

MONTANE CRABS (DECAPODA: PSEUDOTHELPHUSIDAE) FROM THE CLOUD FORESTS OF THE SUMAPAZ EASTERN SUBREGION, TOLIMA (COLOMBIA)

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Abstract: Mountain crabs were collected in June and July of 2009 and 2010 in five water bodies of the Icononzo municipality, in Tolima (Colombia), at different altitudes. A total of five species of the Pseudothelphusidae family were recorded from the area: *Hypolobocera bouvieri* (Rathbun, 1898), *Strengeriana cajaensis* Rodríguez & Campos, 1993 *Neostrengeria lindigiana* (Rathbun, 1897), *Neostrengeria binderi* Campos, 2000 and *Phallangothelphusa dispar* (Zimmer, 1912). *S. cajaensis* is here reported for the first time from the western ranges of Colombia, and *N. binderi* as for the first time from the Icononzo area.

Key words: Decapoda, Brachyura, Pseudothelphusidae, crabs, mountain, cloud forest, streams, Icononzo, Tolima, Colombia.

Cangrejos de montaña (Decapoda: Pseudothelphusidae) del bosque nublado de la subregión oriental de Sumapaz, Tolima (Colombia)

Resumen: Se colectaron cangrejos de montaña en junio y julio de 2009 y 2010 en cinco cursos de agua del municipio Icononzo, en Tolima (Colombia), a diferentes altitudes. Se registraron de la zona un total de cinco especies de la familia Pseudothelphusidae: *Hypolobocera bouvieri* (Rathbun, 1898), *Strengeriana cajaensis* Rodríguez & Campos, 1993 *Neostrengeria lindigiana* (Rathbun, 1897), *Neostrengeria binderi* Campos, 2000 y *Phallangothelphusa dispar* (Zimmer, 1912). Se cita a *S. cajaensis* por primera vez de la cordillera occidental de Colombia, y a *N. binderi* por primera vez del municipio Icononzo.

Palabras clave: Decapoda, Brachyura, Pseudothelphusidae, cangrejos, montaña, bosque nublado, arroyos, Icononzo, Tolima, Colombia.

Introduction

Pseudothelphusidae is a endemic neotropic al family of freshwater crabs, common inhabitants of the Andes, at elevations between 0 and 3000 m (Rodríguez, 1982; Campos, 1994, 2005; Martin & Davis, 2001). These crabs are usually found in streams or adjacent to these sites, under rocks, leaves or logs (Campos, 1994). According to the work by Rodriguez (1982), which collects information and data from Rathbun (1893) and Bott (1955), the Pseudothelphusidae family is organized in two subfamilies: Pseudothelphusinae (Ortman, 1893) and Epilobocerinae (Smalley, 1964). Forming two subfamilies with six tribes Strengerianini, Hypolobocerini, Pseudothelphusini, Kinsleyini, Potamocarcini and Guinotini (Rodríguez, 1982; Guinot *et al.*, 2008). Conforming these six tribes a total of 40 genera in the whole family 13 of which are in Colombia and a worldwide of 240 species in, 82 are present in Colombia, of which 79 are endemic to the country (Campos, 1985, 1992, 1994, 1998, 2000, 2003, 2005; Rodríguez, 1982; Campos & Rodríguez, 1985, 1993).

The Taxonomic and distributional previous studies of this family, in Tolima Colombia, show that a mountainous area offers natural refuges for crabs, registering for Icononzo Tolima, three species *Neostrengeria lindigiana*, *Hypolobocera bouvieri* and *Phallangothelphusa dispar* (Campos, 2005).

The morphology of the Pseudothelphusidae family is characterized by having and oval carapace, a lateral margin

with a series of teeth or tubercles, behind external orbital angle; exognath of the third maxilliped devoid of flagellum, walking legs with podomeres rounded, with five rows of corneous spines and all the species have the gill chamber for the presence of psedolugds (Campos, 2005; Rodríguez, 1982). The pereion can be found for the presence of cervical groove well developed epigastric lobes are usually different in size and are separated by a median groove. The forehead is broad with prominent brachial regions. Short flagella antennal. The exognath of third maxilliped under developed or absent except an the genera *Strengeriana* and *Epilobocera* (Rodríguez, 1982).

These crabs are very important in many aspects; especially they are an important economic sources for human populations. Many indigenous communities eat them, in the Amazonian jungles and in some indigenous groups of northern Colombia (Rodríguez & Malghalae, 2005). Medical possess importance species some and are intermediate hosts of lung flukes of the genus *Paragonimus* (Braun, 1899) (Monge *et al.*, 1985; Uruburu *et al.*, 2008; Rodríguez, 1982; Campos, 2005, Miyazaki & Yoichi, 1968).

In addition these crabs have ecological importance because are indicators of the quality of the ecosystem, contributing to sustainability and energy flow in aquatic ecosystems (Rodríguez, 1982; Campos, 2005).

The unknowledge of the ecology and biology of mountain crabs of the Pseudothelphusidae family leaves a large gap in understanding the role that these crabs in energy flow, maintenance and sustainability of water ecosystems is high mountain in Colombian Andes and neotropics (Rodríguez & Maghalaes, 2005).

Materials and methods

The study area was the town of Icononzo in the department of Tolima Colombia (4° 10'55. 26 " N; 74° 31'54. 86 " W), at an altitude range 1000 - 1626 m.a.s.l. This area is part of the sub region of Sumapaz along with the municipalities of Melgar, Carmen Apicalá, Villa Rica and Cunday, located on the eastern range. Five streams were sampled using a manual technique, lifting rocks, logs and leaf litter surrounding the creeks during the morning hours 9 am to 12 m, in the afternoon / evening 2pm to 9pm. Also, fishing nets were used, baited barrel-shaped with a length of 1.5 m by 30 cm in diameter in the deep zones of the streams at night, plus homemade traps for fishing were made with plastic bottles gas.

The collected specimens were sexed, measured with calipers Vernier (width and length of the carapace) and only a representative sample of the population were sacrificed in ethanol 96% and preserved in 70% ethanol, being transported in vials glass styrofoam coolers inside the laboratories of Biology, Faculty of Science and Education of Universidad Distrital Francisco José de Caldas, to be taxonomically identified based on specialized llegs (Campos, 2005), taking into account the morphology of the gonopods and other secondary characters.

For each crab was performed a photographic record, using Kodak camera 500 and brand ZEUSS stereoscope, accompanied by scientific illustrations of the taxonomic structures. The material then be determined taxonomically were delivered to be part of the collection of decapod Natural History Museum District University Francisco José de Caldas MUD-046 and the collection of crustaceans of the ICN Instituto de Ciencias Naturales, Universidad Nacional de Colombia.

Results

From the collections made in Icononzo Tolima, a total of five species of the Pseudothelphusidae family were collected in 110 stations in five streams (Fig. 1) were. The five species reported in this study correspond to *Hypolobocera bouvieri* (Rathbun, 1898); *Strengeriana cajaanensis* Rodríguez & Campos, 1993; *Neostrengeria lindigiana* (Rathbun, 1897); *Neostrengeria binderi* Campos, 2000; *Phallangothelphusa dipsar* (Zimmer, 1912) (Fig. 2). *S. cajaanensis* is the first record of the genus and species for the Colombian Cordillera Oriental and *N. binderi* is the first record for the town of Icononzo (Fig. 1)

The collected crabs belong to the infraorder Brachyura, Pseudothelphusidae family, Pseudothelphusinae subfamily divided into two tribes, Strengerianini and Hipolobocerini, In the Hypolobocerini tribe, the species *Neostrengeria lindigiana*, *N. binderi* and *Hypolobocera bouvieri*, and in the Strengerianini tribe are located *Strengeriana cajaanensis* and *Phallangothelphusa dispar*. The taxonomic status of the species collected at Icononzo Tolima, plus descriptions, in biology and distribution are summarized.

Tribe Hypolobocerini Pretzmann, 1971

TAXONOMIC HISTORY: Hypolobocerini Pretzmann, 1971; 17 Hypolobocerini. Rodríguez, 1982: 44 Campos, 1985: 275. Rodríguez, 1992: 183. Campos, 1994: 9.

TYPE GENUS: *Hypolobocera* Ortmann, 1897.

DIAGNOSIS: Third maxilliped whit exognath 0.20 to 0.60 times length of ischium to endognath: orifice of efferent branchial channel open, which varies is shape between semicircular, ovale square. First male gonopod with lateral lobe well developed, varies according to species, although sometimes reduced; apex outline either rounded, oval, or elongated in distal view (Campos, 2005).

Genus *Neostrengeria*

TAXONOMIC HISTORY: *Strengeria* (*Neostrengeria*) Pretzmann, 1965: 7. *Neostrengeria*, Rodríguez, 1982: 69. - Campos, 1985: 278. - Rodríguez, 1992: 184. - Campos & Rodríguez, 1985: 718. - Campos, 1992: 540. - Campos, 1994: 11. - Campos & Lemaitre, 1998.- Campos, 2000: 405.

TYPE SPECIES: *Boscia macropa* H. Milne Edwards, 1853.

DIAGNOSIS: First male gonopod with caudal crest forming lateral lobe; lateral lobe usually developed, shape varies according to species, and is either semicircular, elongated or rounded, lateral lobe divided into two longitudinal halves forming accessory lobe; apex outline either rounded, oval or elongated in distal view; mesial lobe subtriangular, triangular, semicircular, developed into distinct elongated projection or reduced as a strong fold; mesocaudal projection of spermatoc channel either awlshape, or bifid; third maxilliped with exognath 0.50 to 0.72 times length of ischium of endognath; orifice of branchial efferent channel open, usually ovate shaped. (Campos, 2005).

Neostrengeria binderi Campos, 2000

TAXONOMIC HISTORY: *Neostrengeria binderi* Campos, 2000.

DIAGNOSIS: Carapace with a median furrow pronounced, reaching the lateral edge. First male gonopod with mesial lobe slightly convex, with a strong notch in caudal view; compressed caudal cephalic apex; mesial lobe forming an acute triangle (Campos, 1994, 2005) (Fig. 3-4).

DISTRIBUTION: The genus *Neostrengeria* is endemic of the Colombian Andes, and is restricted to the Oriental Colombian range (Rodríguez, 1982; Campos & Rodríguez, 1985; Campos, 2005).

BIOLOGY: These crabs were collected in relatively deep water with little flow in caves and crevices formed by rocks and logs, they have a crepuscular activity.

COMMENTS: No crabs of this species were collected by manual methods, only in traps that were immersed in the day, evening and night, falling only at night.

MATERIAL EXAMINED: Colombia, Icononzo Tolima, Valparaiso, Stream las Lajas 1320 m.a.s.l, 4° 06.515 N 74° 35.395 W, 2 ♀ Mature (cl 2,5 cm, cb 2.0 cm), 3 mature ♂ (cl 2,3 cm, cb 1,8 cm), 1 juvenile ♂ (cl 2,1 cm, cb 1,1 cm), deposited in the Museum of Natural history Universidad Distrital Francisco José de Caldas MUD- 046 and the carcinologist collection of the (ICN) Instituto de Ciencias Naturales, Universidad Nacional de Colombia.

Neostrengeria lindigiana (Rathbun, 1897)

TAXONOMIC HISTORY: *Pseudothelphusa lindigiana* Rathbun, 1897: 59. - Rathbun, 1898: 534, 537. - Young, 1900: 211. -

Nobili, 1901: 37 - Rathbun 1905: 277. Fig 75. - Coifman, 1939: 108. *Strengeriana (Phyllothelphusa) lindigiana*. Pretzmann, 1965: 8. *Potamocarcinus (Hypolobocera) macropus hartschi*, Bott, 1967: 371. *Hypolobocera* (Neostrengeria) *lindigiana lindigiana*, Pretzmann, 1971: 18. - Pretzman, 1972: 54, fig. 343-345. *Neostrengeria lindigiana* Rodríguez & Turkay, 1978: 298. - Rodríguez, 1982: 76-78, fig. 38k, 39f, 45a-d, 46-d. - Campos, 1994: 75-82, fig. 24a-f, 25a-c, 26a-f. - Campos & Lameitre, 1998: 906, fig. 3G.

DIAGNOSIS: Shell with the presence of post developed frontal lobes, median groove not well developed, short and superficial. Deep cervical groove reaching the side, wide, shallow and straight anterior edge. Edge with small antero lateral buds. Chelates with bulky palm, movable finger with the cut over the motionless lower chela with palm not very bulky. The teeth of the same with small recesses there between. The dactyl and propodo chela with rows of dark brown granules. The pereopods have five rows of smaller spines being proximal. Gonopod with lateral lobe projected distally. Accessory lobe with wider, rounded apical area, with the flat surface that the basal part of it (Campos, 1994, 2005) (Fig. 5-6).

DISTRIBUTION: *Neostrengeria lindigiana* is distributed by the eastern range, in the departments of Cundinamarca and Tolima. In the municipalities of Choachí, Tena, Tibacuy, Pasca, Fusagasugá, Facatativa, Bojacá, Alban, Anolaima, and Icononzo Cundinamarca, Tolima (Campos, 2005).

BIOLOGY: Found adjacent to the creek, near sandstones, possesses activity toward evening although this behavior is not wide spread.

COMMENT: It was collected by manual methods alone was found one possibly be a sensitive species to pollution or human activity.

MATERIAL EXAMINED: Colombia, Tolima Icononzo Valparaiso, Stream Lajas 1320 masl, 4° 06.515 N 74° 35.395 W, 1 mature ♂ (cl: 2.3 cm, cb: 1.8 cm), deposited in the Museum of Natural History Universidad Distrital Francisco José de Caldas MUD-042, and the carcinologist collection of the Instituto de Ciencias Naturales (ICN) Universidad Nacional de Colombia.

Genus *Hypolobocera* Ortmann, 1897

TAXONOMIC HISTORY: *Hypolobocera* Ortmann, 1897: 323. *Hypolobocera*, Rodríguez, 1982: 45. - Campos, 1985: 275. - Rodríguez & Sternberg, 1998: 111. - Campos, 2003a: 754, 755.

TYPE SPECIES. *Potamia chilensis* H. Milne Edwards & Lucas, 1843

DIAGNOSIS: First male gonopod with strongly caudal ridge longitudinally; lateral lobe developed, although sometimes reduced, varying according to species as triangular, rounded or subquadrate, and with or without crenulations over distal border; apex outline either rounded, oval, or elongated in distal view; mesial lobe triangular, semicircular or reduced as strong fold; third maxilliped with exognath between 0.20 and 0.60 times length of ischium; orifice of branchial efferent channel varying in shape as semicircular, ovate or square. (Campos, 2005).

***Hypolobocera bouvieri* (Rathbun, 1898)**

TAXONOMIC HISTORY: *Pseudothelphusa bouvieri* Rathbun, 1898: 518, 533, 537, fig. 9 - Young, 1900: 215. - Rathbun, 1905: 289. - Coifmann, 1939: 107. *Strengeria (Strengeria)*

bouvieri, Pretzmann, 1965: 7. *Hypolobocera (Hypolobocera) bouvieri*, Schmitt, 1969: 7. *Hypolobocera (Hypolobocera) bouvieri bouvieri*, Pretzman, 1971: 17 - Pretzman, 1972: 45, fig. 194-196, 278-280. *Hypolobocera bouvieri* Rodríguez, 1982: 53, 56, fig. 19, 21, 29. - Campos, 1985: 276-277. - Rodríguez *et al.*, 2002: 6. - Campos, 2003: 761-765, fig. 4a-h, 798-800.

DIAGNOSIS: Caparace with nearly straight groove cervical, antero lateral edge with a deep depression behind the orbital angle, followed by 6 buds. Lateral margin with 12 sharp teeth, third maxilliped exognath 0.2 to 0.3 times the length of the erector, efferent orifice open gill semicircular canal; First pair of pereopods unequal, major chela of males with small tubers redonde a dosen external base of the mobile finger and prominent rounded tubercles on the external base of fixed fingers, palm of larger chelae globosa, closing finger leaves no gaps between them (Campos, 2003, 2005) (Fig. 7-8).

DISTRIBUTION: *Hypolobocera bouvieri* is distributed in the departments of Cundinamarca, Norte de Santander, Boyacá, Santander, and Tolima, between the valley of the Magdalena river and the slopes of the Eastern Cordillera and Central (Campos, 2003, 2005).

BIOLOGY: This is one of the most cosmopolitan Pseudothelphusidae species were collected in different environments, being on rocks beside waterfalls, and also can be found under rocks or in cracks adjacent to streams. Are usually seen wandering on sandstone or grasslands near water bodies.

In terms of activity, most of these crabs were observed in mid day, or evening, especially adults. Juveniles have a higher activity at night.

MATERIAL EXAMINED: 1 juvenile ♀ (cl, 30.5 mm, cb 25 mm) Colombia, Tolima Icononzo Valparaiso, las Lajas stream 1300 m, 4° 06.400 N 74° 35.300 W, 1 mature ♂ (cb cl 120.7 mm, 90 mm Icononzo Tolima Hoya Grande, Mataburros stream 1150 m 4° 06.669 N 74° 35.215 W, mature ♀ (cl 130.5 mm, cb 100.5 mm) Icononzo Tolima La Maravilla, la Chorrea creek. 1001 m 4° 06.55 N 74° 35.425 W deposited in the Museum of Natural history Universidad Distrital Francisco José de Caldas MUD-042.

Tribe Strengerianini Rodríguez, 1982

TAXONOMIC HISTORY: Strengerianini Rodríguez, 1982: 29 - Campos, 1985: 273. - Rodríguez & Campos, 1989: 141 - Rodríguez, 1992: 183. - Campos, 1994: 9.

GENUS TYPE: *Strengeriana* Pretzmann, 1971.

DIAGNOSIS: Third maxilliped with exognath overreaching ischium or slightly shorter than ischium of endognath; orifice of efferent branchial channel partially closed or closed by spine at jugal angle, and by extension of lateral lobe of epis-tome. First male gonopod devoid of lateral lobe, apex usually with digitiform processes (Campos, 2005).

Genus *Phallangothelphusa* Pretzmann, 1965

TAXONOMIC HISTORY: *Pseudothelphusa (Phallangothelphusa)* Pretzmann, 1965: 8. *Phallangothelphusa*, Rodríguez, 1982: 42. - Campos, 1985: 274. - Rodríguez & Campos, 1989: 141-143, 149-152, fig. 5-7, Tab.1, 3, 4.

TYPE SPECIES. *Pseudothelphusa dispar* Zimmer, 1912.

DIAGNOSIS: First male gonopod straight; caudal lobe simple; mesial process with deep middepression forming 2 projections: distal nearly ovate or semicircular, proximal rectangular or finger-like and blunt; lateral lobe expanded into semicircu-

lar process with irregular rows of conspicuous spines on proximal border, directed latero-mesially; third maxilliped with exognath 0.80 times length of ischium; orifice of efferent branchial channel open, ovate-shaped. (Campos, 2005).

***Phallangothelphusa dispar* (Zimmer, 1912)**

TAXONOMIC HISTORY: *Pseudothelphusa* (*Phallangothelphusa*) Pretzmann, 1965: 8. *Phallangothelphusa* Rodríguez, 1982: 42. - Campos, 1985: 274. - Rodríguez & Campos, 1989: 141-143, 149-152, fig. 5-7, Tab. 1, 3, 4. Especie type. *Pseudothelphusa dispar* Zimmer, 1912.

DIAGNOSIS: Carapace with cervical groove width, finishing near the lateral margin. Hole efferent branchial channel open, ovate in shape, unequal chelae, palm of larger chela very bulky, when the fingers are closed chela leave no openings. Straight male first gonopod; simple caudal lobe, mesial process consists of two projections similar to deep depression including size. Distal caudal projection view ovate, oblong in distal and proximal view rectangular projection, meso recurved caudally. Sidelobe expanded in a process with irregular rows of visible spines on the proximal edge, directed lateral-mesial; spermatic canal with rows of conspicuous spines (Campos, 1998, 2005) (Fig. 9-10).

DISTRIBUTION: The genus *Phallangothelphusa* is endemic to Colombia comprises the upper and middle Magdalena valley, including the eastern and central slope range of 300-1500 m (Campos, 1998, 2005, 2010). In this genus exist three species *P. dispar* (Zimer, 1992); *P. magdanelensis* Campos, 2004 and *P. juanse* Campos, 2010 (Campos, 1998, 2005, 2010). *P. dispar* has a geographical distribution in four Colombian departments: Boyacá, Caldas, Tolima and Cundinamarca (Campos, 2005).

BIOLOGY: This species can be located inside the body of water and out of it, being associated with stones and sand on the sides of streams, some of them can be found in moist soil or areas a little away from the water.

COMMENTS: In this species samplings with *Strengeriana cajaensis* had a special pattern of altitudinal distribution, this species does not exceed 1300 m in all streams sampled while *S. cajaensis* not found below 1300 m.a.n.l.

MATERIAL EXAMINED: Colombia, Tolima Icononzo Caferrias, La fria creek, 1029-1258 m, 4° 06.515 N 74° 35.395 W 12 juveniles (X: cl 0.6 mm, cb 0.2 mm), Colombia, Tolima Icononzo Caferrias, La fria creek, 1029-1258 m, 4° 06.515 N 74° 35.395 W 1 ♂ mature (cl 30.7 mm, 28.5 mm) 1 mature ♀ (cb 28.5 mm, 24.00 mm) 19 juveniles (X: cl 0.6 mm, cb 0.2 mm), 7 mature ♂ (X: 25.4 mm, cl 22.4 mm), 1 mature ♀ (cl 30.7 mm, 28.5 mm.), Tolima Icononzo Hoya grande, mataburros creek, 1020-1186 m.s.n.m, 4° 07.020 N 74° 35.640 W, 38 juveniles (X: cl 0.6 mm, cb 0.2 mm), 14 mature ♂ (X: cl 24.6 mm, cb 22, 4 mm), 10 mature ♀ (X: 25.4 mm, cl 22.4 mm), Tolima Icononzo Caferrias, the lajitas creek, 1075-1295 m.s.n.m June 4, 606 N - 74° 35.139 W, 26 juveniles (X: cl 0.6 mm, cb 0.2 mm), 21 mature ♂ (X: 25.4 mm, cl 22.4 mm), 4 ♀ mature (X: cb 28, 5 mm 24.00 mm) Icononzo Tolima Vereda la maravilla, La chorre- ra stream 1001-1201 m.s.n.m 4° 06.820 N 74° 35.200 W, deposited in the Natural History Museum District University Francisco José de Caldas MUD- 042.

Genus *Strengeriana* Pretzmann, 1971

TAXONOMIC HISTORY: *Strengeriana* Pretzmann, 1971: 18. -

Rodríguez & Díaz, 1981: 305. - Rodríguez, 1982: 29. - Campos, 1985: 273. - Rodríguez & Campos, 1989: 141. - Rodríguez, 1992: 183. - Campos & Rodríguez, 1993: 508. - Campos, 1995: 98. - Campos, 1999: 405.

TYPE SPECIES: *Epilobocera fuhrmanni* Zimmer, 1912.

DIAGNOSIS: Third maxilliped with exognath overreaching ischium of endognath; orifice of efferent branchial channel partially closed or closed by spine at jugal angle, and by extension of lateral lobe of epistome. First male gonopod forming by 3 lobes: mesial, caudal, and cephalic; mesial and cephalic lobes fused together around spermatic channel; frequently with mesial and cephalic processes. (Campos, 2005).

***Strengeriana cajaensis* Campos & Rodríguez, 1993**

TAXONOMIC HISTORY: *Strengeriana cajaensis* Rodríguez & Campos, 1993: 508-511, fig 1a-f.

DIAGNOSIS: Narrow Caparace. Straight and deep cervical grooves, reaching the lateral margins of the carapace. Anterior side with a depression behind the orbits, followed by small buds not very marked, small frontal lobes ovate shaped pos margin. Lacks median groove. The palm of the chela larger (Right) bulky, closing fingers is not complete. Grouper third pair of maxillipeds 3.5 times longer than wide. Exopod of the third maxilliped is 0.97 times the length of isquipodito. The gonopod of the male is short and robust in caudal view, with a transverse expansion in the apical part, where the genital pore is situated, along with a pronounced rounded lateral protuberance. (1993) (Fig. 11-12).

DISTRIBUTION: The genus *Strengeriana* Pretzmann 1971 is restricted to the Central range of Colombia (Campos, 2005; Rodríguez, 1982), which in any way supports the phylogenetic history of the group. No records were found for Western and Eastern Cordillera. *Strengeriana cajaensis* presents a biogeographical location on the southeastern flank of the Central Cordillera Colombiana (Rodríguez & Campos, 1989; Campos, 2005).

BIOLOGY: *Strengeriana cajaensis* was found in small galleries clays with silt and mud interconnected with each other, crossed by streams, which bathed them with plenty of water, also under rocks that form galleries under the roots of trees. They are more active toward the late afternoon where you can see them wondering in and out of the galleries, around 5 and 7 pm.

COMMENT: This is a new record for the Colombian Cordillera Oriental which would contribute to the biology and distribution history of the group.

MATERIAL EXAMINED: Colombia, Tolima Icononzo Valparaiso, Las Lajas creek 1320-1450 m, 4° 06.515 N 74° 35.395 W, Quebrada 9 juveniles (X: cb 0.5 mm, 0.2 mm), 20 mature ♂ (cb 28.5 mm, 24.00 mm), 2 mature ♀ (X: cb 28.5 mm, 24.00 mm) Icononzo Tolima Valparaiso, las Lajas creek 1320-1450 m, 4° 06.515 N 74° 35.395 W 42 juveniles Quebrada CV 5 ♀ mature (Measures) 8 ♂ mature (X: cb 28.5 mm, 24.00 mm).

DISCUSSION: Taxonomic and distributional work done until now for Pseudothelphusidae family in Colombia, recorded for the Municipality of Icononzo Tolima three species of crabs, *N. lindigiana*, *H. bouvieri*, and *P. dispar* (Campos, 2005). In this study is reported for the first time the presence of *S. cajaensis* and *N. binderi*. *N. binderi* was collected and described by Campos (2000), for the Municipality of Carmen de Apicala, located in the Magdalena Valley River (Campos, 2005).

The distributional range of comprehensive species also being in the Municipality of Icononzo Tolima. It is possible that this species has been moving towards the water bodies found in the slope of Sumapaz, on the slopes of the Cordillera Oriental, however the reasons why this phenomenon is occurring is unclear. The second record for Icononzo Tolima is *S. cajaensis* species recorded previously for the town of Cajamarca on the Central Cordillera of Colombia (Campos, 2005). With this new record the distributional range of the species extends, and provides new input on possible migration and dispersion of different groups of Pseudothelphusidae family. In the work of Campos (2005) and Rodríguez (1982), *Strengeriana* is the second basal genus within the phylogenetic tree Pseudothelphusidae. This genus has a population distribution restricted to the central mountain range in the Sierra Nevada de Santa Marta mountain formation, which was derived from the same mountain range by geological movements (Campos, 2005; Rodríguez, 1982). The formation of this mountain has a volcanic origin and therefore the oldest of the three mountain ranges, consistent with the natural history of *Strengeriana* (Campos, 2005; Rodríguez, 1982). This new record opens a new chapter in the study of this group, especially in its mode of dispersal and how we have come to the eastern cordillera. Specimens collected in the town of Icononzo Tolima show morphological variations gonopod in fingerlike processes, indicating that they are different from those found in Cajamarca and present changes in different environmental conditions with list possibility of being different populations. This can be sustained with the gonopod and female genital opening morphology are complementary, being similar to the lock / lock function (Rodríguez, 1992; Campos, 1994, 2005; Campos & Pedraza, 2007).

Taxonomic key to the species of crabs in Icononzo Tolima Colombia

- 1 Third maxilliped with exognath overreaching ischium or slightly shorter than ischium of endognath; orifice of efferent branchial channel partially closed or closed by spine and yugal angle, and extension of lateral lobe of epistosome. First male gonopod devoid of lateral lobe, apex usually with digitiform processes **2**
 - Third maxilliped with exognath 0.20 to 0.60 times length of ischium of endognath; orifice of efferent branchial channel open, which varies in shape between semicircular, ovate or square. First male gonopod with lateral lobe well developed, varies according to species, although sometimes reduced; apex outline either rounded, oval, or elongated in distal view **3**
2. Orifice of efferent branchial channel partially closed or closed but spine at yugal angle and by extension of lateral lobe of epistosome, third maxilliped with exognath overreaching ischium of endognath, caudal lobe of first gonopod ending tooth-like distally (Fig. 11-12) **Strengeriana cajaensis**
 - Orifice of efferent branchial channel open, first gonopod with proximal mesial process rectangular (Fig. 9-10)..... **Phallangothelphusa dispar**
3. First male gonopod with lateral lobe divided into two longitudinal halves forming accessory lobe **4**
 - First male gonopod with lateral lobe undivided and subtriangular (Fig. 7-8)..... **Hypolobocera bouvieri**

4. Apex of first male gonopod mesial expanded into subtriangular projection (Fig. 3-4) **Neostrengeria binderi**
 - Apex of first male gonopod semicircular in distal view, expanded cephalically (Fig. 5-6) **Neostrengeria lindigiana**

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► **Figure 1.** Sites and streams where sampling was conducted in the municipality of Icononzo Tolima. **Figure 2.** Photographic records of specimens in the field. **A.** *Hypolobocera bouvieri* male. **B.** *Strengeriana cajaensis* in a gallery. **C.** *Strengeriana cajaensis* galleries with young. **D.** *Phallangothelphusa dispar* mixed with female offspring. **E-F.** *Neostrengeria binderi* make shift traps caught.



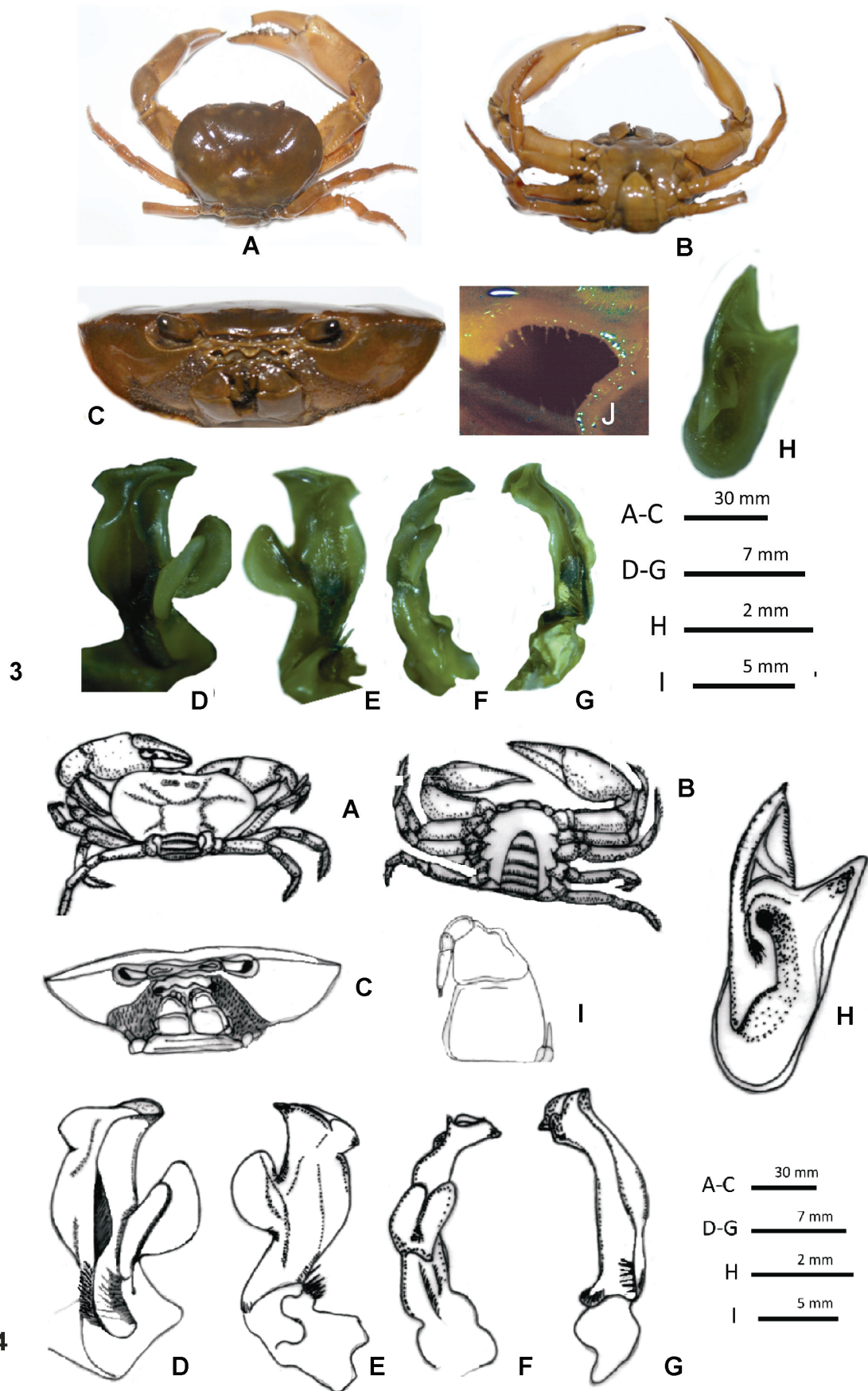


Figure 3. *Neostrengeria binderi*, Campos, 2000. Male. **A.** Caparace and pereiopods in dorsal view. **B.** Caparace and pereiopods in ventral view. **C.** Caparace in front view. **D.** First male left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **I.** Third maxilliped, external view. **J.** Efferent branchial channel. Photos of the specimen. **Figure 4.** *Neostrengeria binderi*, Campos, 2000. Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Caparace en front view. **D.** First Left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **I.** Third maxilliped, external view.

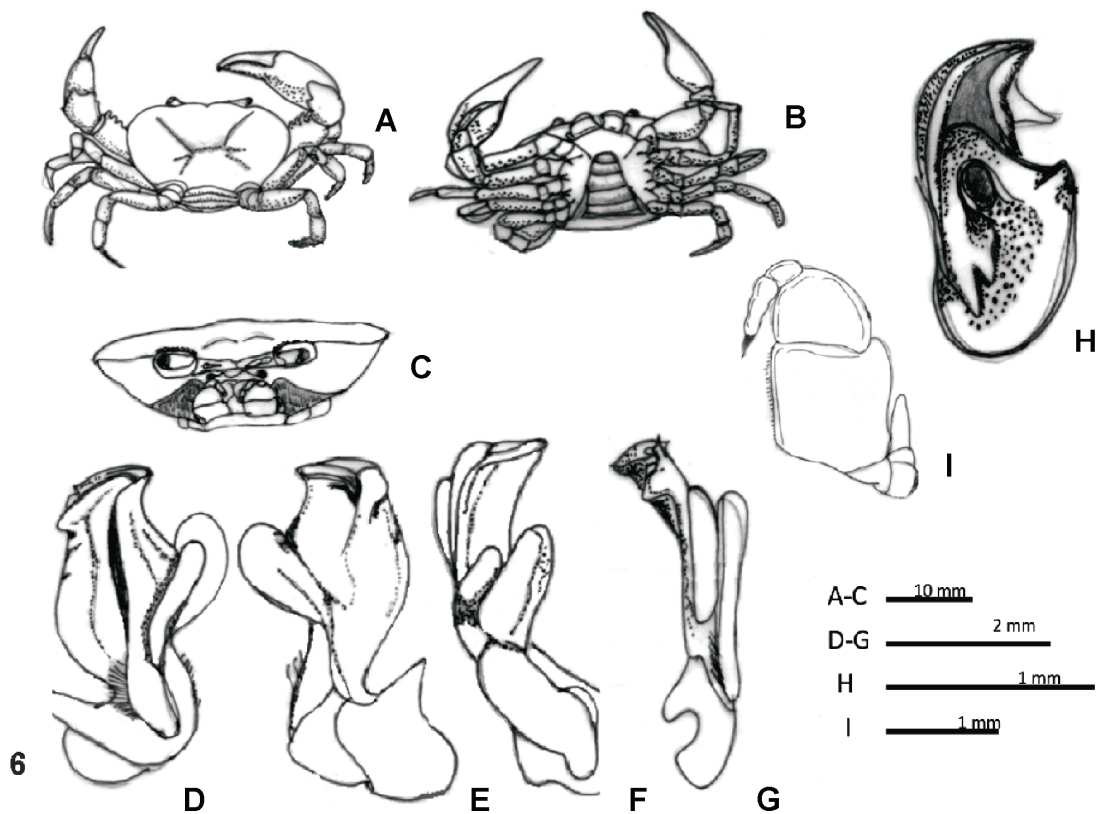
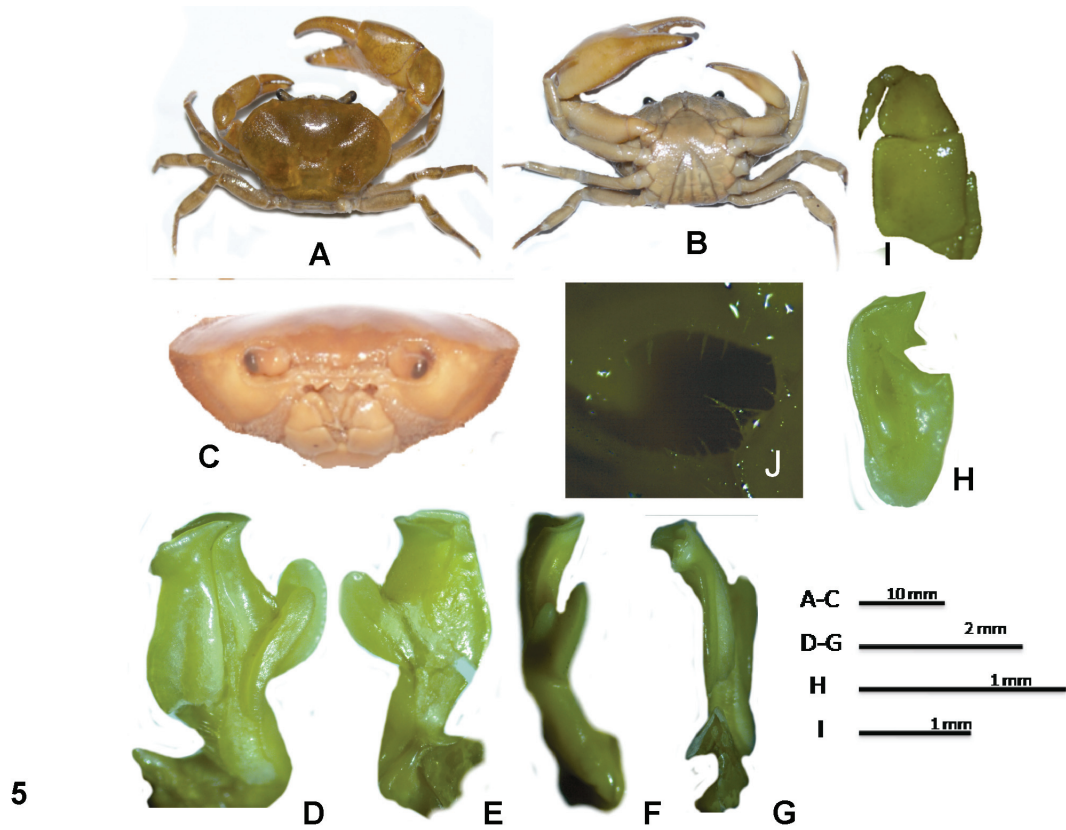


Figure 5. *Neostrengeria lindigiana* (Rathbun, 1897). Male. **A.** Caparace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Caparace in front view. **D.** First Left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **I.** Third maxilliped, external view. **J.** Efferent branchial channel. Photo of the specimen. **Figure 6.** *Neostrengeria lindigiana* (Rathbun, 1897). Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Caparace in front view. **D.** First Left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **I.** Third maxilliped pair left, external view.

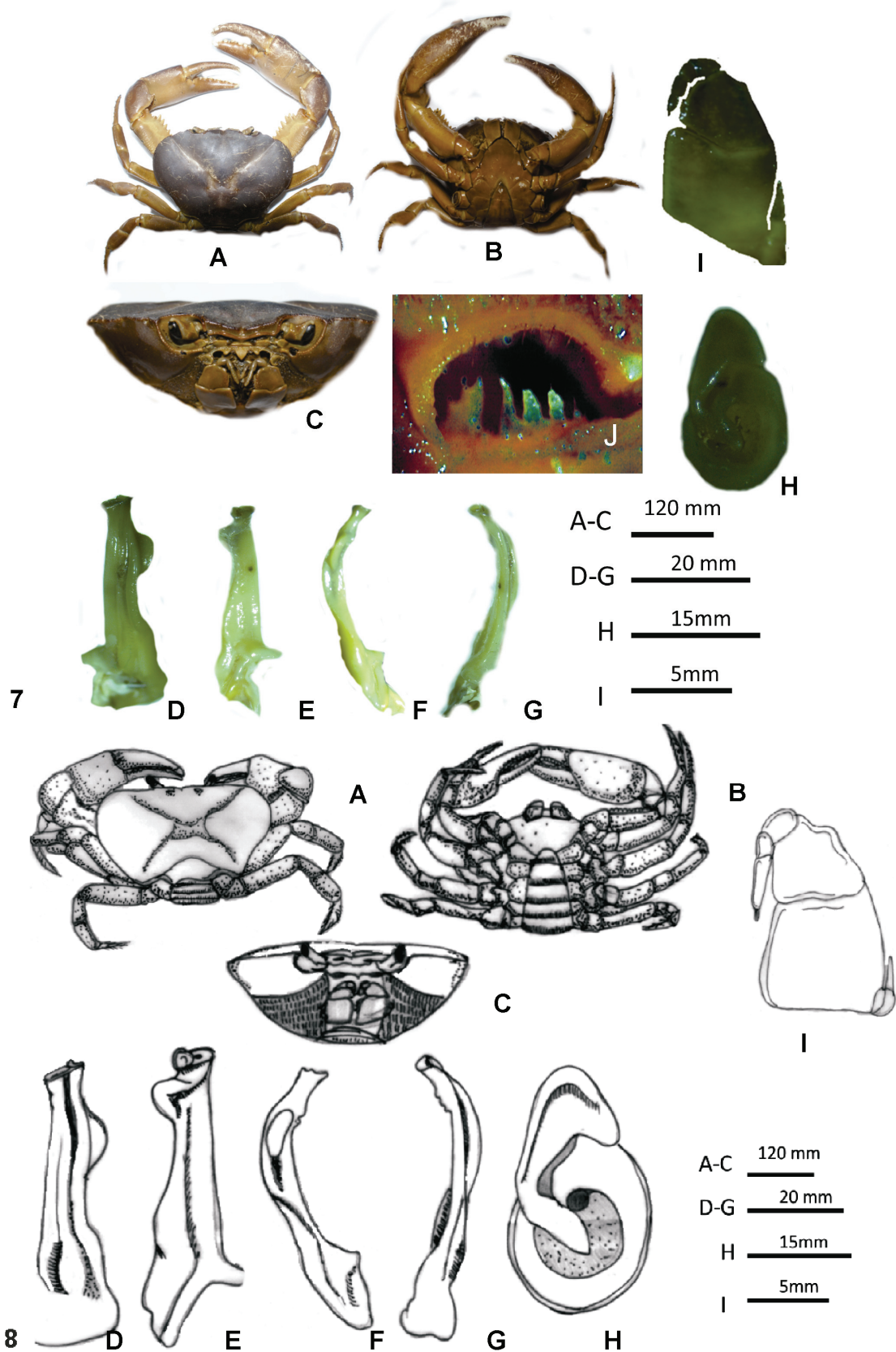


Figure 7. *Hypolobocera bouvieri* (Rathbum, 1898). Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Carapace in front view. **D.** First Left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **J.** Efferent branchial channel. Photo of the specimen. **Figure 8.** *Hypolobocera bouvieri* (Rathbum, 1898). Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Shell in front view. **D.** First left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Gonopod apex distal first view. **I.** Third maxilliped, external view.

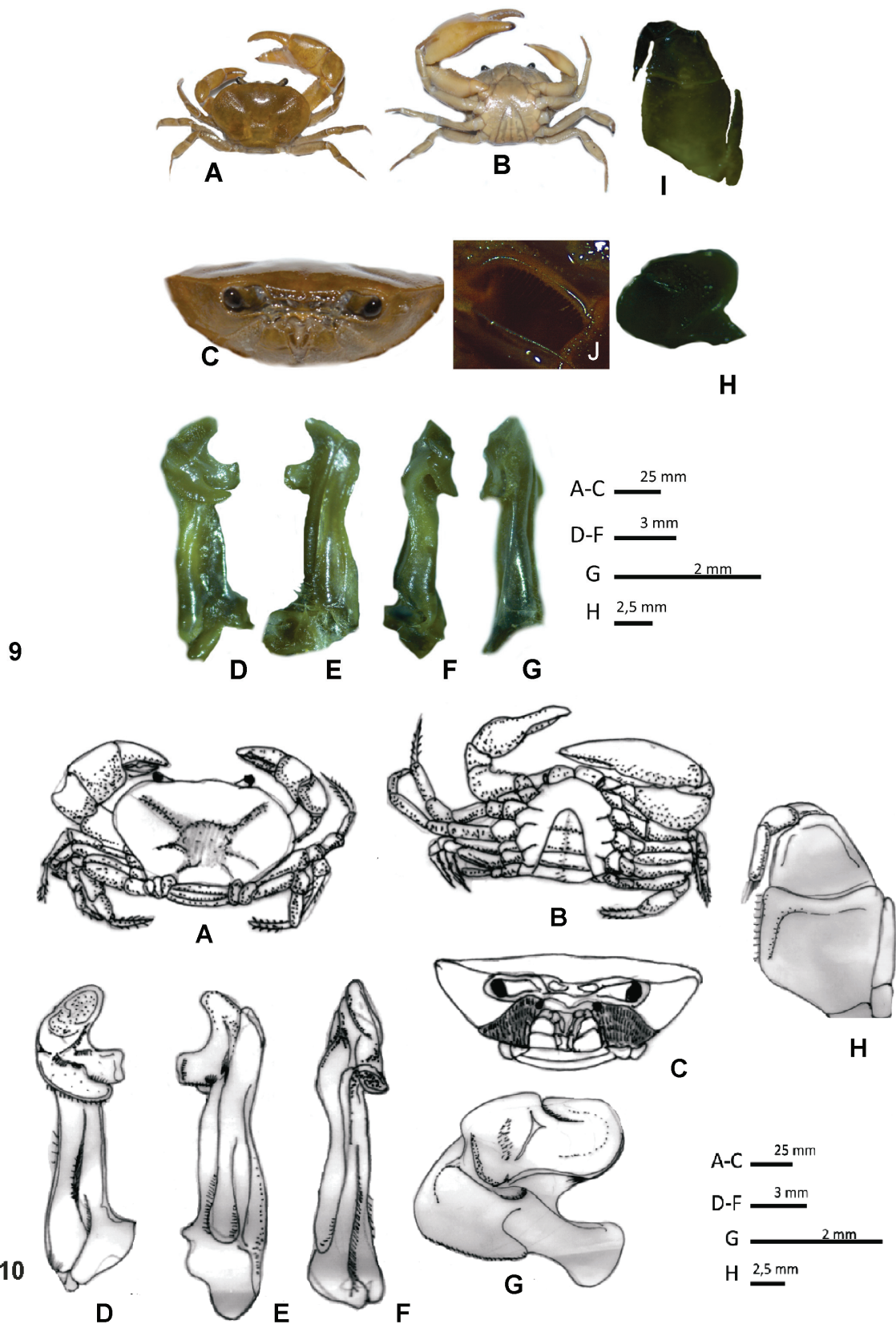


Figure 9. *Phallangothelphusa dispar* (Zimmer, 1912). Macho. **A.** Carapace and pereopods in dorsal view. **B.** Carapace and pereopods in ventral view. **C.** Shell in front view. **D.** First left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** Gonopod apex distal first view. **H.** Third maxilliped, external view. **I.** Third maxilliped, external view. **J.** Efferent branchial channel. Photo of the specimen. **Figure 10.** *Phallangothelphusa dispar* (Zimmer, 1912). Macho. **A.** Carapace and pereopods in dorsal view. **B.** Carapace and pereopods in ventral view. **C.** Shell in front view. **D.** First left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** Gonopod apex distal first view. **H.** Third maxilliped pair Izquierdo, external view.

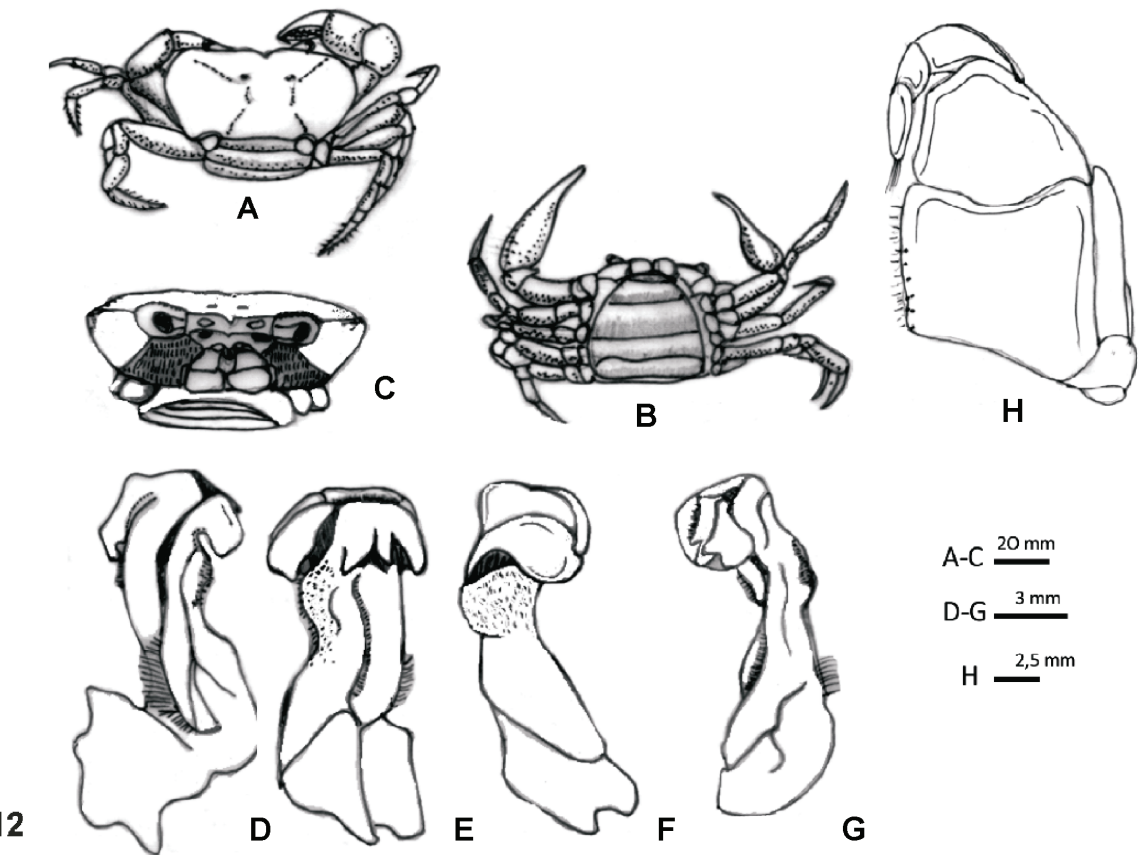
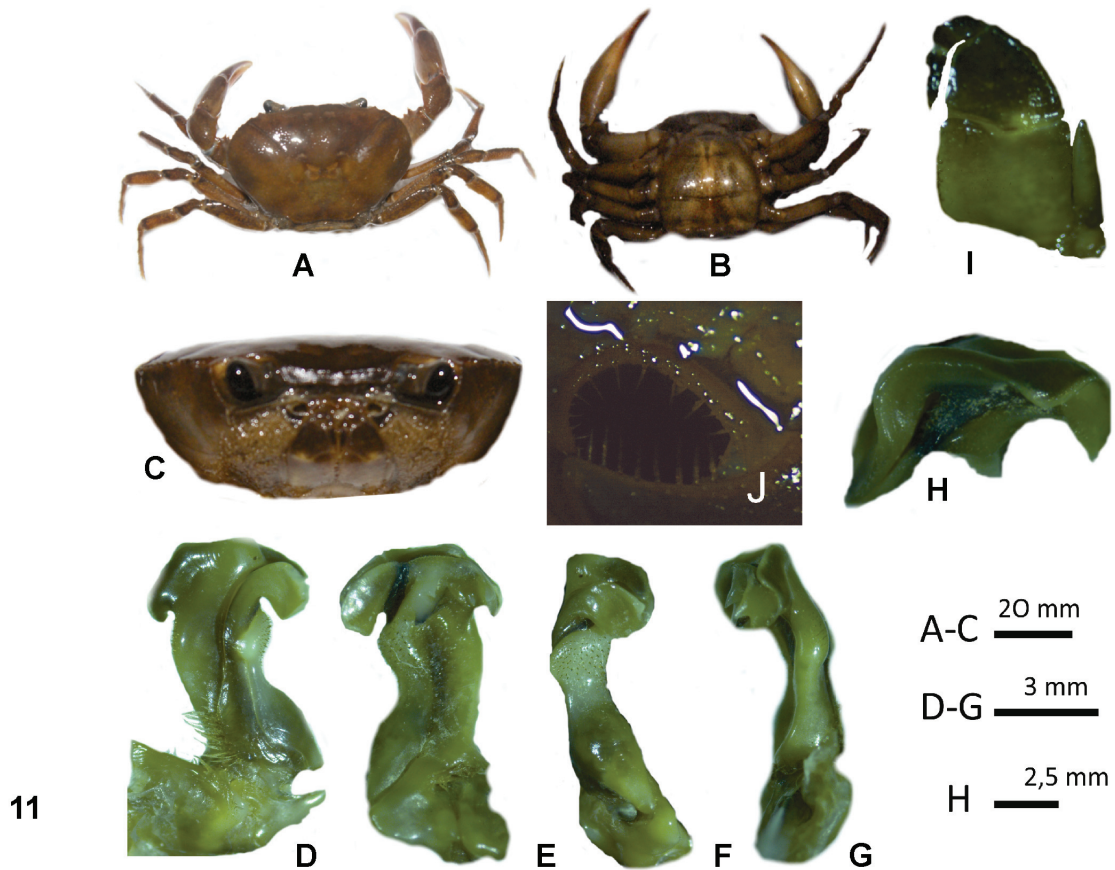


Figure 11. *Strengeriana cajaensis* (Zimmer, 1912). Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Shell in front view. **D.** First Left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Third maxilliped, external view. **I.** Third maxilliped, external view. **J.** Efferent branchial channel. Photo of specimen. **Figure 12.** *Strengeriana cajaensis* (Zimmer, 1912). Male. **A.** Carapace and pereiopods in dorsal view. **B.** Carapace and pereiopods in ventral view. **C.** Shell in front view. **D.** First left gonopod in caudal view. **E.** First gonopod in cephalic view. **F.** First gonopod in side view. **G.** First gonopod mesial view. **H.** Third maxilliped pair Izquierdo, external view.