

A revision of the freshwater crabs of the family Pseudothelphusidae (Decapoda: Brachyura) from Peru with notes on the the southern limits of the family

by

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Abstract

Diagnoses and illustrations of the six species of Peruvian pseudothelphusid crabs, including the new species *Hypolobocera dantae* and *H. ucayalensis*, are provided. These species belong to a group of the tribe Hypolobocerini found from southern Colombia to Peru which after a peak of biodiversity in the Ecuador, display a sharp decrease southward. *Hypolobocera chilensis*, found in the coastal area of the Pacific, wedged in-between the Sechura desert in Ecuador and the arid zone of southern Peru, possibly originated from an Amazonian stock. The rest of species are restricted to the Amazon basin, in the upper Marañon and Ucayali basins, above 400 m. Their geographical areas are very distant from the pseudothelphusid of the tribe Kingsleyini found in the lower plains of the Amazon, and do not cross the southern water divide of the Ucayali basin. Throughout their area of distribution the Amazonian species are flanked or overlapped by species of the crab family Trychodactylidae, but no overlapping of niches seems to occur. A recent occupation may explain the restriction of the Peruvian Pseudothelphusidae to the Ucayali basin. Keywords: **Freshwater crabs, Pseudothelphusidae, biogeography, Amazon basin, Peru.**

Resumo

São fornecidas diagnoses e ilustrações para seis espécies de caranguejos da família Pseudothelphusidae do Peru, das quais duas, *Hypolobocera dantae* e *H. ucayalensis*, são novas. Essas espécies pertencem a um grupo da tribo Hypolobocerini que se distribui do sul da Colômbia ao Peru; esse grupo, após um pico de diversidade no Equador, diminui acentuadamente em direção ao sul. *Hypolobocera chilensis*, encontrada na área costeira do Pacífico, inserida entre o deserto de Sechura, no Equador, e a zona árida do sul do Peru, possivelmente se originou de um estoque amazônico. As demais espécies, *Lindacatalina gracilignatha*, *Moritschus henrici* e *M. peruviana*, estão restritas à bacia amazônica, na parte alta das bacias dos rios Marañon e Ucayali, acima de 400 m. Suas áreas de distribuição geográfica estão muito distantes das áreas dos pseudothelphusídeos da tribo Kingsleyini encontrados na planície amazônica, e não ultrapassam o divisor de águas da bacia do Ucayali, ao sul. Em toda a área onde ocorrem, as espécies amazônicas têm distribuições contíguas ou parcialmente coincidente com as de caranguejos da família Trichodactylidae, mas sem aparente sobreposição de nichos. Uma ocupação recente poderia explicar a restrição dos Pseudothelphusidae peruanos à bacia do Ucayali.

Introduction

The freshwater crabs of the family Pseudothelphusidae cover a vast territory in mountainous areas of the Neotropical region. Its northern limit, on the Pacific side, is located at approximately 27° N in Alamos (State of Sonora, México), but on the Atlantic side it only reaches to latitude 18° N, in Cordoba (State of Veracruz, México), thus forming a diagonal boundary crosswise the Mexican territory. North of this boundary, or "cambarid line" (RODRÍGUEZ 1986), the pseudothelphusid are excluded (or rarely overlapped) by the crayfishes of the family Cambaridae which occupy the habitats favored by the pseudothelphusids to the south. In South America, the Pseudothelphusidae descend along the Pacific side of the Andes to the latitude of Lima, approximately 12° S (PRETZMANN 1978, 1983b), whereas in the Amazon basin the southern limit forms an irregular boundary which stretches from the Peruvian effluents of the Amazon to localities south of this last river and Northeast to Pará, Brazil (MAGALHÃES & RODRÍGUEZ 2002).

The present contribution deals with the distribution of the Peruvian Pseudothelphusidae from the headwaters of the Amazon River, and establishes the limits of the family in South America. To this effect we have revised all the pseudothelphusids from that area, belonging to the tribe Hyplobocerinae, giving particular attention to the validity of the taxa described by PRETZMANN (1972, 1983a) which present some confusion regarding their definition. This revision is based on materials deposited in the Reference Collection of the Instituto Venezolano de Investigaciones Científicas, Caracas, Venezuela (IVIC), the Museum of Natural History of Tulane University, New Orleans, USA (TU), The Natural History Museum, London, UK (BMNH), Naturhistorisches Museum, Wien, Austria (NHMW), and the Museo de Historia Natural, Universidad de San Marcos, Lima, Peru (MUSM). Two new species discovered in these collections are described.

Terminology for gonopod morphology follows SMALLEY (1964). Abbreviations used are cl. for carapace length and cb. for carapace breadth.

Systematics

Family Pseudothelphusidae RATHBUN, 1893

Key to genera from Peru

1. Lateral margin of first gonopods produced into a defined (although sometimes reduced) lateral lobe 2
- Lateral margin widening progressively towards the apex which extends considerably laterally, giving the apex in caudal view a characteristic triangular-elongated appearance *Moritschus*
2. Lateral lobe covered with spinules or short stout setae implanted in pores. Exognath of third maxilliped usually more than 0.45 length of ischium of endognath *Lindacatalina*
- Lateral lobe naked or with a few sparse spinules and short hairs. Exognath of third maxilliped usually less than 0.45 length of ischium of endognath *Hyplobocera*

Hyplobocera ORTMANN, 1897

Diagnosis: Exognath of third maxilliped usually less than 0.45 length of ischium of endognath. First male gonopods with strong longitudinal ridge on caudal surface, and well defined (although sometimes reduced) lateral lobe; apex truncated, either circular or oblong in distal view, with round papilla near spermatheca channel.

Type species: *Potamia chilensis* H. MILNE EDWARDS & LUCAS, 1844.

Distribution: Panamá, Colombia, Venezuela, Ecuador and Peru.

Key to species from Peru

1. Apex of gonopod rounded. Lateral lobe occupying distal fourth of gonopod *H. dantae*
- Apex of gonopod elongated, with one of the borders acuminate. Lateral lobe extending along middle distal third of gonopod 2
2. Lateral lobe expanded, conspicuously projected from outline of appendage *H. chilensis*
- Lateral lobe depressed, scarcely projecting from outline of appendage *H. ucayalensis*

Hypolobocera chilensis (H. MILNE EDWARDS & LUCAS, 1844) (Figs. 1A-F)

Potamia chilensis H. MILNE EDWARDS & LUCAS, 1844: 22, pl. 10, fig. 1; NICOLET in GAY, 1849: 150.

Boscia chilensis, H. MILNE EDWARDS, 1853: 208.

Pseudothelphusa chilensis, SMITH, 1870: 146; POCOCK, 1889: 9; NOBILI, 1897: 3, 5; RATHBUN, 1898: 533, 537; YOUNG, 1900: 215; RATHBUN, 1905: 287, table 13, fig. 4; COIFMANN, 1939: 107.

Hypolobocera chilensis, ORTMANN, 1897: 323; PRETZMANN, 1971: 17; PRETZMANN, 1977b: 429; RODRÍGUEZ, 1982: 60, fig. 32a-h.

Potamacarcinus (Hypolobocera) chilensis, BOTT, 1967: 366, fig. 1a-c.

Hypolobocera (Hypolobocera) chilensis, PRETZMANN, 1971: 17; PRETZMANN, 1972: 38, figs. 202, 203, 292.

Hypolobocera (Hypolobocera) chilensis chilensis, MAYTA LINO, 1980: 71, fig. 5; PRETZMANN, 1983b: 335, figs. 1, 8, 14, 22, 26, 29, 35.

Hypolobocera (Hypolobocera) chilensis ssp. PRETZMANN & MAYTA, 1980: 138-139, figs. 3, 4.

Pseudothelphusa dentata, ORTMANN, 1893: 493 (part).

Pseudothelphusa conradi, RATHBUN, 1905: 298, fig. 90b, c (part, material of Peru).

Strengeria (Strengeria) eigenmanni PRETZMANN, 1965: 7.

Hypolobocera chilensis eigenmanni PRETZMANN, 1977a: 87.

Hypolobocera (Hypolobocera) chilensis eigenmanni, PRETZMANN & MAYTA, 1980: 137, figs. 1, 2; PRETZMANN, 1983b: 337-338, figs. 2, 7, 13, 22, 30.

Hypolobocera (Hypolobocera) chilensis eigenmanni [sic], MAYTA LINO, 1980: 72, fig. 6.

Hypolobocera (Hypolobocera) caputii eigenmanni PRETZMANN, 1971: 17; PRETZMANN, 1972: 40, fig. 251.

Material: Peru, Amazonas Department, Chachapoyas, 15 February 1973, leg. Enrique DEL SOLAR, 1 male (IVIC 607); Cajamarca Department, Tembladera, Valle Jequetepeque, 3 June 1977, leg. F. ARRESTEGUI, 3 males, 3 males broken carapace, 2 mature females, 2 juv. female. (IVIC 608); San Gregorio, 7°04'S, 79°06'W, 1 October 1974, leg. N. IBÁÑEZ, 1800 m (IVIC 609); Rio Saña, La Florida, 28 February 1952, leg. H.W. KOEPCKE & M. KOEPCKE, 900 m alt., 1 male, 1 mature female (MUSM); Llama, 6°31'S 79°8'W, 2095 alt., 4 March 1958, leg., H.W. KOEPCKE & M. KOEPCKE, 1 mature female, 2 females (MUSM); Hacienda Taulis, 6°54'S 79°3'W, January 1952, leg., H.W. KOEPCKE & M. KOEPCKE, 1700 m alt., 1 mature female (MUSM); Rio Jequetepeque, El Ponjo, La Libertad, 4 March 2001, 1 male, cl. 32.6 mm, cb. 50.4 mm (MUSM); Cajabamba, 1 male, 1 female (TU 94-100); Near San Pablo, leg. KOEPCKE, 1 male (MUSM); San Marcos, 2000 alt., June 1953, leg. Gonzalez MOGABURU, 2 males, 2 juv. (MUSM); Cajabamba, 1 male, 1 female (TU 94-100); Ancash Department, Bolognesi Province, Yumpe, Huayllacayan, 2200 m alt., 18 February 1988, leg. Pablo VILLASECA, 1 immature male, cl. 19.9 mm, cb. 29.5 mm (IVIC 1116);

Diagnosis: Carapace with upper frontal margin angled, with few small tubercles at lateral angles and notch at middle. Larger chela with small tubercle on outer surface, at articulation of dactylus. First male gonopods with lateral lobe well developed, expanded, either rounded or subtriangular, with distal margin straight or slightly concave, advanced; apex lanceolate in distal view, ending in acuminate tip directed distally, well developed flat, fingerlike papilla on caudal side of spermatic opening.

Remarks: The area of distribution of *Hypolobocera chilensis* covers two different watersheds: (a) The Pacific watershed of the Eastern Cordillera, from 5° S to 10° S, comprising localities in Jequetepeque River recorded under Material examined, many small rivers along the coast recorded by PRETZMANN & MAYTA (1980) and PRETZMANN (1983a, b), and the type locality (Lima). (b) The upper valley of the Marañón River, down to the confluence of Chinchipe River, where many records are given by RODRÍGUEZ (1982) and PRETZMANN (1983b). To the North both areas are in close contact, separated by the water divide of the Coastal Cordillera, with altitudes greater than 2000 m.

Hypolobocera chilensis displays some slight variability in the profile of the lateral lobe, which cannot be associated to their provenance from either watershed. The following variations are found in our material (Fig. 1) or in specimens illustrated in the literature. 1. Lateral lobe regularly rounded, with all sides convex. Our material from Chachapoyas, in the Marañón River headwaters (Fig. 1A) and the specimen illustrated by PRETZMANN (1983b) from the neighborhood of Lima, Pacific drainage belongs in this group. 2. Lateral lobe regularly rounded proximally, slightly sinuous distally, as in our material from Tembladera, Jequetepeque River, Pacific drainage (Fig. 1B) and in the holotype from Lima illustrated by BOTT (1967). 3. Lateral lobe transverse proximally, moderately concave distally, as in our material from La Libertad, Jequetepeque River, and La Florida, Saña River, Pacific drainage (Fig. 1C, D). 4. Lateral lobe transverse proximally, almost straight or slightly sinuous distally. This morphology was not found in our material, but is illustrated by RODRÍGUEZ (1982) in specimens from Chachapoyas and Cutervo, in the Marañón River headwaters, PRETZMANN & MAYTA (1980) from Huallas, Cajamarca, Pacific drainage (*Hypolobocera (Hypolobocera) chilensis eigenmanni*), and from an unknown locality (as *Hypolobocera (Hypolobocera) chilensis* ssp.), and by (PRETZMANN (1983b) from Jequetepeque River (as *Hypolobocera (Hypolobocera) eigenmanni*). 5. Lateral lobe angled proximally, slightly sinuous distally (Fig. 1E). Our material from San Gregorio, Cajamarca, Pacific drainage belongs in this group. An immature male (cb. 29.5 mm), from Fortaleza River, Pacific drainage, display a reduced lobe, with transverse furrows (Fig. 1F).

***Hypolobocera dantae* n.sp. (Fig. 2A-G)**

Material: Peru, Huanuco Department, Dantas, Molino, 19 May 1987, leg. Jeraldo RODRÍGUEZ, 1 male holotype, cl. 22.6 mm, cb. 36.8 mm (IVIC 1105).

Diagnosis: Front of carapace without defined upper margin, sloping regularly to lower margin. First male gonopods slender, curviform in caudal view, bent in caudocephalic direction; caudal ridge wide, geniculate proximally, curving towards and merging with lateral lobe distally; lateral lobe subterminal, very short, occupying only one fifth of appendage, rounded, with very inconspicuous spinules barely visible; apex subtriangular, with rounded borders, ending cephalically in triangular tip directed distally, well developed flat papilla on caudal side of spermatid opening.

Description of holotype: Carapace 1.73 times as wide as long, surface smooth and polished, regions of carapace not well defined, except for metagastric and urogastric regions which are conspicuously depressed; cervical grooves narrow and straight, ending far from margins of carapace. Anterolateral margins without notch behind outer orbital angle, entire up to level of distal end of cervical grooves; posterior to cervical groove with approximately 15 wide teeth which become more acute posteriorly. Upper margin of orbit entire, smooth. Postfrontal lobes inconspicuous, with shallow depressions in front of them; median groove replaced by shallow depression. Surface of carapace in front of postfrontal lobes inclined anteriorly and towards mid-line. Front without a defined upper margin, sloping regularly to lower margin; lower margin moderately sinuous in frontal view, conspicuously thickened.

Third maxilliped with lateral border of merus of endognath transverse, with shallow depression on distal part. Exognath of third maxilliped 0.53 length of ischium of endognath. Orifice of efferent branchial channel rectangular.

Larger cheliped missing, smaller one with fingers not gaping when closed, palm slightly swollen, surface smooth, with 5-6 squamiform tubercles on proximal end of lower margin. Carpus with large triangular spine on internal upper margin followed by 4 smaller spines; internal upper margin of merus with 12 conical spines.

First male gonopods slender, curviform in caudal view; caudal ridge wide, geniculate proximally, curving towards and merging with lateral lobe distally; lateral lobe subterminal, very short, occupying only one fifth of appendage, rounded, with very inconspicuous and barely visible spinules; apex subtriangular, with rounded borders, ending cephalically in triangular tip directed distally, well developed flat papilla on caudal side of spermatic opening.

Remarks: The gonopod of *Hypolobocera dantae* resembles in the reduced lateral lobe that of *Hypolobocera beiri* PRETZMANN, 1968, from northern Colombia. However, in *Hypolobocera beiri* the lateral lobe is not subterminal, but more centrally placed, the caudal ridge is not bent towards the lateral lobe, but ends in a narrow ridge beyond the lateral lobe and does not merge with it distally, and the apex in distal view is expanded cephalically and does not taper to a triangular point. The front of the carapace in *Hypolobocera beiri* is well defined, angled, with some scattered tubercles.

Size: This is a relatively small species for the genus. Our only specimen, a mature male, has a cb.36.8 mm.

Etymology: The species is named after the Dantas village in the Huanuco Department, where the species was collected.

***Hypolobocera ucayalensis* n.sp. (Fig. 3A-F)**

Material: Perú, Loreto Department, Pucallpa, Ucayali, km. 59 of Basadre highway, 10 Sep 1985, leg. H. ORTEGA. 1 adult male holotype, cl. 26.5 mm, cb. 40.2 mm (IVIC 1115).

Diagnosis: Carapace with upper frontal margin well defined, with row of ill-defined tubercles and deep median notch. First male gonopods with lateral lobe long, narrow, oblong, regularly convex proximally and distally, with border crossed by numerous wrinkles; apex in distal view oblong, of equal width throughout, ending cephalically in strong spine directed distally, acute papilla on caudal side of spermatic opening.

Description of holotype: Carapace 1.52 times as wide as long, surface smooth except for minute flat papillae over orbital and protogastric regions; regions of carapace well marked, cardiac region depressed; cervical grooves well marked, narrow distally, wide proximally, slightly curved backwards, reaching margin of carapace. Anterolateral margins without well defined notch behind outer orbital angle, with 6 papillae between external orbital angle and level of cervical grooves, 4 papillae behind level of cervical grooves followed by approximately 15 minute teeth. Postfrontal lobes small, oval, low but well defined anteriorly; median groove deep, extending backwards between postfrontal lobes. Surface of carapace in front of postfrontal lobes inclined anteriorly and towards mid-line. Upper margin of front convex, slightly bilobed as seen from above, with deep median notch, margin well defined but not projected, with row of ill-defined tubercles; surface of front low, almost vertical; lower margin sinuous and strongly crested, placed slightly in front of upper margin.

Third maxilliped with lateral border of merus of endognath transverse, with shallow depression on distal part. Exognath of third maxilliped 0.42 length of ischium of endognath. Orifice of efferent branchial channel semicircular.

Larger cheliped missing, smaller one with fingers not gaping when closed, palm slightly swollen, surface smooth. Carpus with large triangular spine on internal upper margin followed by 2 smaller spines; internal upper margin of merus with 10 conical spines.

First male gonopods with lateral lobe long, narrow, oblong, regularly convex proximally and distally, with border crossed by numerous wrinkles; apex in distal view oblong, of equal width throughout, ending cephalically in strong spine directed distally, acute papilla on caudal side of spermatic opening.

Remarks: The gonopod of *Hypolobocera ucayalensis* resembles in the shape of the lateral lobe that of *H. delsolari* PRETZMANN, 1978, from Ecuador (RODRÍGUEZ & VON STERNBERG 1998), but in *H. delsolari* the apex of the gonopod is lanceolate in distal view, wide proximally, with a round flat papilla on caudal side of spermatic opening. The upper border of the front in *H. delsolari* is devoid of tubercles.

***Lindacatalina* PRETZMANN, 1977b**

Diagnosis: Exognath of third maxilliped usually more than 0.45 length of ischium of endognath. First male gonopods with strong longitudinal ridge on caudal surface; well developed lateral and supplementary

cephalic lobes (this last one rarely absent), both covered by minute spinules; if supplementary lobe absent, lateral lobe covered by short stout setae implanted in pores; apex truncated, circular in distal view, with two flat papillae near spermatic channel.

Type species: *Hypolobocera (Lindacatalina) hauserae* PRETZMANN, 1977b.

Distribution: Southern Colombia, Ecuador and Peru.

***Lindacatalina gracilignatha* (PRETZMANN, 1972) (Fig. 4A-E)**

Hypolobocera (Hypolobocera) caputii gracilignatha PRETZMANN, 1972: 41, figs. 256, 300, 301, (pro parte, nec fig. 257).

Hypolobocera (Hypolobocera) chilensis gracilignatha, MAYTA LINO, 1980: 71, fig. 4; PRETZMANN, 1983b: 339, (pro parte, nec fig. 21).

Hypolobocera gracilignatha, RODRÍGUEZ, 1980: 53, fig. 27a-d.

Hypolobocera (Lindacatalina) lamercedis lamercedis PRETZMANN, 1978: 164, fig. 4; MAYTA LINO, 1980: 68, fig. 1; PRETZMANN, 1983b: 334, fig. 5, 11, 17.

Hypolobocera (Lindacatalina) lamercedis, PRETZMANN & MAYTA, 1980: 140, figs. 7, 8; PRETZMANN (1983a): 302, figs. 8-14.

Hypolobocera (Lindacatalina) lamercedis maytai PRETZMANN, 1978: 164; MAYTA LINO, 1980: 68; PRETZMANN, 1983b: 335, figs. 5, 23, 28, 32, 36 (pro parte, nec figs. 11, 17).

Material: Peru, Cajamarca Department, Chanchamayo, eastern Peru, 1 male holotype (BMNH 1907.57.12); San Gregorio, 7°04'S, 79°06'W, 1974, leg. Nicanor IBÁÑEZ, 1800 m, 1 male cl. 62.8 mm, cb. 103.6 mm (IVIC-612); Valle Condebamba, Condebamba River, upper tributary of Cajamarca River, 7°28'S, 78°08'W, October 1975, leg. Nicanor IBÁÑEZ, 2000 m alt., 1 male cl. 54.4 mm, cb. 89.6 mm, 1 female cl. 56.5 mm, cb. 93.9 mm (IVIC 611); Pasco Department, Valle Condebamba, 4 juvenile males, 5 immature females (IVIC 613); Río Chorobamba, 20 July 1990, leg., P. BALTAZAR & C. RAMIREZ, 7 juvenile males, 2 immature females, 3 juvenile females (MUSM); San Martín Department, Camisea, La Convención, Cuzco, 3 well site, under litterfall, 480 m alt., 11°47'10''S, 72°42'05''W, March-May 1997, leg. J. SANTISTEBAN, 3 males cl. 33.9, 32.0 and 25.5 mm, cb. 55.1, 50.9 and 40.8 mm, 1 mature female cl. 56.2 mm, 92.7 mm (MUSM); San Martín Department, Quebrada Yopocuriari, Río Camisea, Echarate, La Convención, Cuzco, 11°51'28''S, 72°46'22''W, 14 October 1998, leg. A. PORTILLA, 1 male cl. 21.7 mm, cb. 34.4 mm, 1 mature female cl. 51.1 mm, cb. 83.0 mm, 5 juveniles (MUSM); Quebrada Yopocuriari, 21 October 1998, leg., R. PEÑA, 1 male cl. 25.9 mm, cb. 41.1 mm, 1 mature female cl. 42.0 mm, cb. 68.2 mm (MUSM); Tarapoto, 1 left gonopod from the holotype of *Hypolobocera (Lindacatalina) lamercedis maytai* PRETZMANN, 1978 (NHMW 4192); Loreto Department, Cerros de Orellana, alrededor del campamento El Fuerte, Río Ucayali, 15 July 1988, leg., Antonio W. SALAS, 1 male cl. 37.3 mm, cb. 59.3 mm, 1 immature female cl. 31.1, cb. 48.4 mm, 1 juvenile female (MUSM); Cerros de Contamana, La Unión, 15 September 1986, leg. P. HACKINS, 1 juvenile male (MUSM); Río Ucayali, Contamana, M. HIDALGO, 1 juvenile male (MUSM); Junín Department, La Merced, Tarma, 1 male holotype of *Hypolobocera (Lindacatalina) lamercedis lamercedis* PRETZMANN, 1978, cl. 52.3 mm, cb 83.0 mm (NHMW 4159).

Diagnosis: Carapace with upper frontal margin well defined, but only slightly projected, devoid of papillae. Larger chela with well developed tubercle on outer surface at articulation of dactylus. First male gonopods with caudal ridge strongly geniculated at middle, progressively tapering to end near apex, projected laterally; lateral lobe thick, rounded, displaced cephalically, lateral surface covered by short stout setae implanted on pore; apex truncated in caudal view, rounded, expanded laterally into semicircular projection in distal view, well developed flat papilla on caudal side of spermatic opening.

Remarks: This species is closely related to *Lindacatalina orientalis* (PRETZMANN, 1968), but both species can be readily differentiated by the outline of the apex of gonopods in distal view which is wider and rounded in *L. gracilignatha*, narrower and elongated in *L. orientalis*. In both species the characters of the genus are not fully developed. In both the caudal ridge is strongly projected laterally and the lateral lobe is displaced. Consequently in lateral view two long parallel lobes are observed. The spinules on the lateral lobe of *Lindacatalina gracilignatha* are very minute and sunk into pores. An illustration of the left

gonopod of the holotype is given in RODRÍGUEZ (1982). The illustrations of the gonopod given by PRETZMANN (1972, fig. 257), and PRETZMANN (1983b, fig. 21) do not correspond to this species, but probably to *Hypolobocera chilensis*.

The holotype of *Hypolobocera (Lindacatalina) lamercedis lamercedis* PRETZMANN, 1978, is a male (cl. 41.4 mm fide PRETZMANN (1978), 52.3 mm according to our own measurements), from La Merced, Tarma, Peru. The author mentions also 2 males, 1 female and 1 juvenile from the same locality. Later PRETZMANN & MAYTA (1980), added 1 male from Satipo, Chimauka, and 1 male from Satipo, Anachea, Junin Department. PRETZMANN (1983a), recorded again the holotype (correcting its cl. to 51.4 mm), and designated as paratypes the additional specimen in PRETZMANN (1978). PRETZMANN (1983b) recorded again the holotype (correcting again its cl. to 41.4 mm) and mentions as additional materials the specimens in PRETZMANN & MAYTA (1980), plus 1 male from Chanchamayo and 2 females from Tingo Maria. However, these last two females come from a different basin from that of *Hypolobocera lamercedis* recorded so far, and furthermore cannot be specifically identifiable. Consequently all localities of *Hypolobocera (Lindacatalina) lamercedis lamercedis* come from the upper reaches of the Ucayali River, in the same basin of *Hypolobocera gracilignatha* (Fig. 5).

Examination of the gonopods from the holotype of *Hypolobocera (Lindacatalina) lamercedis lamercedis* shows that it is identical with those of the holotype of *Lindacatalina gracilignatha* in the British Museum (Natural History), London, as illustrated by RODRÍGUEZ (1982, fig. 27).

The holotype of *Hypolobocera (Lindacatalina) lamercedis maytai* PRETZMANN, 1978, is a male, from Tarapoto, Peru. He also mentions 1 paratype male from the same locality (cl. 45 mm). Comparison of the gonopod again shows an exact correspondence with the holotype of *Lindacatalina gracilignatha*. MAYTA LINO (1980) had already noted that *Hypolobocera (Lindacatalina) lamercedis lamercedis* and *Hypolobocera (Lindacatalina) lamercedis maytai* cannot be segregated as different taxa.

According to the present records and those in the literature the species has two distinct areas of distribution, one in the upper reaches and small tributaries of the Ucayali River, and another one in the headwaters of the Marañon River (Condebamba River), with a transbasin extension into in the Jequetepeque River, on the Pacific slopes of the Andes (Fig. 5).

***Moritschus* PRETZMANN, 1965**

Diagnosis: Exognath of the third maxilliped usually more than 0.30 length of ischium of endognath. First male gonopods with strong longitudinal ridge on caudal surface; lateral expansion continuous with apex of appendage; apex truncated, very elongated in distal view, with two flat papillae on side or in front of spermatoc channel.

Type species: *Pseudothelphusa ecuadoriensis* RATHBUN, 1897.

Distribution: Southern Colombia, Ecuador and northern Peru.

***Moritschus henrici* (NOBILI, 1897)**

Pseudothelphusa henrici NOBILI, 1897: 1; 1901: 40; RATHBUN, 1898: 534, 537; 1905: 302; YOUNG, 1900: 219; COLOSI, 1920: 40; COIFMANN, 1939: 108.

Strengeria (Strengeria) henrici, PRETZMANN, 1965: 7.

Hypolobocera (Hypolobocera) henrici henrici, PRETZMANN, 1971: 17; 1972: 39, figs. 260, 261, 294, 296.

Hypolobocera henrici, PRETZMANN & MAYTA, 1980: 139, figs. 5, 6; RODRÍGUEZ, 1982: 66, figs. 190; 22a, f. 23d, 36a, d.

Hypolobocera (Hypolobocera) (peruviana) henrici henrici, PRETZMANN, 1983c: 355, figs. 7, 19, 34, 42, 50, 62, 66, 75.

Hypolobocera (Hypolobocera) (henrici henrici nora) PRETZMANN, 1977b: 436 (nomen nudum); 1978: 164, fig. 3.

Hypolobocera (Hypolobocera) (peruviana) henrici nora, PRETZMANN, 1983c: 356, figs. 6, 20, 32, 43, 47, 61, 67, 84-88.

Hypolobocera (Hypolobocera) conradi, MAYTA LINO, 1980: 71, fig. 3 (not *Pseudothelphusa conradi*)

NOBILI, 1897: 3, see RODRÍGUEZ & VON STERNBERG 1998).

Material: Peru, Amazonas Department, Imasita, Río Marañón, 1 October 1976, leg. N. IBAÑEZ, 1 male cl. 55.3 mm, cb. 92.1 mm, 1 female (IVIC 620).

Diagnosis: Carapace with upper frontal margin crested, advanced, with illdefined papillae and deep median notch. Third abdominal tergites with unusually deep cavities to receive apex of first gonopods, already present in juveniles. Propodous of fifth pereopods wide, with row of plumose setae on inferoposterior margin. First male gonopods extraordinarily large, lateral margin widening progressively towards apex which extends considerably laterally, giving apex in caudal view triangularly-elongated appearance; elongate process over field of spines ending in 2 rudimentary papillae which reaches almost to the opening of spermatic channel.

Remarks: The synonymy of this species was revised by RODRÍGUEZ & VON STERNBERG (1998). Additionally, the male specimen from Napuruca, Amazonas, recorded and illustrated by MAYTA LINO (1980) as *Hypolobocera (Hypolobocera) conradi* (NOBILI, 1897) is a juvenile specimen (cb. 41.5 mm) of *Moritschus henrici*. The species is widely distributed in Ecuador, where it covers a large territory in the Napo, Pastaza and Santiago Rivers which drain into the Amazon. In Peru, except for the record of MAYTA LINO (1980), it has been collected only in an isolated locality at the middle course of the Marañón River, in the piedmont of Cordillera del Condor, representing the southernmost limit of this Ecuadorian species (Fig.5).

***Moritschus peruvuviana* (RATHBUN, 1898) (Fig. 5A-E)**

Pseudothelphusa peruviana RATHBUN, 1898: 527, 535, 537, fig. 18; YOUNG, 1900: 229; NOBILI, 1901: 40; RATHBUN, 1905: 304; COLOSI, 1920: 21; COIFMANN, 1939: 109.

Hypolobocera (Hypolobocera) henrici peruviana, PRETZMANN, 1971: 17; PRETZMANN, 1972: 39, figs. 258, 259, 297-299.

Hypolobocera (Neostrengeria) macropa, PRETZMANN, 1972: 53 (pro parte, material from Moyambamba [sic]).

Hypolobocera peruviana, RODRÍGUEZ, 1982: 65, fig. 35.

Hypolobocera (Hypolobocera) peruviana, MAYTA LINO, 1980: 70, fig. 2; PRETZMANN, 1983b: 339, figs. 4, 10, 16, 25, 27, 31, 33.

Material: Peru, San Martin Department, Moyobamba, "purchased of Higgins". 1 male holotype, cl. 23,7 mm, cb. 34,5 mm (BMNH 74.53); Moyobamba, Río Mayo, Puerto San Juan Antonio, 9 November 1984, leg. H. ORTEGA, 1 male (MUSM).

Diagnosis: Carapace with upper frontal margin convex, carinated, with slight notch at middle and few scattered papillae; lateral lobe foliose, transverse, apex elongated in distal view, very narrow, ending cephalically in ill-defined extension, spatulate papilla near opening of spermatic channel ending in point directed cephalically.

Remarks: The species cannot be placed in the genus *Hypolobocera* because the lateral lobe is foliose and transversely placed; the apex is elongated in distal view, very narrow and is not prolonged cephalically in a well defined, spiniform or rounded apex, but rather in an ill-defined extension as in the species of *Moritschus* PRETZMANN, 1965 (sensu RODRIGUEZ & VON STERNBERG 1998), particularly *M. henrici* (NOBILI, 1897). Perhaps for this reason PRETZMANN (1971, 1972) gave it a subspecific rank as *Hypolobocera (Hypolobocera) henrici peruviana*. All collections of this species (holotype and additional material above) come from the Moyobamba Province, San Martin Department, in the upper reaches of Río Mayo, a minor affluent of the Río Huallaga, at altitudes around 860 m.

Biogeography

As has been shown by CAMPOS et al. (2002), the Pseudothelphusidae from southern Colombia, Ecuador and Peru form a specific faunal set clearly distinguished from more northerly pseudothelphusids assemblages. This faunal set comprises three distinct phyletic lines: (a) All species of the genus *Hypolobocera* with a lanceolate apex, (b) all

species of the genus *Lindacatalina* and (c) all species of the genus *Moritschus*. The Peruvian species belonging to these phyletic lines are distributed in two distinct geographical areas, separated by the water divides of the Andean Cordillera, as follows: (1) The Pacific slopes of the Eastern Cordillera; (2) The piedmont and upper slopes of the Andes traversed by effluents of the Amazon River (Fig. 5).

1. According to the available data the Pacific basin is devoid of pseudothelphusids from 3°20'S, where the last Ecuadorian species, *Hypolobocera delsolari* PRETZMANN, 1978, is found (RODRÍGUEZ & VON STERNBERG 1998), to 7°0'S where the first record of *H. chilensis* appears at Rio Saña. This species continues to appear at several littoral streams up to Rio Cañete, 100 km south of Lima (PRETZMANN 1983b). Beyond this locality, at 13° S, no species of pseudothelphusid is found on the Pacific basin of South America. A noteworthy transbasin distribution between the Pacific and Amazonian basins is displayed by *Hypolobocera chilensis* in the Jequetepeque River and the upper reaches of the Marañon (Fig. 5).

2. All Peruvian species from the Amazonian drainage, with the exception of *Moritschus henrici*, are found in the basins of the Huallaga and Ucayali Rivers. The most widely distributed species is *Lindacatalina gracilignatha*, found in the headwaters of the Marañon River, the Ucayali and its effluents, and also represented by an isolated record in the Jequetepeque River. The Ucayali basin is also the distribution area of *Hypolobocera ucayalensis*. Two species are present in the Huallaga basin, *Hypolobocera dantae* and *Moritschus peruviana*. The water divides of the Ucayali River forms the southern Amazonian limit and no pseudothelphusid is found in the neighboring basins of the Madre de Dios River and Lake Titicaca.

The vertical distribution of the six Peruvian pseudothelphusid, obtained from the labels of the materials studied and supplemented with information derived from cartographic evidence, is presented in Table 1. *Hypolobocera chilensis* ranges from 50 to 2000 m on the Pacific side, while in the upper reaches of the Marañon River it has been recorded from Chachapoyas at 1800 m altitude. *Hypolobocera dantae*, *H. ucayalensis*, and *Moritschus peruviana* are only known at altitudes of 400, 450, and 460 m, respectively. *Lindacatalina gracilignatha* has been recorded at 480 m altitude in the basin of the Ucayali and at 1800 and 2000 m altitude in the upper course of the Jequetepeque and Marañon Rivers, respectively. The only locality in Peru where *Moritschus henrici* has been recorded is situated at approximately 500 m altitude, but RODRÍGUEZ & VON STERNBERG (1998) give numerous records from neighboring areas of Ecuador where it ranges from 450 to 1100 m altitude. Therefore, the evidence available indicates that the species of the Hypolobocerini does not descend lower down than 400 m altitude in the Amazon basin.

In general the number of species of pseudothelphusids diminish progressively in a North-South direction in the Andes. To quantify this decline we computed the total number of species and the number of species that appeared for the first time at each degree of latitude from 6° N to 12° S on the western side of South America (Fig. 6). In southern Colombia (6° N to 2° N) the diversity of species is high, but it increases even further in Ecuador (1° N to 5° S). In the Peruvian Andes there is sharp decline and after 13° S no new species appears. Thus it is an impoverished pseudothelphusid fauna that reaches the southern limits of the family.

As shown in Fig. 7, three taxonomic groups of fresh water crabs could be delimited in the Amazonian basin. The Hypolobocerini do not descend beyond 400 m altitude, and

the Kingsleyini are restricted to the lower planes of the Amazonian basin (MAGALHÃES & RODRÍGUEZ 2002). Consequently both tribes of Pseudothelphusidae are separated by a vast territory and no overlapping occurs in the Amazonian effluents.

On the other hand the Trichodactylidae and the Kingsleyini share a common territory throughout the basin, and the former surpass the limits of the Kingsleyini, and overlap at several places the Hypolobocerini. However, this geographic overlap does not imply an ecological one. At Rio Camisea, one of the headwaters of Rio Urubamba in the Ucayali basin, where *Lindacatalina gracilignatha* was collected (see Material), we found also the trichodactylid *Valdivia gila* PRETZMANN, 1978, with the same field data, but their collector J. SANTISTEBAN (pers. commun.) informed us that the first species was found under the leaf litter in the forest, whereas the second species was collected submerged in the stream. This separation may be explained by the difference in the respiratory mechanisms. While the pseudothelphusids are capable of gas interchange in the air through pseudolungs, the trichodactylids are restricted to gas interchange in water through gills (DIAZ & RODRÍGUEZ 1977.)

The absence of Pseudothelphusidae on the Pacific slopes in the area between Ecuador and Peru, and south of 13° S could be attributed to the climatic conditions found in the southern Pacific. All the coastal areas of South America, from about 4° S to about 30° S have a mean annual rainfall of less than 250 mm, but south of Lima the rainfall drops to less than 50 mm per year (KENDREW, 1961). The coastal areas between Ecuador and Peru where the Sechura desert is found, and southward from latitude 13° S, are arid or semiarid (ANONYMOUS 1994), with a territory in-between where rainfall over the Cordillera feeds the permanent streams inhabited by *Pseudothelphusa chilensis*.

As mentioned in the introduction, the northern boundary of the Pseudothelphusidae in Mexico is delineated by the "cambarid line" (RODRÍGUEZ 1986), with the crayfishes of the family Cambaridae excluding (or rarely overlapping) the pseudothelphusid in the habitats favored by these last organisms. However the southern limit in the Ucayali basin cannot be attributed to the presence of competing organisms. The results presented in Fig. 6 rather suggest a relatively recent ocolonization of the this basin by the Pseudothelphusidae. On the other hand, the range of *Pseudothelphusa chilensis*, wedged in-between two large littoral desertic areas, as well as the presence of this species in the neighboring basin of the Marañon, suggests that this species originated from an Amazonian stock. Moreover, the transbasin distribution of *Lindacatalina gracilignata* in the Marañon and the Jequetepeque basins also reinforces the possibility of a former biotic interchange in this area.

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Table 1: Altitudes reported for Peruvian Pseudothelphusids (m above sea level).

<i>Hypolobocera chilensis</i>	>100-2000
<i>H. dantae</i>	1400
<i>H. ucayalensis</i>	450
<i>Lindacatalina gracilignatha</i>	480
<i>Moritschus henrici</i> *	450-1100
<i>M. peruviana</i>	860

* Altitudes reported for Ecuador in RODRÍGUEZ & VON STERNBERG (1998).

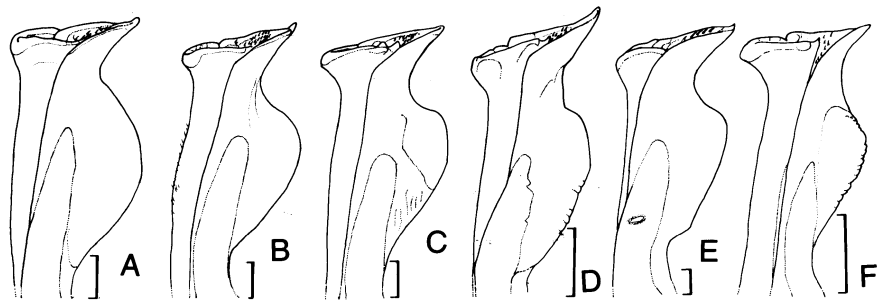


Fig. 1:

First left gonopod of *Hypolobocera chilensis* (H. MILNE EDWARDS & LUCAS, 1844), from several localities in Peru, caudal view: **A**: Chachapoyas (IVIC 607); **B**: Tembladera, Valle Jequetepeque, Cajamarca Department, (IVIC 608); **C**: El Ponjo, La Libertad, Rio Jequetepeque (MUSM); **D**: Rio Saña, La Florida, Cajamarca Department, (MUSM); **E**: San Gregorio, Cajamarca Department (IVIC 609); **F**: Yumpe, Bolognesi Province, Ancash Department (MUSM 1116).

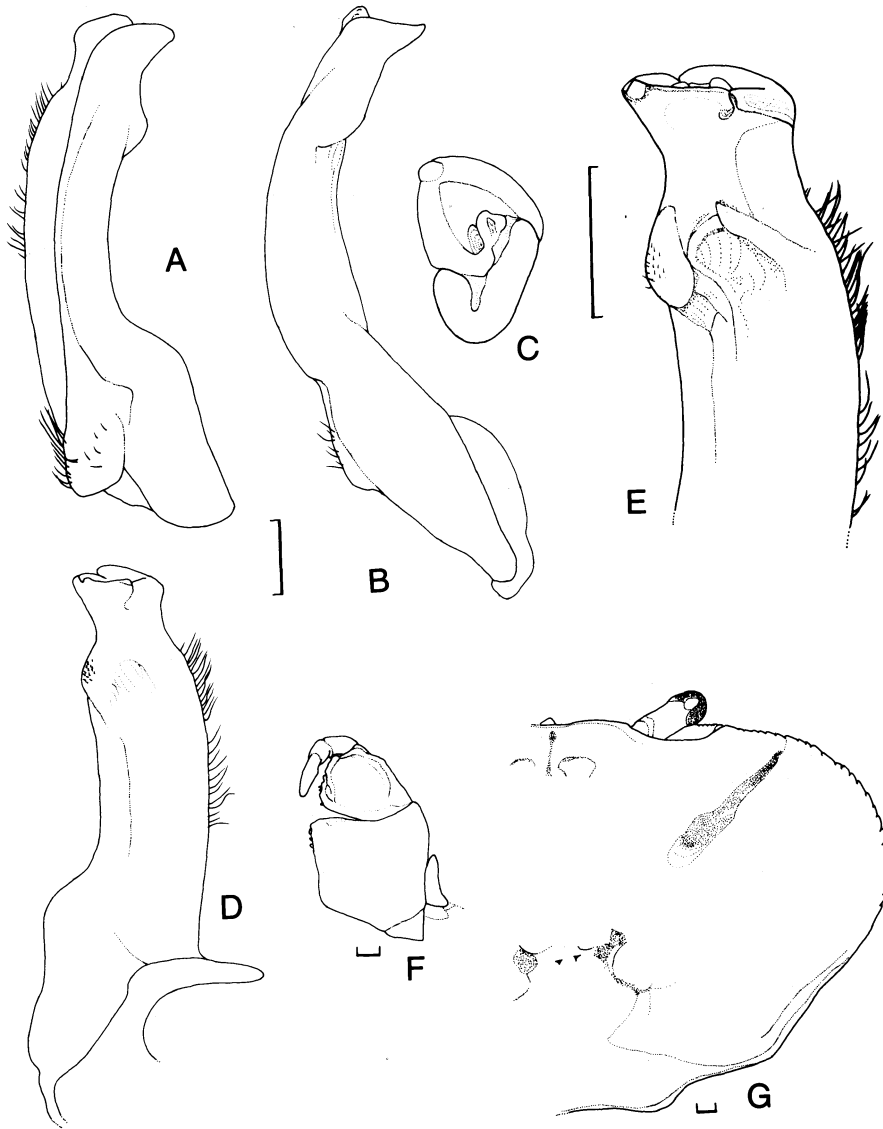


Fig. 2:
Hypolobocera dantae n.sp., holotype male from, Dantas, Molino, Huanuco, Peru (IVIC 1105): **A**: first left gonopod, caudal; **B**: lateral; **C**: apex, distal; **D**: cephalic; **E**: detail of apex, cephalic; **F**: third maxilliped; **G**: dorsal view of right side of carapace.

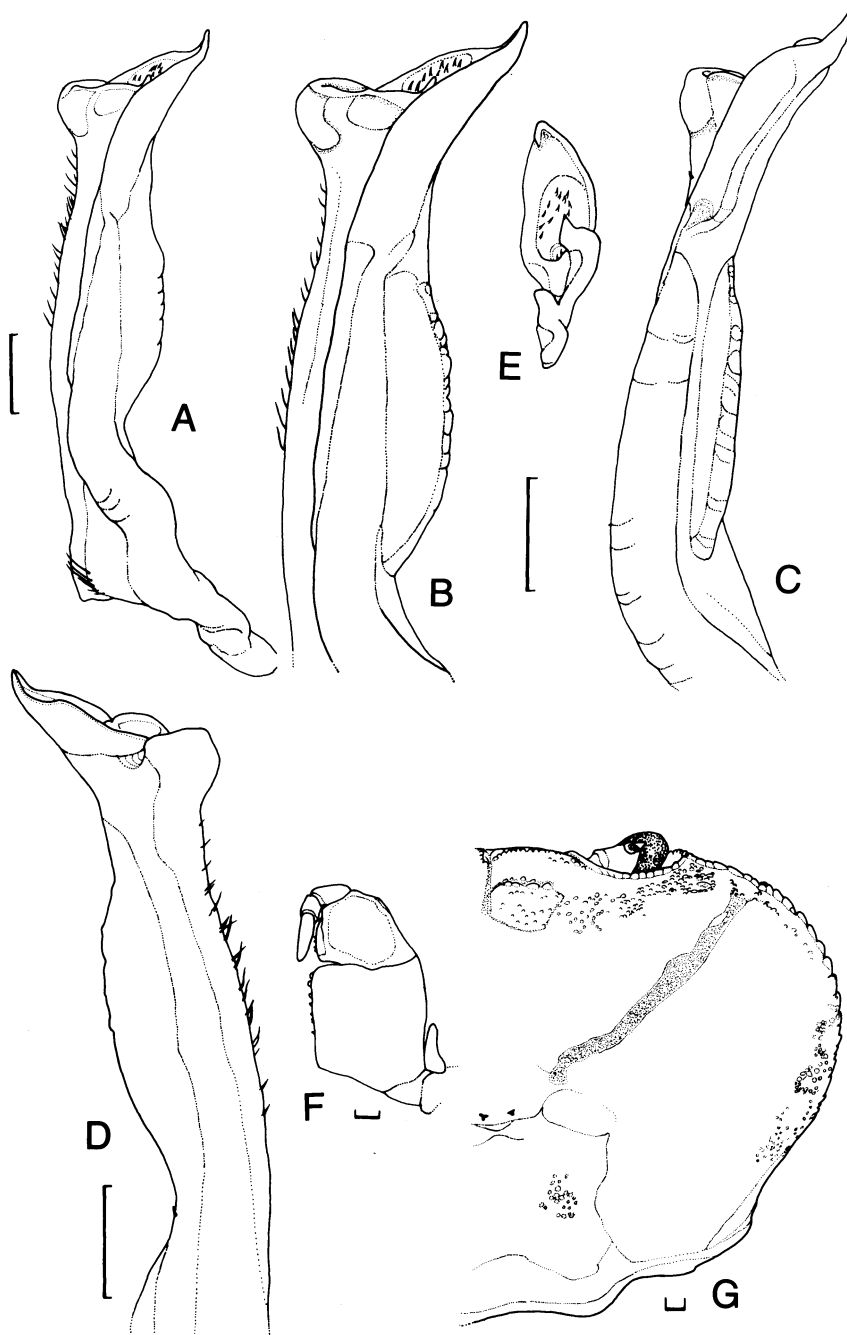


Fig. 3:
Hypolobocera ucayalensis n.sp., holotype male from Ucayali, Pucallpa, Peru (IVIC 1115): A: first left gonopod, caudal; B: detail of apex, caudal; C: lateral; D: cephalic; E: apex, distal; F: third maxilliped; G: dorsal view of right side of carapace.

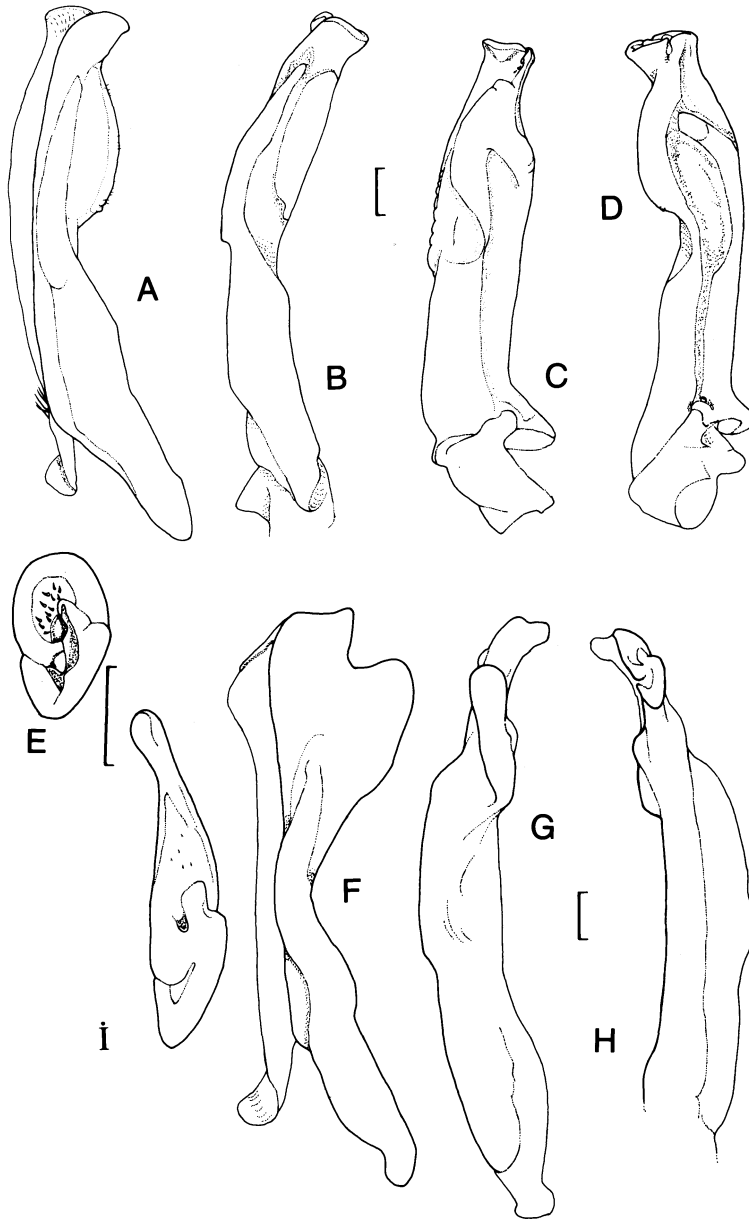


Fig. 4:
A-E: *Lindacatalina gracilignatha* (PRETZMANN, 1972), male from Camisea, La Convención, San Martín Department (MUSM): **A:** first left gonopod, caudal; **B:** lateral; **C:** cephalic; **D:** mesial; **E:** apex, distal; **F-I:** *Moritschus peruviana* (RATHBUN, 1898), male holotype from Moyobamba, Peru (BMNH 7453): **F:** first left gonopod, caudal; **G:** lateral; **H:** cephalic; **I:** apex, distal.

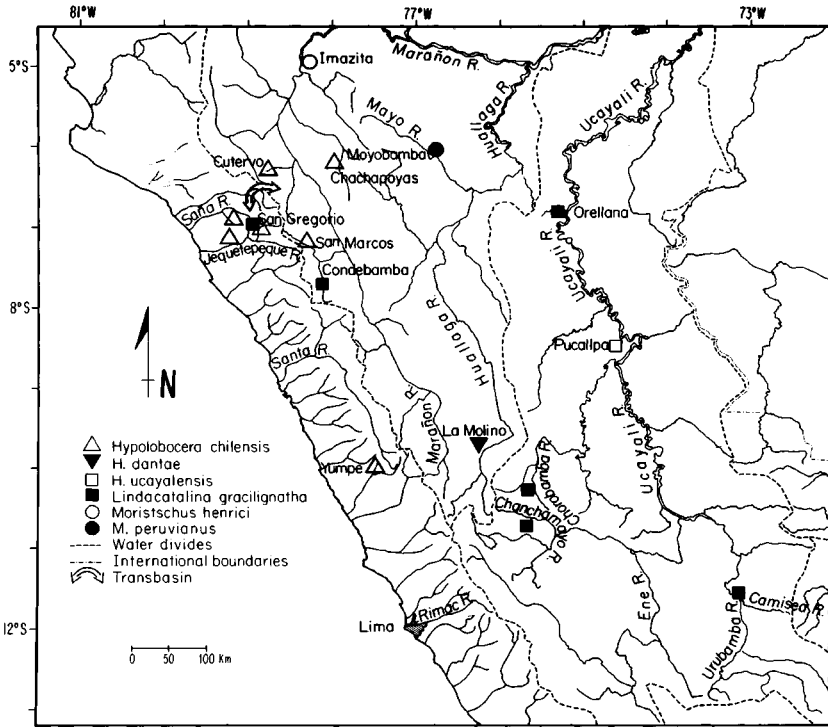


Fig. 5:
Geographical distributions of Peruvian Pseudothelphusidae.

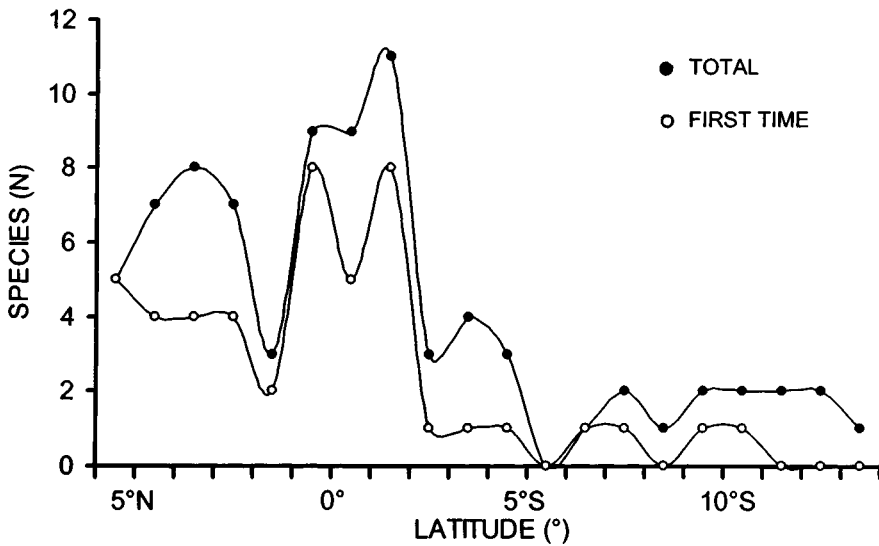


Fig. 6:
Total number of species and number of species that appear in the Andes for the first time at each degree of latitude, from 6° N to 12° S.

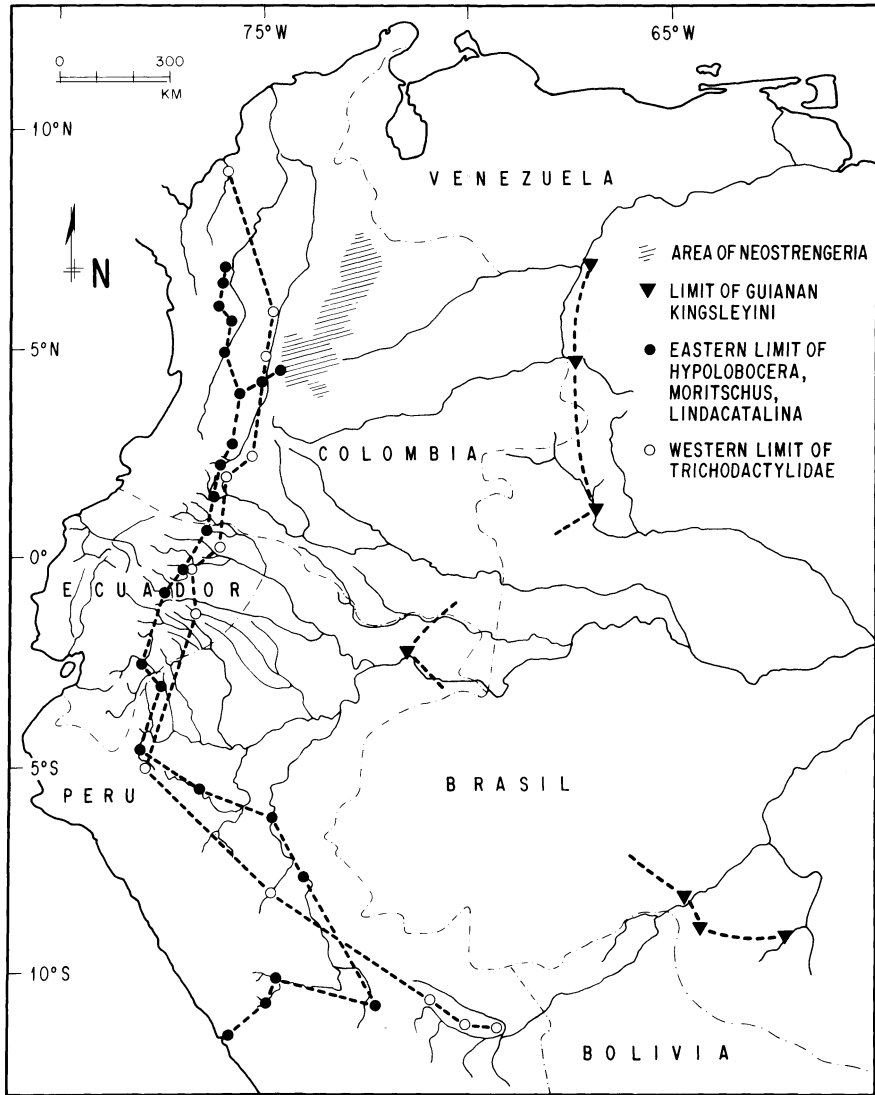


Fig. 7:
Amazonian boundaries of the families Pseudothelphusidae and Trichodactylidae.