lower lip slightly enlarged; inner plates of maxilla 1 with one seta on one side, two on the other side; pereopodal dactyls as figured for *Lepechinella uchu*, new species, article 6 of pereopods 1–5 with active margins bearing single spines in tandem except for paired locking spines.

HOLOTYPE.—AMNH, female, 6.9 mm. Unique.

TYPE-LOCALITY.—*Vema* 15–35, off Pacific Panama, 07°30'N, 79°16'W, 14 November 1958, 2234 m.

Lepechinella curvispinosa Pirlot

Lepechinella curvispinosa Pirlot, 1933:156–161, figs. 55–57.

DIAGNOSIS.—Anterior dorsal teeth about two-thirds length of coxa 2, posterior teeth twice as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 3 with one tooth, teeth of pleonites 1–3 much larger than teeth on pereon, dorsal tooth of pleonite 4 very small; body with dorsal setae; epimera 1–3 straight posteriorly, epimera 1–2 softly quadrate posteroventrally, epimeron 3 with softly rounded posteroventral extension; rostrum short, semi-erect, extending less than 25 percent along article 1 of antenna 1, first and second cephalic teeth half as long as rostrum, scarcely projecting (like some species of *Atylus*); mandibular palp article 3 as long as article 1, article 2 about 4 times as long as article 3; anterior coxae very short, coxa 1 slipper-shaped, anteroventral corner strongly extended, not bifid, coxa 2 broad, then abruptly narrowed to sharp point, coxa 3 softly and weakly bifid, coxa 4 scarcely bifid, posteroventral limb sharp, anteroventral limb rounded, coxa 5 with sharp anteroventral limb as long as coxa 4, coxa 6 with weak, soft anteroventral lobe, rounded posteroventrally, coxa 7 with vestigial posteroventral cusp; accessory flagellum elongate, 1-articulate; telson apparently cleft one-third its length, each lobe thin and with one long apical

setal spine; inner rami of uropods 1 and 3 (apparently) extending about 67 percent along outer rami, uropod 2 ordinary; dactyls of pereopods 1–2 about 1.75 times as long as sixth articles.

DISTRIBUTION.—Ceram Sea, Indonesia, 02°40'S, 128°37'E, 835 m.

Lepechinella drygalskii Schellenberg

Lepechinella drygalskii Schellenberg, 1926:345–347, fig. 50.—Nicholls, 1938:97.

DIAGNOSIS.—All dorsal teeth about half as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one tooth, no accessory teeth; body with sparse dorsal setae; epimeron 3 nearly straight posteriorly, epimera 1–3 with short, sharp posteroventral tooth, apparently epimeron 2 lacking facial setae; rostrum of medium length and thin, extension along antenna 1 unknown, first cephalic tooth as long as rostrum, second tooth two-thirds as long as first; mandibular palp article 1 unknown, article 2 about 3 times as long as article 2; coxa 1 slipper-shaped, thick, not bifid, coxa 2 much shorter than coxa 1, broad but evenly tapering to point, coxa 3 weakly bifid, anterior limb longer than posterior, both sharp, coxa 4 evenly and weakly bifid, limbs sharp, coxa 5 with sharp anterior limb, no posterior limb, coxa 6 weakly bifid, limbs weak and softly rounded, coxa 7 with sharp posteroventral corner; accessory flagellum elongate, 1-articulate; telson cleft about halfway, each lobe with long apical spine; inner ramus of uropods 1–2 extending about 80 percent along outer ramus; uropod 3 broken.

DISTRIBUTION.—Antarctica, only known depth, 288–300 fms.

Lepechinella echinata (Chevreux)

Dorbanella echinata Chevreux, 1914:1–4, figs. 1–3.

Lepechinella echinata.—J. L. Barnard, 1962:63, figs. 56, 57.

DIAGNOSIS.—Dorsal teeth as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one tooth, pereonite 4 to pleonite 4 with accessory nobs anterior to main teeth; body sparsely covered with heavy spines especially on nobs; epimera 1–3 straight posteriorly, each with medium to long, straight, sharp, extended tooth turning slightly ventrally, no row of facial setae on epimeron 2; rostrum short, reaching about 33 percent

along article 1 of antenna 1, slightly or strongly erect, first cephalic tooth very long, extending about 67 percent along article 1 of antenna 1, second tooth obsolescent; mandibular palp article 3 nearly twice as long as article 1, article 2 about 2.2 times as long as article 3; coxa 1 very long, thin, lanceolate, not bifid, coxa 2 shorter and slightly thicker basally than coxa 1, lanceolate, coxa 3 shorter than coxa 2, weakly bifid, with medium anterior lobe, coxa 4 weakly bifid, coxa 5 with anterior lobe as long as coxa 4, coxa 6 weakly and softly bifid, coxa 7 with scarcely extended, sharp posteroventral corner; accessory flagellum elongate, 1-articulate; telson cleft half to two-thirds its length, each lobe thin and armed apically with long setal spine; inner ramus of uropods 1–3 reaching halfway along outer ramus.

South African specimens have the rostrum more erect, coxae 2–3 thicker and the telson less cleft than specimens from Bay of Biscay.

DISTRIBUTION.—Bay of Biscay, 4380 m; South Africa, 4050 m.

Lepechinella eupraxiella, new species

Lepechinella arctica.—Gurjanova, 1951:677–678, fig. 465 [not Schellenberg].

DIAGNOSIS.—Anterior dorsal teeth about half length of coxa 2, posterior teeth fully as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one large posterior tooth, pleonites 1–3 with one small accessory tooth; body with sparse setae or thin spines dorsally; epimera 1–3 each with slightly convex posterior margin and small to medium, slightly blunt posteroventral tooth, strong sinus on epimera 1–2, epimeron 2 with one stout lateral spine; rostrum thin and small, extending less than halfway along article 1 of antenna 1, first cephalic tooth larger than rostrum, second tooth as long as first but thicker; mandibular palp unknown; coxa 1 bifid about one-third its length, each point also bifid, coxa 2 as long as coxa 1, lanceolate and slightly bifid, coxa 3 with lanceolate process as long as coxa 2, bifid, with strong posterior limb, coxa 4 asymmetrically bifid, coxa 5 bifid, with elongate anterior process as long as that on coxa 3, posterior cusp short, coxa 6 with medium-sized anterior hook pointing forward, posteroventral corner weakly rounded,

coxa 7 with weakly extended posteroventral corner; accessory flagellum unknown; telson deeply cleft, with one seta on each apex (description); uropod 2 apparently ordinary, uropods 1–2 poorly known.

ETYMOLOGY.—Named for the great Russian carcinologist, Eupraxie Gurjanova.

HOLOTYPE.—Specimen in figure 465 of Gurjanova (1951).

TYPE-LOCALITY.—Apparently 78°02'N, 09°12'W.

REMARKS.—This species differs from *L. arctica* in the bifid points of the two limbs of coxa 1, the larger cephalic teeth, the large hook on coxa 6 and the condition of the epimera, especially the one large lateral spine of epimeron 2 instead of a horizontal row of setae.

DISTRIBUTION.—Between Spitzbergen and Greenland.

Lepechinella huaco, new species

FIGURE 6

DIAGNOSIS.—Anterior teeth obsolescent, pereonite 1 with one definite anterior dorsal tooth, pereonites 2–4 lacking teeth, pereonite 5 to pleonite 4 with one sharp tooth, posterior teeth about half length of coxa 2, accessory teeth absent but pleonite 4 with small spinose hump anterior to main tooth; body with sparse dorsal setae; epimera 1–3 posteriorly convex, each with posteroventral tooth, small on epimera 1 and 3, medium on epimeron 2, latter with row of lateral setae; rostrum thin and of medium thickness, extending along 33 percent of article 1 on antenna 1, first cephalic tooth 75 percent length of rostrum, second tooth about half length of rostrum; mandibular palp article 3 about twice as long as article 1, article 2 about twice as long as article 3, articles elongate; coxa 1 weakly slipper-shaped, not bifid, coxae 2–4 with anterior bulge, coxa 2 evenly tapering, subtruncate, coxa 3 bifid, limbs soft, posterior slightly the shorter, coxa 4 evenly and softly bifid, coxa 5 with anterior lobe as long as coxa 4, coxa 6 with weak and rounded anterior lobe, coxa 7 with sharp, slightly extended posteroventral corner; accessory flagellum elongate, 1-articulate; telson cleft nearly halfway, each lobe with long apical spine and two long lateral setae on each side; inner ramus of uropod 1 extending 67 percent along outer ramus; outer ramus of uropod 2 slightly shorter than inner ramus;

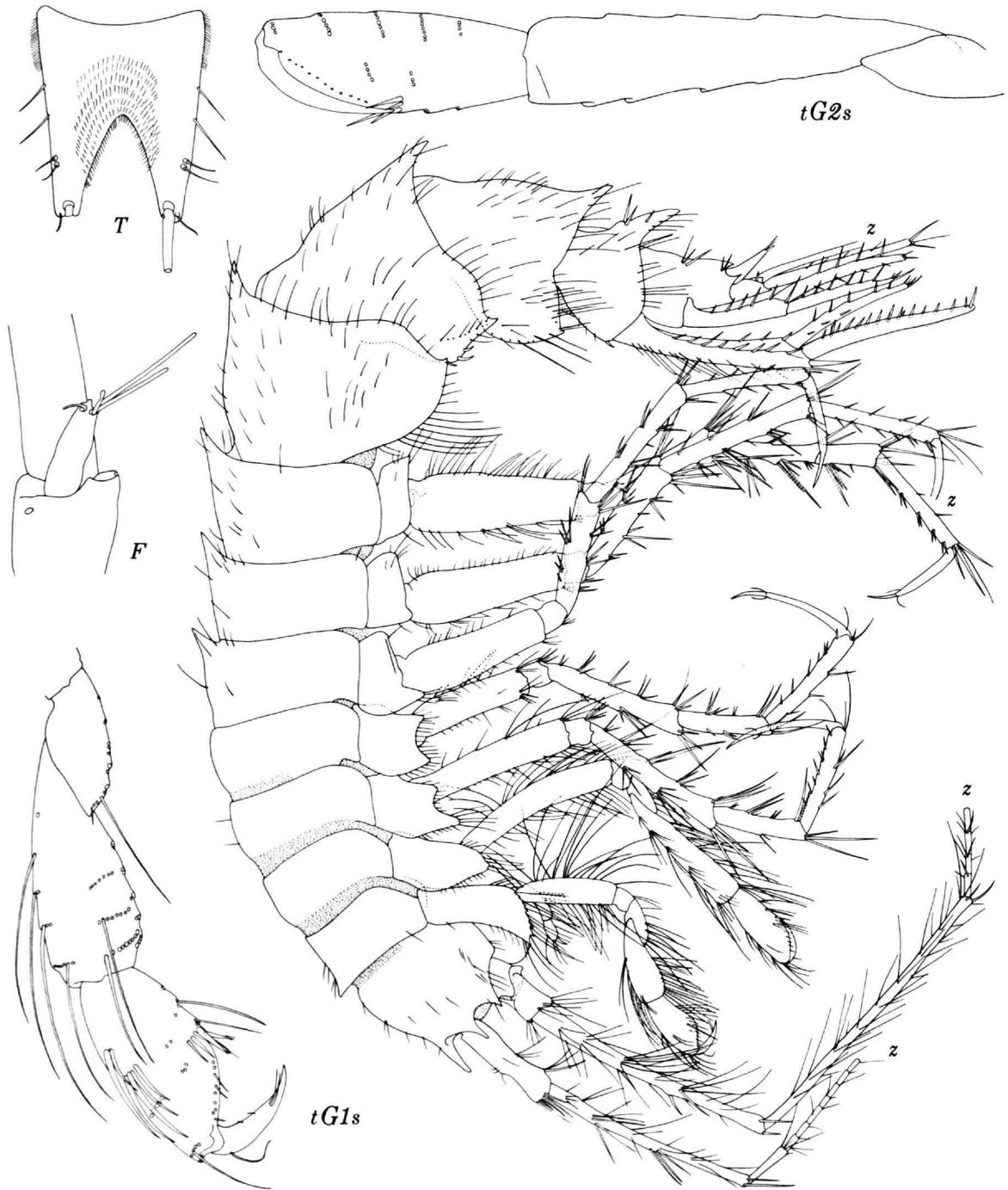


FIGURE 6.—*Lepechinella huaco*, new species, holotype, female, 8.6 mm, *Eltanin* 350.

inner ramus of uropod 3 extending 90 percent along outer ramus.

DESCRIPTION.—Flagellum of antenna 1 slightly shorter than peduncular articles 4–5 of antenna 2, flagellum of antenna 2 slightly longer than peduncle of antenna 1; mouthparts like those figured for *Lepechinella oclo*, new species, but mandibular palp longer and thinner, inner plate of maxilla 1 with 2 or 3 setae, inner plate of maxilla 2 slightly thinner, outer plate of maxilliped with 13 spines and setae, with 6 stout spines on medial edge; outer ramus of uropod 3 with second article.

HOLOTYPE.—USNM 139128, female, 8.6 mm.

TYPE-LOCALITY.—*Eltanin* 350, Drake Passage, 55°00'S, 58°57'W, 2452 m, 4 December, 1962.

MATERIAL.—Three specimens from the type-locality.

Lepechinella manco, new species

FIGURE 7

DIAGNOSIS.—All dorsal teeth about half length of coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one main tooth, one or two accessory nodules present on pereonites 2–7, pleonites 1–3 with two or three accessory nodules, none on pleonite 4; body covered with heavy articulate spines; epimera 1–3 posteriorly convex, each with long, thin, sharp posteroventral tooth, epimeron 3 with facial row of spines; epimeron 1 with subventral facial row of heavy setae; rostrum very long, extending along 87 percent of article 1 on antenna 1, both cephalic teeth about half as long as rostrum; mandibular palp article 3 twice as long as article 1, article 2 twice as long as article 3; coxa 1 bifid one-third its length, coxae 2–4 with angular anterior bulge, coxa 2 as long as coxa 1, sharply tapering, coxa 3 asymmetrically bifid, anterior limb long and sharp but shorter than coxa 2, coxa 4 sharply and slightly asymmetrically bifid, coxa 5 with long sharp anterior limb, no posterior limb, coxa with weak, rounded anterior limb, coxa 7 with long thin sharp posteroventral tooth; accessory flagellum slightly elongate, 1-articulate; telson cleft halfway, each lobe with long apical spine and long lateral spine; inner ramus of uropod 1 slightly shortened; outer ramus of uropod 2 extending 67 percent along inner ramus; inner ramus of uropod 3 slightly shortened.

DESCRIPTION.—Mouthparts as shown for *Lepechinella oclo*, new species, but lobes of upper lip slightly more asymmetrical, mandibular palp with two terminal and three or four subterminal setae on article 3; outer plate of maxilliped with five or six spines on inner margin; accessory flagellum of medium elongation, longer than shown for *L. oclo*.

HOLOTYPE.—AMNH, female, 5.4 mm.

TYPE-LOCALITY.—*Vema* 14–49, northwest of Crete, 35°46'N, 23°28'E, 843 m, 7 October 1958.

MATERIAL.—Six specimens from the type-locality.

RELATIONSHIP.—This species differs from *L. echinata* (Chevreux, 1914) in the elongate rostrum, long second cephalic tooth, bifid coxa 1, long coxa 3, elongate inner rami of uropods 1 and 3, and the short outer ramus of uropod 2.

DISTRIBUTION.—Mediterranean Sea, 843 m.

Lepechinella monocuspadata J. L. Barnard

Lepechinella monocuspadata J. L. Barnard, 1961:99, fig. 68.

DIAGNOSIS.—Length of dorsal teeth and coxae of medium size relative to most extreme species of genus, dorsal teeth about two-thirds length of coxa 2, pereonite 1 with one middorsal tooth, pereonite 2 to pleonite 4 with one tooth, no accessory teeth; body naked; epimera 1–3 nearly straight posteriorly, epimeron 1 with softly rounded posteroventral corner, epimera 2–3 with weak sinus and small sharp tooth, epimeron 2 lacking lateral setae; rostrum thin, extending less than half way along article 1 of antenna 1, first cephalic tooth as long as rostrum, second tooth slightly shorter; mandibular palp unknown; coxa 1 deeply serrate, indistinctly bifid, otherwise slipper-shaped, coxa 2 posteroventrally serrate but not bifid, coxae 3–4 weakly bifid, coxa 3 asymmetrically, coxa 4 symmetrically, coxa 5 with anterior limb as long as coxa 4, coxa 6 with weakly rounded anterior lobe, bluntly extended posteroventrally, coxa 7 with small sharp, curved posteroventral tooth; accessory flagellum uniarticulate, length unknown; telson cleft halfway, lobes scarcely gaping, much like that of *Atylus*, each lobe with one long apical setal spine; outer ramus of uropod 1 unusually thick, length of inner ramus unknown; uropod 2 very small, rami extending equally; uropod 3 ordinary.

REMARKS.—Probably the view of coxa 2 shown by J. L. Barnard (1961, fig. 68A) on the whole

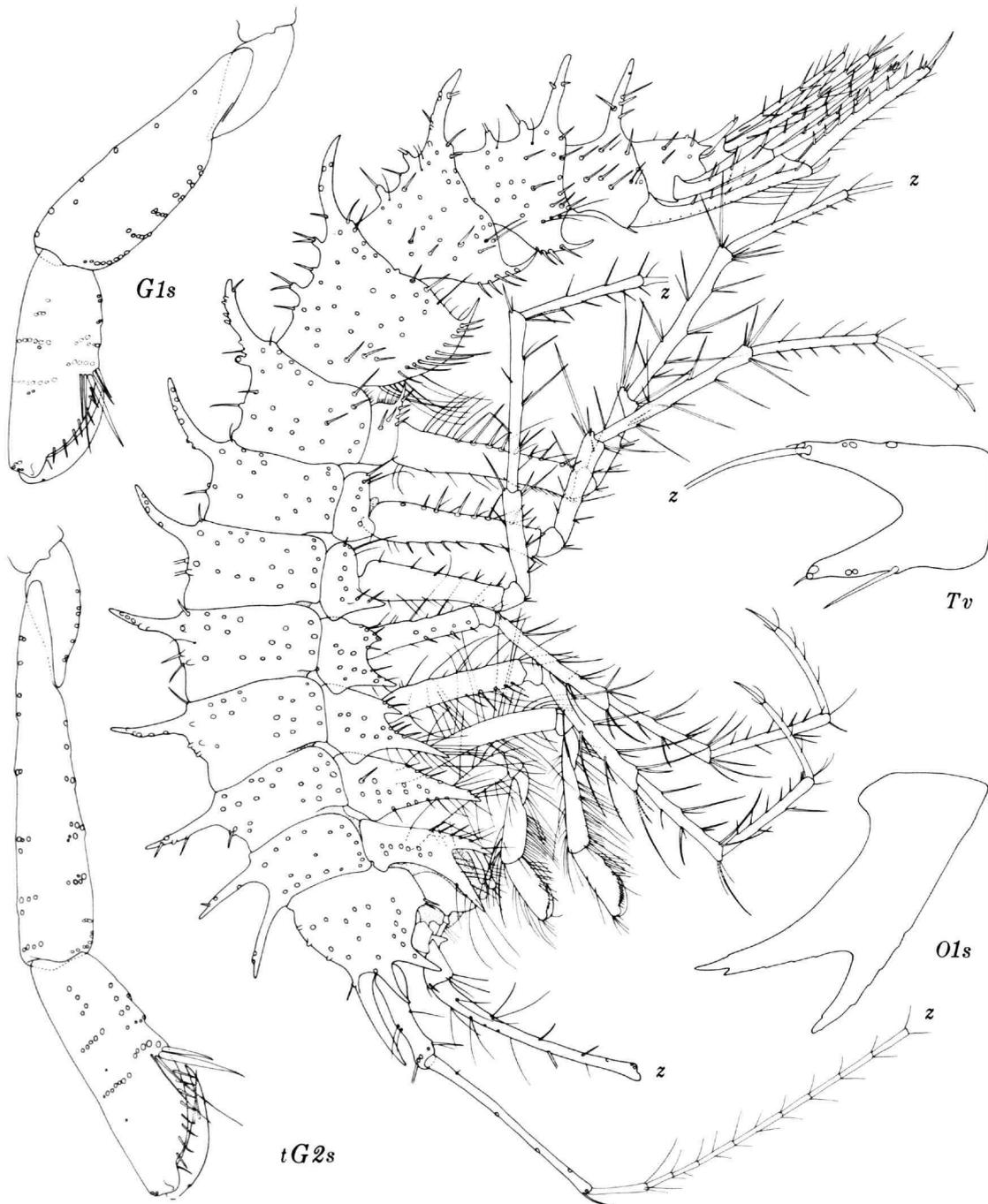


FIGURE 7.—*Lepechinella manco*, new species, holotype, female, 5.4 mm, *Vema* 14-49; v=female, 5.5 mm.

animal is erroneous; a correct view is in figure 68c of the same publication.

DISTRIBUTION.—East Africa, 1510 m.

Lepechinella oclo, new species

FIGURES 8, 9

DIAGNOSIS.—Anterior dorsal teeth one-fifth length of coxa 2, posterior teeth one-half length of coxa 2; pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one main tooth, accessory teeth composed of very low hump on pereonites 4–6, two humps on pereonite 7 to pleonite 3; body sparsely covered with long setal spines; epimera 1–3 with convex posterior margin, each with medium, sharp posteroventral tooth, each with row of lateral setae; rostrum thin, extending along 40 percent of article 1 on antenna 1, first cephalic tooth 67 percent as long as rostrum, second tooth 75 percent as long as rostrum; article 3 of mandibular palp twice as long as article 1, article 2 twice as long as article 3; coxa 1 slipper-shaped, weakly bifid, coxae 2–4 with weak anterior bulge, coxa 2 broad, slightly shorter than coxa 1, abruptly tapering apically but narrowly bifid, coxa 3 extending as far as coxa 2, asymmetrically and sharply bifid, coxa 4 weakly and sharply bifid, coxa 5 with long sharp anterior lobe as long as coxa 4, coxa 6 with weak anterior lobe, rounded posteroventrally, coxa 7 with sharp, curved posteroventral cusp; accessory flagellum scarcely longer than broad, 1–articulate; telson cleft two-thirds, lobes thin, long, gaping but apposing margins straight, each lobe with one long apical spine-seta; inner ramus of uropod 1 reaching 75 percent along outer ramus; outer ramus of uropod 2 slightly shorter than inner ramus; inner ramus of uropod 3 scarcely shorter than outer ramus.

Juvenile, smallest, 3.8 mm long; Rostrum short and not exceeding cephalic teeth, head with only 13 spines from lateral view (compare adult figure), coxa 1 strongly subbifid; article 2 of gnathopod 1 not strongly expanded distoposteriorly; epimera 2–3 each with only two setae in setal row; anterior pereonal teeth shortened, but remaining teeth as well developed as in adult; tooth on pleonite 6 absent.

HOLOTYPE.—NZOI, ?male, 9.6 mm.

TYPE-LOCALITY.—NZOI F755, southeast of Kaitiaki, New Zealand, 43°00'S, 174°30'E, 721 m, 19 August 1966.

MATERIAL.—NZOI E417 (3), F753 (5), F755 (14).

DISTRIBUTION.—Off east coast, South Island, New Zealand, 721–860 m.

Lepechinella pangola J. L. Barnard

Lepechinella pangola J. L. Barnard, 1962:63–64, figs. 58, 59.

DIAGNOSIS.—Anterior dorsal teeth rudimentary, posterior teeth of small to medium size, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one tooth, no accessory teeth; body naked; epimera 1–3 scarcely or not convex posteriorly, each with small, slightly reverted posteroventral cusp, sinuses small to absent, no lateral setae on epimeron 2; rostrum extending about halfway along article 1 of antenna 1, but otherwise small, first cephalic tooth as long as rostrum, second tooth slightly shorter; mandibular palp not well described; anterior coxae short and broad, coxa 1 weakly slipper-shaped, not bifid, coxae 2–4 with slight mid-anterior bulge, coxa 2 slightly to moderately narrowed apically, weakly pointed, coxae 3–4 weakly bifid, coxa 5 with anterior cusp as long as coxa 4, coxa 6 with blunt short anteroventral cusp, coxae 6–7 with weak to medium, sharp posteroventral cusp; accessory flagellum unknown; telson cleft nearly halfway, each lobe with apical spine of unknown length, sides of telson with one or five spines; inner ramus of uropod 1 extending halfway along outer ramus, uropods 2–3 ordinary.

DISTRIBUTION.—South Africa, 4893 m.

Lepechinella raua, new species

FIGURE 10

DIAGNOSIS.—Pereonites 1–4 lacking dorsal teeth, large tooth on pereonite 5 to pleonite 4, teeth about half to fully as long as coxa 2 (latter small), no accessory teeth; body covered with long setae and bifid spines; epimera 1–3 with convex posterior margin, each with small to medium, sharp posteroventral cusp, epimera with facial setae but no rows; rostrum thin, extending along 40 percent of article 1 on antenna 1, first cephalic tooth as long as rostrum, second tooth about 67 percent as long as rostrum; mandibular palp article 3 longer than article 1, article 2 about 2.2–2.5 times as long as article 3; anterior coxae of medium length, coxa 1 slender, tapering, slightly slipper-shaped, not bifid,

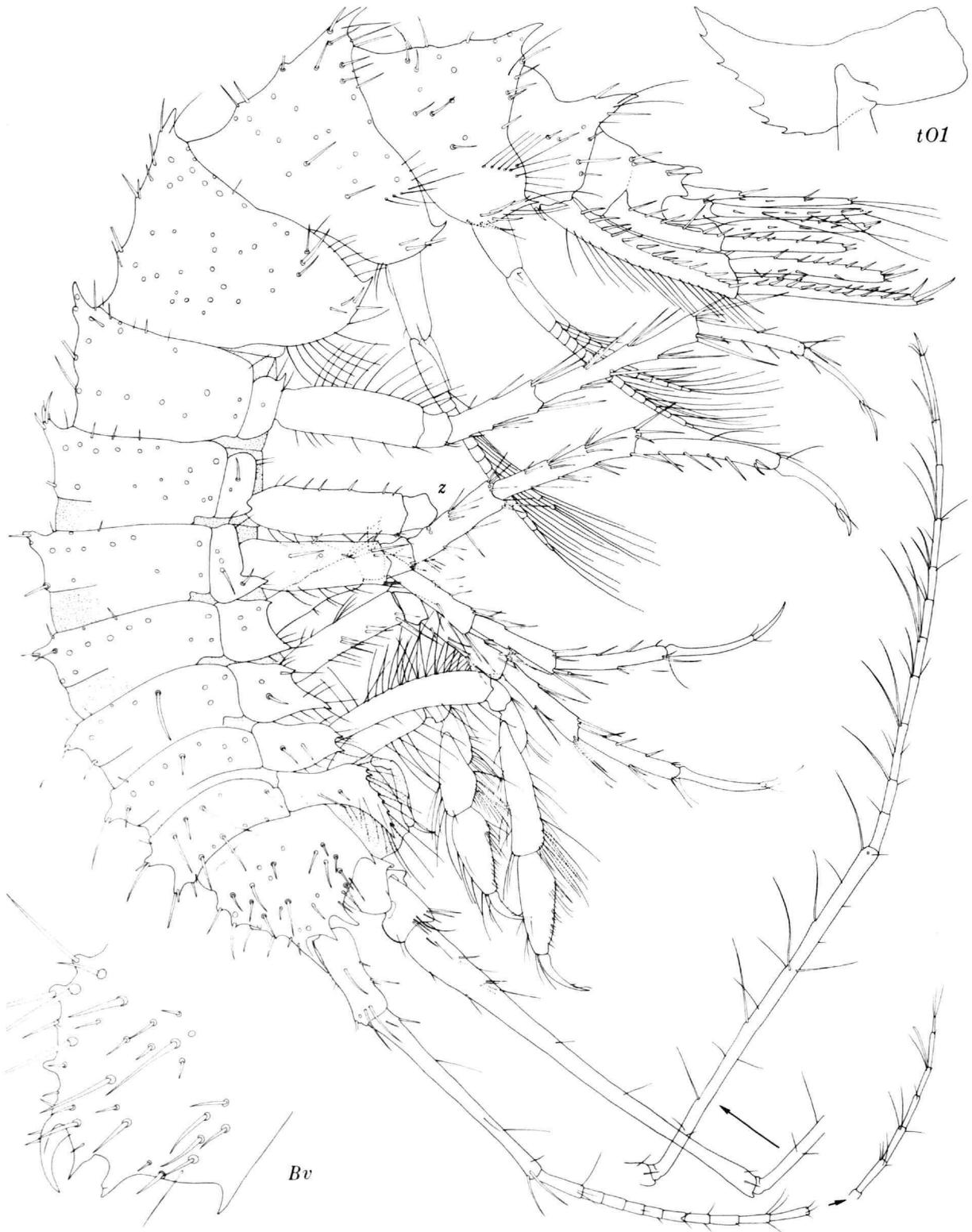


FIGURE 8.—*Lepechinella oclo*, new species, ♂male, 8.3 mm. NZOI F755, pereopod 4 partially missing; ♀=holotype, ♂male, 9.6 mm.



FIGURE 9.—*Lepechinella oclo*, new species, ♂male, 8.3 mm, NZOI F755.

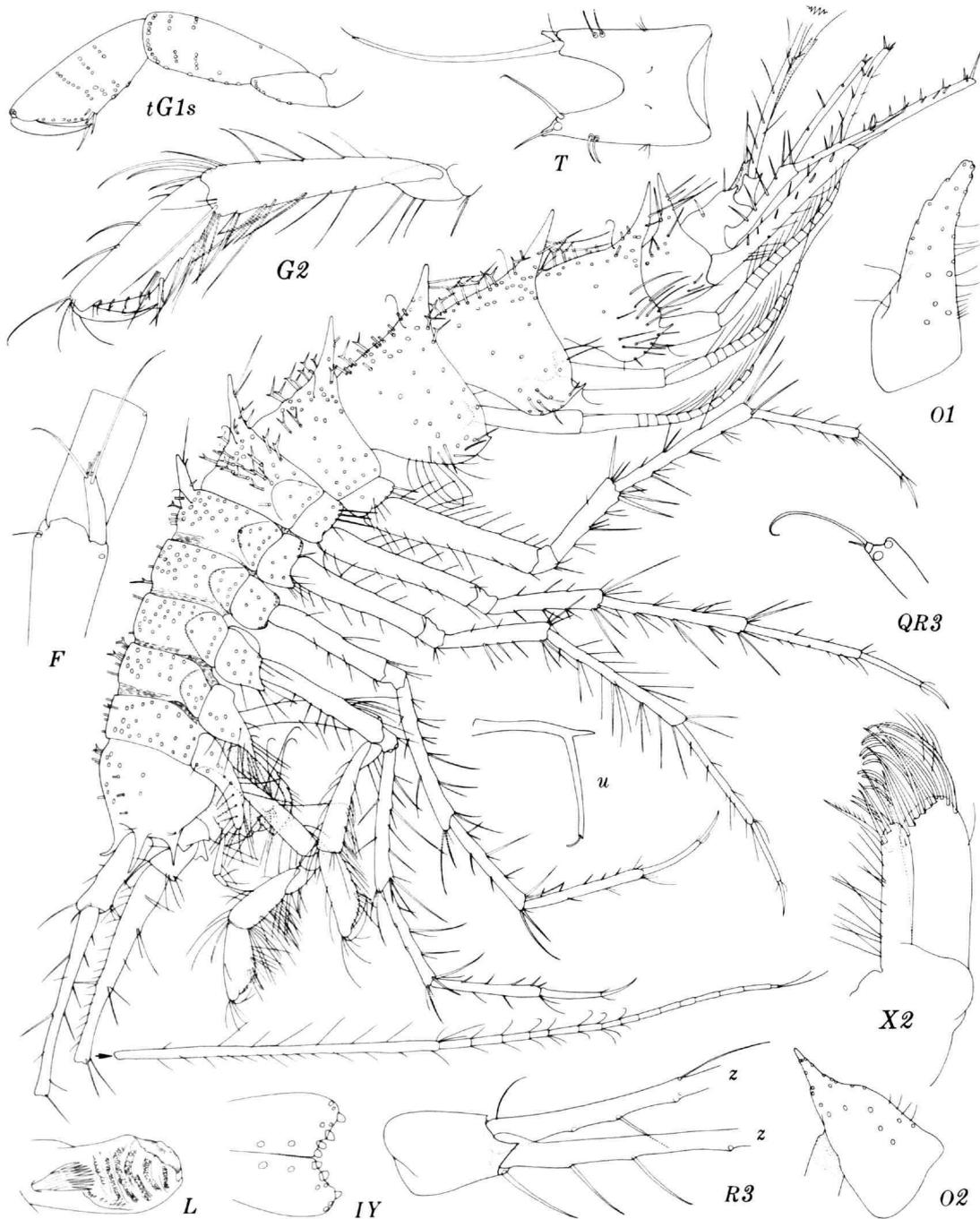


FIGURE 10.—*Lepechinella raua*, new species, holotype, male, 3.75 mm, *Vema* 15-23;
 u=dorsal spine.

coxa 2 slightly shorter than coxa 1, tapering sharply, coxa 3 with short, sharp anterior limb, obsolescent posterior limb, coxa 4 nearly rectangular, softly and weakly bifid, coxa 5 with small anterior lobe as long as coxa 4, coxa 6 with weak, rounded anterior lobe, coxa 7 with rounded antero- and posteroventral corners; accessory flagellum elongate, 1-articulate; telson cleft halfway, each lobe with one long and 0-1 short apical spines; inner ramus of uropod 1 reaching 67 percent along outer ramus; outer ramus of uropod 2 reaching 67 percent along inner ramus; rami of uropod 3 broken, unknown.

DESCRIPTION.—Most of antennae missing; mouthparts generally like those of *Lepechinella oclo*, new species, but ratio of mandibular palp articles 3 and 2 is 18:46 in the holotype and 18:36 in the female, article 3 with three apical setae and two setae on margin, article 2 with three setae on margin (or 5 in female), inner plate of maxilliped truncate distally, margin more oblique, and one inner plate of holotype with four tooth-spines, other with normal three; dactyls of pereopods like *Lepechinella oclo*.

HOLOTYPE.—AMNH, male, 3.75 mm.

TYPE-LOCALITY.—*Vema* 15-23, off Caribbean Panama, 09°46.3'N, 79°37.5'W, 10 November 1958, 566-811 m.

MATERIAL.—The holotype and a female, 4.5 mm from the type-locality.

Lepechinella sucia J. L. Barnard

Lepechinella sucia J. L. Barnard, 1961:99-101, fig. 69.

DIAGNOSIS.—Anterior dorsal teeth about two-thirds length of coxa 2, posterior teeth almost fully as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one tooth, no accessory teeth; body with a few spines on pleonite 4; epimera 1-3 posteriorly convex, each with medium sharp tooth and weak sinus at posteroventral corner, epimera 1-2 with faciolateral row of setae; rostrum reaching almost halfway along article 1 of antenna 1, first cephalic tooth as long as rostrum, second tooth slightly shorter; mandibular palp article 3 slightly longer than article 1, article 2 nearly 3 times as long as article 3; anterior coxae of medium length, coxae 2-4 with slightly midanterior bulge, coxa 1 slipper-shaped, deeply serrate, not bifid, coxa 2 slightly narrowed distally, scarcely pointed, coxae 3-4 weakly bifid, coxa 5 with anterior limb as long as coxa 4, coxa 6 slightly ex-

tended and rounded posteroventrally, coxa 7 extended as sharp posteroventral tooth; accessory flagellum elongate, 1-articulate; telson cleft halfway, each lobe with one long apical setal spine; inner ramus of uropod 1 extending about 67 percent along outer ramus; uropods 2-3 ordinary.

DISTRIBUTION.—Tasman Sea, 3580 m.

Lepechinella turpis J. L. Barnard, new status

Lepechinella arctica turpis, J. L. Barnard, 1967:31-34, figs. 14, 15.

DIAGNOSIS.—Adult: Anterior dorsal teeth half as long as coxa 2, posterior teeth fully as long as coxa 2, pereonite 1 with two teeth, pereonite 2 to pleonite 4 with one large posterior tooth, pereonite 7 with one large accessory tooth, pleonites 1-3 with two large accessory teeth, pereonites 5-6 with one or two accessory nobs; body with sparse setae or thin spines dorsally; epimera 1-3 with slightly convex posterior margins, each with small to medium, sharp posteroventral tooth, weak sinus, epimeron 2 with horizontal row of lateral setae; rostrum nearly as long as article 1 of antenna 1, first cephalic tooth only one-third as long as rostrum and second tooth much shorter; mandibular palp article 3 longer than article 1, article 2 about twice as long as article 3; coxa 1 scarcely bifid, each point simple, coxae 2-4 with subsharp midanterior bulge, coxa 2 slightly shorter than coxa 1, lanceolate, coxa 3 with lanceolate process, not bifid, coxa 4 similar to 3 but shorter, coxa 5 with sharp anterior cusp as long as coxa 4, coxae 5-6 with rounded posteroventral corners, coxa 7 with slightly acute posteroventral corner; accessory flagellum elongate, weakly 2-articulate; telson cleft halfway, each lobe with one apical spine of unknown length and one large lateral spine on each side; uropods 1-3 ordinary.

Juvenile: Very similar to adult of *L. arctica* in coxa 1, pleonal teeth, and accessory teeth but rostrum much longer than in *L. arctica*.

REMARKS.—On the basis of the elongate rostrum this subspecies is raised to full rank despite juvenal similarities to *L. arctica*.

DISTRIBUTION.—Baja California, 1205-2667 m.

Lepechinella uchu, new species

FIGURES 11, 12

DIAGNOSIS.—All dorsal teeth about half length of coxa 2, pereonite 1 with one tooth, pereonite 2 to

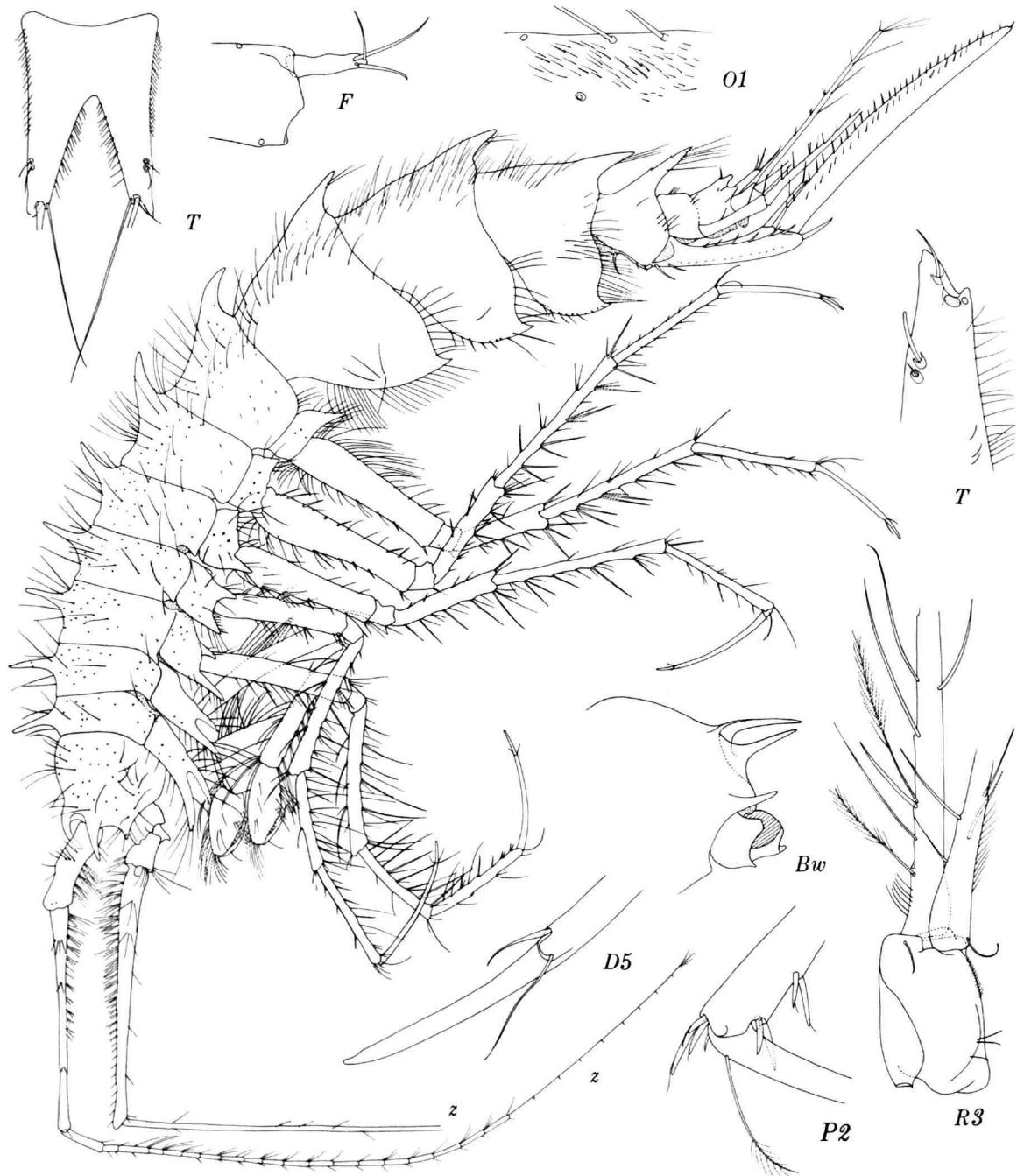


FIGURE 11.—*Lepechinella uchu*, new species, holotype, male, 7.6 mm, *Vema* 15-53; w=female, 8.5 mm.

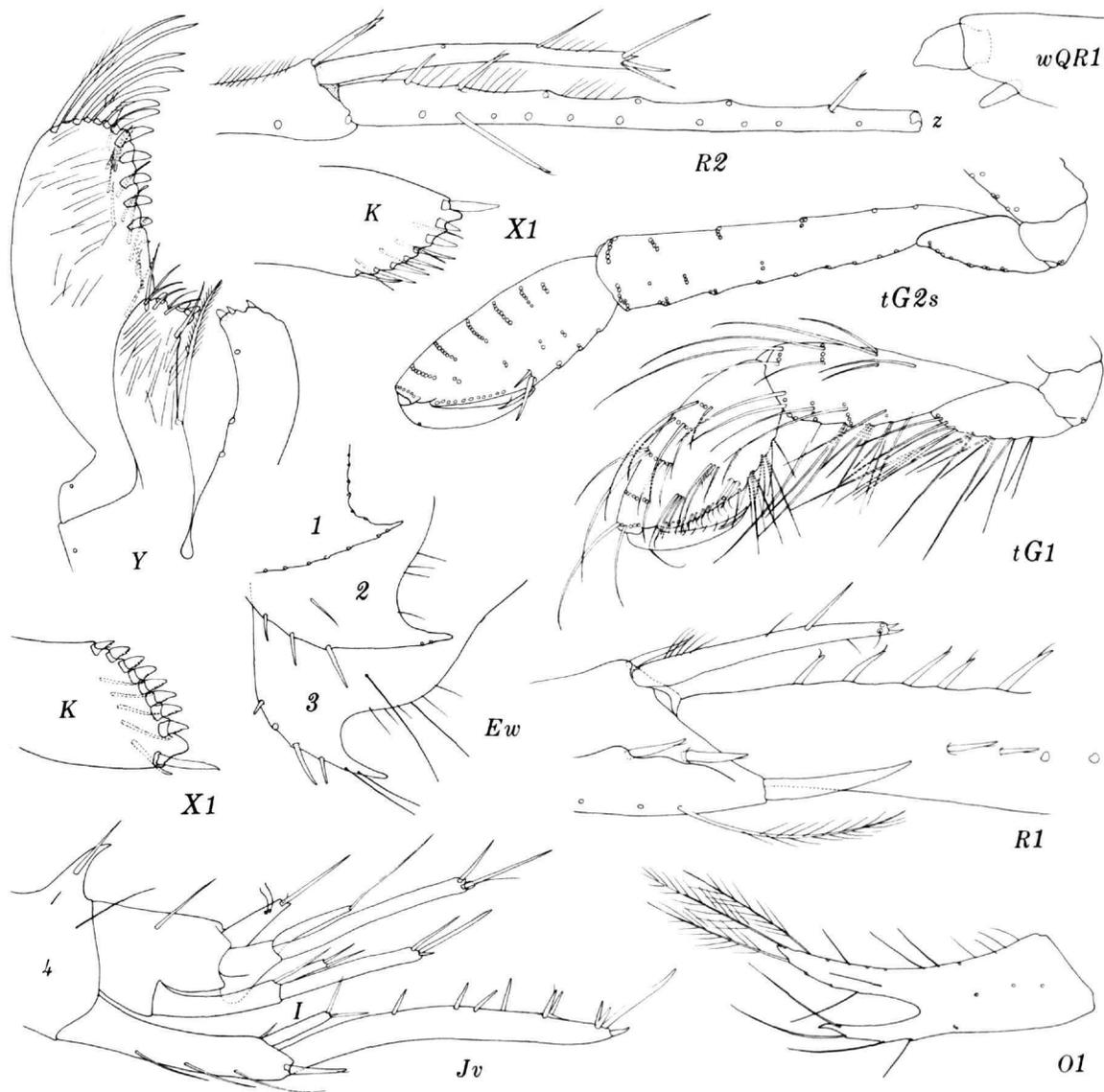


FIGURE 12.—*Lepechinella uchu*, new species, holotype, male, 7.6 mm, *Vema* 15-53; w=female, 8.5 mm; v=juvenile, 3.1 mm, *Vema* 15-49.

pleonite 4 also with one tooth, no accessory teeth; body covered with thin setae; epimera 1-3 posteriorly convex, each with medium and sharp tooth posteroventrally, no facial rows of setae; rostrum thin, slightly curved, extending along 33 percent of article 1 on antenna 1, first cephalic tooth as

long as rostrum, second tooth less than half as long as rostrum; mandibular palp article 3 nearly 3 times as long as article 1, article 2 twice as long as article 3; coxa 1 bifid nearly half its length, coxa 2 shorter than coxa 1, also deeply and slightly bifid asymmetrically, coxa 3 asymmetrically bifid, pos-

terior limb half length of anterior limb, coxa 4 evenly, strongly and sharply bifid, coxa 5 with anterior lobe similar to one limb of coxa 4, posterior lobe forming small nodule, coxa 6 with weak and rounded anteroventral limb, sharply extended posteroventral angle, coxa 7 with sharp and strongly extended posteroventral angle; accessory flagellum elongate, 1-articulate; telson cleft about 63 percent its length, each lobe with one long apical spine and one long seta, apposing margins of lobes nearly straight; uropod 1 with immensely large and thick outer ramus, inner ramus only one-fifth as long as outer ramus, very thin; uropod 2 exceptionally small, inner ramus extending 33 percent along outer ramus; inner ramus of uropod 3 extending about 80 percent along outer ramus.

DESCRIPTION.—Mouthparts generally like those shown for *Lepechinella oclo*, new species, but upper lip more deeply and asymmetrically notched, mandible similar but palpal proportions as in diagnosis and article 3 with two apical setae and three subapical setae, mandibular lobes of lower lip stouter, inner plate of maxilla 1 with two setae, outer with ten spines, right palp apex with eight stout spines and one thin facial spine, left palp apex with seven thin spines and one thin facial spine, inner plate of maxilla 2 thin like that of *L. rava*, new species, inner plate of maxilliped thinner and curved, outer as illustrated; gills heavily folded basally. Largest specimen, female, 8.5 mm.

Medium-sized individual, 5.6 mm, sex unknown, *Vema* 15-49: First cephalic tooth as long as rostrum, length ratios of outer and inner rami of uropods as follows: uropod 1 = 85:13, uropod 2 = 32:9, uropod 3 = 47:37.

Juvenile, 3.1 mm, *Vema* 15-49: First cephalic tooth twice as long as rostrum, latter short, second cephalic tooth about 75 percent as long as first; article 6 of gnathopods 1-2 lacking posterior setae; inner rami of all uropods relatively shorter than in adult; urosomite 1 lacking ventral spine shown for adult.

HOLOTYPE.—AMNH, male, 7.6 mm.

TYPE-LOCALITY.—*Vema* 15-53, off Pacific Costa Rica, 09°23'N, 89°32'W, 3545 m, 23 November 1958.

MATERIAL.—*Vema* 15-49 (2), 15-53 (2).

DISTRIBUTION.—Pacific Costa Rica, 3545-3563 m.

Lepechinella ultraabyssalis Birstein and Vinogradova

Lepechinella ultraabyssalis Birstein and Vinogradova, 1960: 156-159 figs. 7, 8.

DIAGNOSIS.—Pereonal teeth rudimentary, pereonite 1 with two vague humps, pereonites 2-4 with stronger hump, pereonite 5 to pleonite 4 with small to medium, sharp tooth, no accessory teeth; body with sparse dorsal setae; epimera 1-3 posteriorly convex, posteroventral tooth small, sharp, projecting, epimera with facial setae but no setal rows; rostrum straight, subconical, basally thick, extending about 40 percent along article 1 of antenna 1, first cephalic tooth about 67 percent as long as rostrum, second tooth slightly smaller than first; mandibular palp article 3 nearly 4 times as long as article 1, article 2 only 1.5 times as long as article 3; anterior coxae short and broad, coxa 1 slipper-shaped, not bifid, anterior extension narrow, coxa 2 broad basally, then abruptly narrowed to point, coxa 3 nearly rectangular, with weak anteroventral point and slightly concave ventral margin, coxae 4-5 weakly bifid, points sharp, coxa 6 with anteroventral point similar to coxae 4-5, rounded posteroventrally, coxa 7 weakly bifid, both limbs rounded; accessory flagellum "small, 1-articulate"; telson cleft only 40 percent its length, each lobe with long apical spine seta; inner ramus of uropod 1 reaching 67 percent along outer ramus; inner ramus of uropods 2-3 scarcely shorter than outer ramus.

DISTRIBUTION.—Pacific Japan, 6475-6571 m.

Lepechinella wolffi Dahl

Lepechinella wolffi Dahl, 1959:237-238, fig. 19.

DIAGNOSIS.—Anterior dorsal teeth about 1.5 times as long as coxa 2, posterior teeth only as long as coxa 2, pereonite 1 with two teeth fused at base, pereonite 2 to pleonite 4 with one main tooth, accessory teeth as follows: pereonite 2 with hump, 3-4 with pair of small thin teeth, 5 with triad, 6 with tetrad, 7 with sextet but small, spinelike, pleonite 1 with numerous tiny spines on humps in rows dorsally, pleonites 2-3 with spines in dorsal rows, pleonite 4 lacking dorsal ornament; body with sparse dorsal setae besides special spines in dorsal rows; epimera 1-3 with slightly concave posterior margins, posteroventral corners more or less extended, corner rounded on epimeron 1, sharp on

epimera 2–3, epimeron 2 lacking facial setae; rostrum very short, suberect, thick, first cephalic tooth very long and thin, extending 75 percent along article 1 of antenna 1, second tooth thick, as short as rostrum; mandibular palp like that of *L. curvispinosa*, *L. echinata*, and *L. chrysotheras*: coxa 1 slipper-shaped, thinly extended anteriorly, not bifid, coxa 2 thin, not bifid, coxa 3 slightly bifid, anterior limb sharp, posterior limb shallow and rounded, coxa 4 weakly bifid, each limb shallow and rounded, coxa 5 with anterior lobe like lobes on coxa 4, coxa 6 with weak, rounded anterior lobe, rounded posteroventrally, coxa 7 weakly bifid, rounded softly at both corners; accessory flagellum "short and rod-like"; telson "deeply cleft with lobes somewhat diverging"; inner rami of uropods 1–3 scarcely shorter than outer rami.

DISTRIBUTION.—Kermadec Trench, 6660–6770 m.

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Appendix: Sample Data

Vema samples. Lamont Geological Observatory, Palisades, New York:

- 14–38: 20°10'S, 56°23.5'E, 1421–1750 m, 7 May 1958.
 14–49: 35°46'N, 23°28'E, 843 m, 7 October 1958.

15-23: 09°46.3'N, 79°37.5'W, 566-811 m, 10 November 1958.
15-35: 07°30'N, 79°16'W, 2234 m, 14 November 1958.
15-49: 09°24'N, 89°27'W, 3563 m, 22 November 1958.
15-53: 09°23'N, 89°32'W, 3545 m, 23 November 1958.
15-118: 55°44.2'S, 64°11.5'W, 3777 m, 16 March 1959.
15-119: 57°04'S, 61°25'W, 3987 m, 17 March 1959.

Eltanin samples, National Science Foundation, Data stored in Smithsonian Oceanographic Sorting Center, Washington, D.C.

72: 31°06.5'S, 71°48.5'W, 480-510 fms, 24 June 1962.
112: 56°02'S, 61°56'W, 4008 m, 20 July 1962.
350: 55°00'S, 58°57'W, 2452 m, 4 December 1962.

NZOI samples, New Zealand Oceanographic Institute, Wellington:

E417: 45°12'S, 171°49'E, 860 m, 13 October 1965.
E709: 40°28'S, 177°43'E, 1642-1683 m, 21 March 1967.
F753: 44°45'S, 174°30'E, 854-788 m, 18 August 1966.
F755: 43°00'S, 174°30'E, 721 m, 19 August 1966.

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