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New Neotropical species of *Downeshelea* Wirth and Grogan and redescription of *D. multilineata* (Lutz) (Diptera: Ceratopogonidae)

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ABSTRACT

Seven new species of *Downeshelea* Wirth and Grogan 1988 – *D. casimirensis*, *D. costaricensis*, *D. eclectica*, *D. jarina*, *D. litorale*, *D. marambaia* and *D. moravia* – are described and illustrated based on male and female specimens from Central and South America. The new species are compared with their similar congener *D. multilineata* (Lutz). A redescription of *D. multilineata* is presented and its neotype designated. These eight species were included in the *multilineata* species group, and a diagnosis and identification key are presented for each.

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Introduction

The Ceratopogonidae, with 1249 named Neotropical species (Santarém and Felippe-Bauer 2017), is one of the most diverse families of Diptera in this area. There are, however, many more undescribed species needing attention. In this paper we describe further diversity in *Downeshelea* Wirth and Grogan. The genus presently includes 35 species, with 21 present in the Neotropical region (Borkent 2016; Santarém and Felippe-Bauer 2017) (with two of these extending into the Nearctic). Wirth and Grogan (1988), in their revision of the Ceratopogonini of the World, placed the species of the *Monohelea multilineata* group into a new genus *Downeshelea*, based on a number of features of both males and females.

Downeshelea multilineata (Lutz) was originally described by Lutz (1914) as *Palpomyia multilineata* based on specimens collected at Manguinhos, Rio de Janeiro, Brazil. This species was assigned to *Monohelea* Kieffer by Johannsen (1943) and placed in the *multilineata* group by Wirth (1953). Lane (1945) redescribed *M. multilineata* based on the male holotype and six females from Rio de Janeiro ('Estrada Rio-São Paulo, km 47' – now known as Rodovia Presidente Dutra, km 47, near the municipality of Seropédica).

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Wirth (1953) redescribed the male genitalia based on material from Itaguaí, Rio de Janeiro, and Lane and Wirth (1964) added data of females based on material from Brazil (Mato Grosso State), Panama and Puerto Rico. Unfortunately, the male holotype described by Lutz (1914) and redescribed by Lane (1945) appears to be lost and is not present in the Collections of Fundação Oswaldo Cruz or the Entomological Collection of Faculdade de Saúde Pública of São Paulo, where the specimens studied by these researchers were generally preserved.

Because the holotype of *D. multilineata* has been misplaced, the species is poorly described, and to confidently differentiate it from other species, we redescribe the species here, based on male and female specimens from Rio de Janeiro and Bahia, and designate its neotype. We also describe seven new species – *D. casimirensis*, *D. costaricensis*, *D. eclectica*, *D. jarina*, *D. litorale*, *D. marambaia* and *D. moravia* – based on male and female specimens from different localities in the Neotropical region. These species are included in the *multilineata* species group, a new group described herein. Keys to identification of the males and females are provided. The female key and diagnosis are only effective when these are associated with males of the group.

Materials and methods

The specimens studied were deposited in the following collections:

CAIM Colección de Artrópodos con Importancia Médica, InDRE, Mexico City, Mexico.
CCER Coleção de Ceratopogonidae, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil.
CNCI Canadian National Collection of Insects, Agriculture & Agri-Food Canada, Ottawa, Canada.
FSP Coleção Entomológica, Faculdade de Saúde Pública, USP, São Paulo, Brazil.
MNCR Colección Entomológica, Sección de Artrópodos, Museo Nacional in Costa Rica.
USNM Entomological Collection, Smithsonian Institution, National Museum of Natural History, Washington, United States.

The specimens studied were slide mounted in Canada Balsam. Diagnostic characters were illustrated or microphotographed using a Nikon Eclipse E 200 and a Zeiss AX10 microscope, and the photomicrography and plates were prepared using Combine Z and Photoshop GIMP Portable, respectively. The aedeagus and parameres of *D. casimirensis* and *D. marambaia* were drawn separately from the remainder of the male terminalia for a better visualisation. Morphological terms are from Borkent et al. (2009). The distribution of spines on each of tarsomeres 2–4 of all legs are separated by hyphens. Measurements are included in the text with those of the spermathecae in micrometres and those of the wings in millimetres. Meristic information is given as a range, followed by the mean and the number of specimens examined.

Results

Downeshelea multilineata species group: new group

Abbreviated description.

Small- to medium-sized species (male wing length 0.85–1.37 mm, female wing length 0.92–1.30 mm), brown in colouration. Male eyes narrowly separated by a distance shorter than one ommatidia or contiguous in lower area; female eyes contiguous. Male antenna pale, except base of flagellomere 1, distal portion of flagellomere 10 and flagellomeres 11–13 brown; female antenna brown, basal portion of flagellomeres 1–7 pale; flagellomeres 2–8 somewhat barrel-shaped, 9–13 cylindrical, elongate. Palpus brown, segment 3 swollen or slightly swollen on midportion, with broad, deep sensory pit. Male mandible unarmed, female mandible with 9–12 teeth. Legs brown or pale brown, hind leg darker (except in *D. casimirensis*), hind tibial comb with six spines; apical spines of male hind tarsomeres 2–4: 1–1–1; male claws about 0.35–0.45 length of their respective tarsomere 5; female hind leg claw 0.89–1.53 length of tarsomere 5. Wing hyaline, with dark bristles on costa; two distinctive black spots, one on r-m, other in r_3 from apex of r_2 to M_1; three distinctive greyish areas: first near apex of M_1, second sigmoid-shaped near apex of M_2 extending to wing margin in m_2, third over CuA_2, also in CuA_1 in some species. Male tergite 9 gradually tapering distally, distal ½ with sclerotised band laterally; gonocoxite moderately stout; gonostylus nearly straight, proximal ½ slightly pilose; parameres fused on basal portion, each with trilobed basal arm, heavily sclerotised; stem stout, straight or sinuous; distal portion abruptly bent ventrally, directed anteromesally, tapering to pointed tip, overlapped in some species; aedeagus subtriangular to rectangular, posterior portion with mesal excavation. Female with spermathecae variable in size, with short sclerotised ducts, third rudimentary spermathecae generally present.

Key to males of the *Downeshelea multilineata* species group

1. Legs brown or pale brown, without bands (although some with varying pigmentation); wing with three distinctive greyish areas (in addition to the two dark spots on r-m and in r_3 from the apex of r_2 to M_1) (Figure 1a); parameres distal portion abruptly bent ventrally, directed anteromesally, tapering to pointed tip, 0.50–0.75 of total paramere length ..... *multilineata* species group..... 2
– Legs various; wing with variable distinctive greyish areas; parameres distal portion not as above ..... other *Downeshelea* species
2. Legs brown, hind femur brown; medium- to large-sized species; midtarsomere 1 with seven to eight ventral spines. Parameres with a short posteromedian projection on the medial fused portion..... 3
– Legs brown or pale brown, hind femur darker subapically; small- to medium-sized species; midtarsomere 1 with two to six ventral spines. Parameres without a posteromedian projection on the medial fused portion..... 4
3. Tergite 9 with short, broad apicolateral process; paramere stem sinuous on midportion, expanded subapically forming a broad lobe laterally directed; distal portion 0.55–0.84 of total paramere length (Figure 8i); aedeagus without elliptical sclerotised anterior areas, distal portion terminating in sclerotised non-serrate process (Figure 8h) ..... *D. eclectica* sp. nov.
– Tergite 9 with long, slender apicolateral process; paramere stem sinuous, proximal 2/3 directed posterolaterally, distal 1/3 slender directed posteromesally; distal portion 0.50 of total paramere length (Figure 9i); aedeagus with two elliptical sclerotised anterior

areas; distal portion terminating in sclerotised serrate processes (Figure 9h)..... ..... *D. moravia* sp. nov.

4. CuA_1 pale; paramere distal portion short, not reaching the medial fused portion, 0.53–0.62 of total paramere length 5
– CuA_1 greyish; paramere distal portion elongate, reaching the medial fused portion, 0.62–0.80 of total paramere length 7
5. Legs pale brown, foretibia pale or darker apically; halter knob pale; aedeagus subtriangular, with or without sclerotised anteromesal areas, not reaching midlength when present; basal arch extending to 0.22–0.56 of total length..... 6
– Legs brown (Figure 7d); halter knob brown; aedeagus rectangular, with two large elliptical sclerotised anteromesal areas reaching midlength; basal arch extending to 0.17 of total length (Figure 9f)..... *D. marambaia* sp. nov.
6. Hind tibia pale (Figure 2d); gonostylus 0.81 length of gonocoxite (Figure 8c); parameres stem straight, gradually swollen to apex; distal portion deeply curved (Figure 8e); aedeagus with pair of submedian sclerotised stripes and oval areas, basal arch extending to 0.56 of total length (Figure 8d)..... *D. casimirensis* sp. nov.
– Hind tibia darker apically and on proximal third (Figure 5c); gonostylus 0.58–0.64 length of gonocoxite (Figure 9a); parameres stem basolaterally expanded, more slender and convergent distally, distal portion nearly straight (Figure 9b); aedeagus without sclerotised stripes and oval areas, basal arch extending to 0.22–0.28 of total length (Figure 9a) ..... *D. jarina* sp. nov.
7. Sternite 9 with large prominent convex median lobe (Figure 8a); paramere stem straight, distal portion slightly curved (Figure 8b); aedeagus subtriangular, with two elliptical sclerotised anterior areas (Figure 8a) ..... *D. multilineata* (Lutz)
– Sternite 9 with moderately convex median lobe; paramere stem and distal portion various; aedeagus rectangular or subrectangular, without elliptical sclerotised anterior areas 8
8. Halter knob pale; midtibia paler basally (Figure 3c); paramere stem broad, sinuous, expanded apicolaterally, distal portion gradually curved (Figure 8g); aedeagus subrectangular, basal arch extending to 0.22–0.26 of total length (Figure 8f)..... ..... *D. costaricensis* sp. nov.
– Halter knob brown; midtibia brown (Figure 6c); paramere stem nearly straight basally, expanded distally in inner portion, distal portion anteromesally directed abruptly curved to tip (Figure 9d); aedeagus rectangular, basal arch extending to 0.34–0.42 of total length (Figure 9c)..... ..... *D. litorale* sp. nov.

Key to females of the *Downeshelea multilineata* species group

Female members of the multilineata group can only be recognised as such if associated with males of the group. The females of *D. moravia*, *D. marambaia* and *D. casimirensis* are unknown.

1. Legs pale brown; hind tibia darker apically and on proximal third..... ..... *D. jarina* sp. nov.
– Legs brown; hind tibia dark brown..... 2
2. Halter pale; mandible with 10 teeth..... ..... *D. costaricensis* sp. nov.
Halter brown; mandible with 11–12 teeth..... 3

3. Midtibia paler basally ..... *D. multilineata* Lutz
– Midtibia brown 4
4. Hind femur brown; midtarsomere 1 with six to nine ventral spines ..... *D. eclectica* sp. nov.
– Hind femur darker subapically; midtarsomere 1 with four to five ventral spines..... *D. litorale* sp. nov.

Downeshelea multilineata (Lutz), 1914
(Figures 1a–i, 8a–b, 10)

Palpomyia multilineata Lutz 1914: 93 (male; Rio de Janeiro, Brazil; fig. wing).
Monohelea multilineata: Macfie 1940: 137 (Guyana record; misidentification) Johannsen 1943: 781 (combination); Lane 1945: 368 (redescription; fig. male genitalia; in part male specimen); Wirth 1953: 149 (notes; fig. male genitalia; in key; misidentification); Lane and Wirth 1964: 224 (distribution; fig. aedeagus, parameres; in key; misidentifi cation); Wirth 1974: 41 (distribution, Guyana record).
Monohelea (*Allohelea*) *multilineata*:Wilkening et al. 1985: 524 (Florida records).
Downeshelea multilineata: Wirth and Grogan 1988: 52 (combination); Borkent and Wirth 1997: 98 (in world catalogue); Borkent and Spinelli 2000: 47 (in Neotropical catalogue; distribution); Borkent and Spinelli 2007: 80 (in Neotropical catalogue; distribution); Borkent and Grogan2009: 20 (in Nearctic catalogue; distribution); Grogan et al. 2010: 35 (in Florida species list; distribution); Borkent 2016: 124 (in world catalogue); Santarém and Felippe-Bauer 2017: 16 (Brazilian distribution).

Diagnosis
Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.58–0.67 length of gonocoxite; parameres fused for 0.13–0.23 of total length; stem straight, distal portion slightly curved (Figure 8b); aedeagus subtriangular, basal arch V-shaped, extending to 0.41–0.46 of total length with two elliptical sclerotised areas (Figure 8a).

Female. The only species of *Downeshelea multilineata* group in the Americas with medium-sized wing (1.12–1.17 mm) (Figure 1d); midtarsomere 1 with 5–6 ventral spines; hind tibia brown; two unequal spermathecae (Figure 1i).

Description
Male. *Head*. Eyes separated by a distance shorter than one ommatidia; antennal ratio 0.91–1.06 (0.97, n = 9); palpal ratio 2.20–2.75 (2.53, n = 9) (Figure 1c).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 1a) with greyish spot over CuA_1, CuA_2 extending into cua_1, anal cell, reaching wing margin; 2^{nd} radial cell twice longer than 1^{st}; wing length 0.97–1.15 (1.05, n = 10) mm; breadth 0.32–0.40 (0.36, n = 10) mm; costal ratio 0.71–0.77 (0.75, n = 10). Halter brown, distal portion of knob darker. Legs (Figure 1b) brown, midtibia slightly paler basally, hind femur darker subapically. Fore-, hind tarsomere 1 with one basal, one apical spine;

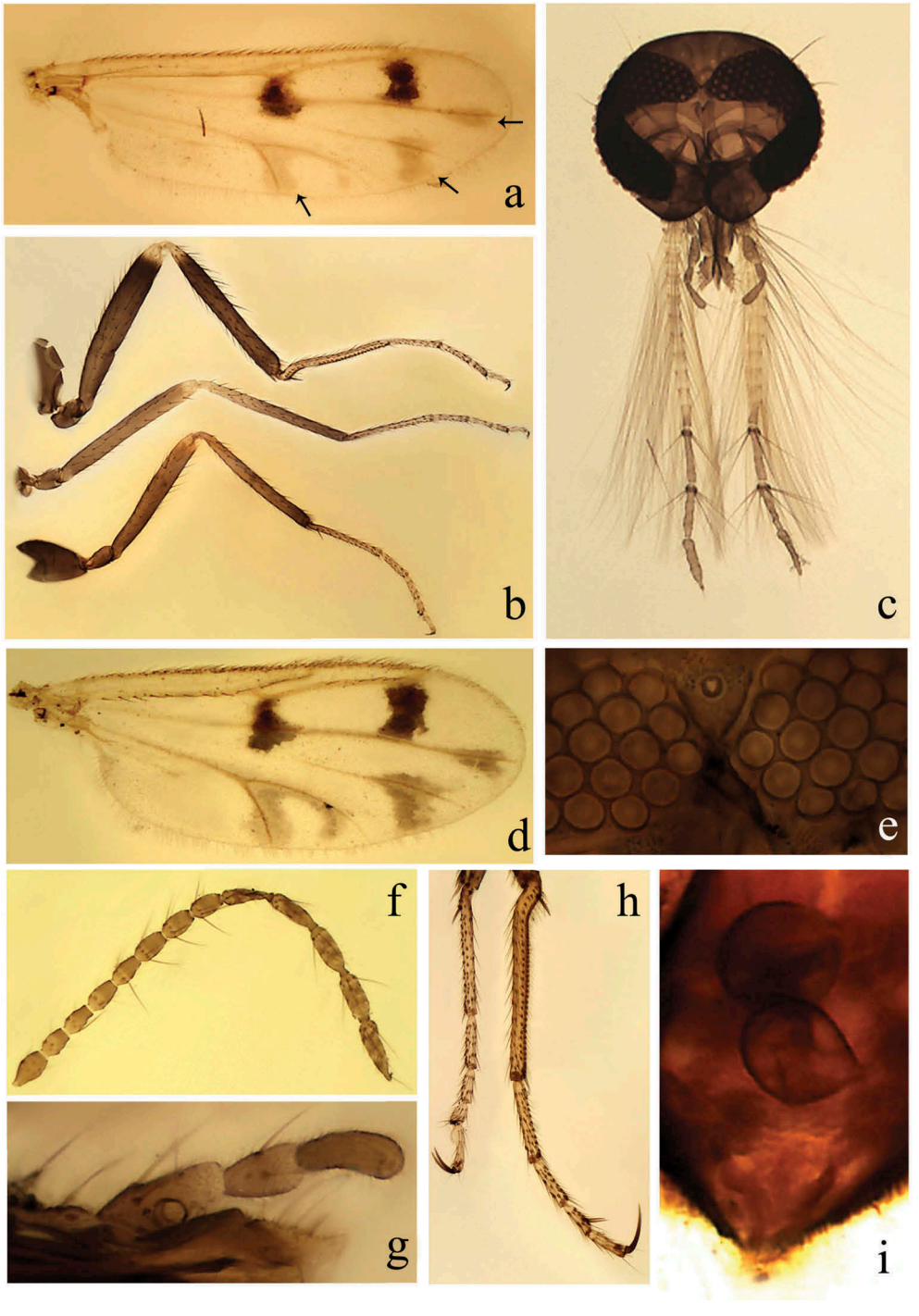

Figure 1. *Downeshelea multilineata* (Lutz). Male: (a) wing; arrows: greyish spots; (b) fore, mid, hind legs (bottom to top); (c) head, anterior view. Female: (d) wing; (e) eye separation, anterior view; (f) antenna; (g) palpus; (h) fore, hind tarsomeres (left to right; from different specimens); (i) apex of female abdomen, ventral view.

midtarsomere 1 with two basal, two apical, 2–5 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1, 2–2–2, 1–1–1; fore tarsal ratio 2.04–2.47 (2.26, n = 10), mid tarsal ratio 2.17–2.64 (2.43, n = 10), hind tarsal ratio 2.06–2.29 (2.21, n = 10); claws 0.33–0.54 (0.43, n = 11) length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 8a): tergite 9 with rounded apex, apicolateral process elongate, slender; sternite 9 nearly straight anteriorly, posterior margin with prominent convex median lobe bearing 3–4 long setae. Gonocoxite 1.90–2.40 (2.15, n = 10) times longer than basal width; gonostylus stout, 0.58–0.67 (0.63, n = 9) length of gonocoxite. Parameres (Figure 8b) 0.96–1.21 (1.07, n = 10) times longer than aedeagus, fused for 0.13–0.23 (0.19, n = 10) of total length; knob bulbous; stem straight, apex slightly expanded laterally in some specimens; distal portion slightly curved, 0.67–0.75 (0.71, n = 8) of total length. Aedeagus subtriangular, heavily sclerotised laterally, basal arch V-shaped, extending to 0.41–0.46 (0.43, n = 9) of total length with two elliptical, sclerotised anterior areas; posterior portion with deep mesal excavation terminating in two pointed serrate processes.

Female. Similar to male with usual sexual differences; eyes as in Figure 1e, antennal ratio 1.02 (n = 1) (Figure 1f); palpus as in Figure 1g, palpal ratio 2.20 (n = 1); mandible with 11 teeth. Wing as in Figure 1d; wing length 1.12–1.17 (1.15, n = 5) mm; breadth 0.45–0.50 (0.48, n = 5) mm; costal ratio 0.77–0.81 (0.78, n = 5). Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, 5–6 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–2–2, 2–2–1, 1–1–2; fore tarsal ratio 2.38–2.47 (2.42, n = 2), mid tarsal ratio 2.38–2.76 (2.56, n = 3), hind tarsal ratio 2.34–2.44 (2.39, n = 4); fore leg claws 0.61–0.72 (0.67, n = 2) length of their tarsomere 5; mid leg claws missing; hind leg claw 1.18–1.22 (1.20, n = 2) as long as tarsomere 5 (Figure 1h). Abdomen with genital sclerite not visible in slide-mounted specimen. Two unequal spermathecae (Figure 1i), measuring 48–58 (51, n = 4) by 45 (n = 1) µm and 38–48 (44, n = 4) by 33–40 (36, n = 2) µm. Third rudimentary spermatheca not visible.

Specimens examined

Neotype male adult, labeled 'Neotype *Downeshelea multilineata* (Lutz), BRAZIL, Rio de Janeiro, Jacarepaguá, May 1977, Paiva & Pereira cols.' (CCER). Other specimens labeled as follows: 1 male, same data as neotype except July 1972, Tavares & Souza cols. (CCER); 2 males, 5 females, same data except Maricá, 06 February 1990, FEEMA team cols. (CCER); 2 males labeled '*Downeshelea multilineata* (Lutz), BRAZIL, Bahia, Itajuipe, Fazenda Almirante, 28 October 1988, emergence trap, J.A. Winder col.' (USNM) (NEW RECORD); 5 males same data except 16 December 1988; 02 June 1989; 05 January 1990; 24 February 1992; 27 July 1992 (4 USNM, 1 CCER).

Distribution and bionomics

This species is found in the USA (Florida), Guyana (?) and Brazil (Bahia, Rio de Janeiro) (Figure 10). It has been found in coastal environments in the USA and forested areas in Brazil (Rio de Janeiro). Wirth (1991, 1992)) and Ronderos and Spinelli (1999) indicated that the collections made by J.A. Winder in Fazenda Almirante, Itajuipe, Bahia, Brazil, were from cocoa plantations.

Discussion

Our study of the pinned specimens of *Monohelea multilineata* from Rio de Janeiro (Municipality of Seropédica and Itaguaí) studied by Lane (1945) and Wirth (1953) and from Mato Grosso studied by Lane and Wirth (1964) deposited in the Entomological Collection of Faculdade de Saúde Pública (São Paulo, Brazil) revealed that the female wing has a dark spot on the apical portion of r_3 and m_1. Unfortunately, considering the material analysis policy of the collection, the pinned specimens could not be studied further. However, the original description by Lutz (1914) does not present this apical spot on r_3 and m_1. Considering the presence of this spot is important for recognition of *Downeshelea* species and, as mentioned by Wirth (1953), to distinguish *D. multilineata* from *Downeshelea stonei* Wirth, we conclude that the specimens from Rio de Janeiro and Mato Grosso do not correspond to *D. multilineata*. Also, the illustrations of the male genitalia in Wirth (1953) and Lane and Wirth (1964) show the stem of parameres with the anterior ½ posterolaterally directed, forming a pointed median projection, not corresponding with the straight stem of the parameres illustrated by Lane (1945) based on the holotype and similar to our observations. The male specimen studied by Wirth (1953) was in bad condition, but it is similar to his illustration. The pinned male and female specimens from Mato Grosso (Brazil) studied by Lane and Wirth (1964) are similar to each other, and the male genitalia correspond to *D. fluminensis* Felippe-Bauer and Quintelas. Lane and Wirth (1964) also analysed specimens of *D. multilineata* from Panama and Puerto Rico. As these specimens are not found in any collection, we presume that they are similar to the erroneous citation of this species included in their work. We therefore exclude these localities from the distribution of *D. multilineata* until more studies are completed.

Lane (1945) reported that the holotype redescribed by him was returned to Instituto Oswaldo Cruz, Rio de Janeiro, Brazil, and Wirth (1974) notes that the type specimen was lost. We also have consulted these collections for any type specimens of *Downeshelea multilineata* deposited there. Lane (1945) designated a female specimen from Rio de Janeiro, Brazil, as 'neoallotype', which has no status according to the International Code of Zoological Nomenclature (ICZN). Furthermore, it was based on a misidentified female specimen, which has no strong characters for identification. Considering the holotype determined by Lutz (1914) and studied by Lane (1945) is lost, we designate herein as neotype of *D. multilineata* a male specimen that matches the original description made by Lutz (1914), which is based only on colouration and the illustrated wing, and also the description of the male genitalia of the holotype by Lane (1945). The only information provided by Lutz (1914) about the collection of the specimens is that they were captured in a light trap, in Manguinhos, Rio de Janeiro, Brazil. The neotype is from Jacarepaguá, nearly 25 km NW of Manguinhos, Rio de Janeiro. It is unlikely that specimens can be presently collected from the original type locality, because the environment has been too modified.

The Guyana records of *D. multilineata* were made by Macfie (1940). Posteriorly, Wirth (1953) recognised the misidentification and described *Downeshelea guianae* Wirth based on this specimen. In Wirth's (1974) catalogue, the country is included in the distribution of *D. multilineata*, despite the absence in the cited literature of other records from Guyana. So, we retain this country in the distribution with a question mark until more studies are completed. The record from Florida (USA) by Wilkening et al. (1985) was based on a unique female specimen deposited in the USNM (not examined). Considering

this, we cannot make further conclusions about its correct identification. Therefore, we retain Florida in the distribution of *D. multilineata*. Finally, our study of the specimens from Mexico, recorded by Huerta et al. (1999) as *D. multilineata*, revealed that they were misidentified, corresponding to the new species *D. litorale* sp. nov. described below.

Downeshelea casimirensis sp. nov.
(Figures 2a–d, 8c–e, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.81 length of gonocoxite; parameres fused for 0.19 of total length; stem straight, gradually swollen to apex; distal portion strongly curved (Figure 8e); aedeagus subtriangular, heavily sclerotised laterally on proximal 2/3, with a pair of submedian, longitudinal sclerotised stripes and oval areas, basal arch V-shaped, extending to 0.56 of total length (Figure 8d).

Female. Unknown.

Description

Male. *Head*. Eyes slightly contiguous in lower area; antennal ratio 0.91 (Figure 2c); palpal ratio 2.0 (Figure 2b).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 2a) with greyish spot over CuA_2 extending into cua_1, anal cell, reaching wing margin; 2nd radial cell twice longer than 1st; wing length 0.85 mm; breadth 0.35 mm; costal ratio 0.70. Halter pale brown. Legs (Figure 2d) pale brown, hind femur slightly darker sub-apically. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, four other ventral spines; apical spines of tarsomeres 2–4 of fore-,

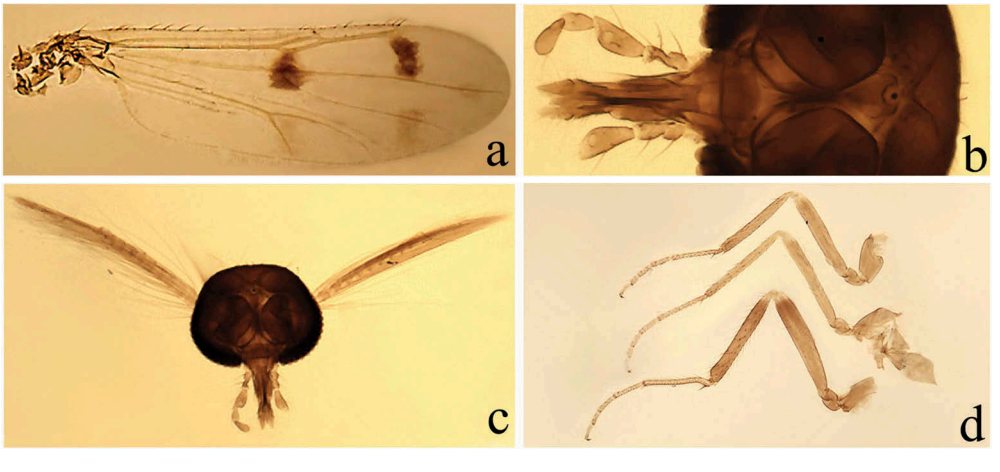

Figure 2. *Downeshelea casimirensis* sp. nov., male. (a) Wing; (b) eye separation, anterior view; (c) head, anterior view; (d) fore, mid, hind legs (top to bottom).

mid-, hind legs: 1–1–1; 2–2–1; 1–1–1; fore tarsal ratio 2.31, mid tarsal ratio 2.45, hind tarsal ratio 2.14; claws 0.35 length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 8c): tergite 9 with quadrate apex, apicolateral process elongate, slender; sternite 9 slightly concave anteriorly, posterior margin with large convex median lobe with blunt tip bearing 3 long setae. Gonocoxite 2.41 times longer than basal width; gonostylus long, 0.81 length of gonocoxite. Parameres (Figure 8e) 1.10 times longer than aedeagus, fused for 0.19 of total length; knob flattened; stem straight, gradually swollen to apex; distal portion strongly curved, 0.53 of total length. Aedeagus (Figure 8d) subtriangular, heavily sclerotised laterally on proximal 2/3, basal arch V-shaped, extending to 0.56 of total length with pair of submedian, longitudinal sclerotised stripes and oval areas; distal portion with a deep mesal excavation terminating in two short, slender, sclerotised, slightly serrate processes with pointed tip.

Female. Unknown.

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea casimirensis* Santarém, Borkent, Spinelli and Felippe-Bauer, BRAZIL, Rio de Janeiro, Casimiro de Abreu, Union Biological Reserve (22° 25′ 35″ S, 42° 2′ 4″ W), 28 April-17 May 2013, Malaise, Biota Diptera Fluminense team cols.' (CCER).

Distribution and bionomics

This species is restricted to forests in the Brazilian State of Rio de Janeiro (Casimiro de Abreu municipality) (Figure 10).

Etymology

This species is named after the type locality at Casimiro de Abreu, municipality of Rio de Janeiro State.

Downeshelea costaricensis sp. nov.
(Figures 3a–h, 8f–g, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.58–0.66 length of gonocoxite; parameres fused for 0.29–0.34 of total length; stem broad, sinuous, expanded apicolaterally, distal portion slightly curved (Figure 8g); aedeagus subrectangular, hyaline on midportion, basal arch U-shaped, extending to 0.22–0.26 of total length (Figure 8f).

Female. The only species of *Downeshelea multilineata* group in the Americas with medium-sized wing (1.02–1.15 mm) (Figure 3d); midtarsomere 1 with 4–5 ventral spines; hind tibia uniformly brown; two subequal spermathecae (Figure 3h).

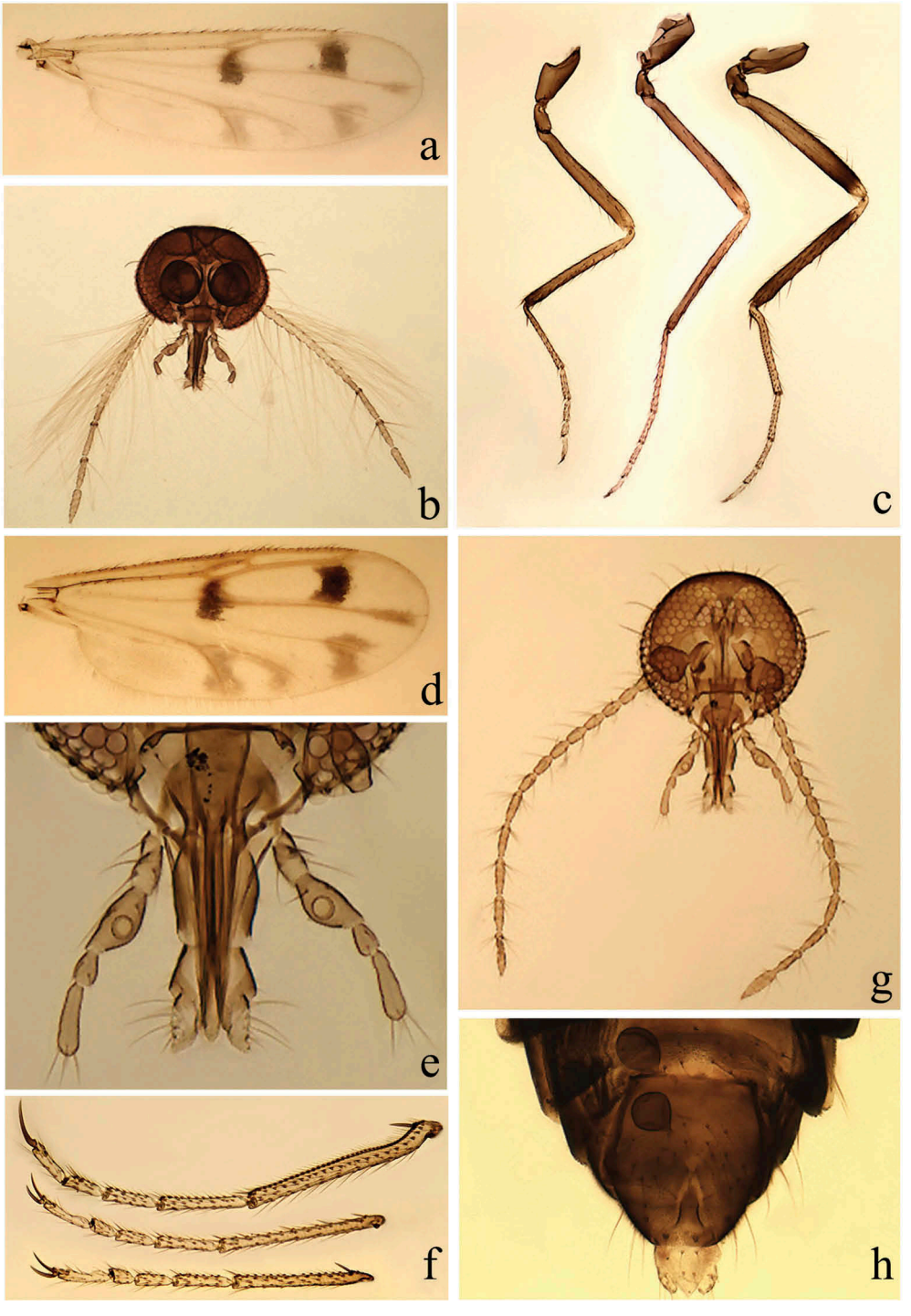

Figure 3. *Downeshelea costaricensis* sp. nov. Male: (a) wing; (b) head, anterior view; (c) fore, mid, hind legs (left to right). Female: (d) wing; (e) palpus; (f) fore, mid, hind tarsomeres (bottom to top); (g) head, anterior view; (h) apex of female abdomen, ventral view.

Description

Male. *Head*. Eyes slightly contiguous in lower area, antennal ratio 0.90–0.99 (0.95, n = 10); palpal ratio 1.83–2.80 (2.31, n = 10) (Figure 3b).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 3a) with greyish spot over CuA_1, CuA_2 extending into cua_1, anal cell, reaching wing margin; 2nd radial cell 2.3 times longer than 1st; wing length 0.95–1.10 (1.06, n = 10) mm; breadth 0.35–0.40 (0.37, n = 10) mm; costal ratio 0.68–0.77 (0.74, n = 10). Halter pale with distal portion of knob darker. Legs (Figure 3c) brown, fore-, mid- tibiae slightly paler on basal portion, hind femur darker on distal third. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, 4–5 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1, 2–2–2, 1–1–1; fore tarsal ratio 2.15–2.40 (2.27, n = 10), mid tarsal ratio 2.33–2.74 (2.55, n = 10), hind tarsal ratio 2.00–2.17 (2.06, n = 10); claws 0.33–0.46 (0.40, n = 10) length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 8f): tergite 9 with quadrate apex, apicolateral process elongate, slender; sternite 9 straight anteriorly, posterior margin with moderately convex median lobe bearing 4–5 long setae. Gonocoxite 1.71–2.50 (2.27, n = 10) times longer than basal width; gonostylus 0.58–0.66 (0.62, n = 10) length of gonocoxite. Parameres (Figure 8g) 0.93–1.05 (0.97, n = 10) times longer than aedeagus, fused for 0.29–0.34 (0.30, n = 10) of total length; knob bulbous; stem broad, sinuous, expanded apicolaterally; distal portion slightly curved, 0.66–0.80 (0.74, n = 10) of total length. Aedeagus subrectangular, strongly sclerotised, hyaline only on midportion, basal arch U-shaped, extending to 0.22–0.26 (0.24, n = 10) of total length; distal portion with deep mesal excavation terminating in two strong pointed, serrate processes.

Female. Similar to male with usual sexual differences; antennal ratio 0.97–1.12 (1.04, n = 8) (Figure 3g); palpus as in Figure 3e, palpal ratio 1.83–2.40 (2.03, n = 8); mandible with 10 teeth. Wing as in Figure 3d; wing length 1.02–1.15 (1.09, n = 8) mm; breadth 0.40–0.47 (0.43, n = 8) mm; costal ratio 0.78–0.82 (0.80, n = 8). Fore, hind tarsomere 1 with one basal and one apical spine; midtarsomere 1 with two basal, two apical, 4–5 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1, 2–2–1, 1–1–2; fore tarsal ratio 2.18–2.52 (2.35, n = 8), mid tarsal ratio 2.40–2.90 (2.65, n = 8), hind tarsal ratio 2.13–2.44 (2.22, n = 8); fore-, mid- leg claws 0.50–0.75 (0.63, n = 8) length of their respective tarsomeres 5; hind leg claw about 0.89–1.20 (1.07, n = 8) as long as tarsomere 5 (Figure 3f). Abdomen with genital sclerite elongated, tapering to rounded tip. Two subequal spermathecae (Figure 3h), measuring 45–55 (50, n = 7) by 40–42.5 (42, n = 5) µm and 43–50 (48, n = 7) by 35–45 (40, n = 6) µm. Third rudimentary spermatheca of nearly 7.5 µm.

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea costaricensis* Santarém, Borkent, Spinelli and Felippe-Bauer, COSTA RICA, Guanacaste, Nosara, R. Privada Nosara, Estación, 5m, 15 June 2004, D. Briceno col, red de barrido. LN217060 352800 #77328' (MNCR); allotype female adult, labeled 'Allotype *Downeshelea costaricensis* Santarém, Borkent, Spinelli and Felippe-Bauer, COSTA RICA, Guanacaste, Nandayure, Manglar Jabilla. 05m.

23 June 2004, D. Briceno, M. Moraga cols, Red Noyes. LN198600 394500 #77424' (MNCR). Paratypes labeled as follows: 4 males, 4 females, same data as holotype (1 male, 1 female CCER; 2 males, 2 females MNCR; 1 male, 1 female CNCI); 2 males, 4 females, same data except 'Río Nosara' (MNCR); 1 male, 5 females, same data except 'Red Noyes' (MNCR); 7 females, same data except 'Desembocadura Rio Nosara, Red de golpe, Y. Cardenas.' (MNCR); 2 males, same data except '13–17 June 2004, Malaise, B. Gamboa, D. Briceno, M. Moraga, Y. Cardenas' (MNCR); 5 females, same data as allotype (3 MNCR, 2 CNCI); 1 female, same data except '19–24 June 2004, Malaise, Porras, Gamboa, Briceno, Moraga, Cardenas' (MNCR); 1 female, 'Guanacaste, Refugio Vida Silvestre Ostional, Playa Ostional, 5m, 13 June 2004, light trap, Gamboa, D. Briceno, M. Moraga, Y. Cardenas' (MNCR); 1 female, 'Limón, Parque Nacional Cahuita, Sector Puerto Vargas, frente a casa administrativa, 5m, 17 May-18 June 2002, Malaise, E. Rojas' (MNCR); 2 males, 1 female, 'Puntarenas, Camaronal, Puesto MINAE, 5m, 19–24 June 2004, Malaise, Cardenas, Gamboa, Porras, Briceno, Moraga' (MNCR); 1 female, 'Puntarenas, Tarcoles, 01 July 1993, A. Borkent col.' (CNCI); 1 male, same data except '2 km Tivives, 24 August 1993' (CNCI); 2 males, 'Puntarenas, Parque Nacional Manuel Antonio, 17 July 1993, A. Borkent' (CNCI); 1 male, 1 female, 'Puntarenas, Golfito, Mano bonito, mangrove, 50–100m, 22–29 April 2004, Malaise, Porras, Gamboa, Briceno, Moraga' (CCER).

Distribution and bionomics

This species is restricted to Costa Rica (Guanacaste, Limón and Puntarenas provinces) (Figure 10). It has been found in coastal and mangrove areas in Costa Rica from 5 m to 100 m above sea level.

Etymology

This species is named after Costa Rica, the country from which the described specimens were collected.

Downeshelea eclectica sp. nov.
(Figures 4a–h, 8h–i, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.55–0.68 length of gonocoxite; parameres fused for 0.21–0.35 of total length, midportion of stem sinuous, expanded subapically, distal portion slightly curved (Figure 8i); aedeagus subtriangular, basal arch U-shaped, extending to 0.28–0.38 of total length (Figure 8h).

Female. The only species of the *Downeshelea multilineata* group in the Americas with medium-sized wing (1.02–1.30 mm) (Figure 4d); midtarsomere 1 with 6–9 ventral spines; hind tibia brown; two slightly unequal spermathecae (Figure 4h).

Description

Male. *Head*. Eyes slightly contiguous in lower area; antennal ratio 0.90–1.08 (0.98, n = 32); palpal ratio 2.00–2.50 (2.14, n = 32) (Figure 4b).

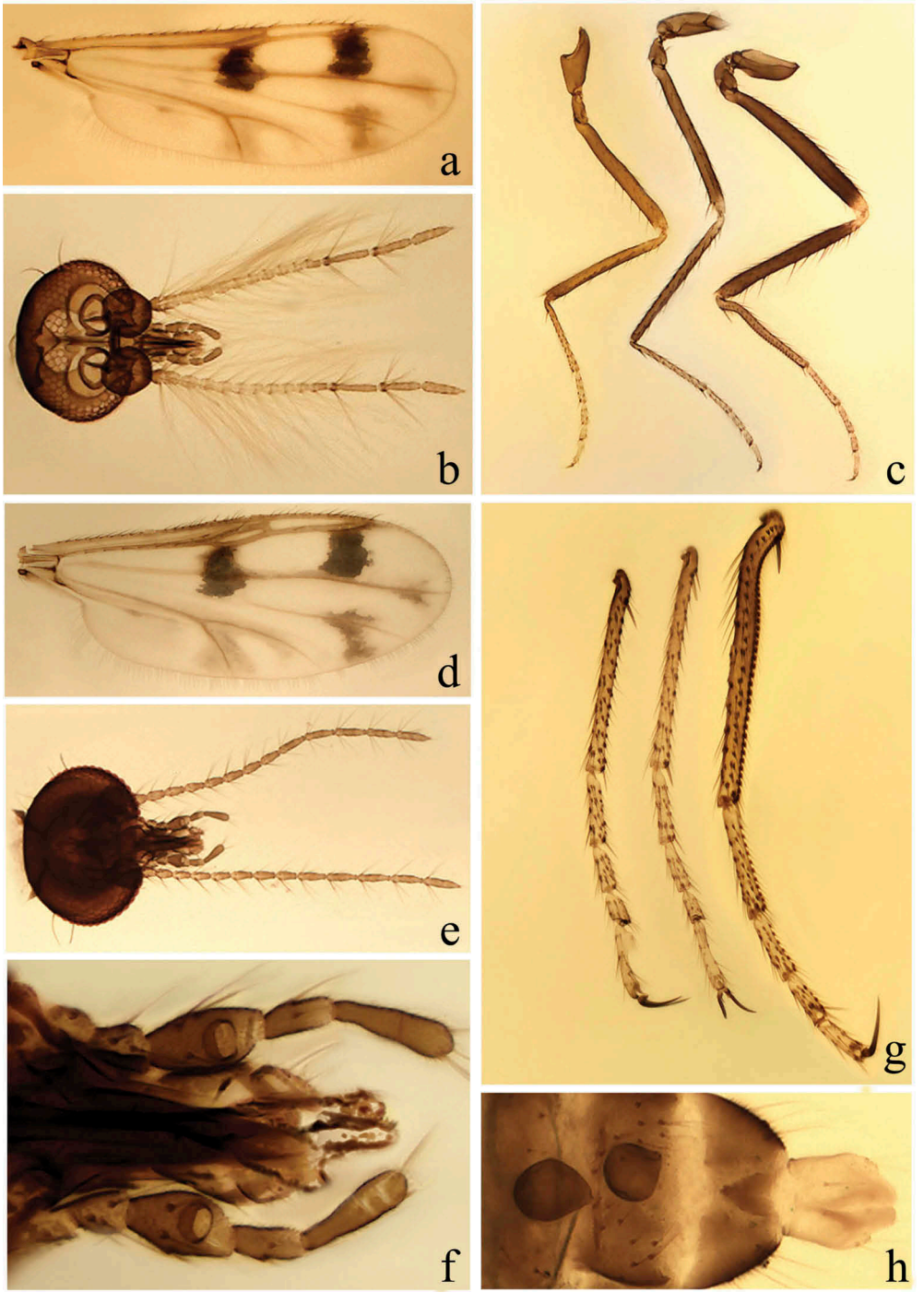

Figure 4. *Downeshelea eclectica* sp. nov. Male: (a) wing; (b) head, anterior view; (c) fore, mid, hind legs (left to right). Female: (d) wing; (e) head, anterior view; (f) palpus; (g) fore, mid, hind tarsomeres (left to right); (h) apex of female abdomen, ventral view.

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 4a) with greyish spot over CuA_1, CuA_2 extending into cua_1, anal cell, reaching wing margin; 2nd radial cell twice longer than 1st; wing length 0.97–1.37 (1.05, n = 33) mm; breadth 0.32–0.47 (0.37, n = 33) mm; costal ratio 0.73–0.80 (0.78, n = 33). Halter brown, distal portion of knob darker. Legs (Figure 4c) brown. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, 7–8 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–2–2, 2–2–2, 1–1–1; fore tarsal ratio 2.28–2.64 (2.51, n = 31), mid tarsal ratio 2.31–2.68 (2.56, n = 30), hind tarsal ratio 2.19–2.55 (2.31, n = 33); claws 0.33–0.50 (0.42, n = 32) length of their respective tarsomeres 5.

Abdomen. Dark brown. Terminalia (Figure 8h): tergite 9 with quadrate apex, apicolateral process short, broad; sternite 9 straight anteriorly, posterior margin with large, greatly convex median lobe bearing 2–4 long setae. Gonocoxite 2.30–2.69 (2.45, n = 31) times longer than basal width; gonostylus 0.55–0.68 (0.60, n = 32) length of gonocoxite, with setae on apex and ventral portion. Parameres (Figure 8i) 0.79–0.98(0.90, n = 31) times longer than aedeagus, fused for 0.21–0.35 (0.26, n = 29) of total length, a short posteromedian projection on the medial fused portion of the parameres in some specimens; knob stout, bulbous; stem sinuous on midportion, expanded subapically forming a broad lobe laterally directed; distal portion slightly curved, 0.55–0.84 (0.66, n = 31) of total length. Aedeagus subtriangular, basal arch U-shaped, extending to 0.28–0.38 (0.34, n = 29) of total length; distal portion with heavily sclerotised margins, narrow, rounded, mesal excavation terminating in two short, heavily sclerotised processes.

Female. Similar to male with usual sexual differences; antennal ratio 0.97–1.10 (1.01, n = 31) (Figure 4e); palpus as in Figure 4f, palpal ratio 1.80–2.40 (2.07, n = 33); mandible with 11–12 teeth. Wing as in Figure 4d; wing length 1.02–1.30 (1.13, n = 33) mm; breadth 0.42–0.52 (0.47, n = 33) mm; costal ratio 0.78–0.83 (0.80, n = 33). Fore-, hind tarsomere 1 with one basal and one apical spine; midtarsomere 1 with two basal, two apical, 6–9 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–2–2, 2–2–2, 1–1–2; fore tarsal ratio 2.27–2.79 (2.56, n = 33), mid tarsal ratio 2.37–2.79 (2.62, n = 33), hind tarsal ratio 2.35–2.76 (2.53, n = 33); fore-, mid- leg claws 0.54–0.81 (0.68, n = 33) length of their respective tarsomeres 5; hind leg claw 1.15–1.53 (1.31, n = 32) as long as tarsomere 5 (Figure 4g). Abdomen with genital sclerite triangular. Two slightly unequal spermathecae (Figure 4h), measuring 48–68 (58, n = 31) by 40–55 (50, n = 27) µm and 43–58 (50, n = 29) by 40–50 (45, n = 26) µm. Third rudimentary spermatheca inflated in some specimens to nearly 7.5 µm (not illustrated).

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea eclectica* Santarém, Borkent, Spinelli and Felippe-Bauer, COSTA RICA, Puntarenas, Refugio Vida Silvestre Río Piro, 1000m Estación Tuva, 180m, 14–21 September 2004, Gamboa, Briceno, Moraga, Cardenas. Malaise. LS276000 525500 #53265' (MNCR); allotype female adult, labeled 'Allotype *Downeshelea eclectica* Santarém, Borkent, Spinelli and Felippe-Bauer' same data as holotype (MNCR). Paratypes labeled as follows: 2 males, 5 females, same data as holotype (1 male CCER; 1 male, 5 females MNCR); 1 male, 3 females, same data except '1500m Estación

Tuva' (1 female CCER; 1 male, 2 females CNCI); 2 females, same data except 'Finca Catalino, 200m' (MNCR); 6 females, same data except '100m' (MNCR); 1 male, same data except '200m, 16 September 2004' (MNCR); 1 male, 'Puntarenas, Golfito, Parque Nacional Corcovado, Estación Agujas, 250–350m, 15 June–15July 1999, Malaise, J. Azofeifa Zuniga' (MNCR); 1 male, same data except 15 September –15 October 1999 (MNCR); 1 female, same data except 15 October–15 November 1999 (MNCR); 1 male, same data except '300m, 22 December 2000–09 January 2001' (CNCI); 5 males, 4 females, same data except 'Sendero La Bonanza, 495m, 15 June–15 July 1999' (1 male, 1 female CCER; 2 males, 2 females MNCR; 2 males, 1 female CNCI); 4 females, 3 males, same data except 15 July–15 August 1999 (2 males, 2 females MNCR; 2 males, 1 female CNCI); 3 males, 3 females, same data except 15 August–15 September 1999 (MNCR); 1 female, same data except 15 September –15 October 1999 (MNCR); 4 males, 8 females, same data except 'Cerro Rincón, 745m, 1August–25 September 2002' (MNCR); 2 males, 6 females, same data except 15 June–15 July 1999 (MNCR); 2 males, 2 females, same data except 15 July–15 August 1999 (MNCR); 2 females, same data except 15 September–15 October 1999 (CNCI); 3 males, 4 females, same data except 11 September–01 October 2002 (MNCR); 4 males, 5 females, same data except 2 June–31 July 2002 (2 males, 2 females MNCR; 2 males, 3 female CNCI); 2 males, 9 females, same data except, '600–745m, 15 August–15 September 1999' (MNCR); 1 male, same data except '600–700m, 28 July 2001, manual, K. Caballero' (MNCR); 1 male, same data except 'La triguilla, 600m, 11 September–31 October 2002, Malaise, J. Azofeifa Zuniga' (MNCR); 1 female, same data except 24 June–31 July 2002 (MNCR); 4 males, 5 females, same data except 'Sendero Las Quebraditas, 640m, 15 September–15 October 1999, CD5101'(CNCI); 2 males, 3 females, same data except 15 October–15 November 1999 (MNCR); 1 male, 4 females, same data except, 782m, 15 July–15 August 2000 (MNCR); 1 female, same data except 20 December 2000–20 January 2001 (MNCR); 4 females, same data except 'Los Charcos', 600–745m, 15 June–15 July 1999 (MNCR); 1 female, same data except 'Estación Los Patos, Senderos a Sirena', 70m, 10 November–20 December 2000 (MNCR); 3 females, same data except 25 December 2000–13 February 2001 (MNCR); 4 males, 7 females, same data except 160m, 9 September–9 October 2001, K. Caballero (MNCR); 3 males, 2 females, same data except 'Sendero Guaymi', 300m, 4 September–9 October 2000 (MNCR); 1 female, same data except 'Cerro Brujo', 600m, 3 November–5 December 2002 (MNCR); 4 males, 'Puntarenas, Osa Sierpe, ACOSA, Estación Los Planes, 180m, 23–24 July 2002, ABC-octenol, G. Chaverri' (MNCR); 4 males, 3 females, 'Puntarenas, Reserva Florestal Golfo Dulce, Orilla de Estación Agujas, 250–350m, 30 June–1 July 2000, light trap, A. Picado' (MNCR); 1 male, 'Puntarenas, Reserva Biológica Isla Del Caño, 0–100m, 28–30 August 2000, light trap, J. Azofeifa Zuniga' (MNCR); 1 female, 'Puntarenas, Golfito, Parque Nacional Piedras Blancas, Cerro Nicuesa, 579m, 28 November 2000–3 February 2001, Malaise, J. Azofeifa Zuniga' (MNCR); 1 male, 'Puntarenas, Peninsula de Osa, San Pedrillo, 13 August 2001, A. Borkent' (CNCI); 1 male, same data except 'Río Agujas, Sendero Purruja, 300m, 10–20 July 1996, A. Azofeifa' (MNCR); 1 female, 'Puntarenas, 2km NE Tarcoles, 20 July 1993, A. Borkent' (CNCI); 2 females, 'Puntarenas, Palmar Sur, 5 August 1964, F.S. Blanton' (USNM); 5 females, 'Alajuela, San Carlos, Pital, Boca Tapada, Finca de Sergio Murillo, 50–100m, 21 July 2004, light trap, B. Hernández' (MNCR); 5 females, same data except 'Laguna Lagarto Lodge', 23 June–23 July 2004, Malaise (1 female CCER; 4 females MNCR); 6 females, same data except 23 July–17 September 2004 (MNCR); 1 female, same data except 'Bosque Ancianos', 23 June–23

July 2004 (MNCR); 4 females, same data except 23 July–17 September 2004 (MNCR); 4 females, 'Alajuela, Parque Nacional Arenal, Sendero Pilón, 600m, 18 May–26 June 1999, Malaise, G. Carballo' (MNCR); 2 females, same data except 1–18 May 1999 (MNCR); 2 females, same data except 650m, 08 November–07 December 2000 (MNCR); 1 female, same data except 'Sector Cerro Chato', 1100m, 25 August –25 September 1999 (MNCR); 3 females, 'Alajuela, Upala, Parque Nacional Guanacaste, Estación San Ramón, 4.75Km SW Dos Ríos Upala, 860m, 17 May–17 June 1996, Malaise, D. Briceno' (MNCR); 1 female, same data except 720m, 17 August–17 September 1996, F. Quesada (MNCR); 1 female, 'Alajuela, Upala, Parque Nacional Volcán Tenorio, Alb. Heliconias, Sendero Laguna Dantas, 900m, 14–16 June 2007, Malaise, J.D. Gutiérrez' (MNCR); 1 female, same data except '1000m, 18 June 2000, red de golpe, A. Picado' (MNCR); 1 female, same data except 'Estación El Pilón, 700–800m, 28 July 2003, J. Azofeifa' (MNCR); 1 female, 'Cartago, Tres Equis, Parque Nacional Barbilla, Sendero principal a Río Barbilla, 500m, 12 April–13 May 2002, Malaise, E. Rojas' (MNCR); 1 female, same data except 12 June–11 July 2002 (MNCR); 1 female, same data except 11 July–12. August 2002 (MNCR); 1 female, same data except 10 September–10 October 2002 (MNCR); 1 female, same data except 10 November–9 December 2002 (MNCR); 1 male, 3 females, same data except 13 May–12 June 2002, 'red de golpe' (MNCR); 2 females, same data except 400–500m, 19 August 2001 (MNCR); 1 male, same data except 'Sector entre Río Barbilla, Río Dantas', 485m, 11 August –11 October 2002 (MNCR); 1 male, 'Cartago, Parque Nacional Barbilla, Campamento 2. Sendero a Cerro Tigre, 1200m, 7 May 2005, B. Gamboa' (CCER); 2 females, 'Turrialba, Parque Nacional Barbilla, 2km SE de Estación, 500–600m, 02July–19 August 2000, Malaise, E. Rojas' (1 CCER; 1 MNCR); 1 female, same data except '3km SE de Estación', 19 August–20 September 2000 (MNCR); 1 male, 1 female, same data except 20 September–18 October 2000 (1 male CCER; 1 female MNCR); 2 females, same data except 'Sendero El Felino, 1.5km SO de Estación', 690m, 22 May–12 June 2001 (MNCR); 6 females, same data except 24 April–22 May 2001 (1 female CCER; 5 females MNCR); 1 female, 'Guanacaste, Parque Nacional Guanacaste, Estación Pitilla. Sendero Cerro Orosilito, 900m, 11–13 December 2007, Malaise, D. Briceno' (CNCI); 6 females, 'Heredia, Refugio Vida Silvestre Corredor Fronterizo Costa Rica Nicaragua, Lagunas a la par de río San Juan, 20–50m, 16 September 2004, Malaise, B. Hernández' (1 female CCER; 5 females MNCR); 5 females, same data, except 'light trap' (MNCR); 5 females, same data except 23 July 2004 (MNCR); 2 females, 'Limón, Parque Nacional Tortuguero, Sendero Real a Agua Fria, 50–100m, 14–21 August 2004, Malaise, Porras, Gamboa, Briceno, Moraga, Cardenas' (1 CCER; 1 MNCR); 1 female, same data except, 'Estación Agua Fria, Sendero Real', 20–50 m (MNCR); 1 female, same data except '16 August 2004, red noyes, M. Moraga' (MNCR); 1 female, 'Limón, Valle de la Estrella, Reserva Biológica Hitoy Cerere, Sendero Bobócara, 640m, 18 May–18 June 1999, Malaise, F. Umana' (MNCR); 4 females, same data except 'Sendero Espavel, 560m, 18 September–5 October 2003, B. Gamboa, E. Rojas, W. Arana' (MNCR); 2 females, 'Limón, Cahuita, 30 October 1993, A. Borkent' (CNCI); 1 male, 'San José, ACLAP, Pérez Zeledón. Parque Nacional Chirripó, Estación Santa Elena, 1850m, 6 July–6 August 1997, E. Alfaro, M. Segura' (CCER); 1 male, same data except 'Sendero Jueves 13, 2. June–6 July 1997, red manual' (MNCR); 2 males, same data except 6 August–15 September 1997 (MNCR); 4 males, 2 females, 'San José, Parque Nacional La Cangreja, Estación Ecotropica, 300–400 m, 13–17 July 2004, Malaise, Porras, Cardenas, Gamboa, Briceno, Moraga' (1 male CCER; 3 males, 2 females CNCI); 2 males, same data except 'amarilla' (MNCR); 5 males, 2 females, same data except '13–14 July 2004, balde'

(MNCR); 1 female, same data except 'Sendero Plinia, 13–17 July 2004' (MNCR); 1 male, '*Downeshelea multilineata* (Lutz), COLOMBIA, Valle Rio Raposo, 15 April 1964, light trap, V. H. Lee' (CCER); 1 male, same data except August 1965 (USNM); 1 male, '*Downeshelea multilineata* (Lutz), BRAZIL, Pará, Belém, APEG forest, March 1970, sticky trap, T.H.G. Aitken' (USNM); 1 male, same data except July 1970 (CCER).

Distribution and bionomics

This species is distributed in all provinces of Costa Rica and a locality in each of Colombia and Brazil (Pará) (Figure 10). It has been found in forested, coastal and mangrove areas, occurring in Costa Rica up to 1850 m above sea level.

Etymology

The name of this species reflects its eclectic distribution and habitats, occurring in several habitats and altitudes in Neotropical countries, up to 1850 m of altitude and in forested, coastal and mangrove areas (Greek – Eklektikos = eclectic).

Downeshelea jarina sp. nov.
(Figures 5a–h, 9a–b, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.54–0.64 length of gonocoxite; parameres fused for 0.10–0.17 of total length; stem basolaterally expanded, more slender and convergent distally; distal portion stout, nearly straight, heavily sclerotised (Figure 9b); aedeagus subtriangular, basal arch U-shaped, extending to 0.22–0.28 of total length (Figure 9a).

Female. The only species of *Downeshelea multilineata* group in the Americas with small wing (0.92–1.02 mm) (Figure 5d); midtarsomere 1 with 3–6 ventral spines; hind tibia darker on proximal third and apical portion; two slightly unequal spermathecae (Figure 5h).

Description

Male. *Head*. Eyes slightly contiguous in lower area; antennal ratio 0.88–0.97 (0.93, n = 7); palpal ratio 2.25–2.75 (2.57, n = 7) (Figure 5b).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 5a) with greyish spot over CuA_2 extending to wing margin; 2nd radial cell 2.5 times longer than 1st; wing length 0.85–0.95 (0.92, n = 7) mm; breadth 0.30–0.35 (0.32, n = 7) mm; costal ratio 0.73–0.79 (0.77, n = 7). Halter pale, distal portion of knob darker. Legs (Figure 5c) pale brown, apex of fore tibia slightly darker; hind femur darker subapically, hind tibia darker on proximal third and apical portion. Fore-, hind tarsomere 1 with one basal, one apical spine; mid tarsomere 1 with two basal (one in some specimens), two apical, 3–4 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1; 2–2–1, 1–1–1; fore tarsal ratio 2.18–2.37 (2.30, n = 7), mid tarsal ratio 2.50–2.73 (2.60, n = 7), hind tarsal ratio 2.08–2.29 (2.10, n = 6); claws 0.38–0.54 (0.46, n = 7) length of their respective tarsomere 5.

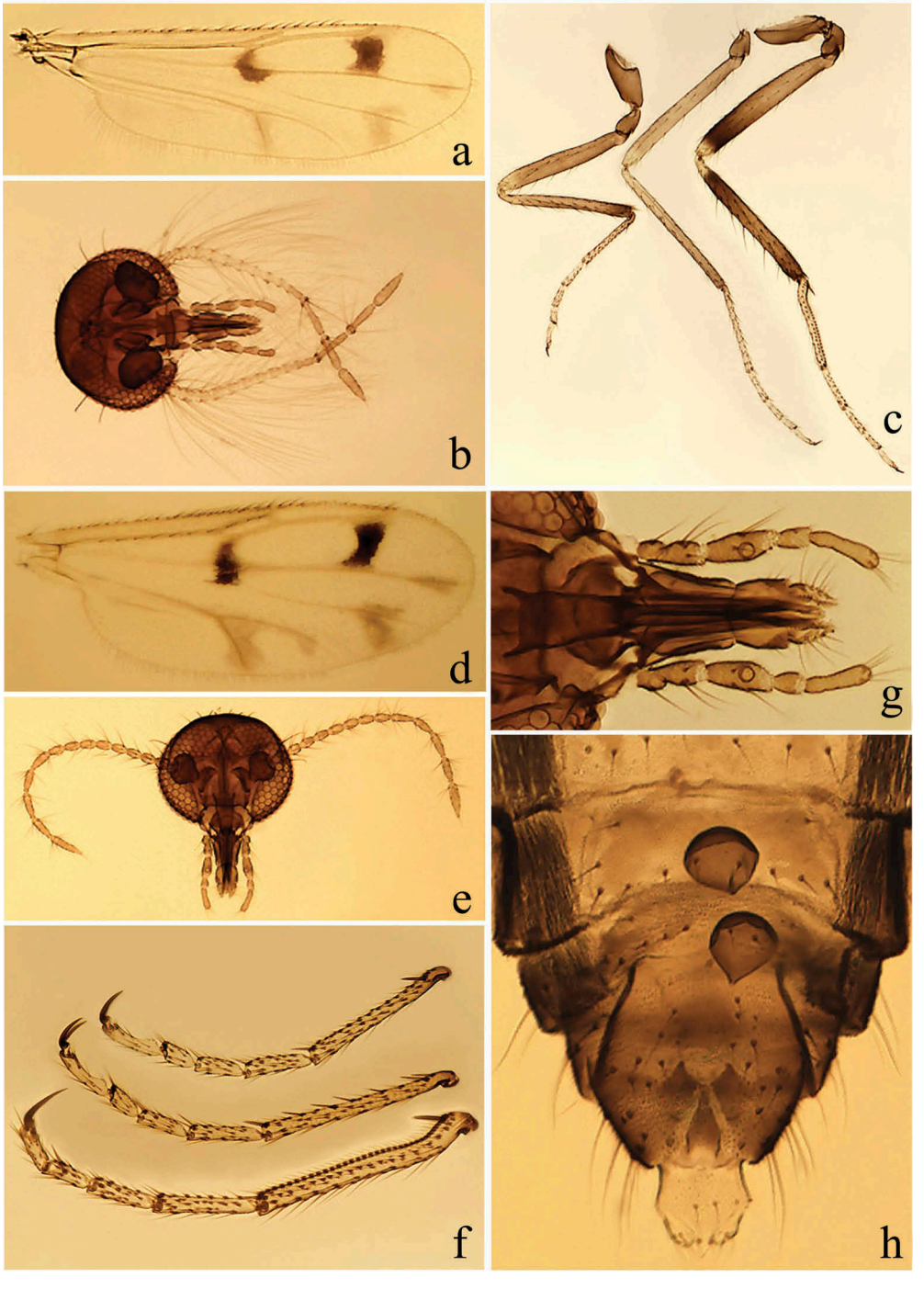

Figure 5. *Downeshelea jarina* sp. nov. Male: (a) wing; (b) head, anterior view; (c) fore, mid, hind legs (left to right). Female: (d) wing; (e) head, anterior view; (f) fore, mid, hind tarsomeres (top to bottom); (g) palpus; (h) apex of female abdomen, ventral view.

Abdomen. Dark brown. Terminalia (Figure 9a): tergite 9 with apex nearly rounded, apicolateral process short, broad; sternite 9 nearly straight anteriorly, posterior margin with moderately convex median lobe bearing 4–6 long setae. Gonocoxite 2.04–2.36 (2.22, n = 7) times longer than basal width; gonostylus with blunt tip, 0.58–0.64 (0.60, n = 7) length of gonocoxite. Parameres (Figure 9b) 1.0-1.09 (1.05, n = 7) times longer than aedeagus, fused for 0.10–0.17 (0.15, n = 7) of total length; knob bulbous; stem basolaterally expanded, more slender and convergent distally; distal portion stout, nearly straight, heavily sclerotised, 0.54–0.62 (0.60, n = 6) of total length. Aedeagus subtriangular, heavily sclerotised laterally, hyaline on midportion, basal arch U-shaped, extending to 0.22–0.28 (0.25, n = 7) of total length; distal portion with moderately deep mesal excavation terminating in two sclerotised pointed serrate processes.

Female. Similar to male with usual sexual differences; antennal ratio 1.05–1.10 (1.08, n = 5) (Figure 5e); palpus as in Figure 5g, palpal ratio 2.20–2.75 (2.38, n = 5); mandible with 9–10 teeth. Wing as in Figure 5d; wing length 0.92–1.02 (0.98, n = 5) mm; breadth 0.37–0.42 (0.41, n = 5) mm; costal ratio 0.79–0.81 (0.80, n = 5). Fore-, hind tarsomere 1 with one basal and one apical spine; midtarsomere 1 with two basal, two apical, 3–6 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1, 2–2–1, 1–1–2; fore tarsal ratio 2.35–2.60 (2.50, n = 5), mid tarsal ratio 2.59–2.78 (2.67, n = 5), hind tarsal ratio 2.23–2.40 (2.31, n = 5); fore, mid- leg claws 0.53–0.67 (0.60, n = 5) length of their respective tarsomeres 5; hind leg claw, about 1.17–1.31 (1.25, n = 5) as long as tarsomere 5 (Figure 5f). Abdomen with genital sclerite broad in distal portion, tapered to rounded tip anteriorly. Two slightly unequal spermathecae (Figure 5h), measuring 50–60 (56, n = 4) by 43–55 (50, n = 5) µm and 45–55 (51, n = 5) by 40–50 (46, n = 3) µm. Third rudimentary spermatheca present, nearly 5 µm.

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea jarina* Santarém, Borkent, Spinelli and Felippe-Bauer, COSTA RICA, Guanacaste, Cuajiniquil, Playa Ostional, 05m, 13–16 June 2004. B. Gamboa, D. Briceno, M. Moraga, Y. Cardenas. Amarilla. LN219450 350300 #77437' (MNCR); allotype female adult, labeled 'Allotype *Downeshelea jarina* Santarém, Borkent, Spinelli and Felippe-Bauer', same data as holotype except Malaise (MNCR). Paratypes labeled as follows: 5 males, 4 females, same data as holotype (2 males, 2 females CCER; 3 males, 2 females MNCR); 1 male, 4 females, same data as allotype (CNCI); 2 females, same data except 'manglar, intersección' (MNCR); 1 male, 'Puntarenas, Camaronal, Puesto MINAE, 5m, 19–24 June 2004, Malaise, B. Gamboa, D. Briceno, M. Moraga, Y. Cardenas' (MNCR).

Distribution and bionomics

This species is restricted to Costa Rica (Guanacaste and Puntarenas provinces) (Figure 10). It has been found in coastal and mangrove areas, occurring 5 m above sea level.

Etymology

The name of this species reflects the name of the tree *Enterolobium cyclocarpum* (Jacq.) Griseb. that is a symbol of Costa Rica and Guanacaste province, where the majority of type specimens were found. The tree is commonly known in Costa Rica as 'árbol de Guanacaste' and/or jarina.

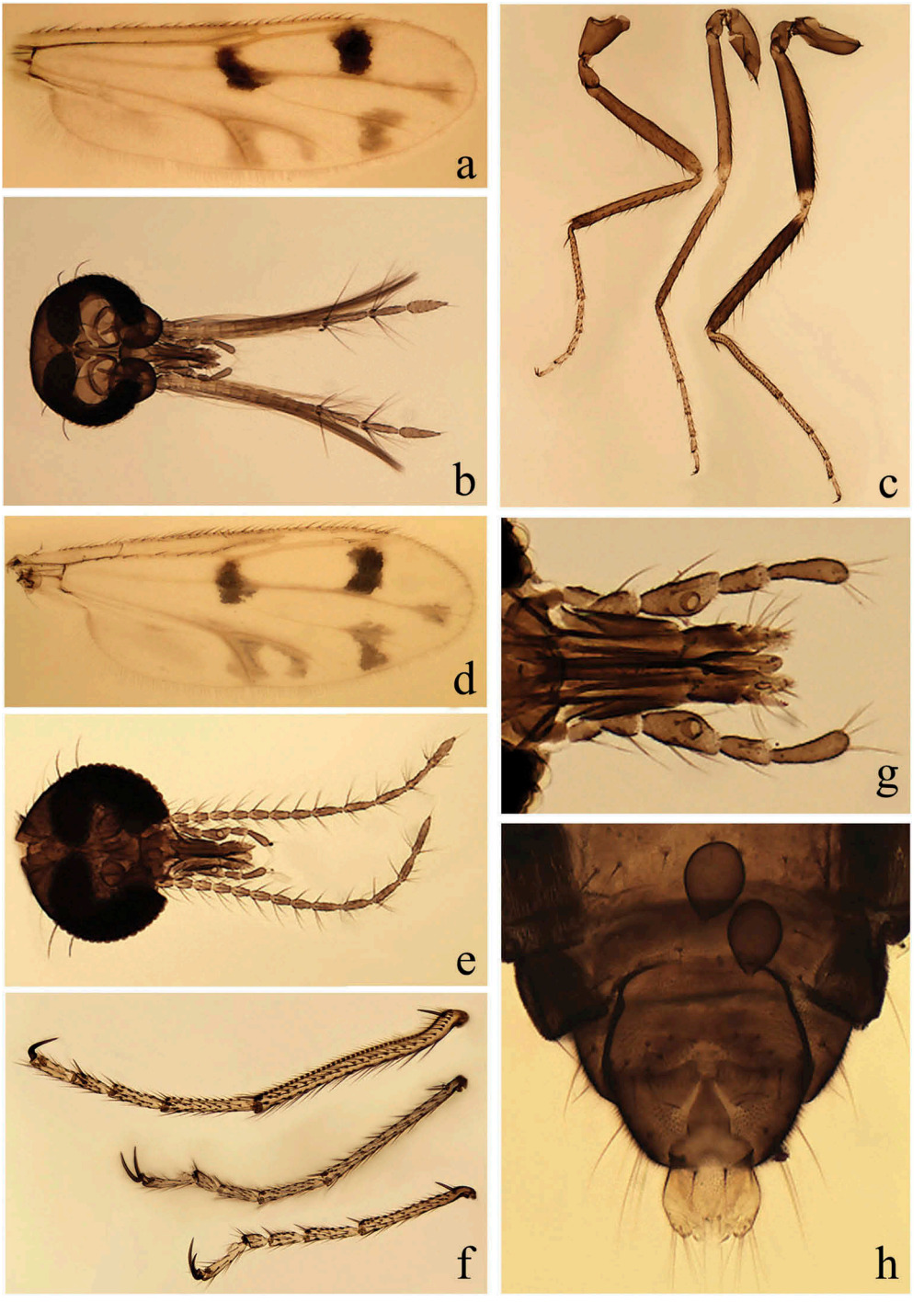

Figure 6. *Downeshelea litorale* sp. nov. Male: (a) wing; (b) fore, mid, hind legs (left to right); (c) head, anterior view. Female: (d) wing; (e) head, anterior view; (f) fore, mid, hind, tarsomeres (bottom to top); (g) palpus; (h) apex of female abdomen, ventral view.

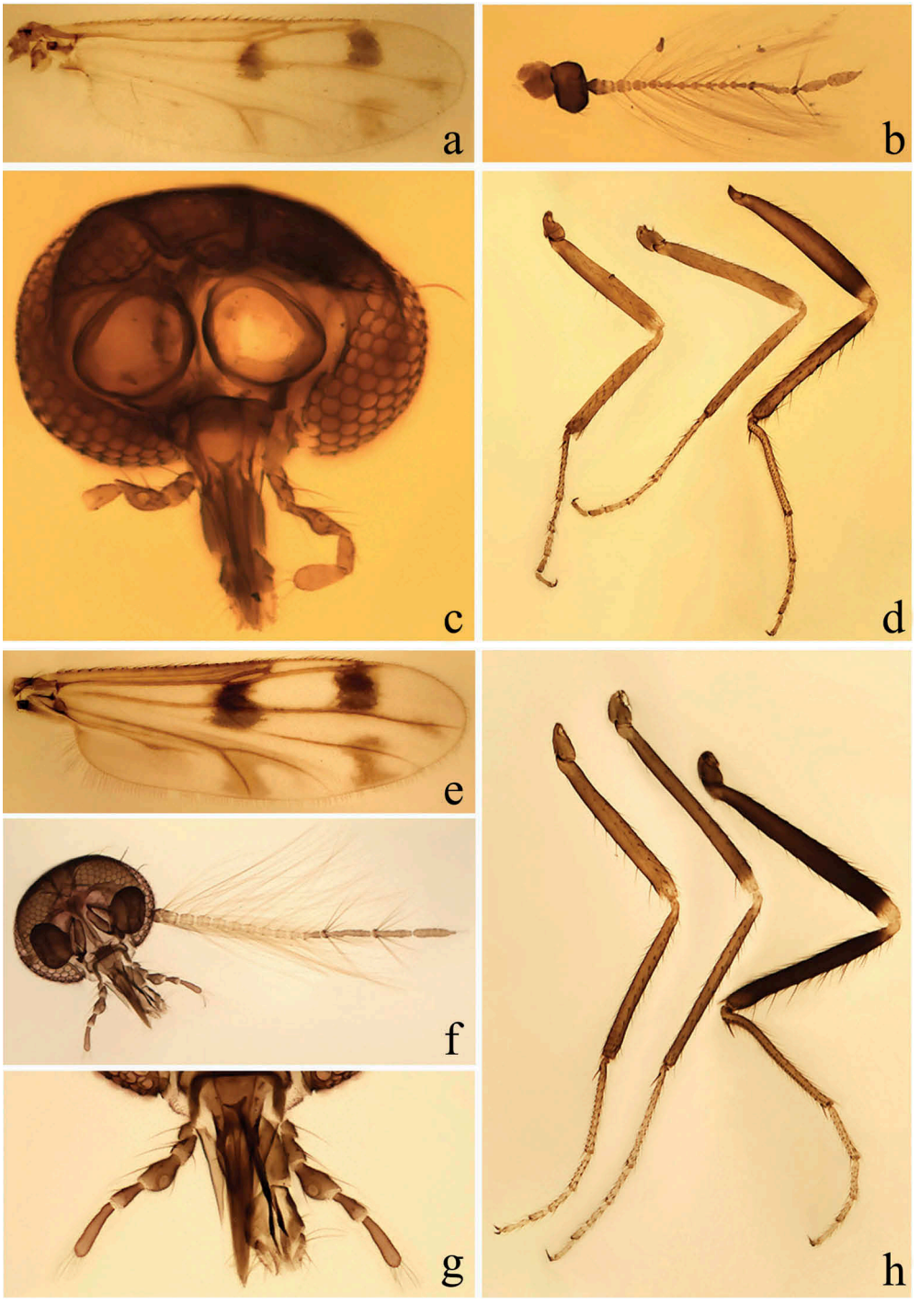

Figure 7. *Downeshelea marambaia* sp. nov., male (a–d). (a) wing; (b) antenna; (c) head, anterior view; (d) fore, mid, hind legs (left to right). *Downeshelea moravia* sp. nov., male (e–h). (e) wing; (f) head, anterior view; (g) palpus; (h) fore, mid, hind legs (left to right).

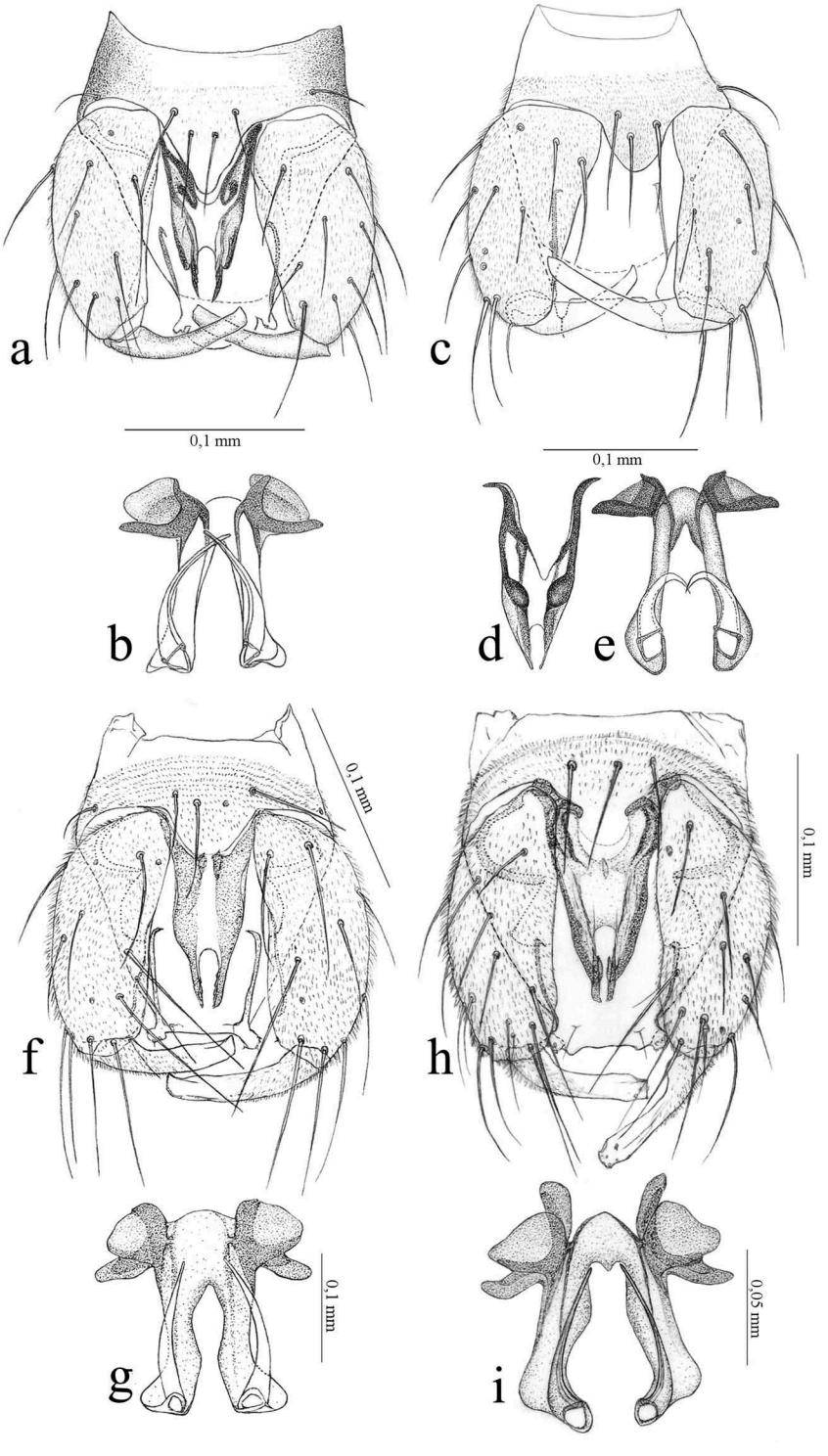

Figure 8. *Downeshelea multilineata* (Lutz), (a) male terminalia with aedeagus; (b) parameres. *Downeshelea casimirensis* sp. nov. (c) male terminalia; (d) aedeagus; (e) parameres. *Downeshelea costaricensis* sp. nov., (f) male terminalia with aedeagus; (g) parameres. *Downeshelea eclectica* sp. nov., (h) male terminalia with aedeagus; (i) parameres.

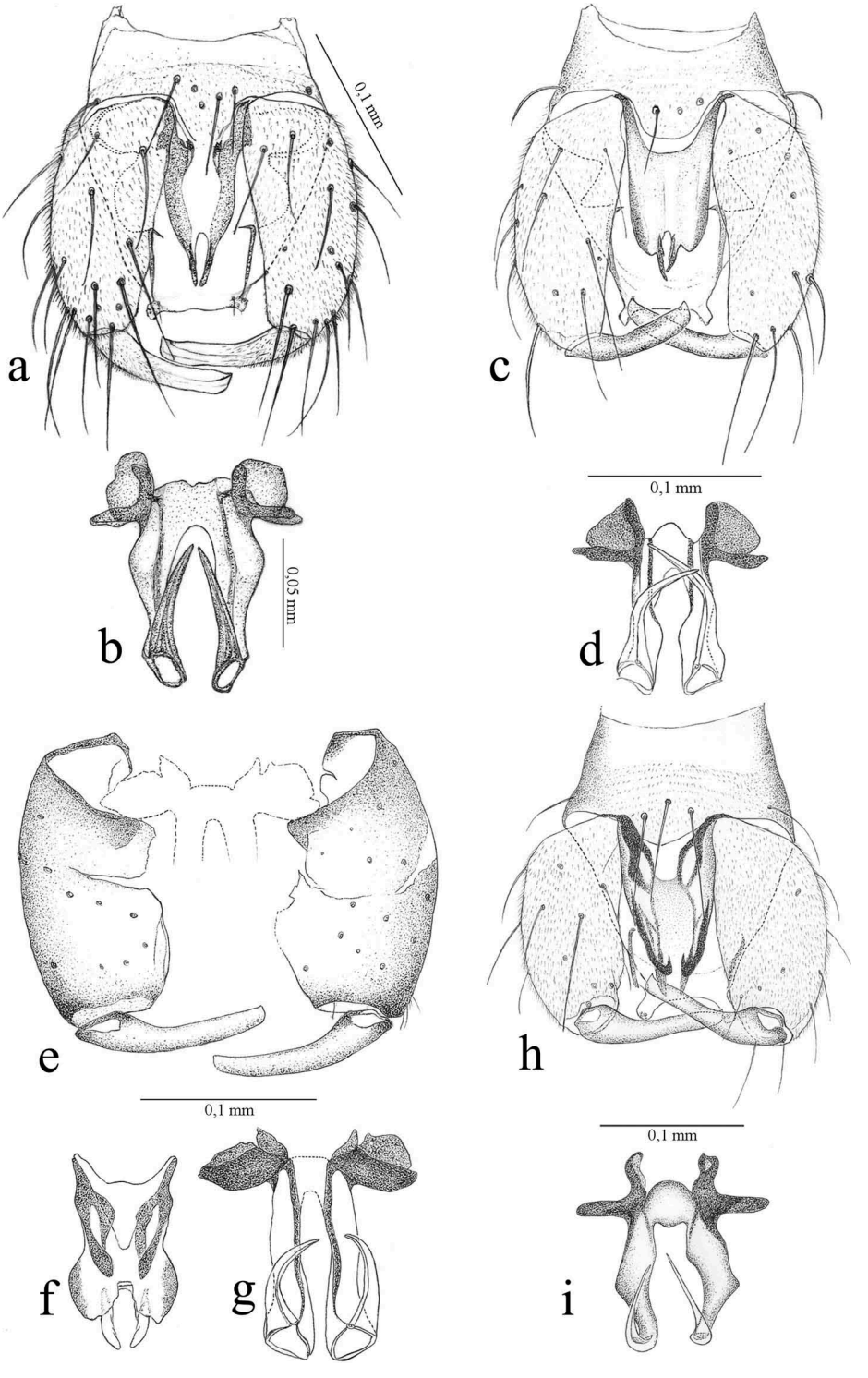

Figure 9. *Downeshelea jarina* sp. nov., (a) male terminalia with aedeagus; (b) parameres. *Downeshelea litorale* sp. nov., (c) male terminalia with aedeagus; (d) parameres. *Downeshelea marambaia* sp. nov., (e) male terminalia; (f) aedeagus; (g) parameres. *Downeshelea moravia* sp. nov., (h) male terminalia with aedeagus; (i) parameres.

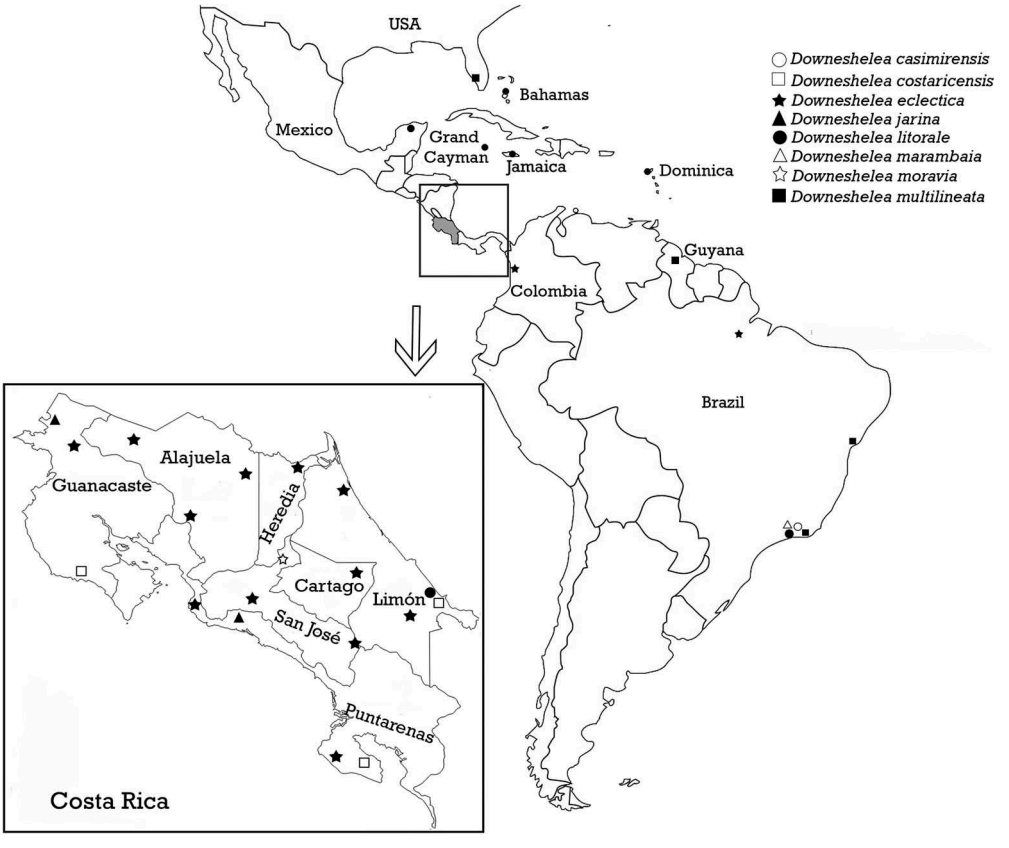

Figure 10. Geographic distribution of species in the *Downeshelea multilineata* species group.

Downeshelea litorale sp. nov.
(Figures 6a–h, 9c–d, 10)

Downeshelea multilineata: Huerta et al. 1999: 494 (misidentification; Mexico record).

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.58–0.68 length of gonocoxite; parameres fused for 0.23–0.30 of total length; stem nearly straight basally, expanded distally in inner portion; distal portion very elongate, strongly curved distally (Figure 9d); aedeagus rectangular, basal arch somewhat U-shaped, extending to 0.34–0.42 of total length (Figure 9c).

Female. The only species of *Downeshelea multilineata* group in the Americas with medium-sized wing (1.05–1.25 mm) (Figure 6d); midtarsomere 1 with 4–5 ventral spines; hind tibia uniformly brown; two slightly unequal spermathecae (Figure 6h).

Description

Male. *Head*. Eyes slightly contiguous in lower area; antennal ratio 1.00–1.07 (1.02, n = 8); palpal ratio 2.20–2.75 (2.46,n = 8) (Figure 6b).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 6a) with greyish spot over CuA_1, CuA_2 extending into cua_1, anal cell, reaching wing margin in CuA_1; 2nd radial cell twice longer than 1st; wing length 1.00–1.17 (1.08, n = 8) mm; breadth 0.32–0.40 (0.37, n = 8) mm; costal ratio 0.71–0.75 (0.73, n = 8). Halter brown, distal portion of knob darker. Legs (Figure 6c) brown, hind femur darker subapically. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, 4–6 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–2–2, 2–2–1, 1–1–1; fore tarsal ratio 2.21–2.35 (2.27, n = 8), mid tarsal ratio 2.22–2.55 (2.42, n = 8), hind tarsal ratio 2.09–2.33 (2.17, n = 8); claws 0.38–0.50 (0.44, n = 8) length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 9c): tergite 9 with quadrate apex, apicolateral process elongate, slender; sternite 9 slightly concave anteriorly, posterior margin with a moderately convex median lobe bearing 3–4 long setae. Gonocoxite nearly 2.15–2.36 (2.27, n = 8) times longer than basal width; gonostylus with blunt tip, 0.58–0.68 (0.63, n = 8) length of gonocoxite. Parameres (Figure 9d) 1.06–1.23 (1.11, n = 8) times longer than aedeagus, fused for 0.23–0.30 (0.26, n = 8) of total length; knob heavily sclerotised, bulbous; stem nearly straight basally, expanded distally in inner portion; distal portion very elongate, strongly curved distally, 0.62–0.73 (0.69, n = 8) of total length. Aedeagus rectangular, slightly sclerotised laterally, basal arch somewhat U-shaped, deep, extending to 0.34–0.42 (0.38, n = 8) of total length, distal portion with moderately deep mesal excavation terminating in two short, pointed, serrate processes.

Female. Similar to male with usual sexual differences; antennal ratio 1.06–1.17 (1.11, n = 5) (Figure 6e); palpus as in Figure 6g, palpal ratio 2.20–2.60 (2.36, n = 5); mandible with 11–12 teeth. Wing as in Figure 6d; wing length 1.05–1.25 (1.15, n = 5) mm; breadth 0.40–0.50 (0.46, n = 5) mm; costal ratio 0.75–0.80 (0.77, n = 5). Fore-, hind tarsomere 1 with one basal and one apical spine; midtarsomere 1 with two basal, two apical, 4–5 other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 1–1–1, 2–2–1, 1–1–2; fore tarsal ratio 2.25–2.50 (2.32, n = 5), mid tarsal ratio 2.45–2.54 (2.49, n = 5), hind tarsal ratio 2.37–2.50 (2.43, n = 5); fore, mid- leg claws 0.66–0.87 (0.71, n = 5) length of their respective tarsomeres 5; hind leg claw about 1.0–1.4 (1.11, n = 4) as long as tarsomere 5 (Figure 6f). Abdomen with genital sclerite nearly triangular, trilobed, tapering anteriorly. Two slightly unequal spermathecae (Figure 6h), measuring 55–65 (60, n = 5) by 43–50 (47, n = 5) µm and 50–58 (54, n = 4) by 40–48 (44, n = 4) µm. Third rudimentary spermatheca nearly 7.5 µm.

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea litorale* Santarém, Borkent, Spinelli and Felippe-Bauer', '*Downeshelea multilineata* (Lutz), BAHAMAS, W.I. Coral Harbour, New Province, 23 November 1968, G.M. Stobes col., light trap' (USNM); allotype female adult, labeled 'Allotype *Downeshelea litorale* Santarém, Borkent, Spinelli and Felippe-Bauer' same data as holotype (USNM). Paratypes labeled as follows: 1 male, 'BRAZIL, Rio de Janeiro, Jacarepaguá, Tanque, July 1972, Tavares and Souza cols.' (CCER); 1 male, 'COSTA RICA, Limón, Parque Nacional Cahuita, Sector Puerto Vargas, 5m, 9 August–15

October 2002, E. Rojas. Malaise' (CNCI); 1 male, same data except 15 December 2002–15 January 2003 (MNCR); 1 male, '*Downeshelea multilineata* (Lutz), DOMINICA, Cabrit Swamp, 23 February 1965, W. Wirth, Bredin-Archbold, Smithsonian biological survey Dominica' (USNM); 2 males, 3 females, '*Downeshelea multilineata* (Lutz), JAMAICA, Westmoreland Parish Negril, Crystal Waters Tropical Hammock, 20 November 1968, R. E. Woodruff, black light trap' (1 male, 1 female CCER; 1 male, 2 females USNM); 1 male, 1 female, same data except '22 June 1970, light trap, E.G. Farnworth' (USNM); 3 males, 2 females, '*Downeshelea multilineata* (Lutz), GRAND CAYMAN, 14 July 1991, P. Fitzgerald, black light trap' (1 male, 1 female CCER; 2 males, 1 female USNM); 1 female, same data except October 1991 (USNM); 2 males, 'MEXICO, Yucatan, Reserva Río Lagartos, Tizimin, entrada a Zacbo, selva baja, 19 March 1996, light trap, Ibáñez-Bernal col.' (CAIM).

Distribution and bionomics

This species is known from the Mexico, Bahamas, Grand Cayman, Jamaica, Dominica, Costa Rica (Limón) and Brazil (Rio de Janeiro) (Figure 10). It has been found in forests near coastal areas.

Etymology

The name of this species reflects its distribution along seashores in the Caribbean, Mexico, Costa Rica and Brazil (Latin – litorale = seashore).

Downeshelea marambaia sp. nov.
(Figures 7a–d, 9e–g, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.65–0.66 length of gonocoxite; parameres fused for 0.12 of total length; stem slightly curved, convergent distally, slightly enlarged apically, distal portion strongly curved (Figure 9g); aedeagus rectangular, basal arch shallow, extending to 0.17 of total length with two large elliptical sclerotised anteromesal areas (Figure 9f).

Female. Unknown.

Description

Male. *Head*. Eyes separated by a distance shorter than one ommatidia (Figure 7c); antennal ratio 1.00 (n = 1) (Figure 7b); palpal ratio 2.50 (n = 1) (Figure 7c).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 7a) with greyish spot over CuA_2 reaching wing margin; 2^{nd} radial cell twice longer than 1^{st}; wing length 1.05 (n = 1) mm; breadth 0.37 (n = 1) mm; costal ratio 0.74 (n = 1). Halter knob brown, stem pale. Legs (Figure 7d) brown, hind femur darker apically, hind tibia with subbasal dark band. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, three other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–2–3, 2–2–2, 1–1–1; fore tarsal ratio 2.25

(n = 1), mid tarsal ratio 2.52 (n = 1), hind tarsal ratio 2.24 (n = 1); claws 0.40 (n = 1) length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 9e): tergite 9 with quadrate apex, apicolateral process elongate, slender, in bad condition in slide-mounted specimen (not illustrated); sternite 9 concave anteriorly, posterior margin in bad condition in slide-mounted specimen (not illustrated). Gonocoxite 1.91–2.17 (2.04, n = 2) times longer than basal width; gonostylus delicate, 0.65–0.66 (0.65, n = 2) length of gonocoxite. Parameres (Figure 9g) 1.16–1.17 (1.16, n = 2) times longer than aedeagus, fused for 0.12 (n = 1) of total length; knob bulbous; stem nearly straight, convergent distally, slightly expanded apically, distal portion strongly curved, tapering to tip, 0.56 (n = 1) of total length. Aedeagus (Figure 9f) rectangular, enlarged distally, heavily sclerotised laterally, basal arch shallow, extending to 0.17 (n = 1) of total length with large elliptical sclerotised anteromesal areas reaching midlength of aedeagus; distal portion with deep mesal excavation terminating in two prominent sclerotised pointed serrate processes.

Female. Unknown.

Specimens examined

Holotype male adult, labeled 'Holotype *Downeshelea marambaia* Santarém, Borkent, Spinelli and Felippe-Bauer, BRAZIL, Rio de Janeiro, Itaguaí, 22 March 1990, FEEMA team col.' (CCER). Paratype male labeled as holotype except Marambaia island, P. Armas, 29 October 1992, Quintelas col. (CCER).

Distribution and bionomics

This species is restricted to Rio de Janeiro (Brazil) in coastal areas of the Itaguai municipality (Figure 10).

Etymology

The name of this species refers to its distribution in Marambaia island, Rio de Janeiro, Brazil.

Downeshelea moravia sp. nov.
(Figures 7e–h, 9h–i, 10)

Diagnosis

Male. The only species of *Downeshelea* in the Americas with the following combination of features: gonostylus 0.69 length of gonocoxite; parameres fused for 0.25 of total length, stem sinuous, proximal 2/3 stout, directed posterolaterally, distal 1/3 slender, directed posteromesally; distal portion aculeate (Figure 9i); aedeagus subtriangular, basal arch U-shaped, extending to 0.38 of total length with elliptical sclerotised anterior areas (Figure 9h).

Female. Unknown.

Description

Male. *Head*. Eyes separated by a distance shorter than one ommatidia; antennal ratio 1.02 (Figure 7f); palpal ratio 1.7 (Figure 7g).

Thorax. Brown, without definite pattern in slide-mounted specimens. Wing (Figure 7e) with greyish spot over CuA, CuA_1, CuA_2 extending into cua_1, anal cell, reaching wing margin, anal cell with greyish area in middle not reaching wing margin; 2^{nd} radial cell twice longer than 1^{st}; wing length 1.37 mm; breadth 0.47 mm; costal ratio 0.75. Halter brown, distal portion of knob darker. Legs (Figure 7h) brown, hind tibia slightly pale apically. Fore-, hind tarsomere 1 with one basal, one apical spine; midtarsomere 1 with two basal, two apical, seven other ventral spines; apical spines of tarsomeres 2–4 of fore-, mid-, hind legs: 2–3–3, 2–2–2, 1–1–1; fore tarsal ratio 2.48, mid tarsal ratio 2.60, hind tarsal ratio 2.49; claws 0.38 length of their respective tarsomere 5.

Abdomen. Dark brown. Terminalia (Figure 9h): tergite 9 with quadrate apex, apicolateral process elongate, slender; sternite 9 slightly concave anteriorly, posterior margin with a poorly developed convex median lobe bearing three long setae. Gonocoxite 2.30 times longer than basal width; gonostylus broader basally, tapering gradually to blunt tip, 0.69 length of gonocoxite. Parameres (Figure 9i) 1.02 times longer than aedeagus fused for 0.25 of total length with short posteromedian projection on the medial fused portion of parameres; knob slender, directed anteriorly; stem sinuous, proximal 2/3 stout, directed posterolaterally, distal 1/3 slender, directed posteromesally; distal portion aculeate, 0.50 of total length. Aedeagus subtriangular, heavily sclerotised laterallly, basal arch U-shaped, extending to 0.38 of total length with elliptical sclerotised anterior areas; distal portion with moderately deep mesal excavation terminating in two sclerotised pointed serrate processes.

Female. Unknown.

Specimens examined

Holotype male adult, labeled 'Holotype, *Downeshelea moravia* Santarém, Borkent, Spinelli and Felippe-Bauer, COSTA RICA, Prov. San José, Moravia, Zurquí de Moravia, Sendero torre, 1600m, 12 September 2012, Proyecto ZABDI team col, Pan light trap, ZABDI-21. −84:00:56 10:02:58 #105001' (MNCR).

Distribution and bionomics

This species is found in forested areas in Costa Rica (San José) at 1600 m above sea level (Figure 10).

Etymology

This species is named after its distribution in Cantón de Moravia, San José, Costa Rica.

Discussion

Wirth and Grogan (1988) described *Downeshelea* as (among other characteristics) a moderately large species, with wing length 1.1–2.0 mm, eyes bare and contiguous, females with

equal spermathecae and males with separated parameres. Herein we have observed some differences, as follows: small- to medium-sized species with minimum wing length 0.85 mm; females with contiguous eyes but males with eyes separated or contiguous; females with unequal, subequal or slightly unequal spermathecae; and males with fused parameres. We also note the length of the medial portion of the fused parameres and the distal portion of parameres varies between species, and these are useful features to identify them. To show these variations we included herein the anteromedial fusion/paramere ratio (that is, the relation of the length of the parameres' anteromedian fusion to the length of the parameres), and the distal portion/paramere ratio to represent the relation of the parameres' distal portion to the length of the parameres.

Differences between the species can be found in the male wing length, and mainly the male terminalia. *Downeshelea multilineata* has medium-sized male wings (length 0.97–1.15 mm), as do the new species, *D. costaricensis* (0.95–1.10 mm), *D. eclectica* (0.97–1.37 mm), *D. litorale* (1.00–1.17 mm), *D. marambaia* (1.05 mm) and *D. moravia* (1.37 mm), while *D. casimirensis* (0.85 mm) and *D. jarina* (0.85–0.95 mm) have shorter male wings. *Downeshelea multilineata* and the following five species – *D. casimirensis*, *D. costaricensis*, *D. litorale*, *D. marambaia* and *D. moravia* – have an elongate and slender apicolateral process on tergite 9, while *D. eclectica* and *D. jarina* have a short apicolateral process. The gonostylus of *D. casimirensis* is long (0.81 the length of the gonocoxite), while in the other species the gonostylus is shorter (0.60–0.69 the length of the gonocoxite). *Downeshelea multilineata* and *D. marambaia* are the only species with straight paramere stems, slightly enlarged distally, differing from the other six new species that have the sinuous stem pronounced laterally near its base (*D. jarina*), on the midportion *(D. moravia*), subapically (*D. eclectica*), apically (*D. casimirensis* and *D. costaricensis*) or internally in the distal half (*D. litorale*). The aedeagus is rectangular with elliptical anteromesal areas (*D. marambaia*), subtriangular with elliptical sclerotised anterior areas (*D. moravia* and *D. multilineata*) or with sclerotisations that extend from the base to the aedeagus apex, forming rectangular, oval and striped areas (*D. casimirensis*). Also, the basal arch is deep, extending to 0.56 of the total aedeagus length in *D. casimirensis*, shallow and extending to 0.17 in *D. marambaia*, or extending to 0.24–0.43 in the other species.

Downeshelea multilineata is now restricted to Florida in the United States, Guyana and the Brazilian states of Rio de Janeiro and Bahia (in Atlantic forest). Two new species, *D. casimirensis* and D. *marambaia*, are restricted to Rio de Janeiro (also Atlantic forest). *Downeshelea litorale* is also present in Atlantic forest but it is distributed in the Caribbean islands of Bahamas, Dominica, Grand Cayman and Jamaica, Costa Rica (Limón Province – 5 m above sea level) and Mexico. The new species *D. costaricensis*, *D. jarina* and *D. moravia* are restricted to Costa Rica. *Downeshelea costaricensis* occurs in Guanacaste, Limón and Puntarenas provinces and can be found from 5 to 100 m above sea level, while *D. jarina* is restricted to the lower altitude (5 m) of Guanacaste province, and *D. moravia* occurs at high altitude (1600 m) in San José province. *Downeshelea eclectica* is widely distributed in all Costa Rica provinces, occurring from 0 to 1850 m in altitude, and is also found in Brazil (Pará) and Colombia at sea level.

Only *D. cebacoi* (Lane and Wirth) and *D. stonei* (Wirth) were previously recorded from Costa Rica (Wirth 1953; Felippe-Bauer et al. 2011), and our study now shows the presence of seven species occurring there. Additionally, *D. panamensis* (Lane and Wirth) and *D. stonei* are the only species previously known from the Caribbean Islands

(Virgin Islands – *D. panamensis*; Bahamas and Cuba – *D. stonei*) (Lane and Wirth 1964; Wirth and Williams 1964). These are the first records of *Downeshelea* species from Dominica, Cayman Islands and Jamaica.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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