Belgian Journal of Entomology 65: 1–18 (2018) ISSN: 2295-0214
www.srbe-kbve.be

urn:lsid:zoobank.org:pub:31CA4C95-F850-442C-8CA7-B4F2BF1DC20D

Belgian Journal of Entomology

The Laccophilinae Gistel, 1848 of Belize (Coleoptera: Dytiscidae)

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Published: Brussels, March 01, 2018

Citation: SCHEERS K. & THOMAES A., 2018. - The Laccophilinae Gistel, 1848 of Belize (Coleoptera: Dytiscidae). *Belgian Journal of Entomology*, 65: 1–18.

ISSN: 1374-5514 (Print Edition)
ISSN: 2295-0214 (Online Edition)

The Belgian Journal of Entomology is published by the Royal Belgian Society of Entomology, a non-profit association established on April 9, 1855.

Head office: Vautier street 29, B-1000 Brussels.

The publications of the Society are partly sponsored by the University Foundation of Belgium.

Front cover: *L. fasciatus fasciatus* Aubé, 1838; from left to right: habitus dorsal view, habitus ventral view, distribution in Belize.

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Abstract

The taxonomic composition of the subfamily Laccophilinae Gistel, 1848 in Belize is reviewed based on material collected by the authors during a field survey in 2015 and literature. In total eight species were collected belonging to two genera. Four species are recorded from Belize for the first time: *Laccophilus duplex* Sharp, 1882; *L. fasciatus fasciatus* Aubé, 1838; *L. ovatus zapotecus* Zimmermann, 1970 and *L. spangleri* Zimmermann, 1970. Diagnostic characters, notes on the ecology and distribution of all species are provided and illustrated.

Keywords: *Laccomimus*, *Laccophilus*, Hydradephaga, Central America, Neotropical region

Introduction

The subfamily Laccophilinae is the third largest subfamily within the Dytiscidae and comprises two tribes Agabetini and Laccophilini which contain respectively two and 448 species (NILSSON & HÁJEK, 2017). In the Neotropical region only the tribe Laccophilini is present. Of the four genera present in the Neotropics only *Laccomimus* Toledo & Michat, 2015 and *Laccophilus* Leach, 1815 occur in Central America.

Until now only four species of Laccophilinae were reported from Belize. In his comprehensive revision of the genus *Laccophilus* of North America, ZIMMERMAN (1970) reported *Laccophilus gentilis suavis* Sharp, 1882 from Belize (as British Honduras) based on one specimen lacking further locality data. TOLEDO & MICHAT (2015) give the first records of *Laccomimus pumilio* (LeConte, 1878) from Belize and SITES & REYNOSO-VELASCO (2015) give the first records of *Laccophilus oscillator laevipennis* Sharp, 1882 and *L. proximus* Say, 1823.

The knowledge of the water beetles of Belize is very limited and only few species and records are known (CARRIE, 2015; SCHEERS & THOMAES, 2017). In 2015, a survey was carried out by the authors with the objective of improving the knowledge of the water beetles of Belize. During this survey eight species of Laccophilinae were encountered, of which four are recorded from this country for the first time. This paper deals with the taxonomic composition, distribution and bionomics of the species of Laccophilinae in Belize, based on literature and material collected during this field survey.

Material and methods

During a field survey carried out from April 13 to May 9 2015, representatives of Hydradephaga were collected at 63 sites in the south and central regions of Belize. The sampling was done with a hydrobiological handnet with a diameter of 30 cm and a mesh of

1 mm and a sieve with a diameter of 20 cm and a mesh of 0.8 mm. The content of the net and the sieve was put in a white tray and sorted out on site. All beetles were conserved in the field in 90% alcohol.

Dry mounted specimens were relaxed in hot water for about 10 minutes prior to dissection. Male genitalia were dissected and glued on the mounting card together with the specimen after examination. The collected material is deposited in the private collection of the first author. The nomenclature follows NILSSON & HÁJEK, 2017.

Habitus photographs (Figs 1A-I, 2A-H) were made with the semi-automatic camera system described by BRECKO *et al.* (2014). This Canon-Cognisys set-up uses a Canon 700D camera equipped with a Canon macro lens MP-E 65 mm. The image stacking software package Zerene Stacker (Build T201404082055) was used for image stacking. These method was designed and described in detail by BRECKO *et al.* (2014). Drawings of the genitalia (Figs 3A-H) were made based on digital images.

Distribution maps indicating the known distribution of Laccophilinae in Belize are given for each species (Figs 3A-I). These maps were made with ArcGIS 10.4.1 and are based on specimens examined as well as literature records: SITES & REYNOSO-VELASCO (2015); TOLEDO & MICHAT (2015) and ZIMMERMAN (1970).

Results

During the survey Laccophilinae were found at 49 of the 63 sampled sites (Fig. 3A). In total 741 specimens were collected belonging to eight species. Below we provide a checklist of the Laccophilinae of Belize and give a detailed account of all eight species.

Checklist of the Laccophilinae of Belize
(*first record)

Laccomimus Toledo & Michat, 2015
- *L. pumilio* (LeConte, 1878)

Laccophilus Leach, 1815
- *L. duplex* Sharp, 1882*
- *L. fasciatus fasciatus* Aubé, 1838*
- *L. gentilis suavis* Sharp, 1882
- *L. oscillator laevipennis* Sharp, 1882
- *L. ovatus zapotecus* Zimmerman, 1970*
- *L. proximus* Say, 1823
- *L. spangleri* Zimmerman, 1970*

Laccomimus pumilio (LeConte, 1878)
(Figs 1A, 2A, 3A, 4B)

= *Laccophilus pumilio* LeConte, 1878

MATERIAL STUDIED. STANN CREEK: Maya Center, stream, 16°47'48,9"N, 88°22'50,2"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (27ex) TOLEDO: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Bladen NR, pond transition savannah-forest, 16°32'26,3"N, 88°42'57,1"W, 20.IV.2015, Leg K. Scheers &

A. Thomaes (10ex); Bladen NR, pond in forest, 16°32'55,3"N, 88°43'1,7"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (10ex); Punta Gorda, temporary stream, 16°06'20,1"N, 88°49'44,7"W, 24.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Indian Creek, Lake of former Lodge, 16°18'45,1"N, 88°49'31,4"W, 29.IV.2015, Leg. K. Scheers & A. Thomaes (6ex); San Miguel, puddle in intermittent stream, 16°16'52,5"N, 88°53'3,1"W, 02.V.2015, Leg. K. Scheers & A. Thomaes (2ex).

PUBLISHED RECORDS. TOLEDO & MICHAT, 2015

DIAGNOSIS. TL: 2.1–2.3 mm; MW: 1.0–1.2 mm. Outline droplet-shaped. Head and pronotum testaceous to testaceous-rufous, darkened between the eyes and along the base of the pronotum. Elytra dark rufous to pitchy, each with a paler, diffuse and broken up subbasal band and with small lateral and subapical paler markings (Fig. 1A). Elytra and pronotum with prominent characteristic iridescence. Ventral parts reddish-brown (Fig. 2A). This species is very similar to the other species of *Laccomimus* and is distinguishable only by the morphology of the male and female genitalia (Fig. 3A).

DISTRIBUTION. Belize, Cuba, Guatemala, USA (Florida).

ECOLOGY. *Laccomimus pumilio* has, like most other species of the genus, a preference for lentic or stagnant waters that are rich in debris and vegetation. In Florida, YOUNG (1954) collected this species from the heavily shaded edges of a large, permanent woodland pond and mentioned that the occurrence of the adults of this species is seasonal. In Belize it is found mainly in partly shaded ponds with a thick layer of organic debris in the form of decaying leaves and branches or at the edge of larger permanent ponds in a thick mat of vegetation.

***Laccophilus duplex* Sharp, 1882**

(Figs 1B, 2B, 3B, 4C)

= *Laccophilus optatus* Sharp, 1882

MATERIAL STUDIED. STANN CREEK: Cockscomb Basin Wildlife Sanctuary, stream and puddles on rock, 16°46'50,44"N, 88°26'28,6"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (11ex); Cockscomb Basin Wildlife Sanctuary, pool under waterfall and puddles on rockface, 16°46'22,8"N, 88°27'3,3"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (1ex) TOLEDO: Bladen NR, Tyre track pools, 16°33'4,82"N, 88°42'58,08"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, tyre track puddle, 16°05'24"N, 88°51'6,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, small stream, 16°05'17,8"N, 88°52'4"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (2ex); Golden Stream CP, puddle temp. stream, 16°22'10,6"N, 88°47'10,5"W, 28.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Golden Stream CP, Golden stream, 16°22'8"N, 88°47'59,4"W, 30.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); San Miguel, puddle in intermittent stream, 16°16'52,5"N, 88°53'3,1"W, 02.V.2015, Leg. K. Scheers & A. Thomaes (45ex); San Miguel, pool in intermittent stream, 16°37'43,6"N, 88°33'28,8"W, 02.V.2015, Leg. K. Scheers & A. Thomaes (3ex).

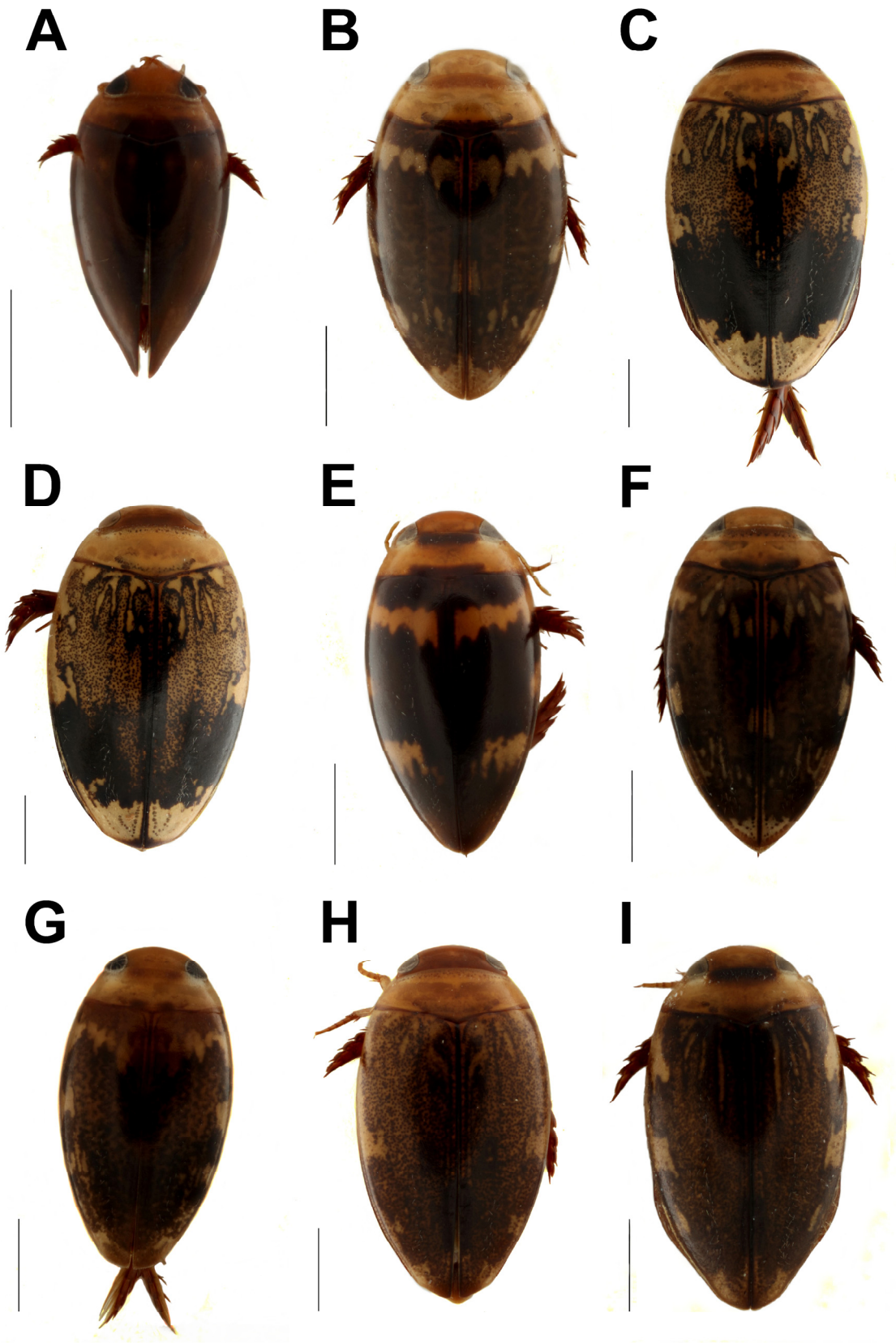

Fig. 1. Dorsal view of Laccophilinae species in Belize. A, *Laccomimus pumilio* (LeConte, 1878); B, *Laccophilus duplex* Sharp, 1882; C-D, Female of *L. fasciatus fasciatus* Aubé, 1838, C, with distinct elytral flange, D, without elytral flange; E, *L. gentilis suavis* Sharp, 1882; F, *L. oscillator laevipennis* Sharp, 1882; G, *L. ovatus zapotecus* Zimmerman, 1970; H, *L. proximus* Say, 1823; I, *L. spangleri* Zimmerman, 1970 (Photograph: F. Trus).

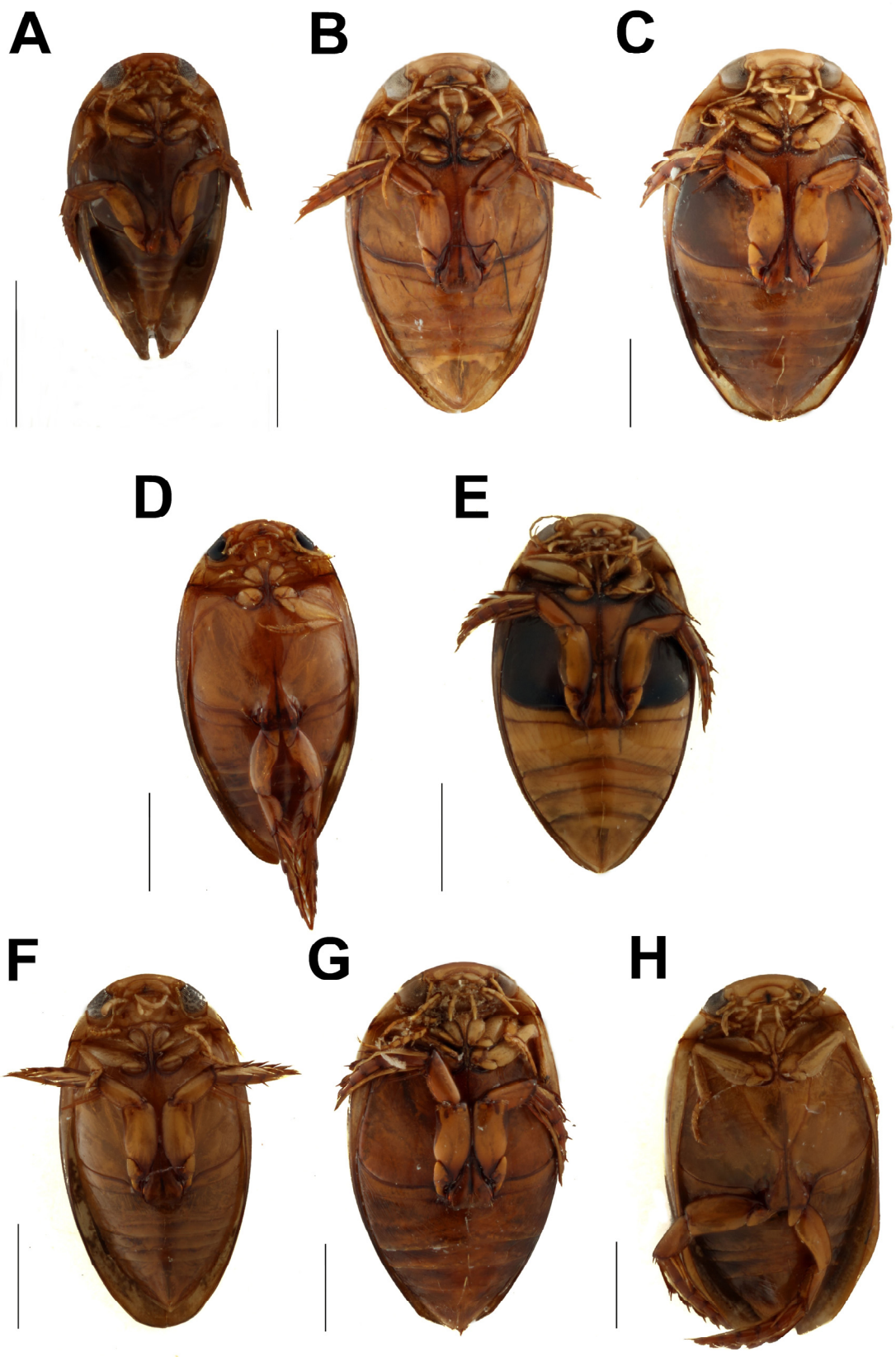

Fig. 2. Ventral view of Laccophilinae species in Belize. A, *Laccomimus pumilio* (LeConte, 1878); B, *Laccophilus duplex* Sharp, 1882 (pale specimen); C, *L. fasciatus fasciatus* Aubé, 1838; D, *L. gentilis suavis* Sharp, 1882; E, *L. oscillator laevipennis* Sharp, 1882; F, *L. ovatus zapotecus* Zimmerman, 1970; G, *L. proximus* Say, 1823; H, *L. spangleri* Zimmerman, 1970 (Photograph: F. Trus).

DIAGNOSIS. TL: 3.8–4.3 mm; MW: 2.1–2.3 mm. Head testaceous, pronotum same color as head but often with a slim darker area near the base. Elytra testaceous, clouded with black and with pale markings present along the base, suture, lateral margins and the apex. The basal markings, although variable, are quite extensive and form an almost complete basal band (Fig. 1B). Ventral parts testaceous with the metacoxal plates narrowly darkened to pitchy black along the lateral and anterior margins (Fig. 2B). Male genitalia with median lobe swollen at the base (Fig. 3B).

SIMILAR SPECIES. The elytral markings of *Laccophilus duplex* are very similar to those of *L. oscillator laevipennis* but the markings in the latter are much more reduced and seldom confluent. Furthermore *L. duplex* has the metacoxal plates testaceous and at most narrowly darkened along the margins, whereas *L. oscillator laevipennis* has the metacoxal plates completely piceous (Fig. 2B, 2E).

DISTRIBUTION. Belize (**first records**), Brazil, Costa Rica, El Salvador, Honduras, Mexico (Chiapas, Nuevo Leon, San Luis Potosi, Tamaulipas, Veracruz), Nicaragua.

ECOLOGY. According to ZIMMERMAN (1970), this species occurs at low altitudes but above the coastal plain. He collected it in heavily shaded, shallow, clear streams with gravel bottoms and in roadside ditches. During our survey in Belize, *L. duplex* was collected in intermittent and permanent streams, both in the forest and open country (Fig. 5). This species was also encountered with single specimens in puddles in tyre tracks and was present close to sea level.

***Laccophilus fasciatus fasciatus* Aubé, 1838**

(Figs 1C-D, 2C, 3C, 4D)

= *Laccophilus apicalis* Sharp, 1873

MATERIAL STUDIED. BELIZE DISTRICT: La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 08.V.2015, Leg. K. Scheers & A. Thomaes (6ex); La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (5ex); La Democracia, shallow exposed pool, 17°21'23,5"N, 88°33'1,8"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (5ex); La Democracia, Belize ZOO, concrete pond, 17°21'6,3"N, 88°33'12,6"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (1ex) CAYO: Nochuch, small pool on parking lot, 17°12'28,2"N, 88°39'1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (15ex) STANN CREEK: Cockscomb Basin Wildlife Sanctuary, stream and puddles on rock, 16°46'50,44"N, 88°26'28,6"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (21ex); Cockscomb Basin Wildlife Sanctuary, pool under waterfall and puddles on rockface, 16°46'22,8"N, 88°27'3,3"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (1ex) TOLEDO: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 13.IV.2015, Leg. K. Scheers & A. Thomaes (16ex); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (31ex); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 04.V.2015, Leg. K. Scheers & A. Thomaes (5ex); Bladen NR, Tyre track pools, 16°33'4,82"N, 88°42'58,08"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (9ex); Deep River FR, pond savannah, 16°31'11,7"N, 88°42'3,8"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (4ex); Deep River FR, pond savannah, 16°31'14,2"N, 88°42'5,6"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (2ex); Deep River FR, pond savannah, 16°31'42,7"N, 88°42'31,6"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (2ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (4ex); Punta

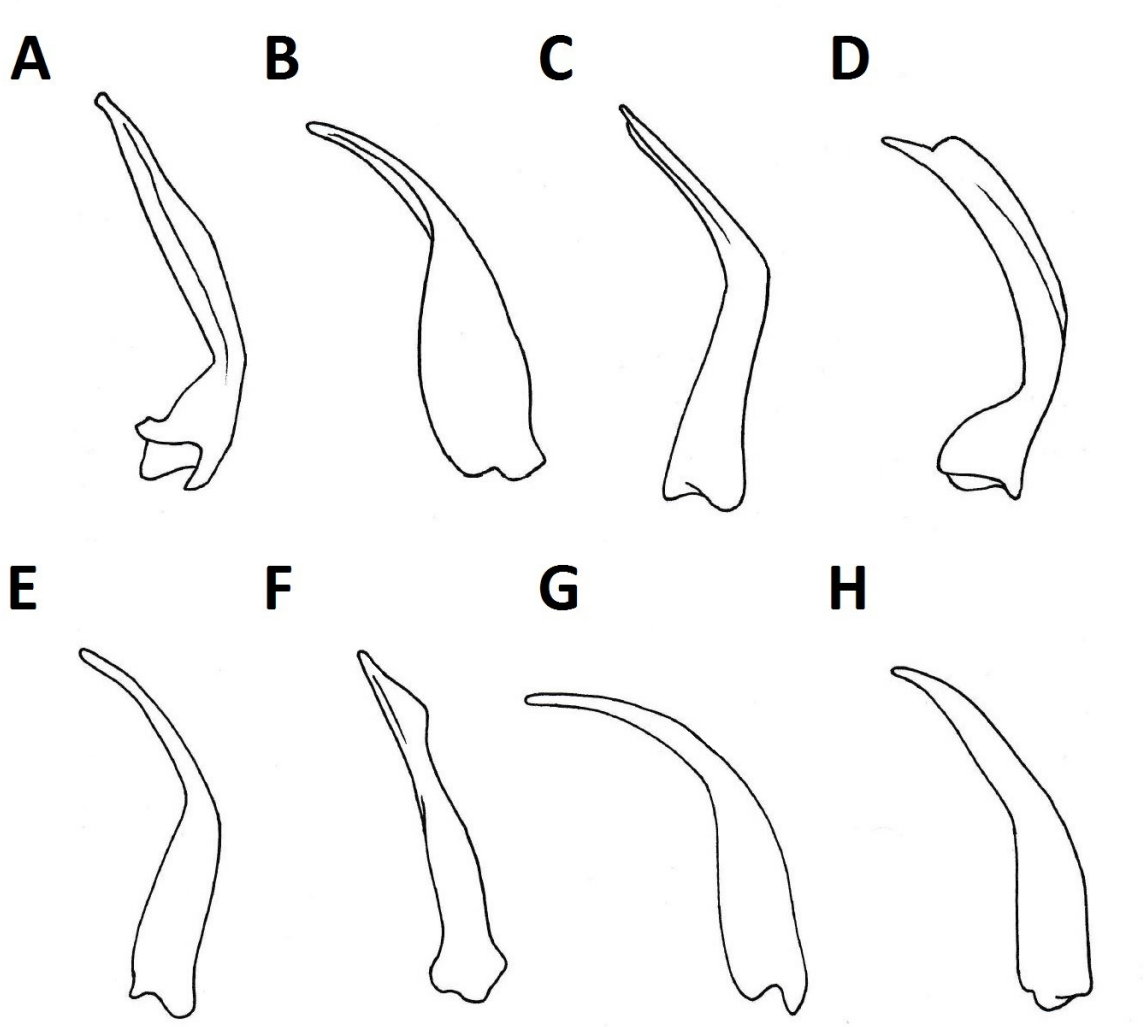

Fig. 3. Median lobe, left lateral view. A, *Laccomimus pumilio* (LeConte, 1878); B, *Laccophilus duplex* Sharp, 1882; C, *L. fasciatus fasciatus* Aubé, 1838; D, *L. gentilis suavis* Sharp, 1882; E, *L. oscillator laevipennis* Sharp, 1882; F, *L. ovatus zapotecus* Zimmerman, 1970; G, *L. proximus* Say, 1823; H, *L. spangleri* Zimmerman, 1970.

Gorda, tyre track puddle, 16°05'24"N, 88°51'6,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (11ex); Punta Gorda, cattle pond, 16°05'12,8"N, 88°51'1,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); Punta Gorda, small stream, 16°05'17,8"N, 88°52'4"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); Indian Creek, Lake of former Lodge, 16°18'45,1"N, 88°49'31,4"W, 29.IV.2015, Leg. K. Scheers & A. Thomaes (2ex); San Miguel, pool in intermittent stream, 16°37'43,6"N, 88°33'28,8"W, 02.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, temp. pool next to road, 16°06'35"N, 88°48'41"W, 03.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, small temp. grassy marsh, 16°06'42,5"N, 88°48'37,4"W, 03.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, shallow pool, 16°05'19,7"N, 88°48'53,4"W, 05.V.2015, Leg. K. Scheers & A. Thomaes (4ex).

DIAGNOSIS. TL: 4.2–5.2 mm; MW: 2.3–2.8 mm. Head and pronotum testaceous to testaceous-rufous. Elytra testaceous and irrorated with black, pale markings along the base, suture, lateral margins and the apex, elytra with an irregular transverse dark fascia on the apical half which is normally very prominent but can in some specimens be nearly absent (Fig. 1C-D). Ventral testaceous-rufous but broadly darkened along the lateral sides of the sternites and the lateral and anterior sides of the metacoxal plate (Fig. 2C), the intensity of these dark infuscation is

variable between specimens. In the field this species is readily distinguished by the dark transverse fascia on the elytra and the large size. Median lobe of male genitalia distinctly bent in the middle (Fig. 3C).

DISTRIBUTION. Belize (**first records**), Costa Rica, El Salvador, Guatemala, Honduras, Mexico (Campeche, Chiapas, Coahuila, Colima, Jalisco, Michoacán, Oaxaca, Puebla, Tabasco, Veracruz, Yucatan), Nicaragua, Panama. According to ZIMMERMAN (1970) this species also occurs in South America, he gives however no specifics.

ECOLOGY. *Laccophilus fasciatus fasciatus* is a lowland species usually occurring below 1000 m a.s.l. (ZIMMERMAN, 1970). It is found in roadside ditches, pools of streams, sloughs and stock ponds and is most abundant in shallow water in marginal vegetation and debris (ZIMMERMAN, 1970). In our samples this species was most abundant in sun-exposed, permanent ponds (Fig. 6) often with abundant marginal vegetation. It was however present in most types of lentic habitats and was in some occasions even found in small pools on rock faces and puddles in tyre tracks. This species was found to be completely absent in heavily shaded ponds and in lotic habitats with a permanent flow.

NOTE. There are three subspecies of *L. fasciatus*, of which only in the nominate form females with an epipleural flange exist (Fig. 1C-D). ZIMMERMAN (1970) mentioned that these flanged form is frequent, which corresponds to our samples where epipleural flanges are present in most female specimens.

***Laccophilus gentilis suavis* Sharp, 1882**
(Figs 1E, 2D, 3D, 4E)

= *Laccophilus suavis* Sharp, 1882
= *Laccophilus championi* Sharp, 1882

MATERIAL STUDIED. STANN CREEK: Cockscomb Basin Wildlife Sanctuary, pool with leaf litter next to stream, 16°46'49,3"N, 88°28'7,1"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (1ex) TOLEDO: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (8ex); Deep River FR, pond savannah, 16°31'11,7"N, 88°42'3,8"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Bladen NR, pond transition savannah-forest, 16°32'26,3"N, 88°42'57,1"W, 20.IV.2015, Leg K. Scheers & A. Thomaes (4ex); BFree, Agami lagoon, 16°33'27,7"N, 88°42'14,8"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Indian Creek, Lake of former Lodge, 16°18'45,1"N, 88°49'31,4"W, 29.IV.2015, Leg. K. Scheers & A. Thomaes (43ex); Punta Gorda, shallow pool, 16°05'19,7"N, 88°48'53,4"W, 05.V.2015, Leg. K. Scheers & A. Thomaes (1ex).

PUBLISHED RECORDS. ZIMMERMAN (1970) “British Honduras” without locality.

DIAGNOSIS. TL: 3.3–3.6 mm; MW: 1.75–1.9 mm. Head testaceous, pronotum testaceous with distinct anterior and posterior pitchy-black bands. Elytra pitchy-black with a testaceous fascia along the base indistinctly interrupted near the suture, a mark near lateral margin at about the middle, a subapical fascia not reaching the suture and a mark near the apex (Fig. 1E). Ventral parts completely testaceous to testeceous-rufous (Fig. 2D). Median lobe distinctive (Fig. 3D).

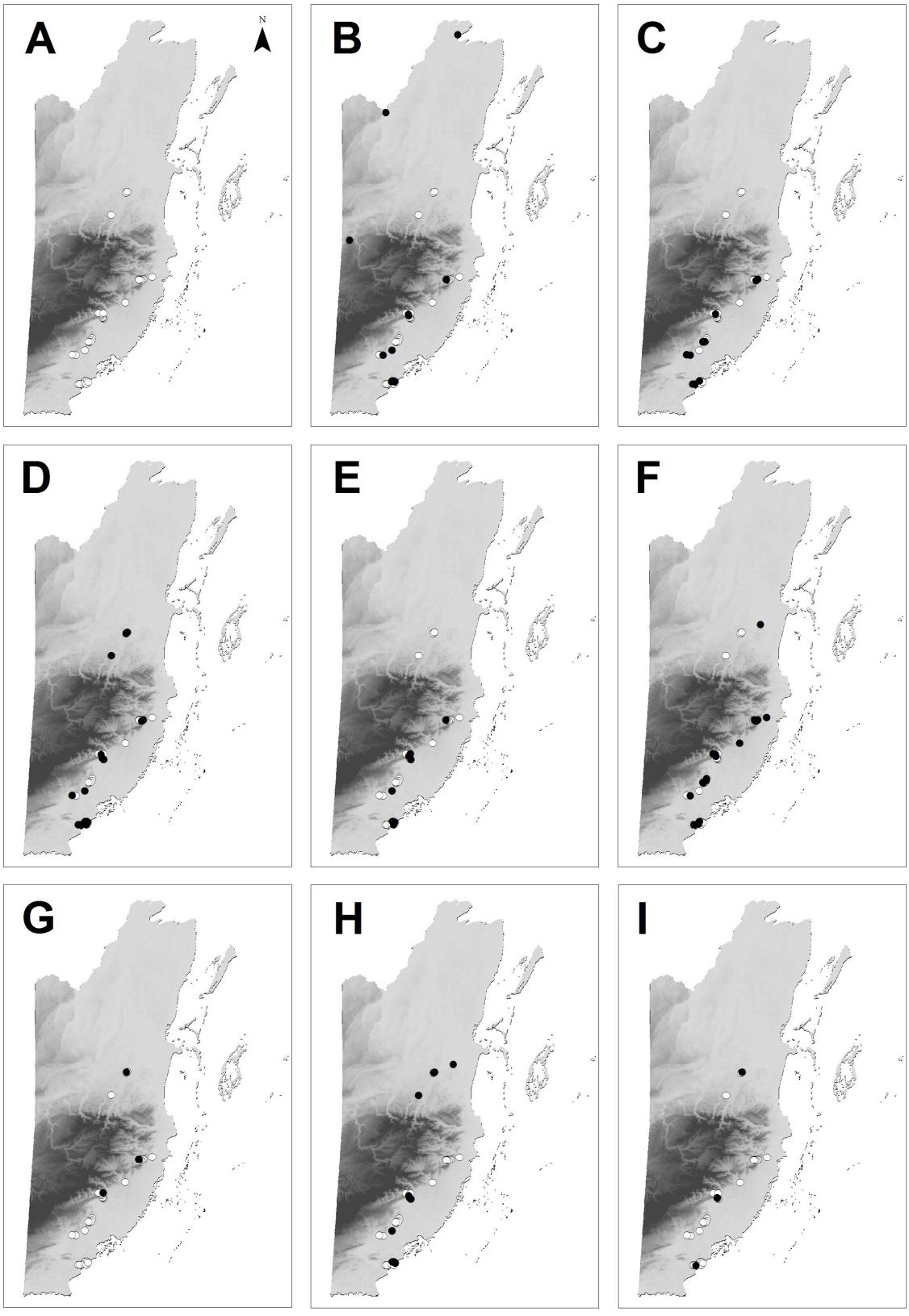

Fig. 4. Known distribution of Laccophilinae species in Belize. A, sampled sites; B, *Laccomimus pumilio* (LeConte, 1878); C, *Laccophilus duplex* Sharp, 1882; D, *L. fasciatus fasciatus* Aubé, 1838; E, *L. gentilis suavis* Sharp, 1882; F, *L. oscillator laevipennis* Sharp, 1882; G, *L. ovatus zapotecus* Zimmerman, 1970; H, *L. proximus* Say, 1823; I, *L. spangleri* Zimmerman, 1970 (white dots indicate sampled sites and black dots indicate sites where the species is recorded, elevation map as background in which dark shading increases with height).

DISTRIBUTION. Belize, Costa Rica, Cuba, Guatemala, Mexico (Campeche, Chiapas, Colima, Jalisco, Nayarit, Michoacán, Oaxaca, Quintana Roo, Sinaloa, Tabasco, Tamaulipas, Veracruz), Panama.

ECOLOGY. A tropical lowland species that is mostly distributed in coastal areas. It occurs mainly in grassy and muddy-bottomed pools and in duckweed-chocked, shaded sloughs or in pools of stabilized dunes immediately next to the ocean (ZIMMERMAN, 1970). Also in Cuba this species was collected in the lowlands in permanent lagoons with abundant aquatic vegetation, muddy sediment, and turbid water (MEGNA *et al*., 2011). There are, however, some records of higher elevations up to 1500 m a.s.l. (ZIMMERMAN, 1970). In Belize this species was found in muddy ponds and lagoons rich in vegetation or at least with some patches of vegetation.

***Laccophilus oscillator laevipennis* Sharp, 1882**

(Figs 1F, 2E, 3E, 4F)

= *Laccophilus laevipennis* Sharp, 1882

MATERIAL STUDIED. STANN CREEK: Cockscomb Basin Wildlife Sanctuary, stream and puddles on rock, 16°46'50,44"N, 88°26'28,6"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (10ex); Cockscomb Basin Wildlife Sanctuary, edge of stream with leaf litter, 16°46'55,4"N, 88°27'41,1"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (4ex); Cockscomb Basin Wildlife Sanctuary, pool under waterfall and puddles on rockface, 16°46'22,8"N, 88°27'3,3"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (3ex); Cockscomb Basin Wildlife Sanctuary, slow part of stream, 16°46'40,5"N, 88°27'29,8"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (2ex); Maya Center, stream, 16°47'48,9"N, 88°22'50,2"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (3ex) TOLEDO: Bladen NR, Tyre track pools, 16°33'4,82"N, 88°42'58,08"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (8ex); Bladen NR, pond transition savannah-forest, 16°32'26,3"N, 88°42'57,1"W, 20.IV.2015, Leg K. Scheers & A. Thomaes (4ex); Bladen NR, pond in forest, 16°32'55,3"N, 88°43'1,7"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (7ex); Bladen NR, pond in forest, 16°32'59,4"N, 88°43'0,8"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); Bladen NR, stream near spring, 16°33'27,4"N, 88°43'56,4"W, 21.IV.2015, Leg. K. Scheers & A. Thomaes (2ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (9ex); Punta Gorda, tyre track puddle, 16°05'24"N, 88°51'6,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (7ex); Punta Gorda, small stream, 16°05'27,3"N, 88°51'32,7"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); Punta Gorda, pool temp. stream in forest, 16°05'42,2"N, 88°49'38,9"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (3ex); Golden Stream CP, temp. stream in forest, 16°23'33"N, 88°46'33,8"W, 26.IV.2015, Leg. K. Scheers & A. Thomaes (24ex); Golden Stream CP, puddle near Golden Stream, 16°21'50,8"N, 88°47'55,7"W, 27.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Golden Stream CP, puddle temp. stream, 16°22'50,7"N, 88°46'45,3"W, 27.IV.2015, Leg. K. Scheers & A. Thomaes (4ex); Golden Stream CP, Golden stream, 16°22'8"N, 88°47'59,4"W, 30.IV.2015, Leg. K. Scheers & A. Thomaes (6ex); Red Banks, stream in forest, 16°37'43,6"N, 88°33'28,8"W, 01.V.2015, Leg. K. Scheers & A. Thomaes (7ex); San Miguel, puddle in intermittent stream, 16°16'52,5"N, 88°53'3,1"W, 02.V.2015, Leg. K. Scheers & A. Thomaes (16ex).

PUBLISHED RECORDS. SITES & REYNOSO-VELASCO, 2015

DIAGNOSIS. TL: 3.5–4.1 mm; MW: 2.0–2.4 mm. Head testaceous with a more or less distinct darker band posteriorly, pronotum same color as head with and more or less indistinct darker area near the base. Elytra testaceous clouded with black, pale markings along the base, suture, lateral margins and the apex (Fig. 1F). Ventral parts testaceous with the metacoxal plates dark brown to pitchy black (Fig. 2E). Median lobe of male genitalia with wide base and narrow apical half (Fig. 3E).

DISTRIBUTION. Belize, Costa Rica, Mexico (Chiapas, Jalisco, Oaxaca), Nicaragua.

ECOLOGY. According to ZIMMERMAN (1970) this subspecies occurs in mountainous regions in tropical deciduous forest. This species (both this subspecies and the nominate form) is typical of rocky mountain streams that are frequently subjected to high currents. He collected the nominate form by sweeping underneath large boulders that are subject to heavy currents. In Belize it is the most common species of Dytiscidae present in forest streams where it is almost a constant. We found *L. oscillator laevipennis* most abundant in leaf packs in slow flowing parts of forest streams and small rivers with a substrate of gravel or rock but it was often also collected between the exposed gravel and boulders (Fig. 5). Furthermore this species was also encountered in lentic habitats in the forested areas where it occurred in puddles in tyre tracks and in heavily shaded ponds with a thick layer of leaf litter where other *Laccophilus* species were absent.

***Laccophilus ovatus zapotecus* Zimmerman, 1970**
(Figs 1G, 2F, 3F, 4G)

MATERIAL STUDIED. BELIZE DISTRICT: La Democracia, shallow exposed pool, 17°21'23,5"N, 88°33'1,8"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (1ex) STANN CREEK: Cockscomb Basin Wildlife Sanctuary, pool with leaf litter next to stream, 16°46'49,3"N, 88°28'7,1"W, 06.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Cockscomb Basin Wildlife Sanctuary, Wari Lagoon, 16°46'46,1"N, 88°28'2,4"W, 07.V.2015, Leg. K. Scheers & A. Thomaes (79ex) TOLEDO: BFree, Agami lagoon, 16°33'27,7"N, 88°42'14,8"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (2ex).

DIAGNOSIS. TL: 3.3–3.8 mm; MW: 1.7–1.9 mm. Head and pronotum pale testaceous. Elytra pale testaceous marmorated with pitchy-brown, with pale markings along the base, lateral sides and near the apex originating from the absence of the dark marmorated pattern (Fig. 1G). The area between the base of the elytra and the basal fascia is distinctly paler than the rest of the elytra. Ventral parts testaceous to testaceous rufous (Fig. 2F). Male genitalia with median lobe very distinct (Fig. 3F).

SIMILAR SPECIES. The elytral pattern of *Laccophilus gentilis suavis* resembles that of *L. ovatus zapotecus*, but differs from it by the much darker pigmented elytra sharply contrasting with the pale markings. Furthermore the aedeagus of these two species is completely different (Fig. 3D, 3F).

DISTRIBUTION. Belize (**first records**), Costa Rica, Cuba, Guadeloupe, Guatemala, Mexico (Chiapas, Tabasco, Veracruz), Nicaragua, Panama.

ECOLOGY. ZIMMERMAN (1970) mentions that *L. ovatus zapotecus* is mainly found in pasture ponds and in roadside ditches with mud bottoms and that all localities are under 500 feet (about 150 meter) elevation. This species was found at only four sites, in three of which only

one or two specimens were found. The only site where it was abundant was in an old oxbow pond in the Cockscomb Basin Wildlife Sanctuary. At this site specimens were collected in high numbers in the mats of vegetation at the edge of the pond together with many other species of Hydradephaga.

Laccophilus proximus Say, 1823

(Figs 1H, 2G, 3G, 4H)

= *Laccophilus americanus* Aubé, 1838
= *Laccophilus confusus* Sharp, 1882

MATERIAL STUDIED. BELIZE DISTRICT: La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 08.V.2015, Leg. K. Scheers & A. Thomaes (18ex); La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (14ex); La Democracia, shallow exposed pool, 17°21'23,5"N, 88°33'1,8"W, 08.V.2015, Leg. K. Scheers & A. Thomaes (3ex); La Democracia, shallow exposed pool, 17°21'23,5"N, 88°33'1,8"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (13ex) CAYO: Nochuch, small pool on parking lot, 17°12'28,2"N, 88°39'1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (4ex) TOLEDO: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 13.IV.2015, Leg. K. Scheers & A. Thomaes (9ex); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (7ex); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 04.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Deep River FR, pond savannah, 16°31'11,7"N, 88°42'3,8"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (18ex); Deep River FR, pond savannah, 16°31'14,2"N, 88°42'5,6"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (23 ex); Deep River FR, pond savannah, 16°31'35,5"N, 88°42'23,6"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (30ex); Deep River FR, pond savannah, 16°31'41,5"N, 88°42'30"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (8ex); Deep River FR, pond savannah, 16°31'42,7"N, 88°42'31,6"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (21ex); Bladen NR, pond transition savannah-forest, 16°32'26,3"N, 88°42'57,1"W, 20.IV.2015, Leg K. Scheers & A. Thomaes (1ex); Punta Gorda, temp. stream in forest, 16°06'37,6"N, 88°49'18,8"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Indian Creek, Lake of former Lodge, 16°18'45,1"N, 88°49'31,4"W, 29.IV.2015, Leg. K. Scheers & A. Thomaes (9ex); Punta Gorda, temp. pool next to road, 16°06'35"N, 88°48'41"W, 03.V.2015, Leg. K. Scheers & A. Thomaes (1ex); Punta Gorda, puddle on road, 16°06'20,3"N, 88°48'29,5"W, 04.V.2015, Leg. K. Scheers & A. Thomaes (1ex).

PUBLISHED RECORDS. SITES & REYNOSO-VELASCO, 2015

DIAGNOSIS. TL: 3.8–4.6 mm; MW: 2.1–2.4 mm. Head and pronotum testaceous. Elytra testaceous and densely irrorated with dark brown to black, the base, lateral margins and apex with well-defined pale markings originating out of the absence of irrorations (Fig. 1H). Ventral parts completely testaceous-rufous (Fig. 2G). Median lobe of male genitalia evenly curved and gently narrowed towards the apex (Fig. 3G).

SIMILAR SPECIES. This species is very similar to *Laccophilus maculosus* but in that species the irrorations are much denser and confluent along the pale markings on the elytra while in *L. proximus* they are evenly distributed.

Fig. 5. Permanent stream in the Cockscomb Basin Wildlife Sanctuary, typical habitat of *Laccophilus duplex* Sharp, 1882 and *L. oscillator laevipennis* Sharp, 1882 (Photograph: K. Scheers).

Fig. 6. Warm, sun-exposed, vegetation free pond in the savannah with a loamy substrate in the Deep River Forest Reserve, the habitat of *L. fasciatus fasciatus* Aubé, 1838, *L. proximus* Say, 1823 and *L. spangleri* Zimmerman, 1970 (Photograph: K. Scheers).

DISTRIBUTION. Bahama Islands, Belize, Costa Rica, Cuba, Guadeloupe, Guatemala, Mexico (Campeche, Chiapas, Coahuila, Oaxaca, San Luis Potosi, Tabasco, Tamaulipas, Veracruz, Yucatan), Puerto Rico, USA (Alabama, Arkansas, Colorado, Connecticut, Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Massachusetts, Maryland, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, Wyoming), Virgin Islands.

ECOLOGY. *Laccophilus proximus* is one of the most widespread species of the genus in North America and is very common throughout Central America and the Antilles. The species can be found in nearly all kinds of lentic habitats but is nearly absent in heavily shaded habitats with a thick layer of decaying leafs. This species is particularly common in temporary situations and sunlit exposed pools with mineral substrate. YOUNG (1954) characterized *L. proximus* as one of the principal pioneer species of newly formed ponds, puddles and ditches with fresh water. He has found adults in rain barrels, tin cans with rain water, flooded furrows in recently plowed fields and even in water in old car tires. It is the most common *Laccophilus* species in temporary pools and puddles throughout Florida and may appear in large numbers in recently filled basins (ZIMMERMAN, 1970). In Cuba, adults and larvae were collected in water bodies with some degree of pollution (MEGNA *et al*., 2011). Also in Belize it is one of the most common species of the genus and was found in puddles recently filled by rain, in recently dug out ditches and in vegetation free ponds with exposed mineral substrate. It was very common in sun-exposed ponds with very high temperature in the savannah (Fig. 6) and was often present in high numbers. This species was not found in springs, streams, rivers or other lotic habitats, nor in heavily shaded lentic habitats.

Laccophilus spangleri Zimmerman, 1970

(Figs 1I, 2H, 3H, 4I)

MATERIAL STUDIED. BELIZE DISTRICT: La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 08.V.2015, Leg. K. Scheers & A. Thomaes (1ex); La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (2ex) TOLEDO: Deep River FR, pond savannah, 16°31'41,5"N, 88°42'30"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (1ex); Deep River FR, pond savannah, 16°31'42,7"N, 88°42'31,6"W, 20.IV.2015, Leg. K. Scheers & A. Thomaes (5ex); Punta Gorda, cattle pond, 16°05'12,8"N, 88°51'1,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ex).

DIAGNOSIS. TL: 4.1–4.8 mm; MW: 2.3–2.7 mm. Head pale testaceous, sometimes with an orange tinge, area behind the eyes clearly darkened. Pronotum pale testaceous with a dark band along the anterior part, matching the darkened area on the head. Elytra pale testaceous with very distinct dark irrorations and with an elaborate pattern of pale markings. The dark color of the irrorations increases and coalesce along the margins of the pale markings (Fig. 1I). The elytra in the females have the epipleura distinctly flanged (Figs 1I, 2H) while they are unmodified in the males. Ventral parts pale testaceous (Fig. 2H). Median lobe as in Fig. 3H.

DISTRIBUTION. Belize (**first records**), Honduras, Mexico (Oaxaca, Veracruz), Nicaragua.

ECOLOGY. According to ZIMMERMAN (1970), *L. spangleri* is a tropical lowland species and seems to prefer temporary pools that are frequently subject to high surface temperatures and that are located on clay soils. In Belize it was encountered only at five sampled sites. In all

occasions it was found in low numbers in warm, sun-exposed ponds with a loamy substrate and very few vegetation in the savannah (Fig. 6).

NOTE. In all material of Belize the elytra of the females have the epipleura distinctly flanged, clearly visible from above, while the males have the epipleura unmodified. According ZIMMERMAN (1970), however, the females of *L. spangleri* have the epipleura not flanged but have the apices of the elytra only slightly truncated. Possibly this character is regionally variable, which is, by example, also the case in the closely related *Laccophilus vacaensis* Young, 1953 (ZIMMERMAN, 1970).

Discussion

Most species of Laccophilinae in Central America have a relatively wide distribution and occur throughout the region, with only a few species endemic to smaller subregions (ZIMMERMAN, 1970). This is also the case with the species present in Belize. None of the species or subspecies are endemic to a small region in Central America or to Belize. Five of the eight species are found throughout Central America and only *Laccomimus pumilio, Laccophilus oscillator laevipennis* and *L. spangleri* have a more limited distribution, known from only three countries outside of Belize.

In Belize, Laccophilinae were found at most of the sampled sites and in nearly all sampled types of habitat. *Laccophilus fasciatus fasciatus, L. oscillator laevipennis* and *L. proximus* are the three most common species respectively, of which *L. oscillator laevipennis* is typical for heavily shaded habitats in the Belizean forests, both lentic and lotic, while *L. fasciatus fasciatus* and *L. proximus* are typical inhabitants of sun-exposed lentic habitats. The other species were less common and more restricted to well vegetated permanent ponds (*Laccomimus pumilio, Laccophilus gentilis suavis* and *L. ovatus zapotecus*), warm sun-exposed savannah ponds (*Laccophilus spangleri*) or small streams (*Laccophilus duplex*).

There are still several other species of *Laccophilus* that occur in Southern Mexico, Guatemala and Mesoamerica as a whole, which could be expected to occur in Belize. During the field survey in 2015 only the southern and central part of Belize was sampled and future samplings in the north of the country could result in additional species and a more complete view on their distribution and ecology.

Acknowledgements

The authors wish to acknowledge the Ya'axché Conservation Trust, the Cockscomb Basin Wildlife Sanctuary and the Belize Forest Department for the permission to conduct the study in the Deep River Forest Reserve, the Bladen Nature Reserve, the Cockscomb Basin Wildlife Sanctuary (permit number: CD/60/3/15(27)). The Belize Forest Department is also acknowledged for the permits for the export of the specimens (permit number: CD/60/3/15(28)). Belize Agricultural Health Authority (BAHA) is acknowledged for providing the Phytosanitary certificate. Thanks are also due to Florence Trus (RBINS) who made the habitus photos and Wouter Dekoninck (RBINS) and Pol Limbourg (RBINS) for their assistance with the collections of the Royal Belgian Institute of Natural Sciences. Furthermore we would like to thank Maarten Hoffmann for his assistance, hospitality and company during our research in Belize. We also would like to thank two anonymous reviewers for their valuable comments.

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