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

J. Laurens Barnard
SERIAL PUBLICATIONS OF THE SMITHSONIAN INSTITUTION

The emphasis upon publications as a means of diffusing knowledge was expressed by the first Secretary of the Smithsonian Institution. In his formal plan for the Institution, Joseph Henry articulated a program that included the following statement: “It is proposed to publish a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge.” This keynote of basic research has been adhered to over the years in the issuance of thousands of titles in serial publications under the Smithsonian imprint, commencing with *Smithsonian Contributions to Knowledge* in 1848 and continuing with the following active series:

*Smithsonian Annals of Flight*
*Smithsonian Contributions to Anthropology*
*Smithsonian Contributions to Astrophysics*
*Smithsonian Contributions to Botany*
*Smithsonian Contributions to the Earth Sciences*
*Smithsonian Contributions to Paleobiology*
*Smithsonian Contributions to Zoology*
*Smithsonian Studies in History and Technology*

In these series, the Institution publishes original articles and monographs dealing with the research and collections of its several museums and offices and of professional colleagues at other institutions of learning. These papers report newly acquired facts, synoptic interpretations of data, or original theory in specialized fields. These publications are distributed by mailing lists to libraries, laboratories, and other interested institutions and specialists throughout the world. Individual copies may be obtained from the Smithsonian Institution Press as long as stocks are available.

S. Dillon Ripley
Secretary
Smithsonian Institution
Deep-sea Amphipoda of the
Genus *Lepechinella*
(Crustacea)

*J. Laurens Barnard*
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 dexamid 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.

Official publication date is handstamped in a limited number of initial copies and is recorded in the Institution's annual report, Smithsonian Year.
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Evolution of <em>Lepechinella</em></td>
<td>1</td>
</tr>
<tr>
<td>Speciation in <em>Lepechinella</em></td>
<td>3</td>
</tr>
<tr>
<td>Methods of Presentation</td>
<td>4</td>
</tr>
<tr>
<td>Family <em>Dexaminidae</em></td>
<td>5</td>
</tr>
<tr>
<td>Subfamily <em>Dexamininae</em></td>
<td>5</td>
</tr>
<tr>
<td><em>Lepechinella</em> Stebbing</td>
<td>5</td>
</tr>
<tr>
<td>Key I to Species of <em>Lepechinella</em></td>
<td>5</td>
</tr>
<tr>
<td>Key II to Species of <em>Lepechinella</em></td>
<td>6</td>
</tr>
<tr>
<td>Key III to Species of <em>Lepechinella</em></td>
<td>7</td>
</tr>
<tr>
<td><em>Lepechinella aberrantis</em> (J. L. Barnard)</td>
<td>7</td>
</tr>
<tr>
<td><em>Lepechinella arctica</em> Schellenberg</td>
<td>10</td>
</tr>
<tr>
<td><em>Lepechinella auca</em>, new species</td>
<td>10</td>
</tr>
<tr>
<td><em>Lepechinella bierii</em> J. L. Barnard</td>
<td>12</td>
</tr>
<tr>
<td><em>Lepechinella cachi</em>, new species</td>
<td>12</td>
</tr>
<tr>
<td><em>Lepechinella cetrata</em> K. H. Barnard</td>
<td>14</td>
</tr>
<tr>
<td><em>Lepechinella chrysotheras</em> Stebbing</td>
<td>14</td>
</tr>
<tr>
<td><em>Lepechinella cura</em>, new species</td>
<td>14</td>
</tr>
<tr>
<td><em>Lepechinella curvispinosa</em> Pirlot</td>
<td>16</td>
</tr>
<tr>
<td><em>Lepechinella drygalskii</em> Schellenberg</td>
<td>16</td>
</tr>
<tr>
<td><em>Lepechinella echinata</em> (Chevreux)</td>
<td>16</td>
</tr>
<tr>
<td><em>Lepechinella euprasiella</em>, new species</td>
<td>17</td>
</tr>
<tr>
<td><em>Lepechinella huaco</em>, new species</td>
<td>17</td>
</tr>
<tr>
<td><em>Lepechinella manco</em>, new species</td>
<td>19</td>
</tr>
<tr>
<td><em>Lepechinella monocuspidata</em> J. L. Barnard</td>
<td>19</td>
</tr>
<tr>
<td><em>Lepechinella occlo</em>, new species</td>
<td>21</td>
</tr>
<tr>
<td><em>Lepechinella pangola</em> J. L. Barnard</td>
<td>21</td>
</tr>
<tr>
<td><em>Lepechinella raua</em>, new species</td>
<td>21</td>
</tr>
<tr>
<td><em>Lepechinella sucia</em> J. L. Barnard</td>
<td>25</td>
</tr>
<tr>
<td><em>Lepechinella turpis</em> J. L. Barnard, new status</td>
<td>25</td>
</tr>
<tr>
<td><em>Lepechinella uchu</em>, new species</td>
<td>25</td>
</tr>
<tr>
<td><em>Lepechinella ultraabyssalis</em> Birstein and Vinogradova</td>
<td>26</td>
</tr>
<tr>
<td><em>Lepechinella wolffi</em> Dahl</td>
<td>26</td>
</tr>
<tr>
<td>Literature Cited</td>
<td>29</td>
</tr>
<tr>
<td>Appendix: Sample Data</td>
<td>29</td>
</tr>
<tr>
<td>Index</td>
<td>31</td>
</tr>
</tbody>
</table>
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.

**Acknowledgments.**—This study was supported by NSF grant GB-3285. I am indebted to Dr. D. E. Hurley of New Zealand Oceanographic Institute in whose laboratories much of the study was conducted. The Smithsonian Oceanographic Sorting Center under Dr. I. E. Wallen kindly supplied the *Eltanin* specimens and the American Museum of Natural History supplied the specimens sorted from *Vema* expeditions. I thank Dr. R. J. Menzies who aboard *Eltanin* and *Vema* supervised much of the careful sediment processing that saved so many specimens from irremedial damage. *Eltanin* specimens are deposited in the Smithsonian collections (USNM).

**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
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 mandible 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 cleit 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 Gammaridea, 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 Para-*dexamine*. 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 dexamenids, 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 dexamenids. 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 linear organization of facial setae on epimera; (8) number of apical setae and aesthetascas 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. euprasiella*, and *L. chrysotheras* is not well known but the species appear very closely related to each other. *Lepechinella euprasiella*, 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. euprasiella* 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. rausa* (TA), *L. cachi* (RS), *L. ultra abyssalis*, *L. cetrata* (T), *L. huaco* (T)

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* (T), *L. wolffi* (RS), *L. curvispinosa* (D)

6. Pereonites 1-4 with large teeth, pereonite 1 with two teeth; coxa 1 bifid *L. manco* (AES), *L. chrysotheras*, *L. arctica* (AS), *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) “pygidization” 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 Hagellum 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 unclut, linguiform telson in Paracalliopoe (Eusiridae), uniramus uropod 3 (several families), reduced coxa 1 (several families), unclut 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**


**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 1–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
2. Pereonites 1–3 with long dorsal teeth, one-fifth or more as long as coxa 2 .......................... 8
3. Pleonite 4 lacking dorsal notch and accessory tooth, epimera 2–3 lacking side ridge, pereopods 3–5 short, dactyls of pereopods 1–5 long .......................... 1
4. Body densely covered with setae and spines, many spines bifid .......................... 1
5. Body not densely covered with setae and spines .......................... 5
6. Rostrum very short, extending less than 25 percent along article 1 of antenna 1, faciolateral setae of epimera 1–2 in definite row .......................... 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 .......................... 11
8. Pereonite 1 with only one tooth, outer ramus of uropod 1 immense or enlarged .......................... 9
9. Body naked, epimeron 1 softly rounded posteroventrally, coxae 1–2 scarcely or not bifid, rami of uropod 2 extending equally .......................... 11
10. 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 .......................... 11

**Lepechinella Stebbing**


**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 1–articulate; large processes of body always located on dorsal midline, never slightly subdorsal; only pleonites 5–6 coalesced.

**Type-species.**—*L. chrysotheras* Stebbing (1908).
<table>
<thead>
<tr>
<th>Key II to Species of <em>Lepechinella</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Partial key concerning only those species with body covered by spines and setae)</strong></td>
</tr>
<tr>
<td>1. Dorsal teeth of pereonites 1–2 absent, many body spines bifid</td>
</tr>
<tr>
<td>Dorsal teeth of pereonites 1–2 present, no body spines bifid</td>
</tr>
<tr>
<td>2. Dorsal teeth of pereonites 1–2 small, one-fifth as long as coxa 2, epimeron 2 with horizontal row of lateral setae</td>
</tr>
<tr>
<td>Dorsal teeth of pereonites 1–2 large, half or more as long as coxa 2, epimeron 2 lacking facial row of setae</td>
</tr>
<tr>
<td>3. Coxa 1 bifid one-third its length</td>
</tr>
<tr>
<td>Coxa 1 not bifid</td>
</tr>
<tr>
<td>4. Inner rami of uropods 1–2 at least 67 percent as long as outer rami</td>
</tr>
<tr>
<td>Inner rami of uropods 1–2 one-third or less as long as outer rami</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>
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)


Diagnosis.—Pereonites 1–6 without teeth, pereonite 7 with rudimentary posteroventral 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, epimera 2 without lateral row of setae, epimera 2–3 each with lateral ridge (also on epimera 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 occult, 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 11-38, 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 11-38: 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 1–5 of peduncle; uropod 3 as in Lepechinella euchi, 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.—Verna 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


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 pleonites 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.

DESCRIPTION.—Mouthparts as shown for Lepechinella occlo, new species, but outer plate of maxillipeds lacking proximalmost medial spine; accessory flagellum like that of L. occlo, 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, 21 June 1962, Menzies Trawl.

RELATIONSHIP.—This species differs from L. ultra-abyssalis Birstein and Vinogradova (1960) in the shorter rostrum, longer second cephalic tooth, shorter article 3 of the mandibular palp, bifid...
FIGURE 5.—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


**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 1, coxa 4, coxa 6 softly bifid; coxa 7 with long sharp posteroventral hook; accessory flagellum very 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 occlo*, new species, except for mandibular palp (which see), api cal 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.
SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY

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

Distribution.—Drake Passage, 3777–4008 m.

Lepechinella cetrata K. H. Barnard


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 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


Diagnosis.—Anterior dorsal teeth 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

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. Pema 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 occlo, 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


**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 4 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 posterodorsally, epimeron 3 with softly rounded posterodorsal 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, 855 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 anteroventral corner; accessory flagellum elongate, 1-articulate; telson cleft about halfway, each lobe with long apical spine; inner rami 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.


**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, pereonites 1–3 with one small anterior 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 2, 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 67 percent along outer ramus; outer 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 ocello, 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 ocello, 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. ocello.

Holotype.—AMNH, female, 5.4 mm.

Type-locality.—Vema 14-49, northwest of Crete, 35°16'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 monocuspidata J. L. Barnard

Lepechinella monocuspidata 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 5 ordinary.

Remarks.—Probably the view of coxa 2 shown by J. L. Barnard (1961, fig. 68A) on the whole...
FIGURE 1.—Lepechinella manco, new species, holotype, female, 5.4 mm, Vema 14-49; v = female, 5.5 mm.

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 occlo, 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 8; 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 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 pangola J. L. Barnard*


**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 rana, 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 ocelo_, new species, ♂male, 8.3 mm, NZOI F755, pereopod 4 partially missing; ♀holotype, ♀male, 9.6 mm.
FIGURE 9.—Lepechinella occlo, 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 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


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, epimera 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 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 juvenile 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.
pleonite 4 also with one tooth, no accessory teeth; body covered with thin setae; epimera 1–3 posteri- orly 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 posterior ventral angle, coxa 7 with sharp and strongly extended posterior ventral 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 occlo*, 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. rana*, 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* 15–19: 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 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.


**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


**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 posterocentrally, 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.

**Literature Cited**

Barnard, J. L.


Barnard, K. H.


Birstein, Ja. A., and N. G. Vinogradova


Chevreux, E.


Dahl, E.


Enequist, P.


Gurjanova, E.


Nicholls, G. E.


Pirlot, J. M.


Schellenberg, A.


Skogsberg, T., and G. H. Vansell


Stebbing, T. R. R.


Stephensen, K.


**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.
15–40: 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, 61°56'W, 4008 m, 20 July 1962.
15–119: 57°00'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°50'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.
F755: 43°00'S, 174°30'E, 721 m, 19 August 1966.
Index

aberrantis, Atylus, 2, 7
   Lepechinella, 2, 7
arctica, Lepechinella, 3, 4, 10, 17, 25
Atylus, 1, 2, 3
   aberrantis, 2, 7
auca, Lepechinella, 10
bierii, Lepechinella, 12
cachi, Lepechinella, 12
cetrata, Lepechinella, 12, 14
chrysotheras, Lepechinella, 3, 5, 14
cura, Lepechinella, 14,
curvispinosa, Lepechinella, 16
Dorbanella, 5
echinata, 16
   spez., 10
drygalskii, Lepechinella, 16
echinata, Dorbanella, 16
   Lepechinella, 16, 19
eupraxiella, Lepechinella, 3, 17
huaco, Lepechinella, 17
Lepechinella, 1, 2, 3, 4, 5
   aberrantis, 2, 7
arctica, 3, 4, 10, 17, 25
auca, 10
bierii, 12
cachi, 12
cetrata, 12, 14
chrysotheras, 3, 5, 14
cura, 14
curvispinosa, 16
drygalskii, 16
echinata, 16, 19
eupraxiella, 3, 17
huaco, 17
manco, 19
monocuspidata, 19
occlo, 21
pangola, 12, 21
raua, 21
schellenbergi, 10
sucia, 25
turpis, 3, 4, 25
uchu, 25
ultraabyssalis, 10, 12, 28
wolffi, 28
manco, Lepechinella, 19
monocuspidata, Lepechinella, 19
occlo, Lepechinella, 21
osborni, Polycheria, 3
Paradexamine, 2
Paralepechinella, 1, 2
pangola, Lepechinella, 12, 21
Polycheria osborni, 3
raua, Lepechinella, 21
schellenbergi, Lepechinella, 10
sucia, Lepechinella, 25
Syndexamine, 2
turpis, Lepechinella, 3, 4, 25
uchu, Lepechinella, 25
Uuschakoviella, 3
ultraabyssalis, Lepechinella, 10, 12, 28
wolffi, Lepechinella, 28
Publication in *Smithsonian Contributions to Zoology*

*Manuscripts* for serial publications are accepted by the Smithsonian Institution Press, subject to substantive review, only through departments of the various Smithsonian museums. Non-Smithsonian authors should address inquiries to the appropriate department. If submission is invited, the following format requirements of the Press will govern the preparation of copy.

*Copy* must be typewritten, double-spaced, on one side of standard white bond paper, with 1½" top and left margins, submitted in ribbon copy with a carbon or duplicate, and accompanied by the original artwork. Duplicate copies of all material, including illustrations, should be retained by the author. There may be several paragraphs to a page, but each page should begin with a new paragraph. Number consecutively all pages, including title page, abstract, text, literature cited, legends, and tables. The minimum length is 30 pages, including typescript and illustrations.

The *title* should be complete and clear for easy indexing by abstracting services. Taxonomic titles will carry a final line indicating the higher categories to which the taxon is referable: "(Hymenoptera: Sphecidae)." Include an *abstract* as an introductory part of the text. Identify the *author* on the first page of text with an unnumbered footnote that includes his professional mailing address. A *table of contents* is optional. An *index*, if required, may be supplied by the author when he returns page proof.

Two *headings* are used: (1) text heads (boldface in print) for major sections and chapters and (2) paragraph sideheads (caps and small caps in print) for subdivisions. Further headings may be worked out with the editor.

In *taxonomic keys*, number only the first item of each couplet; if there is only one couplet, omit the number. For easy reference, number also the taxa and their corresponding headings throughout the text; do not incorporate page references in the key.

In *synonymy*, use the short form (taxon, author, date: page) with a full reference at the end of the paper under "Literature Cited." Begin each taxon at the left margin with subsequent lines indented about three spaces. Within an entry, use a period-dash (.—) to separate each reference. Enclose with square brackets any annotation in, or at the end of, the entry. For *references within the text*, use the author-date system: "(Jones, 1910)" and "Jones (1910)." If the reference is expanded, abbreviate the data: "Jones (1910:122, pl. 20: fig. 1)."

Simple *tabulations* in the text (e.g., columns of data) may carry headings or not, but they should not contain rules. Formal *tables* must be submitted as pages separate from the text, and each table, no matter how large, should be pasted up as a single sheet of copy. Use the *metric system* instead of, or in addition to, the English system.

*Illustrations* (line drawings, maps, photographs, shaded drawings) can be intermixed throughout the printed text. They will be termed *Figures* and should be numbered consecutively; however, if a group of figures is treated as a single figure, the components should be indicated by lowercase italic letters on the illustration, in the legend, and in text references: "Figure 9b." If illustrations (usually tone photographs) are printed separately from the text as full pages on a different stock of paper, they will be termed *Plates*, and individual components should be lettered (Plate 9b) but may be numbered (Plate 9: figure 2). Never combine the numbering system of text illustrations with that of plate illustrations. Submit all legends on pages separate from the text and not attached to the artwork. An instruction booklet for the preparation of illustrations is available from the Press on request.

In the *bibliography* (usually called "Literature Cited"), spell out book, journal, and article titles, using initial caps with all words except minor terms such as "and, of, the." For capitalization of titles in foreign languages, follow the national practice of each language. *Underscore* (for italics) book and journal titles. Use the colon-parentheses system for volume, number, and page citations: "10(2):5-9." Spell out such words as "figures," "plates," "pages."

For *free copies* of his own paper, a Smithsonian author should indicate his requirements on "Form 36" (submitted to the Press with the manuscript). A non-Smithsonian author will receive 50 *free copies*. Order forms for quantities above this amount with instructions for payment will be supplied when page proof is forwarded.