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A new species of *Mesochra* (Copepoda: Harpacticoida: Canthocamptidae) from a coastal system of northern Colombia with a key to the American species

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ABSTRACT

Plankton samples obtained from the Laguna Navío Quebrado, La Guajira, northern Colombia, yielded the first record of the genus *Mesochra* Boeck, 1865 for Colombia. It is represented by an undescribed species, *M. huysi* sp. nov., which appears to be closely related to *M. parva* Thomson, 1946 and *M. pseudoparva* Gómez & Fiers, 1997. However, the new species can be distinguished from these two species by the insertion point of the inner seta of P1 ENP1, the length/width ratio of P1ENP, the inner seta of P1ENP2, the relative length of P3 and P4 ENP, by details of elements of P5 EXP female, the structure of the anal operculum, the remarkable ornamentation of the male P3 EXP1-2, the apophysis of the male P3 ENP2, and the claw-like or flame-shaped element of male P3 ENP3. This is the third record of a species of the genus from the Caribbean. A key to the 11 species of *Mesochra* known from the Americas is provided.

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KEYWORDS

Taxonomy; benthic copepods; Harpacticoida; Laguna Navío Quebrado

Introduction

The Family Canthocamptidae was established by Sars (1906) by upgrading the subfamily Canthocamptinae Brady, 1880. It is the largest family in the Harpacticoida, currently comprising about 627 species, of which only 17% are known from the Neotropical region (Boxshall and Defaye 2008). Most canthocamptids inhabit fresh water (Wilson 1971) but some genera can dwell in coastal marine habitats or in brackish water, e.g. *Cletocamptus* and *Mesochra* Boeck, 1865 (Boxshall and Defaye 2008); the latter genus has been reported also from coral reef environments (Sarmiento and Parrera Santos 2012). Among the 52 valid canthocamptid genera, *Mesochra* is one of the largest, currently comprising more than 45 valid species (Boxshall and Halsey 2004; Gaviria-Melo et al. 2013).

In Colombia, studies on the Harpacticoida have been historically sparse but have increased recently (Gaviria and Defaye 2012; Fuentes-Reinés and Zoppi 2013a, 2013b; Fuentes-Reinés and Gómez 2014; Fuentes-Reinés and Suárez-Morales 2014). In particular, the knowledge about the family Canthocamptidae is still limited in Colombia, and to date only three of the nine genera known from the Neotropical region (Boxshall and

Defaye 2008) have been recorded from this country. Colombian canthocamptids are represented by six species of *Elaphoidella* (*E. bidens bidens* (Schmeil, 1894), *E. colombiana* Gaviria, 1993, *E. grandidieri* (Guerne & Richard, 1893), *E. radkei* Reid, 1987, *E. sewelli minuta* (Chappuis, 1932) and *E. suarezi* Reid, 1987), one of *Epactophanes* (*E. richardi* Mrázek, 1893), and four of *Attheyella* (*A. (Chappuisiella) fuhrmanni* (Thiébaud, 1912), *A. (C.) pichilafquensis* Löffler, 1961, *A. (Delachauxiella) freyi* Löffler, 1963 and *A. (Canthosella) chocoensis* Gaviria and Defaye 2012). There are no previous reports of species of *Mesochra* from Colombian waters. Recent biological sampling at one of the largest protected coastal systems of northern Colombia yielded several male and female specimens of an undescribed species of *Mesochra* which is described in full in the present contribution. A key for the identification of the American species of the genus is also presented.

Material and methods

Biological samples of benthos and plankton were taken from the Laguna Navío Quebrado, Colombia (11°25' N, 73°05' W) from April to December 2012, mainly in the littoral areas with vegetation (macrophytes and mangrove) but also from open water in areas adjacent to shallow oyster banks. Water salinity was measured with a WTW 3111 conductivity meter. Water samples were collected using a 25 l bucket at both vegetation areas and open water. Samples were filtered with a standard zooplankton net (45 µm mesh) and fixed and preserved in 70% ethanol. Copepods were sorted from the original samples. Dissected specimens and appendages were mounted in glycerine and sealed with Canada balsam or Entellan®. Drawings of the mounted appendages were prepared at 1000× magnification with the aid of a camera lucida adapted to a compound microscope. The specimens were measured in lateral position, from the anterior end of the cephalic area to the posterior margin of the caudal rami. Morphological nomenclature follows Huys and Boxshall (1991) and Huys et al. (1996). The following abbreviations are used in the text and tables: P1–P6, first to sixth swimming legs; EXP, exopod; ENP, endopod. The type specimens examined were deposited in the collection held at the Museo de Colecciones Biológicas de la Universidad del Atlántico (UARC), Barranquilla, Colombia and in the Collection of Zooplankton at El Colegio de la Frontera Sur in Chetumal, Mexico (ECO-CHZ).

Systematics

Order **HARPACTICOIDA** Sars, 1903

Family **Canthocamptidae** Brady, 1880

Genus ***Mesochra*** Boeck, 1865

Mesochra huysi sp. nov.

(Figures 1–4)

Material examined

Female holotype (UARC390), male allotype (UARC391), from shallow plankton samples, Laguna Navío Quebrado, Colombia (11°25'N, 73°05'W), partially dissected, semi-permanent slides. Paratypes: one female, one male, plus two undissected females and two

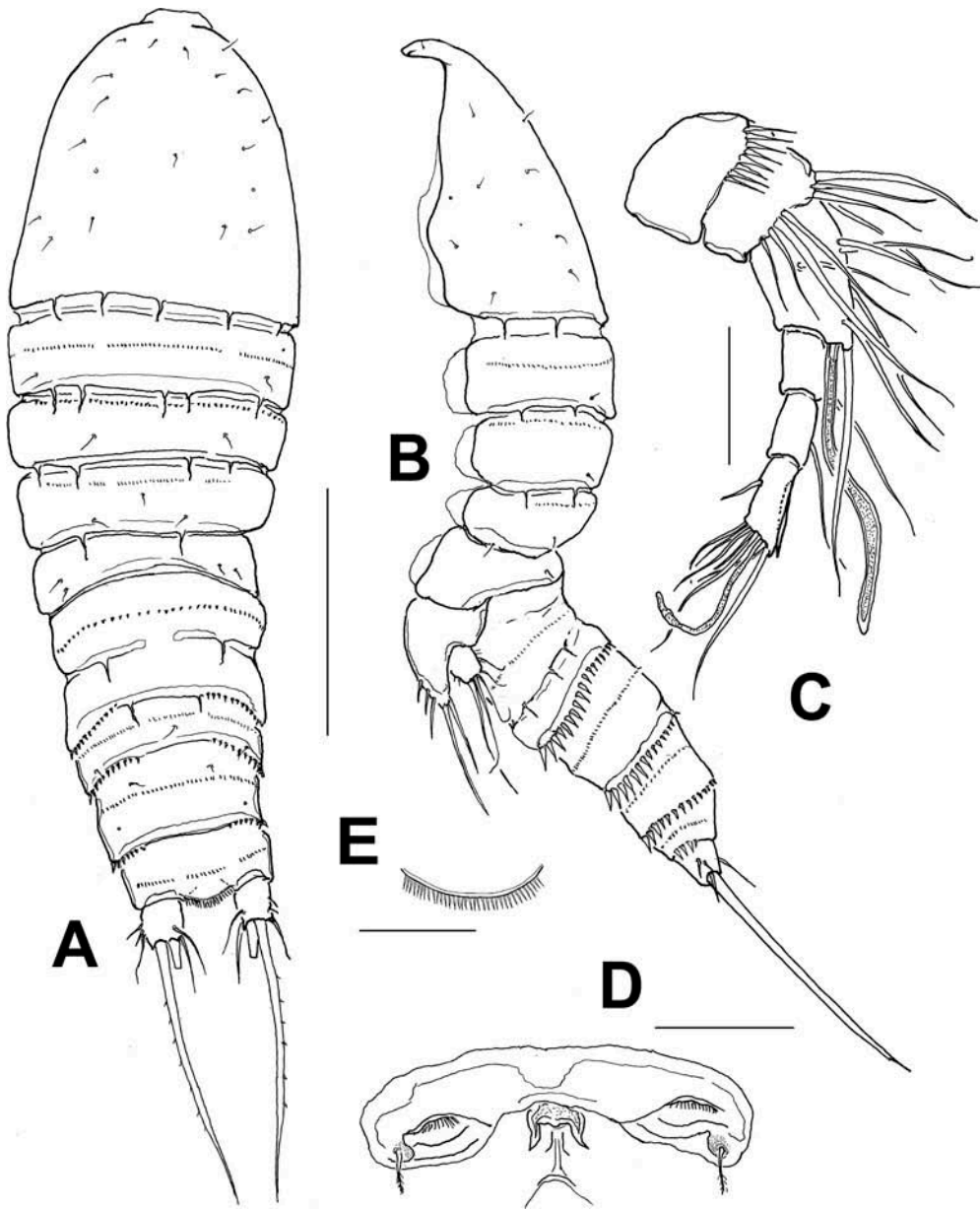


Figure 1. *Mesochra huysi* sp. nov., adult female from Colombia: (A) habitus, dorsal view; (B) same, lateral view; (C) antennule; (D) genital field and sixth legs, ventral view; (E) anal operculum, dorsal view. Scale bars: A, B = 100 μ m, C–E = 20 μ m.

males, ethanol-preserved, vial (UARC392). Three adult females and two adult males, dissected, mounted in slides, same locality, and collector (ECOCHZ-09325). Additional material: 5 adult females, 5 adult males in author's (JF-R) personal collection; these specimens are available for consultation upon request.

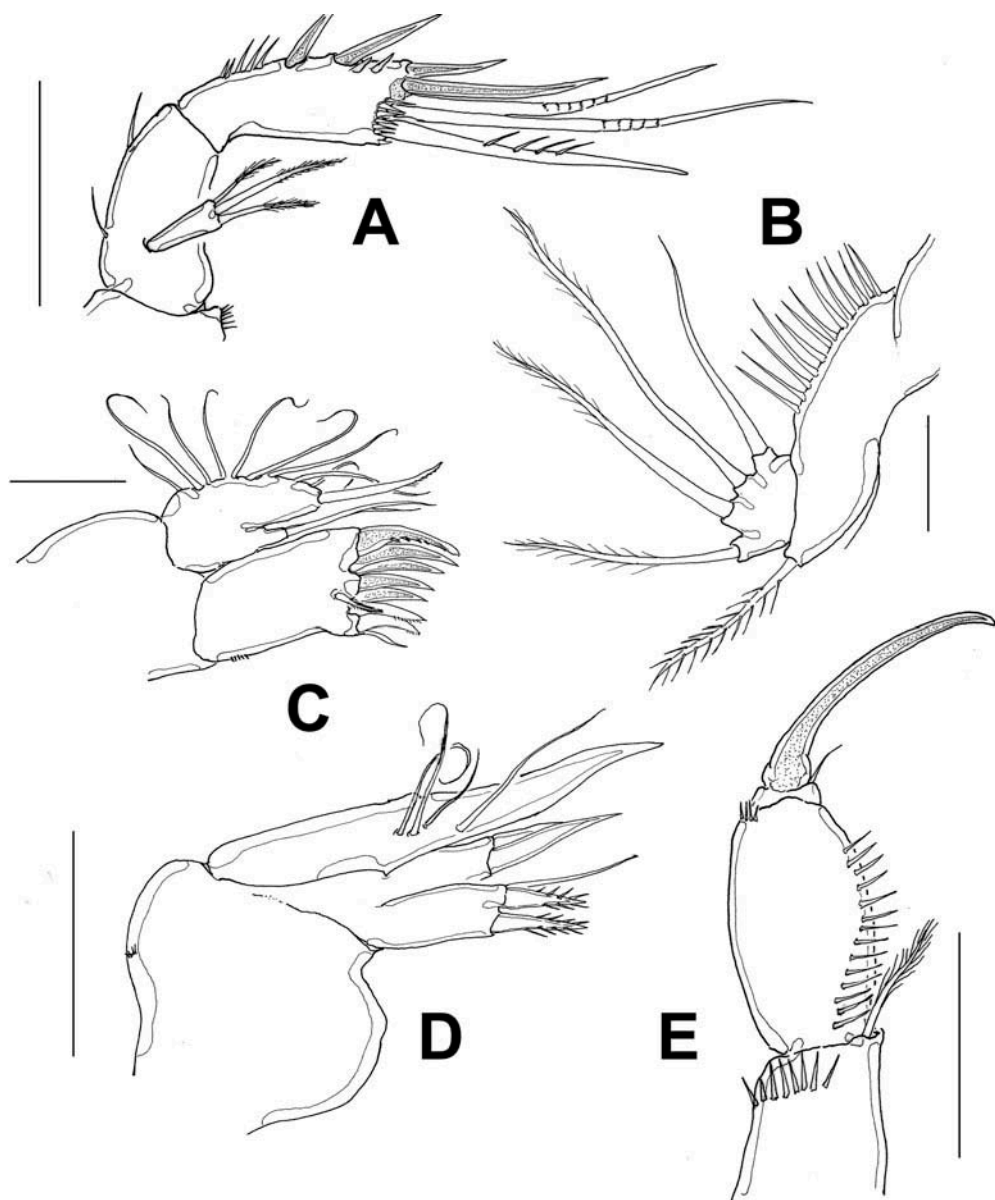


Figure 2. *Mesochra huysi* sp. nov., adult female from Colombia: (A) antenna; (B) mandibular palp; (C) maxillule; (D) maxilla; (E) maxilliped. Scale bars: A, D, E = 20 μm , B, C = 10 μm .

Type locality

Laguna Navío Quebrado, La Guajira, Colombia (11°25'N, 73°05'W).

Description of female

Body fusiform, slightly tapering posteriorly (Figure 1A). Habitus in dorsal view as in Figure 1A, in lateral view as in Figure 1B. Total body length, measured from tip of rostrum to posterior margin of caudal rami ranging from 336 to 403 μm (average 374 μm , $n = 10$; holotype: 336 μm). Rostrum distinct, flat in dorsal view, subtriangular, with rounded tip in

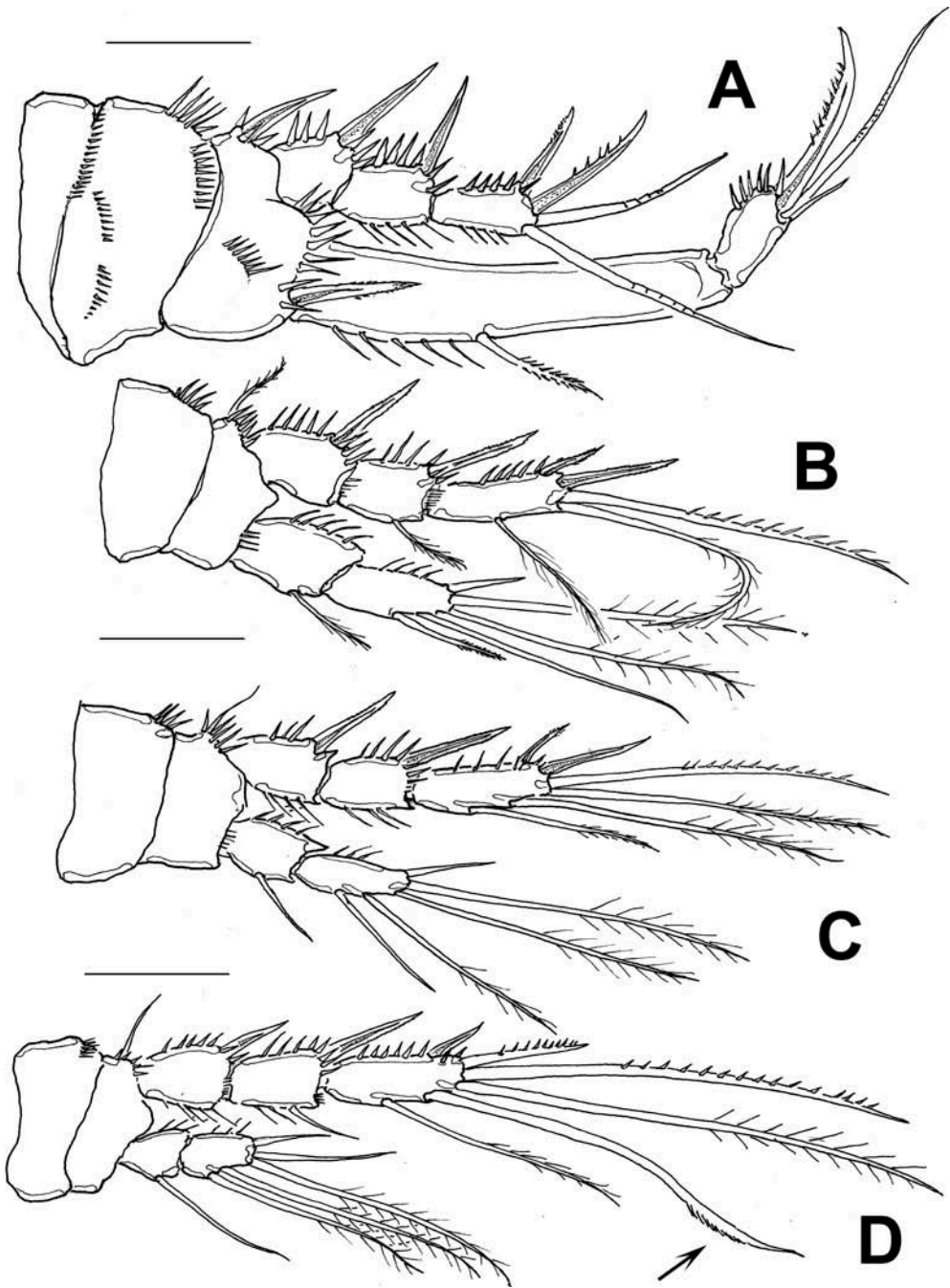


Figure 3. *Mesochra huysi* sp. nov., adult female from Colombia: (A) leg 1; (B) leg 2; (C) leg 3; (D) leg 4. Scale bars: 20 μ m.

lateral view. Dorsal surface of cephalosome and free prosomites with incised hyaline frill. Transverse row of microspinules on dorsal surface of first three pedigerous free somites, fourth free somite without dorsal spinulation. Genital double-somite with vestigial suture

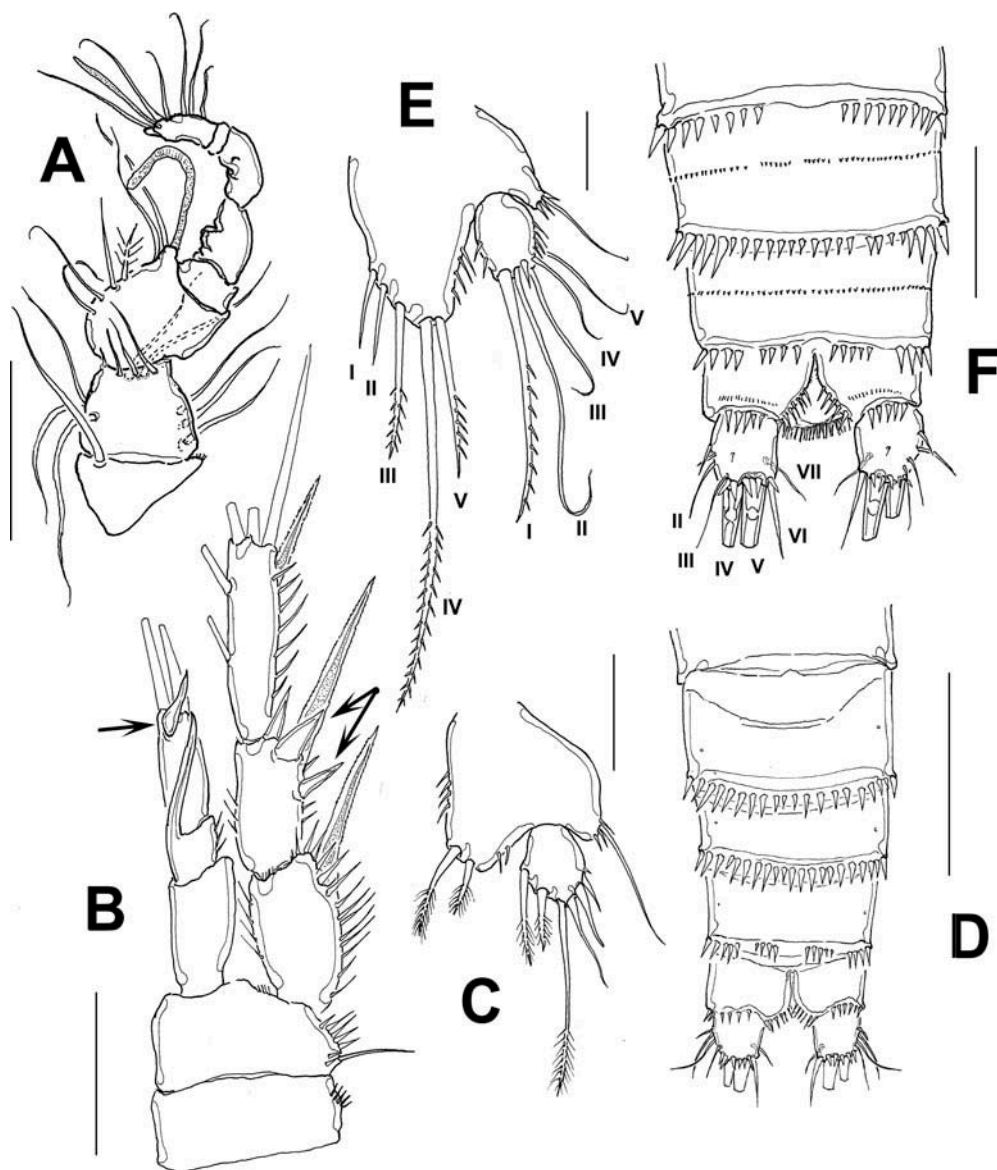


Figure 4. *Mesochra huysi* sp. nov., adult male from Colombia: (A) antennule; (B) leg 3 showing flame-shaped element (arrowed) and remarkably large spinules on second exopodal segment (double arrow); (C) P5; (D) ornamentation of urosome and caudal rami, ventral view. Adult female, (E) P5 showing setal nomenclature (Huys et al. 1996); (F) ornamentation of urosome and armature of caudal rami, ventral view. Scale bars: A–C, E = 20 µm, D, F = 50 µm.

visible in ventral view, first genital somite with row of small spinules on mid-dorsal surface and posterior frill; second genital somite with transverse row of spinules and weak frill along posterior margin on dorsal surface (Figure 1A); lateral and ventral margins with larger set of spinules (Figures 1B, 4D). First and second free urosomites with mid-dorsal row of minute spinules and row of spinules along posterior margin, spinules increasing in size laterally and

ventrally (Figure 4D). Anal somite with separate transverse rows of minute spinules on mid-dorsal surface, distal margin with short row of spinules along insertion of caudal rami. Anal operculum rounded, ornamented with slender spinules (Figure 4F).

Caudal rami (Figure 4F) subquadrate, with six setae, with spinules along ventral surface. Seta II with accompanying spinules, and about as long as caudal rami, seta III 1.2 times as long as seta II, seta V about 4.2 times longer than seta IV and seta VII as long as seta II.

Antennule. 6-segmented, with distal row of 8–9 spinules on first segment. Aesthetasc on third segment reaching well beyond last segment, this segment with small outer spine (Figure 1C). Armature formula as follows: 1(0), 2(8), 3(7 + 1ae), 4(1), 5(1), 6(9 + ae).

Antenna. Allobasis with two short setae, one proximal and one on subdistal position. Exopod short, cylindrical, 1-segmented, with three unequally long terminal setae, middle setae being longest. Endopod 1-segmented, inner margin with row of spinules on proximal 1/3 of segment, lateral armature represented by two subequal spines plus two outer spinules distally. Distal margin with five setal elements, two spines, two geniculate setae and one stout seta furnished with spinules (Figure 2A).

Mandible. Gnathobase with strong, wide teeth and one plumose dorsal seta, basis elongate, armed with one basipodal seta and row of long spinules. Endopodal lobe armed with four setae (Figure 2B).

Maxillule. Praecoxal arthrite with two setae. Distal margin with five strong curved claws and four setal elements. Coxa and basis partially fused; coxal endite with two slender setae. Basis with one seta. Endopodal and exopodal rami fused to basis, each represented by four and four setae, respectively (Figure 2C).

Maxilla. Syncoxa ornamented with row of minute spinules, with two endites, each with three setal elements, two of them wide-based, spinulated, the other slender. Basis forming strong claw with one slender seta. Endopod represented by three slender setae (Figure 2D).

Maxilliped. Syncoxa furnished with subdistal row of spinules, with inner distal plumose seta reaching half-length of basis. Basal segment robust, ornamented with longitudinal row of long spinules from proximal margin to distal 1/3 of segment; distal outer margin with row of small spinules. Endopod represented by weakly curved claw with an accompanying proximal seta (Figure 2E).

P1 (Figure 3A). Protopod ornamented with row of spinules along posterior margin, coxa with proximal rows of minute spinules, additional rows also along outer and posterior margins. Basis with curved row of spinules on middle surface; segment with strong spinules along distal margin, particularly near insertion of endopod; with outer and inner spine, latter stout, straight, reaching about 1/3 of ENP1. ENP 2-segmented, longer than EXP, first segment reaching well beyond length of EXP, about 7 times as long as wide, inner seta on first segment inserted almost at the half of segment; second segment ornamented with outer row of spinules, armed with three elements, inner subdistal one shorter than segment. EXP 3-segmented, reaching beyond insertion of inner seta on ENP1, EXP1 and EXP2 without inner setae, third segment with four elements, two of them geniculate.

P2 (Figure 3B). Coxa and basis with weaker ornamentation than in P1. Basis with slender outer basipodal seta. ENP 2-segmented, shorter than EXP, not reaching mid-length of EXP3. ENP1 with outer seta, without inner seta, ENP2 with five setal elements.

Table 1. Armature formula of legs 1–4.

	P1	P2	P3	P4
Basis	I, I	1,0	1,0	1,0
Exopod	I-0;I-0;II,2,0	I-0;I-1,II,2,1	I-0;I-0;II,2,2	I-0;I-0;II,2,2
Endopod	0-1;0,I,2,0	0-1;1,2,2	0-1;I,2,2	0-1;I,2,2

EXP 3-segmented, EXP1 without inner seta, EXP2 with short inner seta, EXP3 with five elements.

P3 (Figure 3C). Coxa and basis with weaker ornamentation than in P1, as in P2. Basis with slender outer basipodal seta. ENP 2-segmented, barely reaching distal end of EXP2; ENP1 with outer seta, without inner seta; ENP2 with five elements. EXP 3-segmented, EXP1 and EXP2 without inner setae, third segment with six elements.

P4 (Figure 3D). Coxa and basis with weaker ornamentation than in P1, as in P2 and P3. Basis with slender outer basipodal seta. ENP 2-segmented, short, reaching only proximal 1/3 of EXP1; ENP1 with inner seta, without outer seta; ENP2 with five setal elements. EXP 3-segmented, EXP1 with inner seta, third segment with six elements, one of them a thickened pectinate seta (arrowed in Figure 3D).

P5 (Figure 4C). Baseoendopod with single seta. EXP rounded, shorter than endopodal lobe, with five elements, inner middle distal seta longer than inner distal spine. Endopodal lobe armed with five elements (Figure 4E). Setal formula (Arabic numerals = setae, Roman numerals = spines) of P1–P4 as in Table 1.

P6 (Figure 1D) vestigial, represented by small crescent-shaped lobe (Figure 1D), with one short seta.

Description of male

Habitus resembling that of female except for narrower prosome and urosome (Figure 4D). Smaller than female, total body length, measured from tip of rostrum to posterior margin of caudal rami ranging from 263 to 315 μm (average 289 μm , $n = 5$; holotype: 263 μm). Somitic ornamentation as in female. Urosomites 1–3 with ventral row of large spinule along posterior margin (Figure 4D) which are coarser than those along the dorsal surface. Row of spinules along ventral margin of preanal somite with discontinuous row of spinules, as opposed to female, with continuous such row. Anal somite as in female, with smaller spinules on ventral surface and along insertion of caudal rami. Armature of caudal rami as in female.

Antennule. Geniculate, 8-segmented (Figure 4A).

Mouthparts, P1, P2, and P4 as in female.

P3 (Figure 4B). Coxa and basis with weaker ornamentation than in female P1, as in female P2. Basis with slender outer basipodal seta. ENP 3-segmented, shorter than EXP, reaching proximal 1/4 of EXP3; ENP1 unarmed, ENP2 without inner seta but with inner sinuous apophysis reaching apical margin of ENP3; ENP3 with two distal setae and a single claw-like or flame-shaped (Gómez and Fiers 1997) element (arrowed in Figure 4B). EXP 3-segmented, EXP1 and EXP2 with strong, long outer spine. EXP2 ornamented with

noticeably strong, wide-based spinules (double arrow in [Figure 4B](#)). EXP3 with 6 setal elements, two of them on inner margin ([Figure 4B](#)).

P5 ([Figure 4C](#)). Baseoendopod with cluster of spinules at point of insertion of seta. EXP rounded, reaching slightly beyond distal margin of endopodal lobe, with six setal elements, middle seta being longest. Endopodal lobe ornamented with few small spinules along inner and outer margins, armed with two spines of unequal length.

Etymology

The new species is named after Dr Rony Huys (Natural History Museum, London, UK), for his outstanding contributions to the taxonomic knowledge of the Harpacticoida.

Remarks

Mesochra huysi sp. nov. most closely resembles *M. parva* Thomson, 1946, *M. pacifica* Gómez and Fiers, 1997, and *M. pseudoparva* Gómez and Fiers, 1997; they share an identical armature formula of P1–P4. The female fifth leg armature, with five setal elements on the fifth leg EXP also resembles that of *M. parva* (Hamond 1971, fig. 13), *M. pacifica* (Gómez and Fiers, 1997, fig. 5b) and *M. pseudoparva* (Gómez and Fiers 1997, fig. 11b). However, *M. huysi* sp. nov. can be separated from these species when comparing the insertion of the inner seta P1 ENP1. It is at the same level of the distal margin of P1 EXP3 in both *M. parva* (Hamond 1971, fig. 14) and *M. pseudoparva* (Gómez and Fiers 1997, fig. 10a), it is inserted beyond the distal end of P1EXP3, in the distal 1/3 of the ENP1 in *M. pacifica* (Gómez and Fiers 1997, fig. 4a), while in *M. huysi* this seta is at the level of half the length of P1EXP3 ([Figure 3A](#)). Also, the length/width ratio of the P1ENP1 is different in these species: is similar in both *M. parva* (from Hamond 1971, fig. 14) and *M. pseudoparva* (from Gómez and Fiers 1997, fig. 10a), 6.0 in *M. pacifica* (from Gómez and Fiers 1997, fig. 4a) and 5.0 in the new species, *M. huysi*. The length ratio of the inner seta of P1ENP2/length of P1ENP2 reveals some additional differences among these species. The seta is short, only about half as long as the second endopodal segment in both *M. parva* (Hamond 1971, fig. 14) and *M. huysi* ([Figure 3A](#)) but it is as long as the second endopodal segment in *M. pacifica* (Gómez and Fiers 1997, fig. 4a) and it is longest, 1.3 longer than the P1ENP2, in *M. pseudoparva* (Gómez and Fiers 1997, fig. 10a). In addition, the distal end of P3 ENP reaches the proximal 1/3 of P3 EXP3 in *M. parva* (Hamond 1971, fig. 16) while in *M. pseudoparva* (Gómez and Fiers 1997, fig. 10d), *M. huysi* ([Figure 3C](#)), and *M. pacifica* (Gómez and Fiers 1997, fig. 4c), the ENP reaches the distal margin of P3EXP2. The P4 ENP reaches the distal margin of P4 EXP2 in *M. parva* (Hamond 1971, fig. 17), half of EXP2, almost reaching the insertion of the inner seta of EXP2 in *M. pseudoparva* (Gómez and Fiers 1997, fig. 11a), and the proximal 1/3 of P4 EXP2 in both *M. huysi* ([Figure 3D](#)) and *M. pacifica* (Gómez and Fiers 1997, fig. 5a). The anal operculum is naked in *M. parva* (Hamond 1971, fig. 6) and *M. pseudoparva* (Gómez and Fiers 1997, fig. 8a) whereas it is furnished with fine spinules in both *M. huysi* ([Figures 1A, 4F](#)) and also in *M. pacifica* (Gómez and Fiers 1997, fig. 6a, b).

The male of *M. huysi* sp. nov. differs from the male of its congeners *M. pseudoparva*, *M. pacifica* and *M. parva* by the features of the outer spinules on the first and second segments of P3 EXP; such spinules are remarkably strong in *M. huysi* while in the other three species, *M. parva* (Hamond 1971, fig. 20), *M. pacifica* (Gómez and Fiers 1997, fig. 7b) and *M. pseudoparva* (Gómez and Fiers 1997, fig. 13a) these elements are slender, regular

spinules. The apophysis of P3 ENP2 differs among these species. This structure does not reach the distal end of P3ENP3 in *M. pseudoparva* (Gómez and Fiers 1997, fig. 13a), *M. pacifica* (Gómez and Fiers 1997, fig. 7b) and *M. huysi* (Figure 4B) but in *M. parva* it is clearly shorter, not reaching the midlength of P3ENP3 (Hamond 1971, fig. 20). The claw-like or flame-shaped elements in P3 ENP3 are unreported or absent in both *M. parva* (Hamond 1971, fig. 20) and *M. pacifica* (Gómez and Fiers 1997, fig. 7b), but one is present in *M. huysi* (arrowed in Figure 4B) and two in *M. pseudoparva* (Gómez and Fiers 1997, fig. 13a, b). As mentioned by Gómez and Fiers (1997), these structures are likely to be overlooked by its size and position in some cases or even confused with other setal elements; their homologies or function cannot be established yet. The male P5 EXP has six setal elements in *M. huysi*, *M. pseudoparva* (Gómez and Fiers 1997, fig. 13c) and *M. pacifica* (Gómez and Fiers 1997, fig. 7c), while only five are present in *M. parva* (Hamond 1971, fig. 21).

Following Wells' (2007) key, our specimens are grouped among several species of *Mesochra* (key KG 33) (*M. sewelli* Lang, 1948, *M. meridionalis* Sars, 1905, *M. pseudoparva*, *M. parva*, *M. wolskii* Jakubisiak, 1933, *M. lindbergi* Petkovski, 1964, *M. rostrata* Gurney, 1927 and *M. aestuarii* Gurney, 1921) by its possession of a combination of characters including the segmentation of P1 rami, the number of segments on P2ENP and P4ENP, and the number of setae on the EXP3 of P2–P4. The new species is then compared (KG 33/2) with *M. pacifica* and *M. suifunensis* Borutsky, 1952, both sharing the same ornamentation of the anal operculum, armature of ENP2 of P2–P4 and armature of male and female fifth legs. *Mesochra suifunensis* clearly differs from the new species, *M. huysi*, in the lack of inner seta on ENP1 of P2 and P3; these setae are present in the new species. Also, the male of *M. suifunensis* lacks an apophysis in the P3, which is present in *M. huysi*. Therefore, the unique combination of characters of these specimens from Colombia appears to be enough evidence to consider them as belonging to a new species of *Mesochra*.

Distribution and ecology

Hamond (1971) recognized 31 valid species of *Mesochra* and presented a key based on Lang's (1948) work. Fiers and Rutledge (1990) recognized, apart from Mielke's (1974) *Mesochra* sp., 34 valid species. Gómez and Fiers (1997) added *M. pacifica* and *M. pseudoparva*. The number of species increased with the addition of three species from Iceland (Gómez and Steinarssdóttir 2007), and one from South Korea (Lee and Chang 2008). Gaviria-Melo et al. (2013) recognized up to 45 species of *Mesochra*; hence, with the addition of this new species from Colombia, the number of species in the genus rises to 46. Overall, from the valid species of *Mesochra*, only about 25% of them have been recorded in the Americas, Brazil harbouring the highest number of species of this genus (Reid 1998).

According to Fiers and Rutledge's (1990) and to our comparative analysis, only 11 species (*M. lindbergi* Petkovski, 1964, *M. dulcicola* Jakobi, 1956, *M. suifunensis* Borutsky, 1952, *M. meridionalis* Sars, 1905, *M. aestuarii* Gurney, 1921, *M. wolskii* Jakubisiak, 1933, *M. rostrata* Gurney, 1927, *M. sewelli* Lang, 1948, *M. parva* Thomson, 1946, *M. pacifica* Gómez & Fiers, 1997, and *M. pseudoparva* Gómez & Fiers, 1997) have a 2-segmented P1 ENP combined with a 222 spine formula (number of spines on the ultimate exopodal segment of P2–P4). The new species *M. huysi* can be assigned to this group. Only four species of this group (*M. dulcicola*, *M. pacifica*, *M. pseudoparva* and the new species, *M. huysi*) are known to be distributed in the Americas. There are only 10 species of the

genus known from the continent (Gómez and Fiers 1997; Suárez-Morales et al. 2006; Sarmiento and Parrera Santos 2012; Gómez and Morales-Serna 2014), a figure that reaches 11 with the addition of the new species. Only two of these species of *Mesochra* have been known from the Caribbean, the nominal *M. pygmaea* (Claus, 1863) from Barbados (Coull 1970), which is probably a species complex (Wells 2007), and a *Mesochra* sp. from the Mexican Caribbean coast (Suárez-Morales et al. 2006). This is the third record of a species of this genus from the Caribbean.

Mesochra huysi is currently known from a single locality, Laguna Navío Quebrado (Colombia). It was found in the limnetic region associated to a salinity of 28 psu. This large (surface area = 10.7 km²) and shallow (depth range = 30–110 cm) lagoonal system has a temperature ranging between 28 and 31°C, and pH values were 7.8–8.3. This is the same kind of lagoonal environment from which its closest congeners, *C. pacifica*, *C. parva* and *C. pseudoparva* (Hamond 1971; Gómez and Fiers 1997) have been collected. Currently, up to 14 species of Harpacticoida have been recorded in this water body (Fuentes-Reinés and Suárez-Morales 2014).

Key to the American species of *Mesochra* (females)

- 1 P1ENP 2-segmented 2
P1ENP 3-segmented 6
- 2 P2-P4EXP3 with outer spine formula 333..... *M. lilljeborgi* Boeck, 1865
P2-P4EXP3 with outer spine formula 222..... 3
- 3 Antennules with 6 segments, female and male P5EXP with five or six elements 4
Antennules with 7 segments, female P5EXP with 4 elements.....
..... *M. dulcicola* Jakobi, 1956
- 4 Anal operculum naked, female and male P5EXP with five elements, male P3ENP3
with two claw-like elements..... *M. pseudoparva* Gómez & Fiers, 1997
Anal operculum with fine cilium, female and male P5EXP with five or six elements. 5
- 5 Spine on P1ENP1 inserted beyond distal margin of P1EXP3, female and male P5EXP
with five elements. Male P3ENP3 with no claw-like elements.....
..... *M. pacifica* Gómez & Fiers, 1997
Spine on P1ENP1 inserted at about half-length of P1EXP3, female P5EXP with five
elements, male with six. Male P3ENP3 with one claw-like element.....
..... *M. huysi* sp. nov.
- 6 P1ENP1 long, going beyond P1EXP3..... 7
P1ENP1 short, reaching the end of P1EXP2..... *M. mexicana* Wilson, 1971
- 7 P1ENP1 less than 5 times as long as wide 8
P1ENP1 more than 5 times as long as wide 9
- 8 Length of inner seta of P1ENP2/length P1ENP2 ratio about 1, anal operculum with
teeth or spines..... *M. alaskana* Wilson, 1958
Length of inner seta of P1ENP2/length P1ENP2 ratio about 1.5, anal operculum with-
out teeth, P2EXP with six setae..... *M. rapiens* (Schmeil, 1894)

- 9 Inner seta of P1 ENP inserted at the level of distal margin of P1EXP2, P2EXP3 with six setal elements..... *M. stellfeldi* Jakobi, 1954
 Inner seta of P1ENP1 inserted at a different level, P2EXP3 with seven setal elements..... 10
- 10 Inner seta of P1ENP1 inserted at proximal 1/3 of P1EXP3.....
 *M. paranaensis* Jakobi, 1954
 Inner seta of P1ENP1 inserted at distal 1/3 of P1EXP3.....
 *M. pygmaea* (Claus, 1863)*

*As mentioned by Wells (2007) this nominal species is probably a widely distributed species complex; American records should be treated and compared in detail.

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