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Observations on the Taxonomy of the Bathynellid Genera

By

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(With 2 Text-figures)

The syncarid genus *Parabathynella* is characterized by having 6-jointed antennules, uni-jointed mandibular palp, 2-jointed endopodite of each pereiopod, and in the absence of pleopods. Such characters are, however, not always sufficient to separate *Parabathynella* from its closely allied genus *Bathynella*. For the distinction of these two genera, Margalef (1953) has used two features, i.e. the relative length of the antennules and antennae, and the presence or absence of pleopods. He has shown that the antennae of *Parabathynella* do not extend beyond the distal end of the first joint of the antennules, while in *Bathynella* those two pairs of appendages do not markedly differ in length from each other. Some Japanese species of *Parabathynella* have, however, 4– or 5-jointed antennae which extend over the third joint of the antennules, and have pereiopods that differ also from most species of the genus in the possession of the 3-jointed endopodites (Uéno 1952, '56). Such endopodites are seen in the European *P. fagei*, too (Delamare Deboutteville & Angelier 1950, Delamare Deboutteville & Chappuis 1953). There are, however, some other features which will be of use for distinguishing these two genera, i.e. the shape of the 8th pereiopods of the male, the arrangement of spines and setae on the furcal lobes of the telson and on the uropods.

The recent discovery in Japan of an aberrant form, which is remarkable in having a combination of features connecting these two genera, has made it difficult to separate them clearly, in so far as the hitherto designated characters are concerned. This form, viz., *Allobathynella japonica* Morimoto et Miura (1957), new to science, closely resembles most species of *Parabathynella* in general appearance and in some features of the body parts. It has the mandibles with unijointed palps, a single epipodite, the short and round 8th pereiopods of the male, and has, on the basipodite of uropod, a comb which is composed of more than 6 spines. The arrangement of spines and setae on its telson resembles more closely that of *Parabathynella* than that of *Bathynella*. Each furcal lobe of telson of *Parabathynella* is armed with spines on both its apical and inner margins, differing from that of *Bathynella*, which has spines only on the apical margin. *Allobathynella* differs, however, from *Parabathynella* in several characters. It has, as in *Bathynella*, one pair of pleopods, though rudimentary, and the 7-jointed antennules and 5-jointed

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antennae. It is particularly notable that the exopodites in the 3rd-7th pairs of its pereiopods are composed of 4 joints, and that the endopodites of its uropods differ also from those of *Parabathynella* in having 5 spines, a large apical and 4 smaller, the latter of which succeed the former on the inner margin, and 2 more long setae at the apex. Their exopodites, on the contrary, resemble closely those

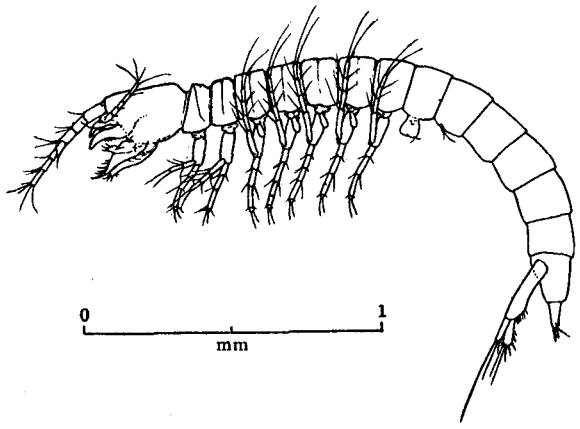

Fig. 1. *Allobathynella japonica* Morimoto et Miura, ♂, from Wadayama, Japan.

of *Bathynella* in the possession of long setae, the longest of which is four times (or more) as long as the exopodite itself. The first and second thoracic somites of the present new form are, as in *Parabathynella*, shorter than the succeeding ones, which are covered with slightly thickened cuticle as is usual in *Parabathynella*. From the characters mentioned above, it will be evident that *Allobathynella japonica* is interesting in that it possesses features found in *Bathynella*, on the one hand, and in *Parabathynella*, on the other. Among *Parabathynella*, *P. malaya* G.O. Sars from the Malay Peninsula seems to have the closest connections with *A. japonica*, though it has no pleopods at all. Probably *Allobathynella* represents a bathynellid genus peculiar to Asia.

The characteristics of the genera discussed above suggest that the differentiation of various features, from an ancestral form, took place along separate lines, moving in one direction to the *Bathynella* type, and in the other to the *Allobathynella* type. The latter, though it possesses a number of resemblances to the *Parabathynella* type, has still marked traces of relationship with the former in the presence of pleopods and in the chaetotaxy of pereiopods and uropods. By a reduction of pleopods and in the number of spines, the *Allobathynella* type would have approached the *Parabathynella* type. The former may be supposed to have

branched off from the bathynellid stem at about the same level as *Bathynella*, which has advanced in a different direction, and may be considered as a little more primitive than *Parabathynella*. *Thermobathynella* from Africa and South America may be regarded as the more specialized type among the *Allobathynella* series, and may have the closest connections with *Parabathynella*.

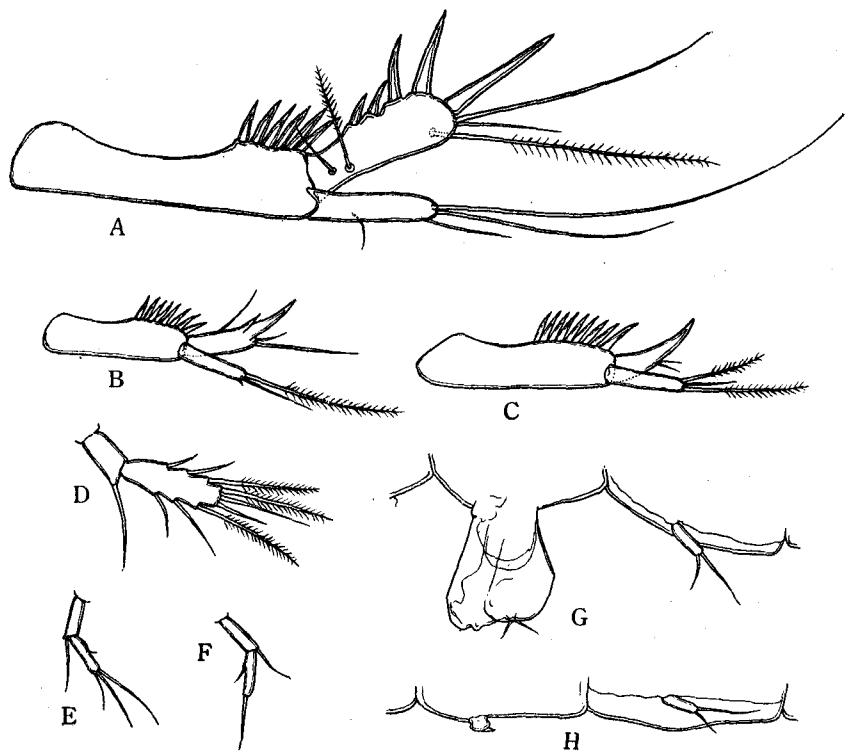

Fig. 2. The appendages of various Japanese bathynellids. A-C, uropods: A, *Allobathynella japonica* Morimoto et Miura; B, *Parabathynella gracillima* Uéno; C, *P. miurai* Uéno. — D-F, pleopods: D, *Bathynella yezoensis* Uéno; E, *B. maritima* Uéno; F, *B. morimotoi* Uéno. — G-H. 8th pereiopod and pleopod of *Allobathynella japonica*: G, of ♂; H, of ♀.

The advance of differentiation in structure seems to be agreeable to their behaviour and to various degrees of their adaptation to different subterranean conditions of life. According to our observations, *Bathynella* is a good swimmer, while *Parabathynella* cannot swim, probably creeping on the sandy or muddy deposits in subterranean interstitial fissures filled with water. *Thermobathynella*

has, on the contrary, been found in either the hot-spring water of Africa, or in the interstitial brackish water of the shallow sand of Brazil (Capart 1951, Siewing 1957). *Allobathnella* may (though this is not yet ascertained) be supposed to have the behaviour and habitats similar to *Parabathynella*, but perhaps it can swim on occasion. The construction of the body and the appendages of various bathynellids appears to agree with the difference of their modes of life. The swimming type, *Bathynella*, differs from the creeping types in having a more flexible body of thin cuticle and the setae of appendages much longer and greater in number than in the other three genera, and also in the possession of the epipodites on the base of each periopod and of one pair of pleopods. The adaptability to the creeping mode of life from the level of *Allobathynella* seems to have progressed in structure toward the reduction of pleopods and respiratory epipodites, as well as in the number of joints, spines and setae of appendages, as summarized in Table I. The reduction of such armatures is extreme in *Thermobathynella*, though the combrows of minute spines present on its pereiopods are a little more developed than in *Allobathynella*.

Table I

Number of joints of :	*Bathynella*	*Allobathy-nella*	*Parabathy-nella*	*Thermo-bathynella*
Antennules	9-7	7	6	6-5
Antennae	7-5	5	5-2	5
Mandibular palp	3	1	1	1
Pereiopods :				
Endopodites	4	4	4	4
Exopodites	1	4(5)[1)]	3-2	2
Epipodites	2	1	1	1
Pleopods	2	1	0	0

1) Refer to the key below.

Similar reduction is observable in the number of spines and setae of uropods, particularly in their endopodites. *Bathynella* always has several spines on the inner margin of its endopodites. *Allobathynella* is, however, to be looked upon as more primitive than *Parabathynella* in view of the less specialized uropods, as seen in *Bathynella*. Among the Japanese species of *Parabathynella*, *P. carinata* and *P. kuma* (Uéno 1952, '56), both of which have become peculiarly carinated, are probably the nearest relatives of *Allobathynella*, particularly by reason of the resemblance of the uropods. The differentiation in structure of the endopodites of *Parabathynella* is shown in the reduction in their marginal spines, leaving only two apical spines, the one large, claw-like, and the other small, close to the base of the larger one. A few species of this genus have lost even such an accessory spine, the large apical spine being fused with the endopodite so as to form a large claw. *Parabathynella miurai* Uéno of Japan, *P. fagei* Delamare Deboutteville et An-

gelier and *P. lusitanica* Braga of Europe, similarly have the uropods in such an extreme state of reduction of spines, the former apex of their endopodite which is united with an apical spine being indicated by the presence of 2 (or often 3) setae at the outer side of the claw near the middle.

On the basis of the above considerations, a re-combination of features is summarized in the following key, so as to characterize the four known bathynellid genera.

Key to the Genera of the Family Bathynellidae[1)]

1. Pleopods present; antennae consist of 5 joints or more; mandibular palp 1- or 3-jointed; with 1 or 2 epipodites; male 8th pereiopods slender or round; endopodites of uropods with apical and lateral spines and long setae ..... 2.
—— Pleopods entirely absent; antennae consist of 5 joints or fewer; mandibular palp 1-jointed; with 1 epipodite; male 8th pereiopods round; endopodites of uropods with spines and setae on apical margin ..... 3.
2. Pleopods 2-jointed; mandibular palp 3-jointed; exopodites of pereiopods 1-7, 1-jointed; with 2 (or 1) epipodites; male 8th pereiopods slender; in uropods, basipodite with a row of 4-6 spines, endopodite with 4-5 lateral spines and 2-3 long apical setae .... *Bathynella* Vejdovsky.
—— Pleopods 1-jointed and rudimentary; mandibular palp 1-jointed; exopodites of pereiopods 2-7, 4- or 5[2)]-jointed; with 1 epipodite; male 8th pereiopods round; in uropods, basipodite with a row of 6-10[2)] spines, endopodite with 5-6[2)] spines on apical and lateral margins ..... *Allobathynella* Morimoto et Miura.
3. Antennae consist of 5 joints or fewer; exopodites of pereiopods 2-7, 2- or 3-jointed; in uropods, basipodite with a row of 7-14 spines, endopodite with 1 or 2 apical spines ..... *Parabathynella* Chappuis.
—— Antennae consist of 5 joints; exopodites of pereiopods 1-7, 1-jointed; in uropods, basipodite with 1 or 2 spines, endopodite with 1 apical spine .... *Thermobathynella* Capart.

Literature

Braga, J.M. 1949. Un Bathynellidae (Crust.Syncarida) du Portugal, *Parabathynella lusitanica* n. sp. Publ. Inst. Zool. Port. 40: 1-15.

Capart, André 1951. *Thermobathynella adami* gen. et sp. nov., Anaspidacé du Congo Belge. Bull. Inst. Roy. Soc. Nat. Belg. Bruxelles 27 (10): 1-14.

Chappuis, P.A. 1927. Anaspidacea. Kükenthal-Krumbach: Handb. d. Zool. Berlin und Leipzig 3: 593-606.

Delamare Debouttéville, Cl. et E. Angelier 1950. Sur un type de Crustacé phréaticole nouveau, *Parabathynella Fagei* n. sp. C.R. Acad. Sci. Paris 231: 175-176.

Delamare Debouttevile, Cl. et P. A. Chappuis 1954. Recherches sur les Crustacés souterrains VI. Révision des genres *Parabathynella* Chappuis et *Thermobathynella*

1) In the writer's key (Uéno 1954, p. 522) to the bathynellid genera there are two misprints: lines 4 and 5, *for* endopodite, *read* exopodite.

2) These are the characters in a new species of this genus, to be described by the present writer in a separate paper.

Capart. Arch. de Zool. exp. et gén. 91: 83-102.
Margalef, Ramon 1951. Un sincarido del género *Parabathynella* en las Baleares. Publ. Inst. Biol. Apl. Barcelona 8: 151-153.
———— 1953. Los Crustaceos de las aguas continentales Ibericas. Biologia de las Aguas Continentales, 10, Madrid.
Morimoto, Y. and Y. Miura 1957. *Allobathynella japonica* gen. et. sp. nov., a new bathynellid from Japan. Proc. Jap. Acad. 33: 145-148.
Sars, G.O. 1929. Fauna of the Batu Caves, Selangor. VIII, Description of a remarkable cave-crustacean, *Parabathynella malaya* G.O. SARS, sp. nov. J. Fed. Malay States Mus. 14 (3/4): 339-351.
Siewing, R. 1956. *Thermobathynella amyxi* nov. spec. aus dem Brackwasser der Amazonasmündung. Kieler Meeresforsch. 12 (1): 114-119.
Uéno, Masuzo 1952. Three new species of Bathynellidae (Syncarida) found in subterranean waters of Japan. Annot. Zool. Japon. 25: 317-328.
———— 1954. The Bathynellidae of Japan (Syncarida-Bathynellacea). Arch. Hydrobiol. 49: 519-537.
———— 1956. More species of *Parabathynella* from Japan. Annot. Zool. Japon. 29: 109-115.
Uéno, Masuzo and Y. Morimoto 1956. Bathynellids from the Island of Amani-Oshima. Ibid. 29: 52-56.