

The freshwater crabs of southern Colombia and their biogeographical affinities (Brachyura: Pseudothelphusidae).

Campos¹, M. R.; Magalhães^{2,3}, C. and Rodríguez⁴, G.

¹ Universidad Nacional de Colombia, Instituto de Ciencias Naturales, Apartado Aéreo 103698, Bogotá, Colombia.

² Instituto Nacional de Pesquisas da Amazônia (INPA), Caixa Postal 478, 69.011-970 Manaus, Brasil

³ Research Fellow of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)

⁴ Centro de Ecología, Instituto Venezolano de Investigaciones Científicas, Apartado 21827, Caracas 1020 A, Venezuela

Abstract

Two new species of Pseudothelphusidae, *Hypolobocera barbacensis* and *Moritschus caucasensis*, and three new records of species already known, *Hypolobocera cajambrensis* Prah, 1988, *Hypolobocera meineli* Prah, 1988, and *Lindacatalina sumacensis* Rodríguez and Sternberg, 1998, are added to the southern Andean biota of Colombia. These five species, and others cited in the literature, have affinities with the pseudothelphusid fauna of Ecuador, suggesting the existence of a closely related group of southern taxa that extends into the Amazonian and Pacific slopes of Ecuador and southeastern Colombia. This group is separated by the water divides of the San Juan, Cauca and Magdalena basins from the northern species found at a short distance north of these divides.

Key words: Freshwater crabs, Pseudothelphusidae, Colombia, Andean Biota

Introduction

The large geographical extension and the variety of topographical relief of Colombia originates a wide variety of environments; together with its position as a land bridge between Central and South America, this assortment of environments results in an high biological diversity (Rangel, 1995), which is observable also in the freshwater crab fauna of the Family Pseudothelphusidae that inhabits small streams of the Colombian Andes. As an example, the genus *Hypolobocera* is represented by 20 species (Campos, in press; Rodríguez *et al.*, 2002), whereas in the neighboring territories of Venezuela and Ecuador it is represented by only 1 and 12 species, respectively. The generic fragmentation of the family is also noticeable in Colombia, with 11 genera within its territory (Rodríguez, 1982; Campos, in press), as compared with 10 genera for the whole of Central America, from Panama to Guatemala (Rodríguez, 1982), 8 for Venezuela (Rodríguez, 1982; Campos, 2001) and 3 for Ecuador (Rodríguez and Sternberg, 1998).

A recent examination of the Colombian freshwater crabs in the collections of the Field Museum of Natural History, Chicago (FMNH), the Museo de Historia Natural, Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá (ICN-MHN), and the Instituto Nacional de Pesquisas da Amazônia, Manaus (INPA), has revealed the existence of yet another two new species of *Hypolobocera* and *Moritschus*, as well as the extension of one of the Ecuadorian species of *Lindacatalina* into southern Colombia. The terminology used in the present contribution for the description of the first gonopod is according to the criteria established by Smalley (1964) and Rodríguez (1982). The abbreviations cb and cl are used for carapace breadth and carapace length, respectively.

SYSTEMATIC ACCOUNT

Family PSEUDOTHELPHUSIDAE Rathbun, 1893

Subfamily PSEUDOTHELPHUSINAE Ortmann, 1893

Tribe HYPOLOBOCERINI Pretzmann, 1971

Hypolobocera barbacensis, new species

(Fig. 1)

Holotype.- Colombia, Departamento de Nariño, Municipio Barbacoas, Corregimiento Altaquer, Carbonera Stream, 01°17'N 78°08'W, 1400 m altitude, 31 Jul 1999, leg. M. R. Campos, 1 male, cl 30.1 mm, cb 46.9 mm (ICN-MHN-CR 1774).

Paratypes.- Colombia, Departamento de Nariño, Municipio Barbacoas, Corregimiento Altaquer, Vereda Chirbí, Stream affluent of Güiza River, 700 m altitude, 31 Jul 1999, leg. M. R. Campos, 6 males, the largest cl 21.1 mm, cb 32.6 mm, the smallest cl 11.7 mm, cb 17.7 mm, 3 females, the largest cl 24.1 mm, cb 37.1 mm, the smallest cl 11.7 mm, cb 17.4 mm (ICN-MHN-CR 1773).- Colombia, Departamento de Nariño, Municipio Barbacoas, Corregimiento Altaquer, Altaquer Stream, 1300 m altitude, 8 Mar 1995, leg. P. Ruiz, 1 female, cl 19.1 mm, cb 32.0 mm (ICN-MHN-CR 1873).

Type locality - Carbonera Stream, Corregimiento Altaquer, Municipio Barbacoas, Departamento de Nariño, Colombia.

Diagnosis.- First male gonopod with lateral lobe narrow and rounded. Apex outline subtriangular in apical view, distally expanded into rounded projection, prominent subtriangular papilla on caudal side of spermatic channel. Mesial lobe reduced as strong fold along margin. Third maxilliped with exognath approximately 0.4 times length of ischium of endognath.

Description (based on 7 males and 4 females): Carapace smooth, regions well demarcated. Cervical grooves narrow and shallow, becoming wide and deep towards anterolateral margin, ending some distance from margin. Postfrontal lobes prominent, rounded, delimited anteriorly by two depressions. Median groove shallow, narrow with small notch on upper border of front. Surface of carapace in front of postfrontal lobes flat and inclined anteriorly. Upper border of front convex with shallow median notch, demarcated by row of prominent tubercles; lower margin visible in dorsal view, slightly sinuous in frontal view. Surface of front between upper and lower borders low and excavated. Lower orbital margin with row of tubercles. Anterolateral margin of carapace with two notches behind exorbital angle, fringed by papillae before cervical groove, followed by 12-15 blunt teeth decreasing in size posteriorly, posterolateral margin smooth (Fig. 1F).

Endopod of third maxilliped with outer margin of ischium regularly curved and slightly concave distally. Exopod of third maxilliped approximately 0.4 times the length of endopodal ischium (Fig. 1G). Aperture of efferent branchial channel trapezoidal (Fig. 1I).

Merus of cheliped subtriangular in cross section; external border rounded, with irregular transverse rows of tubercles; internal upper border with a longitudinal row of conical teeth increasing in size distally; internal lower border rounded, with a row of indistinct tubercles. Carpus with tubercles and a prominent distal spine on inner side, outer side rounded, smooth. Palm moderately swollen, smooth on both sides, with irregular rows of papillae on upper and lower rounded borders. Fingers with longitudinal, almost regular rows of tubercles, not gaping when closed on larger chela and tips crossing (Fig. 1H). Pereiopods 2-5 slender, dactyli with five longitudinal rows of corneous spines, increasing in size distally; dactylus approximately 1.5 times the length of propodus.

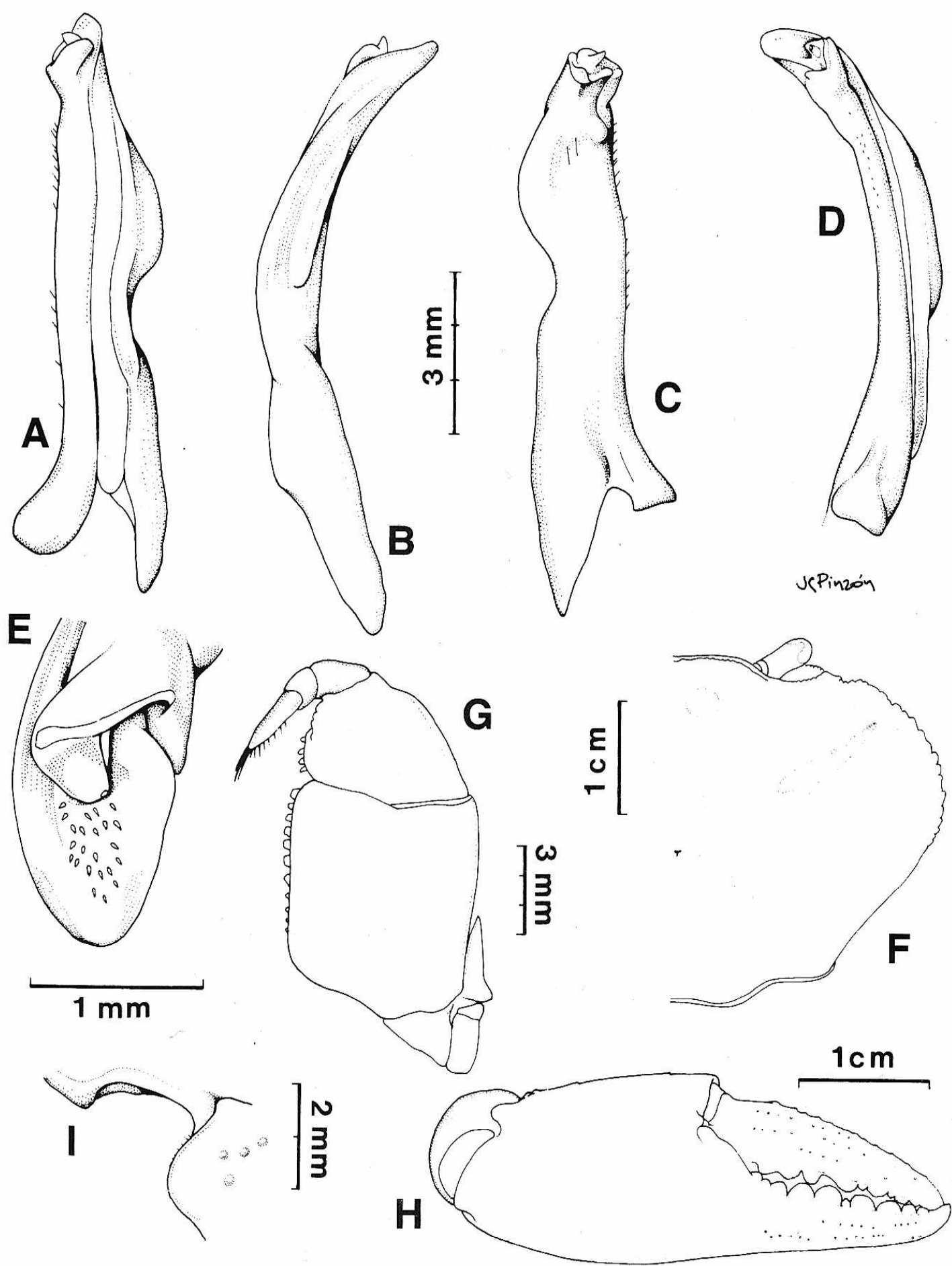


Figure 1: *Hypolobocera barbacensis*, new species, male holotype from Corregimiento Altaquer, Departamento de Nariño, Colombia (ICN-MHN-CR 1774): A, first left gonopod, caudal view; B, same, lateral view; C, same, cephalic view; D, same, mesial view; E, same, apex, distal view; F, dorsal view of right side of carapace; G, left third maxilliped, external view; H, larger chela, right, external view; I, aperture of efferent channel, external view.

First male gonopod slender, bent caudocephalic, constricted at half its length on lateral side (Fig. 1A-D). Mesial side straight with row of tiny setae. Caudal ridge long, sinuous, ending in narrow ridge beyond apex (Fig. 1A). Lateral lobe narrow and rounded (Fig. 1A-C). Small rounded bulge on subdistal cephalic surface (Fig. 1C). Apex outline subtriangular in apical view, distally expanded into rounded projection with caudal ridge, directed distally; prominent subtriangular papilla on caudal side of spermatic channel (Fig. 1A, C-E). Mesocaudal projection of spermatic channel terminated in wide and slightly rounded papilla (Fig. 1A-C). Mesial lobe reduced as strong fold along margin (Fig. 1D-E).

Color [Smithe (1975) color code in parenthesis]. - The holotype preserved in alcohol is light brown (near 37, Antique Brown) on the dorsal side of the carapace. The walking legs and chelipeds are Cinnamon (39) dorsally, and ventrally Sayal brown (223C). The ventral surface of the carapace is Cinnamon (39).

Remarks.- *Hypolobocera barbacensis* belongs to a group species which include *H. meineli* and *H. exuca* Pretzmann, 1977, in which the lateral lobe is considerably reduced or obsolescent. *Hypolobocera barbacensis* can be distinguished from *H. meineli* in the position of the lateral lobe, which is more developed proximally in *H. barbacensis*. In *H. exuca* the lateral lobe is almost obsolete and the outline of the apex in distal view is far more elongated than in both *H. barbacensis* and *H. exuca*, and consequently the apex is more expanded cephalically.

Hypolobocera cajambrensis Prah, 1988

Material examined.- Colombia, Departamento de Cauca, quebrada Huanqui, Rio Saija area, 02°50'N 77°30'W, 100 m altitude, leg. B. Malkin and A. Granja, 3 Nov 1971, 1 male cl. 24.9 mm, cb. 47.6 mm (FMNH 3675).

Remarks.- Prah (1988) originally assigned this species to the genus *Hypolobocera*. However, the auxiliary lobe parallel to the lateral lobe on the mesial side and the rounded, or slightly oval outline of the apex in distal view are characters associated with *Lindacatalina* Pretzmann, 1977. On the other hand this species lacks the characteristic spines which cover the supplementary lobe in *Lindacatalina*. The main area of distribution of *Lindacatalina* is in the Amazonian slopes of the Eastern Cordillera of Ecuador, with only one species showing a transandean distribution into the Pacific slope (Rodríguez and Sternberg, 1998), but recently the range of an Ecuadorian species, *Lindacatalina orientalis* (Pretzmann, 1968) has been extended to the San Miguel-Putumayo basin, in the Amazon basin of Colombia, and a new species, *L. sinuensis* Rodríguez, Campos and López, 2002, have been described from the Sinú River in northern Colombia.

Hypolobocera gorgonensis Prah, 1983

Material examined.- Colombia, Departamento de Cauca, Gorgona Island (03°00'N 78°12'W), Pacific, Jan-Fev 1962, leg. F. Medem, 2 males cl. 43.2 and ? mm, cb. 69.9 and 81.2 mm, 1 female cl. 47.2 mm, cb. 76.4 mm (FMNH 3687).

Remarks .- Rodríguez and López (in press) have indicated that this species is a senior synonym of *Hypolobocera muisnensis* Rodríguez and Sternberg, 1998, thus extending the area of distribution of the species from the continental island of Gorgona to the northern Pacific slope of Ecuador.

Hypolobocera meineli Prah, 1988

Material examined.- Colombia, Departamento de Cauca, quebrada Huanqui, Rio Saija area, 02°50'N 77°30'W, 100 m altitude, leg. B. Malkin and A. Granja; 18 Oct - 3 Nov 1971; 1 male, cl 34.0 mm, cb 59.7 mm, 4 females cl 23.4 to 38.7 mm, cb 38.0 to 66.4 mm (FMNH 3688). Same locality, 1 male, cl 27.7 mm, cb 44.8 mm (INPA 575).

Remarks.- The first gonopods of this species resemble those of *Hypolobocera exuca*, in the funnel-shaped aspect of the apex and the strongly developed caudal ridge. However, in *H. exuca* the lateral lobe is completely absent and the apex in distal view is strongly expanded cephalically (see Rodríguez and Sternberg, 1998, fig. 4A-G). The close resemblance between both taxa suggests the possibility of an allopatric event in two disjunct areas.

Lindacatalina sumacensis Rodríguez and Sternberg, 1998

Material examined.- Colombia, Departamento de Putumayo, headwaters of Rio San Miguel at Santa Rosa, Kafan Indian village, collector and date unknown, 1 male, cl. 21.2 mm, cb. 35.1 mm (FMNH 3684).

Remarks. - The species was originally described from the slopes of Mount Sumaco, in the Napo Province, in the Amazonian slopes of Ecuador. It had been previously recorded from Colombia by Rodríguez *et al.* (2002) in the Caquetá basin. Both records extend the range of the species into the Amazonian basin of Colombia.

Moritschus caucasensis, new species

(Fig. 2)

Holotype.- Colombia, Departamento de Cauca, quebrada Huanqui, Rio Saija area, 02°50'N 77°30'W, 100 m altitude, B. Malkin and A. Granja, 18 Oct - 3 Nov 1971, male, cb 26.1 mm, cl 15.9 mm (INPA 574).

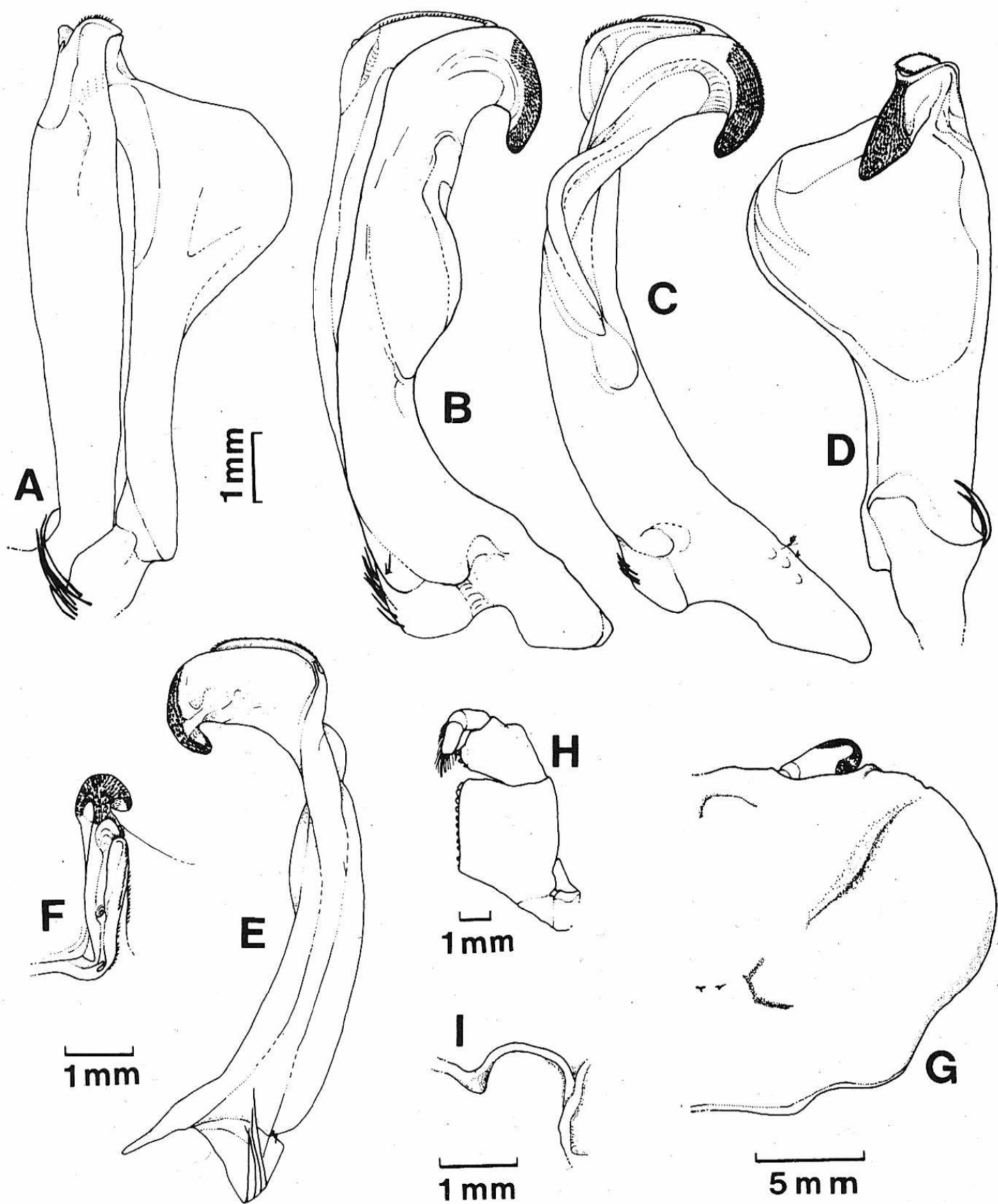


Figure 2: *Moritschus caucasensis*, new species, male holotype from Rio Saija area, Departamento de Cauca, Colombia (INPA 574): A, first left gonopod, caudal view; B, same, lateral view; C, same, mesocephalic view; D, same, cephalic view; E, same, mesial view; F, same, apex, distal view; G, right side of carapace, dorsal view; H, left third maxilliped, external view; I, aperture of efferent channel, external view.

Paratypes.- Same locality, collectors and date, 1 male cb 24.8 mm, cl. 15.1 mm, 1 female cb 23.5 mm, cl 15.0 mm (INPA 878). - Same locality, collectors and date, 1 male, 1 female (FMNH 3670).

Type locality.- Quebrada Huanqui, Rio Saija area, Departamento de Cauca, Colombia.

Diagnosis.- Male gonopods slender, strongly arched laterally; lateral lobe extraordinarily prominent, foliose, rounded, concave in cephalic view, occupying distal half of the appendage; apex strongly elongated mesiolaterally and strongly arched; caudal end of apex produced into strong fingerlike process directed proximally, densely covered by minute spines. Elongate process on caudal side of field of spines linguiform, with row of spinules on distal border and caudal border. Caudal border of apex devoid of spinules.

Description (based on 2 males and 1 female).- Carapace smooth, almost flat, regions indistinct; pair of gastric pits very close to each other, weakly visible on metagastric region. Cervical grooves shallow and wide, sinuous, ending near anterolateral margin. Postfrontal lobules low, small, obliquously positioned. Median groove obsolescent. Surface of carapace between front and postfrontal lobules uniform and slightly inclined anteriorly, covered with few scattered granules visible under magnification. Upper border of front almost straight in frontal view, slightly bilobed in dorsal view, fringed with row of faint tubercles; lower border carinate and sinuous in both dorsal and frontal views, a little more projected anteriorly than upper one. Lower orbital border marginated, with a few indistinct papillae externally, otherwise smooth. Exorbital angle as a small, blunt prominence. Anterolateral margin of carapace not continuous with exorbital angle, slightly curved upward above it, bearing faint notch at cervical groove end in the holotype, smooth otherwise.

Endopod of third maxilliped with outer margin of ischium slightly convex, inner margin straight. Exopod of third maxilliped 0.33 times the length of endopodal ischium. Aperture of efferent branchial channel wide, semicircular.

First pereopods heterochelous; left cheliped larger than right in holotype, opposite arrangement in male paratype. Merus of cheliped subtriangular in cross section; external border rounded, with irregular transverse rows of papillae, wider and fainter distally; internal upper border with longitudinal row of conical teeth increasing in size distally; internal lower border rounded, with row of indistinct tubercles medially. Carpus with faint tubercles and conical distal spine on inner side, outer side rounded, smooth. Palm of larger cheliped inflated, smooth on both sides, with indistinct tubercles only on proximal portion of lower, rounded border; fingers with longitudinal, almost regular rows of very faint tubercles, gaping when closed, tips not crossing. Pereopods 2-5 slender, dactyli with five longitudinal rows of corneous spines, increasing in size distally; pereopod 2 the longest (length 1.25 times the carapace breadth), dactylus approximately 1.5 times the length of propodus.

Male gonopods slender, strongly arched laterally; lateral lobe extraordinarily prominent, foliose, rounded, concave in cephalic view, occupying the distal half of the appendage; apex strongly elongate in meso-lateral plane and strongly arched; caudal end of apex produced into strong finger-like process directed proximally, densely covered by minute spines. Elongated process on caudal side of field of spines linguiform, with row of spinules on distal and caudal borders. Caudal border of apex devoid of spinules.

Remarks.- This species is closely associated to *Moritschus narinnensis* Campos and Rodríguez, 1988, but can be clearly distinguished from this by the shape and development of the lateral lobe, the absence of spinules on the caudal border of apex, and the shape and spinulation of the process on the caudal side of the field of spines.

Up to now the genus *Moritschus* Pretzmann, 1965, comprised four species (Rodríguez and Sternberg, 1998; Rodríguez, Campos and López, 2002): *M. ecuadorensis* (Rathbun, 1897), *M. henrici* (Nobili, 1897), *M. narinnensis* Campos and Rodríguez, 1988, and *M. altaquerensis* (Rodríguez, Campos and López, 2002). As understood by Rodríguez and Sternberg (1998), this genus departs from the more generalized condition of *Hypolobocera* in which the lateral lobe is clearly defined. In the species of *Moritschus* the lateral lobe is advanced to a subterminal position and merges with the structure of the apex. At the same time the apex becomes elongated, departing from the rounded or triangular shape of *Hypolobocera*. *Moritschus henrici* still preserves the small round papillae that overhangs the gonopore in *Hypolobocera* (see Rodríguez and Sternberg, 1998, fig. 1I), but in the rest of the species these papillae are replaced by an elongated process, as the one shown for the present new species (Fig. 2).

One of the Colombian species, *M. altaquerensis*, preserves most of the characters of the Ecuadorian *Moritschus*, but the two other Colombian species depart considerably from the generalized hypolobocerid condition by the presence of a strong finger-like process densely covered by spinules, although a rudiment of this process could be found in the beak-like process of *M. ecuadorensis* (see Rodríguez and Sternberg, 1998, fig. 1H). *Moritschus altaquerensis* departs even further from the hypolobocerid condition in the foliose shape of the lateral lobe. The five species can be distinguished from each other by the following key.

Key to the species of *Moritschus*

- 1. Lateral margin of first gonopod's apex without spinules; caudal end produced into short beak; elongate process over field of spines with 2 rudimentary papillae directed laterally, placed near opening of spermatic channel or displaced towards lateral expansion; distal margin entire 2
- Lateral margin of apex covered with small closely set spinules; caudal end produced in strong finger-like process directed proximally; elongated process over field of spines formed by one papilla, displaced towards lateral expansion, distal margin bordered by minute spinules. Adult specimens very small (cb less than 3 cm) 4
- 2. Elongated process over field of spines placed near opening of spermatic channel. Adult specimens very large (cb more than 6 cm) *M. henrici*
- Elongated process over field of spines displaced towards lateral expansion. Adult specimens very small (cb less than 3 cm) 3
- 3. Lateral margin stretches out progressively towards the apex. The elongated process over the field of spines presents a notch between two rudimentary papillae *M. ecuadorensis*
- Lateral margin forms a well defined subtriangular expansion. The apex of elongated process over the field of spines is continuous *M. altaquerensis*
- 4. Lateral lobe not extraordinarily prominent, transverse, not concave in cephalic view. Small closely set spinules extend to caudal border of apex *M. narinnensis*
- Lateral lobe extraordinarily prominent, rounded, foliose, concave in cephalic view. Caudal border of apex devoid of spinules *M. caucasensis* n. sp.

BIOGEOGRAPHY

All the species recorded in the present contribution from southern Colombia are either range extensions of Ecuadorian species or are species closely related to Ecuadorian taxa. *Lindacatalina sumacensis*, originally described from the Napo Province of Ecuador (Fig. 3), is recorded here from the San Miguel-Putumayo basin. It has been also recorded by Rodríguez, Campos and López (2002) from the Mocoa-Caquetá basin (Fig. 4). These localities cover an extensive range in the Amazonian slopes of the Eastern Andean Cordillera. *Hypolobocera gorgonensis* presents disjunct areas in Gorgona island, off the Colombian coast, and the northern Pacific slope of Ecuador. *Hypolobocera cajambrensis* is closely associated to

Lindacatalina, a genus whose main area of distribution is in the Amazonian slopes of the Eastern Cordillera of Ecuador, with an exceptional transandean extension into the Pacific basin of Ecuador.

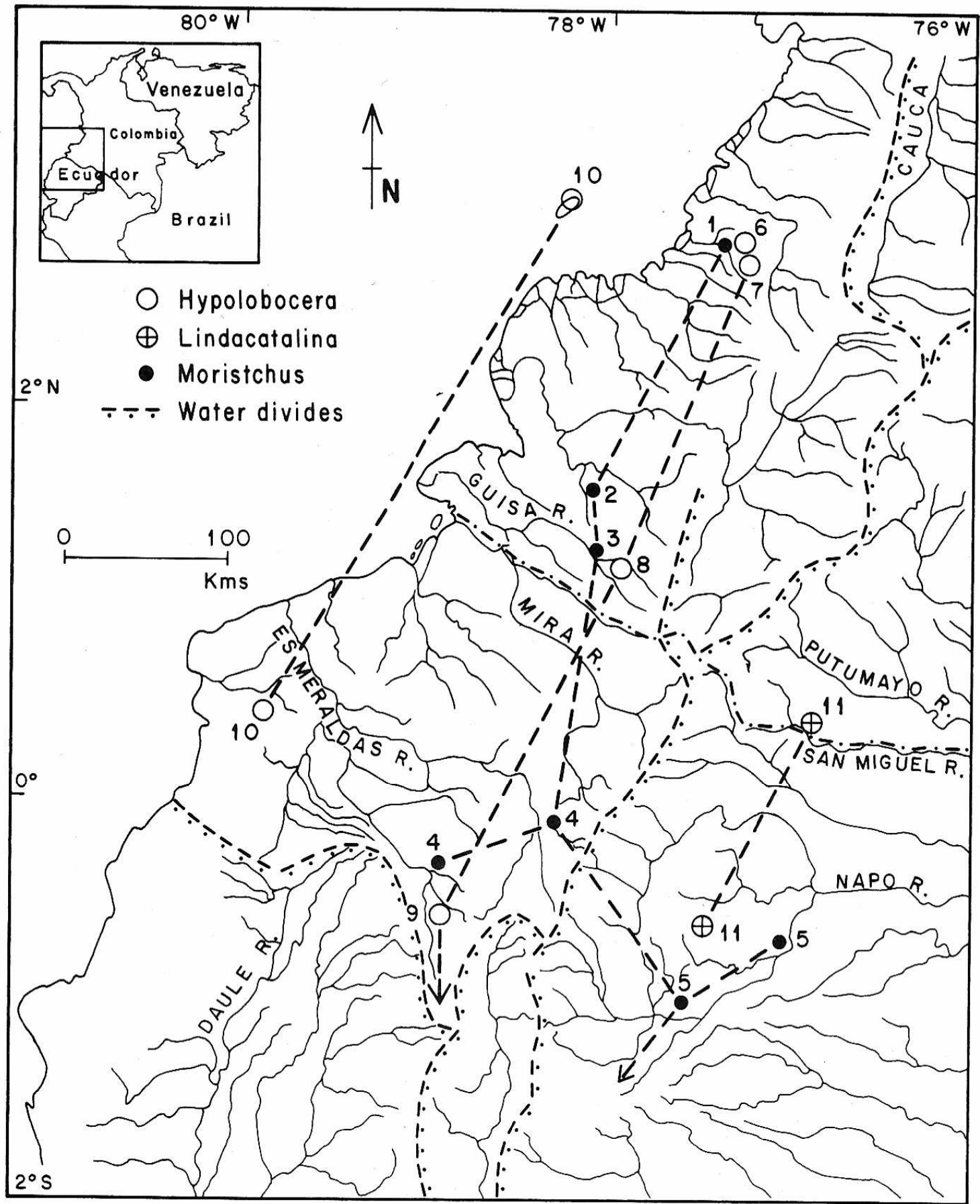


Figure 3: Geographic distribution of some southern Colombian species of Pseudothelphusidae. 1. *Moritschus caucasensis*, 2. *M. narinnensis*, 3. *M. altaquerensis*, 4. *M. ecuadorensis*, 5. *M. henrici*, 6. *Hypolobocera cajambrensis*, 7. *H. minelli*, 8. *H. barbacensis* n. sp., 9. *H. exuca*, 10. *H. gorgonensis*, 11. *Lindacatalina sumacensis*. Dashed lines from left to right indicate the geographical extension of *H. gorgonensis*, the species of *Moritschus*, the species of *Hypolobocera*, and *L. sumacensis*, respectively. Records for Ecuadorian species taken from Rodríguez and Sternberg (1998).

Of the two new species described, *Hypolobocera barbacensis* belongs to a group of species with reduced lateral lobe represented by *H. meineli* and *H. exuca*. *Hypolobocera barbacensis* and *H. meineli* are restricted to southern Colombia (present records and Campos, in press), but the area of distribution of *H. exuca* extends into the basins of the Esmeraldas and Daule Rivers in Ecuador (Rodríguez and Sternberg 1998). *Moritschus caucasensis* belongs to a genus whose other representatives occupy disjunct areas in southern Colombia and in the Pacific and Amazonian slopes of the Ecuadorian Andes, as follows: 1. Southern Colombia, in the Pacific slope of the Nariño and Cauca departments (*M. narinnensis*, *M. altaquerensis* and *M. caucasensis*); 2. Ecuador, in the Pacific slope (*M. ecuadorensis*) and in the Amazonian basin (*M. henrici*).

Nauplius

Four other species with Ecuadorian affinities are reported in the literature. *Lindacatalina orientalis* (Pretzmann, 1968), a species with transbasin distribution in Central Ecuador, was recorded by Prah (1988) and Rodríguez, Campos and López (2002) from the Amazonian basin of Colombia (Fig. 4). *Hipolobocera marthelatami* (Pretzmann, 1965) possess a lateral lobe covered by wrinkles, pores and minute spinules; on the cephalic side there are indications of a second ridge parallel to the lateral lobe. These characters are indication of a relationship with *Lindacatalina* and constitute an exceptional transbasin penetration of an Ecuadorian taxa into the Magdalena basin (Fig. 4). *Hipolobocera mutisi* Prah, 1988 presents in the cephalic side the gonopod a strong rib parallel to the lateral lobe, similar to the condition found in *Lindacatalina*. *Hipolobocera buenaventurensis* (Rathbun, 1905) (*sensu* Prah, 1988) presents in the cephalic side of the gonopod a tuberculated crest, parallel to the lateral lobe, that suggests a primitive condition also related to *Lindacatalina*.

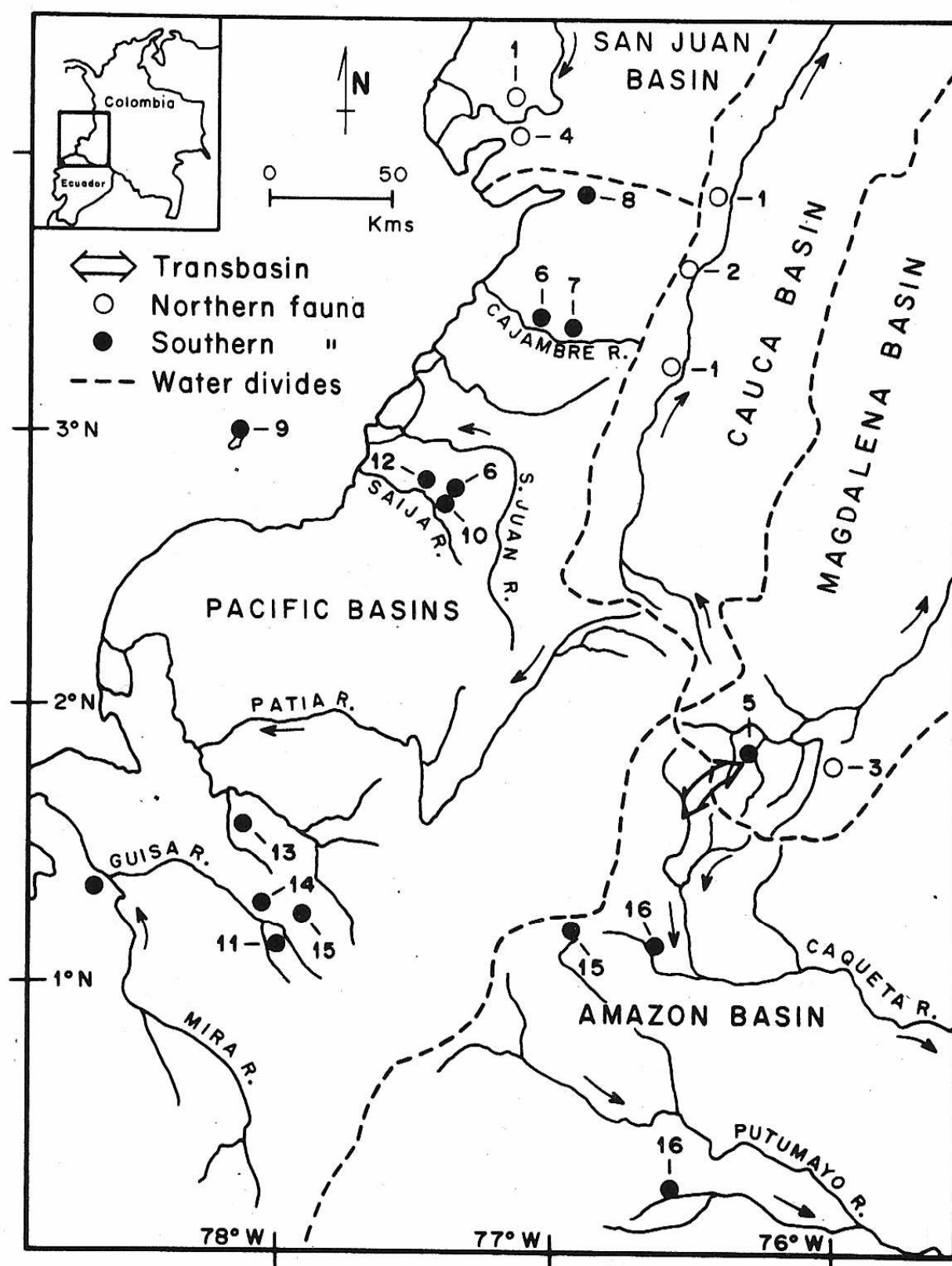


Figure.4: Limits between the northern and southern faunas of Hypolobocerini as defined by the water divides of the San Juan, Cauca and Magdalena Rivers. 1. *Hypolobocera beieri*, 2. *H. steindachneri*, 3. *H. bouvieri stenolobata*, 4. *H. malagueña*, 5. *H. marthelatami*, 6. *H. cajambrensis*, 7. *H. mutisi*, 8. *H. buenaventurensis*, 9. *H. gorgonensis*, 10. *H. meinel*, 11. *H. barbacensis* n. sp., 12. *Moritschus caucasensis* n. sp., 13. *M. narinnensis*, 14. *M. altaquerensis*, 15. *Lindacatalina orientalis*, 16. *L. sumacensis*. Records for Colombian species not mentioned in present contribution taken from Prah (1988), Rodríguez, Campos and López (2002) and Campos (in press).

The type of distribution of these species points to a faunal set clearly distinguished from the more northerly pseudothelphusid fauna recorded from Colombia. These two groups are separated by the water divides of the San Juan, Cauca and Magdalena basins, from the Amazonian and Pacific basins (Fig. 4). The species found north of these divides, *Hypolobocera beieri* Pretzmann, 1968, *H. steindachneri* Pretzmann, 1968, and *H. bouvieri stenolobata* Rodríguez, 1980 are clearly related to the species of northern

Colombia. These first three species present the typical rounded lateral lobe and the funnel shaped apex, circular in distal view, characteristic of the *bouvieri* complex and other allied species (Campos, in press), whereas *Hypolobocera mutisi* is clearly related to *H. chocoensis* Rodríguez, 1980, from the San Juan and Atrato basins, in the Chocó department.

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