XXVI. ON THE CLASSIFICATION OF THE POTAMONIDÆ (TELPHUSIDÆ).

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Since working at the Indian Potamonidae, I have been able, thanks to the kindness of Dr. W. T. Calman, to look through the British Museum non-Indian Collection of these crabs, and this paper is an attempt at a synthesis of the family from data thus obtained. I say "an attempt," because a synthesis implies a complete analysis, and such an analysis in the case of the Potamonidae involves an actual examination of every species that has been described. My justification for making the attempt is that the matter has an important bearing upon theories of geographical distribution.

Ortmann (Zool. Jahrb., Syst. x, 1897, p. 297) divides the Potamonidae into four subfamilies, namely: (1) Potamoninæ, to include, Potamon, Acanthotelphusa, Potamonautes, Geotelphusa, Paratelphusa and Erimetopus; (2) Deckeninæ, for the unique genus Deckenia; (3) Potamocarcinæ, to include Potamocarcinus, Epilobocera, Hypolobocera and Kingsleya; and (4) Trichodactylinæ, with Trichodactylus and Orthostoma as constituents.

Miss Rathbun (Nouvelles Archives du Mus. d'Hist. Nat., ser. 4, vi, 1904, pp. 245—247) divides the Potamonidae into five subfamilies, namely: (1) Potamoninæ, embracing Potamon, Potamonautes, Paratelphusa, Peritelphusa, Geotelphusa, Hydrotelphusa Platytelphusa (= Limnotelphusa) and Erimetopus; (2) Pseudotelphusinæ, for Pseudotelphusa, Potamocarcinus, Epilobocera and Rathbunia; (3) Trichodactylinæ, for Trichodactylus, Dilocarcinus and Valdivia; (4) Gecarcinucinæ, for Gecarcinus; and (5) Deckeninæ, for Deckenia.

Both these systems emphasize the following points:—

(1) The isolation of the African Deckeninæ. As I know only one of the three species (D. imitatrix) of the genus, I can hardly criticise this opinion further than to say that if D. imitatrix had come into my hands as an unknown form, I should have been inclined to regard it as a peculiarly modified Acanthotelphusa.

(2) The segregation of the American Trichodactylinæ. With this opinion I entirely agree. If a specimen of Trichodactylus fluviatilis had been brought to me as an unknown form, without any information as to its freshwater habitat, I doubt whether I should have referred it to the Potamonidae at all.

(3) The disjunction of the American Potamocarcinæ or Pseudotelphusinæ. To this opinion I can give only a hesitating
assent. *Potamocarcinus* and its relatives seem to me to fall in with my series of *Paratelphusinae* or *Gecarcinucinae*, though they certainly have some common peculiarities of their own.

(4) The close relation of *Potamon* and *Paratelphusa*. In my memoir of the Indian *Potamonidae* I have given the reasons against this association.

In Dr. Ortmann's scheme *Acanthotelphusa* is recognised as a distinct subgenus closely related to *Erimetopus*. This is, I am sure, a natural arrangement; but nothing supports Dr. Ortmann's conjecture that *Acanthotelphusa* has any specially close relation to *Potamocarcinus*.

In Miss Rathbun's scheme *Gecarcinucus* is certainly quite out of perspective. This genus, so far from being anything extraordinary, can with difficulty be disjoined from *Paratelphusa*.

For my own part I should like to eject the *Trichodactylinæ* and to see *Deckenia* subordinated to the *Potamoninae*, and *Potamocarcinus* and its relatives subordinated to the *Paratelphusinae*, leaving only two subfamilies of *Potamonidae*; but at the present moment I only propose to re-arrange Miss Rathbun's scheme slightly, and to re-characterize some of her subfamilies, as exhibited in the following synopsis and key:

**Synopsis of Subfamilies of Potamonidae.**

1. Dactyls of crawling-legs not spinose: 
   - merus of external maxillipeds elongate, its outer border being longer than that of the ischium measured from the fork of the exopodite. 
   - Mandibular palp of three distinct joints, its terminal joint simple. 
   - Abdomen of male broadly triangular, the 6th segment when separate being several times broader than long

2. Dactyls of crawling-legs spinose: 
   - merus of external maxillipeds not elongate: mandibular palp of either two or three joints, its terminal joint either simple or bilobed: 6th segment of male abdomen variable, but never more than twice as broad as long

3. Efferent branchial channels produced to the edge of the front, entrenching on and somewhat obscuring the epistome, cramping the antennæ, and so much contracting the antennular fossæ that the antennules fold almost longitudinally.
2. Mandibular palp of two joints, the terminal joint thickened and plumose at base, but not distinctly bilobed. Efferent branchial channels not thus produced.

3. Mandibular palp of either two or three joints, the terminal joint sometimes thickened and plumose at base, but not distinctly bilobed.

4. Abdomen of adult male usually broad at base and suddenly contracted at the 5th or 6th segment: the length of the sixth segment often exceeds and seldom falls short of its distal breadth: the seventh segment is almost always either elongate-triangular or tongue-shaped. Abdomen of adult male not abruptly contracted distally: the 5th segment is usually much broader than long, and the seventh segment is broadly triangular: male abdominal appendages heavy, with blunt, lobed ends.

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**Key to the Subfamilies of Potamonidae.**

- Terminal joint of mandibular palp deeply cut into lobes which embrace the incisor process of the mandible between them. **1**
- Terminal joint of mandibular palp consisting of a single lobe (the base of which may be sometimes thickened and plumose) lying behind the incisor process of the mandible. **2**

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1 In some of the Potamoninae the thickening of the base of the terminal joint of the palp is considerable, and as the hairs that fringe the thickening hang in a tuft over the incisor process of the mandible, the whole has somewhat the appearance of an independent lobe: this condition is most manifest in Potamonastes and in some of the African species of Geotelphusa, but it is not difficult to distinguish it from the broad, heavy, overhanging lobe of, e.g., Paratelphusa tridentata, if the palp be removed and denuded.
The length of the sixth abdominal segment of the adult male seldom falls short of its minimum breadth; the seventh segment is hardly ever broadly triangular.

1. The length of the sixth abdominal segment of the adult male is usually much less than its minimum breadth; the seventh segment is usually broadly triangular; male appendages peculiarly heavy and blunt.

2. Merus of external maxillipeds elongate; dactyli of crawling-legs non-spinose.

3. Efferent branchial channels produced to the edge of the front.

3. Efferent branchial channels not abnormally produced.

**Subfamily Potamoninae.**

In this subfamily the terminal joint of the mandibular palp is never deeply cleft into two lobes, though it may sometimes be thickened and plumose at base. The abdomen of the adult male is almost never abruptly contracted distally; its sixth segment is almost always much broader than long, and its seventh segment is almost always broadly triangular.

It is safe to say that the subfamily is restricted to the Old World, being represented in Europe, Africa, Asia (abundantly), the Malay Archipelago, and (doubtfully) in Australia. One species—*Potamon (Geotelphusa) chilense*, Heller—is said to have come from Chili; but both the generic determination and the locality require confirmation, for there is nothing either in the description or in the figure published that affords conclusive evidence of its position.

The diagnostic features and the broad geographical distribution of the constituent genera are shown in the following synopsis:
SYNOPSIS OF GENERA AND SUBGENERA OF POTAMONINÆ.

1. Antero-lateral borders of carapace serrulate or crenulate, but not strongly laciniate or spinose, though there may be a single lateral epibranchial spine
2. Antero-lateral borders of carapace strongly lanciniate or spinose
3. Flagellum of exopodite of external maxillipeds strong
4. Flagellum of exopodite of external maxillipeds vestigial or absent
5. Post-orbital crests and lateral epibranchial spine very distinct
6. Post-orbital crests and lateral epibranchial spine indistinct or obsolete
7. Edge of front spinulose
8. Edge of front entire
9. Epigastric and post-orbital crests not continuous
10. The epigastric and post-orbital crests of each side form an unbroken line
11. Upper border of merus of chelifeds without a subterminal spine
12. Upper border of merus of chelifeds with a subterminal spine or tooth
13. Antennal flagellum and terminal joints of antennal peduncle vestigial and hidden
14. Antennal peduncle and flagellum normal
15. Eyes and eyestalks normal
16. Eyestalks somewhat tapering, eyes small

1. POTAMISCUS (India and China).
2. GEOTELPHUSA (Asia, Malay Archipelago, Africa).
3. HYDROTELPHUSA (Madagascar).
4. POTAMON subgenus (Europe, Asia, Malay Archipelago, Africa).
5. POTAMONAUTES (Africa).
6. PLATYTELPHUSA (L. Tanganyika).
7. PARAPOTAMON (L. Yunnan Fu).
8. ACANTHOTELPHUSA (Asia, Africa).

1 Subgenus of Potamon.
Potamon in the above synopsis refers to the subgenus only, the type of which is *P. potamios*. The species of this subgenus, as here limited, range from S. Europe, N. and E. Africa, and Madagascar, all through S. Asia, to China and the Malay Archipelago; but the subgenus is not represented in the peninsular part of India.

*Potamiscus* has hitherto been found only in N. E. India and Tongchuan Fu.

*Geotelphusa* ranges from Japan and S. Asia to N. and E. Africa. It may occur in Australia, but the only two Australian species attributed to *Geotelphusa* which I have been able to examine belong to the Gecarcinucine group *Lioteulphusa*. It does not occur in the Indian peninsula, Kingsley’s *Geotelphusa enodis* being, as I have lately ascertained by examination of specimens, a *Lioteulphusa*.

*Hydrotelphusa* is peculiar to Madagascar. It is very like *Potamon*, but the thickening at the base of the terminal joint of the mandibular palp is more than ordinary prominent, and the sixth abdominal segment of the adult male is not so broad.

*Potamonautes* is confined to Africa; the Indian species that have been referred to *Potamonautes* belong to other groups.

*Platytelphusa* (= *Limnotelphusa*, Cunningham) is peculiar to Lake Tanganyika.

*Acanthotelphusa* is well represented both in E. Africa and S. Asia. It has not been found in the peninsular part of India.

*Parapotamon* seems to be restricted to L. Yunnan Fu. It includes two species—*P. endymion* and *P. spincens*. In the former the merus of the external maxillipeds is somewhat longer and narrower than usual, and the exopodite of these appendages is non-flagellate; in the latter this is not the case. *Parapotamon* is, undoubtedly, closely related to *Acanthotelphusa*, but has the post-orbital crests almost obsolete.

*Erimetopus*, which is also a very near relative of *Acanthotelphusa*, is restricted to West Africa.

**Subfamily Deckeniinae.**

This subfamily comprises a single genus, *Deckenia*, with three constituent species, two of which are found in E. Africa and one in the Seychelles. The Seychelles species, judging from Miss Rathbun’s figure, is a good deal unlike the other two.

No doubt the prolongation of the efferent branchial canals, which encroach on the epistome and alter the set of the antennæ and antennules, gives these crabs a peculiar appearance; but it seems to me that the ends of classification would be best served by placing *Deckenia* with the *Potamoninae*.

**Subfamily Gecarcinucinae.**

In all the members of this large subfamily the mandibular palp is divided into two lobes, a dorsal and a ventral: the dorsal
lobe is falciform and lies behind the incisor process of the mandible; the ventral lobe, which is a broad oval plate, more or less covers the exposed surface of the incisor process. Very commonly the abdomen of the adult male is broad at base and is suddenly narrowed at the 5th or 6th segment; but, whether this is so or not, the length of the 6th segment is hardly ever less than (often exceeds) its minimum breadth, and the 7th segment is elongate-triangular or tongue-shaped—not broadly triangular.

The subfamily is restricted to the Old World, and is represented in Asia, Africa, the Malay Archipelago and Australia. All the Potamonidae found in peninsular India belong to this subfamily.

It has already been mentioned that in certain Potamonidae the terminal joint of the mandibular palp, when casually examined, appears to be bilobed: in any case of doubt the palp should be removed and denuded, or, better still, allowed to dry.

The following table shows the diagnostic characters of the constituent genera. The geographical distribution of the several genera cannot be stated with precision, since in the descriptions of species the points most necessary for focus are often not recorded:

### Synopsis of the Genera and Subgenera of Gecarcinucinae

| 1. Front in adult either not wider than or less than half again as wide as the orbit | Gecarcinucus (Peninsular India). |
| 2. Front in adult usually much wider than, but never less than one-and-two-thirds as wide as the orbit | Cylindrotelphusa (Peninsular India, New Guinea). |
| 3. Lower outer corner of orbit produced into a sort of gutter |  |
| 4. Orbits normal |  |

| 3. Upper border of merus of chelipeds with a subterminal spine | Subgenus Paratelphusa (Asia, Malay Archipelago, Africa). |
| 4. Upper border of merus of chelipeds without any subterminal spine | Peritelphusa (Malay Archipelago). |

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1 Except in Paratelphusa blanfordi, a Baluchistan species with broad spooned fingers, and in a few other species which, however, can be distinguished by having the antero-lateral borders of the carapace strongly spinose.

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Post-orbital crests prominent

4 Post-orbital crests low, indistinct, or obsolete

Epigastric and post-orbital portions of crests either continuous or almost in line

5 Epigastric portion in advance of and slightly overlapping post-orbital portion of crest

Exopodite of external maxillipeds strongly flagellate

6 Exopodite of external maxillipeds non-flagellate

Barytelphusa* (Asia, Malay Archipelago, Africa?).

Oziotelphusa* (Asia, Mauritius).

Phricotelphusa* (Asia).

Liotelphusa* (Asia, Malay Archipelago, Australia).

Globitelphusa* (Asia).

Subfamily Pseudotelphusinæ.

This subfamily is restricted to the New World.

The mandibular palp is like that of the Gecarcinucinae: the abdomen of the adult male is like that of the typical Potamoninae.

Miss Rathbun bases the subfamily on the form of the merus of the external maxillipeds, which is said to be not so broad as usual and more obliquely-cut or emarginate internal to the insertion of the flagellum, and on the reduction of the exopodite of these appendages.

As regards the form of the merus, it is very variable within the limits both of the Potamoninae and of the Gecarcinucinae.

As regards the exopodite, there are Potamoninae in which the flagellum is absent, and there are Gecarcinucinae in which not only is the flagellum absent, but also the peduncle is much reduced. More than this: in the Gecarcinucine subgenera Phricotelphusa and Globitelphusa there are to be found exopodites of all lengths down to less than half the length of the ischium, and in Phricotelphusa gageii the exopodite may be flagellate or non-flagellate on one side or on both.

If the Pseudotelphusinæ are to be separated from the Gecarcinucinae, which is a questionable proceeding I think, the separation must depend on the form of the abdomen of the adult male and of its appendages.

1 In Phricotelphusa gageii, a Sikkim species, a slender flagellum may be present on the exopodite of one or both sides.

2 Subgenus of Paratelphusa.
Subfamily Trichodactylinae.

This subfamily is South American, straggling into Central America.

To me, as to Dr. Calman, its present position in the system is not altogether satisfactory.

There is no question that the members of this subfamily are very remarkably different from all other Potamonidae, in many respects: the dactyli of the crawling-legs are devoid of the characteristic spines; the merus of the external maxillipeds is quite a long joint; the postero-lateral borders of the carapace are sharply defined; and in several species the middle segments of the particularly broad male abdomen are fused. Differences so numerous, and (for Cyclometope crabs) so great, appear to me to indicate a different ancestry.
Alcock, A. 1910. "On the classification of the Potamonidae (Thelphusidae)."
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