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THE FRESHWATER CRAYFISHES OF SOUTH AMERICA

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The freshwater crayfish fauna of South America is very inadequately known: the relatively few collections are mostly from localities close to the major areas of settlement. The Parastacidae are, however, apparently restricted to the more southern regions of the continent. It would appear, also, that their distribution has been influenced by that of the Aegleidae which are widely distributed and common in many streams. Most of the crayfishes are apparently burrowing species in contrast to species living in permanent streams and lakes.

Crayfishes are recorded only from two relatively restricted areas: southern Chile, and from Uruguay and the adjoining Rio Grande do Sul province of Brazil (30°–35°S). Freshwater crayfishes range north in Chile, as far as is recorded, only to Valparaiso (about 33°S). The most southern collections are from the Taitao Peninsula (about 47°S). There is an incursion of the Chilean fauna into the Lake Nahuel-Huapi area of the Argentinian Cordilleras.

The most comprehensive revision of the crayfishes of South America is that of Faxon (1898) but he was either unable to recognize or unaware of the species of earlier authors. Eight species are recognized in this review; two undescribed species are known in collections but the material is inadequate for specific description.

The species were all previously referred to *Parastacus* but they separate into two very distinct groups recognized most readily by the manner in which the chelae are held. *Parastacus*

embraces the burrowing species with the chelae moving vertically whereas the stream and lake inhabiting species with chelae moving horizontally are referred to a new genus, *Samastacus.*

These two genera belong to different generic groupings within the Parastacidae, and each genus can be compared with genera occurring in other continents of the Southern Hemisphere, especially Australia.

The Parastacidae are recorded from South America, New Zealand, Australia, including Tasmania and New Guinea, and from Madagascar. None is recorded from Africa or India. Freshwater crayfishes of this family differ from those of the northern hemisphere Astacidae mainly in secondary sexual attributes, especially those of the male.

Key to genera

1. Cervical groove tending to be V-shaped at meson; dactylus of first pereiopod moving more or less in a vertical plane; male genital papilla a mesal calcified projection from the coxopodite; all individuals with both male and female genital apertures ..... *Parastacus*

   Cervical groove U-shaped at meson; dactylus of first pereiopod moving obliquely, almost horizontally; male genital papilla a separately movable, long, narrow, calcified ring; individuals normally with either male or female genital apertures (no partial gynandromorphs known) ..... *Samastacus*

Genus *Parastacus* Huxley

Parastacus Huxley 1878: 771.

Type species: Astacus pilimanus von Martens, 1869: 15. (Subsequent designation by Faxon, 1898: 683.)

Diagnosis: Parastacid with cervical groove deeply impressed, tending to be V-shaped at meson, as in the Australian *Engaeus.* Postcervical groove so close to cervical groove as to be almost indistinguishable. Branchiocardiac groove appearing to merge laterally with cervical groove. Postorbital ridges either well developed or subobsolete. Chelae (first pereiopods) shaped more or less as in *Engaeus:* dactylus moving more or less in a vertical plane; propodus expanded in a vertical plane when articulation between merus and carpus is horizontal, and with dactylus articulating vertically; carpus with tubercles on inner margin, anterior one either slightly enlarged or not enlarged. Abdomen large, pleura of first segment well developed. Merus of third maxilliped with entire lower surface covered with dense setae. Male genital papilla a calcified

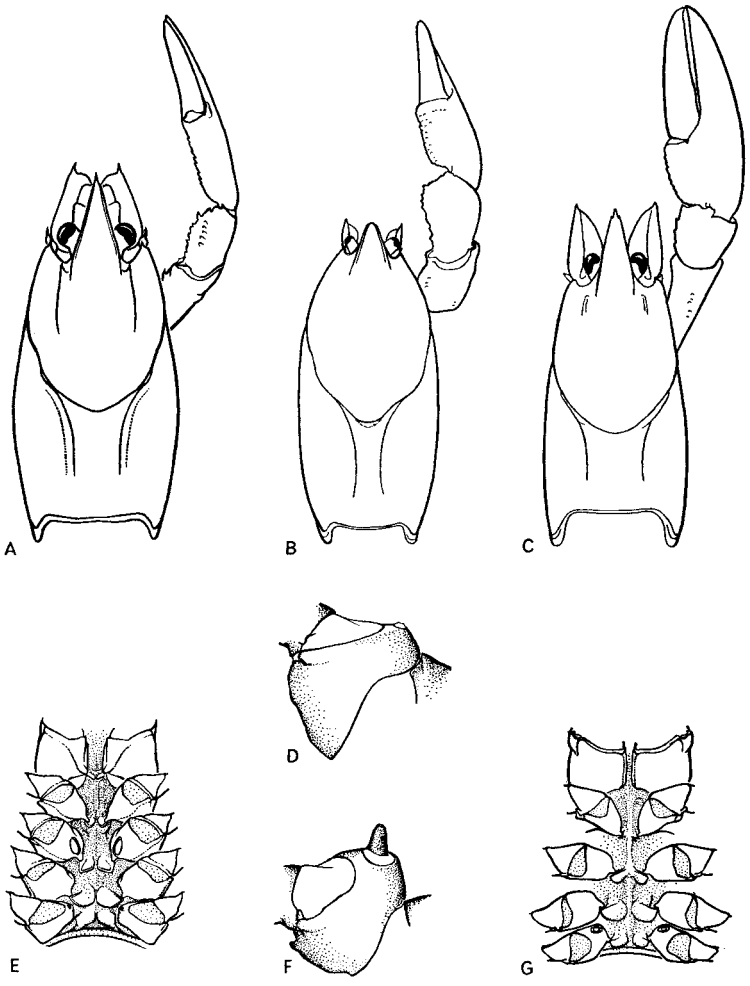

FIG. 1. A, D, E. *Parastacus varicosus*: A, cephalothorax and chela; D, male, coxa of fifth pereiopod, caudal; E, sternum. B. *Parastacus pugnax*: Cephalothorax and chela. C, F, G. *Samastacus spinifrons*: C, cephalothorax and chela; F, male, coxa of fifth pereiopod, caudal; G, sternum.

process, as in *Engaeus*. All specimens with both male and female genital apertures.

The genus is close to the long-abdomened species of *Engaeus*, especially to *lyelli*. It is distinguished from the Australian genus mainly on

the approximation of the postcervical and cervical grooves and the very unusual development of gynandromorphic genitalia. Supernumerary genital apertures occur only rarely in other Parastacidae. There is considerable variation in *Parastacus* in the development of the postorbital ridge, comparable with that which occurs in the Australian genus *Cherax*. The species are all apparently strong burrowers. The genus is recorded from Chile and the Argentinian Cordilleras, and from Uruguay and southern Brazil.

Key to the species of *Parastacus*

1. Postorbital ridges distinct, usually ending anteriorly in a spine; 5th pereiopods slightly closer than 4th pereiopods; carpus with a deep, longitudinal groove above; suborbital margin with a distinct spine; carpus with an enlarged spine on mesal margin (antennal scale very broad, widest beyond the middle; cephalon less than twice as long as thorax; processes to 4th pereiopods broad, appearing almost as wide as long) 2

   Postorbital ridges subobsolete; 5th pereiopods distinctly closer than 4th pereiopods; carpus with only a shallow, longitudinal groove above, suborbital margin with only a small spine; carpus without an enlarged spine on mesal margin (basal lobe of exopodite of uropod rounded; propodus above with a double row of tubercles; antennal scale without a spine at outer apical margin of its basal article) 4

2(1). Basal lobe of exopodite of uropod rounded; postorbital ridge ending anteriorly without a raised spine or tubercle; mesal margin of propodus without a mat of hair but with hairs along cutting edges of dactylus and propodus (rostrum with more or less straight lateral margins) (Brazil) ..... *pilimanus*

   Basal lobe of exopodite of uropod produced to a spine; postorbital ridge ending anteriorly in a spine; mesal margin of propodus with a mat of long hairs 3

3(2). Rostrum extending slightly beyond antennal scale; areola with parallel sides; merus, above, with the spine towards apex only slightly larger than the other spines of the upper surface; marginal suborbital spine small, continuous with margin of carapace (Uruguay) ..... *saffordi*

   Rostrum not quite reaching as far as antennal scale, with lateral margins distinctly convex over posterior half; areola with sides converging slightly over anterior third; merus with a large spine above towards apex; marginal suborbital spine distinct (East Uruguay) ..... *varicosus*

4(1). Rostral carinae ending anteriorly before apex, rostrum ending in a median blunt spine (carpus with one row of tubercles above, large species) (Chile) ..... *pugnax*

   Rostral carinae appearing to meet anteriorly and forming the rounded apex of the rostrum 5

5(4). Carpus with two rows of tubercles above, large species (Chile) ..... *nicoleti*

Carpus with one row of tubercles above, small species (Uruguay and Brazil) ..... *defossus*

Parastacus pugnax (Poeppig)

Astacus pugnax Poeppig 1835: 314.
Astacus chilensis Milne-Edwards 1837: 333.
Parastacus hassleri Faxon 1898: 687 and figure.
Parastacus chilensis: Holthuis 1952: 81 (references).
Parastacus pugnax: Holthuis 1952: 84 (in part).

Type: There is apparently no type of *pugnax*. Holotype of *chilensis* in Mus. Hist. Nat., Paris. (Photographs of type examined.) Holotype of *hassleri* in M.C.Z.

Type locality: Chile. The label with the dry mount of the type of *chilensis* bears the locality name Valparaiso. The type locality for *hassleri* is Talcahuano.

Distribution: Valparaiso; Concepción-Talcahuano area and south to the Taitao Peninsula, Chile.

Parastacus nicoleti (Philippi)

Astacus chilensis: Nicolet 1849: 211, *non* Milne-Edwards 1837.
Astacus Nicoleti Philippi 1882: 624.
Parastacus nicoletii Faxon 1898: 689 (as sp. nov.).
Parastacus pugnax: Holthuis 1952: 84 (in part).
Parastacus nicoleti: Bahamonde 1958: 186.

Type: Location not known (type not examined).

Type locality: Valdivia, Chile.

Distribution: Valdivia area, Chile.

Note: Although the type has not been examined, illustrations of specimens from Valdivia by Bahamonde, show that this species is very distinct, and easily separated from the more widespread *pugnax*.

Parastacus pilimanus (von Martens)

Astacus pilimanus von Martens 1869: 15.
Astacus brasiliensis von Martens 1869: 16 (syn. nov.).
Parastacus pilimanus: Huxley 1878: 771.
Parastacus brasiliensis: Huxley 1878: 771.

Types: Of both species in the Berlin Museum (types not examined).

Type locality: Porto Alegre, Brazil, for both species.

Distribution: The species is known only from the Rio Grande do Sul region of Brazil with the exception of that part adjoining East Uruguay. There are specimens in the U.S. National Museum from Uruguayana, Est Rio Grande do Sul.

Parastacus saffordi Faxon

Parastacus saffordi Faxon 1898: 683 and figure.

Type: Holotype in U.S. National Museum, 12,581 (type examined).
Type locality: Montevideo, Uruguay.
Distribution: The species is known only from the Montevideo area.

Parastacus varicosus Faxon

Parastacus varicosus Faxon 1898: 685 and figure.

Type: Holotype in the U.S. National Museum, 4,133 (type examined).
Type locality: Colima, Mexico, in error.
Distribution: There are specimens in the U.S. National Museum from a ditch near the River Rocha, East Uruguay, and from Bagi River, and Pelotas, Rio Grande do Sul, Brazil.

Parastacus defossus Faxon

Parastacus defossus Faxon 1898: 686.

Type: Holotype in U.S. National Museum, 19,647 (type examined).
Type locality: Montevideo, Uruguay.
Distribution: There are specimens in the U.S. National Museum from Saõ Leopoldo, Rio Grande do Sul, Brazil.

Genus **Samastacus** gen. nov.

Type species: Astacus spinifrons Philippi 1882.

Diagnosis: Parastacid with cervical groove deeply impressed, U-shaped at meson, as in the Australian genus *Geocharax*; the groove almost interrupted midlaterally and with marked changes in direction over this zone. Postcervical groove separated from, but very close to cervical groove, the two parallel and meeting below, at midlateral cephalothorax, rather abruptly; the groove sometimes continued mesad of the branchiocardiac groove. Branchiocardiac groove merging angularly with postcervical groove, but sometimes also continued lateroventrally parallel to it. Postorbital ridges defined, ending anteriorly in a spine or tubercle. Rostrum long and pointed. Chela (first pereiopod) tuberculate, shaped more or less as in *Engaeus* and *Geocharax*: dactylus moving obliquely, almost horizontally; propodus expanded in a more or less horizontal plane when articulation between merus and carpus is horizontal, and with dactylus articulating horizontally; carpus, as in *Parastacoides* and *Geocharax*, with an enlarged tooth on mesal side, but with other small spines, too. Abdomen large, pleura of first segment well developed. Merus of third maxilliped with very dense hairs over all lower surface. Male genital papilla a very long, narrow, calcified ring (more produced than in *Astacoides*). Sexes discrete, with either male or female genital apertures.

The genus differs from the Australian *Geocharax*, the most similar

described genus, mainly in the closeness of the postcervical and cervical grooves, the more rounded cervical groove, at meson, and the cervical groove almost interrupted midlaterally and with marked changes in direction over this zone; also in male genitalia and the setation of the third maxillipeds.

The genus is recorded only from Chile.

Key to the species of *Samastacus*

1. Rostrum tapering regularly to apex, the lateral carinae ending anteriorly in a tubercle; postorbital ridge defined but ending anteriorly, at most, in a tubercle; inner margin of antennal scale tapering regularly to apex; basal lobe of exopodite of uropod ending in a spine ..... *spinifrons*

   Rostrum U-shaped, lateral carinae ending without spine or tubercle; postorbital ridges absent; antennal scale very broad, inner margin tapering abruptly to apex; basal lobe of exopodite of uropod rounded ..... *araucanius*

Samastacus spinifrons (Philippi) **New Combination**

Astacus spinifrons Philippi 1882.
Astacus bimaculatus Philippi 1894: 378.
Parastacus agassizii Faxon 1898: 670 and figure.
Parastacus spinifrons: Holthuis 1952: 81 (for full synonymy).

Types: The location of the types of *spinifrons* and *bimaculatus* is unknown. Holotype of *agassizii* in M.C.Z.; paratype USNM No. 12,045 (paratype examined).

Type locality: spinifrons from Llico and Valdivia (*vide* Bahamonde, 1951); *bimaculatus* from Chile; and *agassizii* from Talcahuano, Chile.

Distribution: Talcahuano area south to Taitao Peninsula, including Island of Chiloé.

Habitat: In streams and lakes.

Note: The specimens from the Lake Nahuel-Huapi area of the Argentinian Cordilleras represent an undescribed species, determined as *spinifrons* by Faxon, 1914, who used the name *bimaculatus* for the Chilean species.

Samastacus araucanius (Faxon) **New Combination**

Parastacus araucanius Faxon 1914: 353.

Type: In M.C.Z. (type examined, on my behalf, by Horton H. Hobbs).

Type locality: Corral, Valdivia, Chile.

Distribution: The species is known only from the type.

Note: The specimens determined as *spinifrons* from Valdivia (*vide* Bahamonde, 1951) may be this species. If this is so then Llico could be considered the type locality for *spinifrons*.

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