

## The genus *Thermonectus* Dejean, 1833 in Belize (Coleoptera: Dytiscidae)

Kevin SCHEERS<sup>1,2\*</sup> & Arno THOMAES<sup>1</sup>

<sup>1</sup> Research Institute for Nature and Forest (INBO), Havenlaan 88 bus 73, B-1000 Brussels, Belgium.

<sup>2</sup> Biodiversity Inventory for Conservation NPO (BINCO), Walmersumstraat 44, B-3380 Glabbeek, Belgium.

\* Corresponding author: aquatic.adephaga@gmail.com.

### Abstract

This paper deals with the taxonomic composition, distribution and ecology of the genus *Thermonectus* Dejean, 1833 in Belize. During a field survey in 2015 three species were found: *Thermonectus basillaris* (Harris, 1829), *T. circumscriptus* (Latreille, 1809) and *T. margineguttatus* (Aubé, 1838). These are the first records of this genus in Belize.

**Keywords:** water beetles, Hydradeptera, British Honduras, Central America, Neotropical region

### Samenvatting

In dit artikel wordt de taxonomische compositie, verspreiding en ecologie van het Genus *Thermonectus* Dejean, 1833 in Belize besproken. Tijdens een veldcampagne in 2015 werden drie soorten aangetroffen: *Thermonectus basillaris* (Harris, 1829), *T. circumscriptus* (Latreille, 1809) en *T. margineguttatus* (Aubé, 1838). Dit zijn de eerste records van dit genus in Belize.

### Résumé

Cet article traite de la composition taxonomique, de la distribution et de l'écologie du genre *Thermonectus* Dejean, 1833 au Belize. Lors d'un inventaire en 2015, trois espèces ont été trouvées: *Thermonectus basillaris* (Harris, 1829), *T. circumscriptus* (Latreille, 1809) et *T. margineguttatus* (Aubé, 1838). Ce sont les premières données pour le genre du Belize.

### Introduction

The taxonomic composition and distribution of the Hydradeptera of Belize is only poorly known and only few species are known from the country (CARRIE, 2015). In 2015 an expedition was done by the authors with the objective of improving the knowledge of the water beetles of Belize. Parts of the results of this survey have already been published (SCHEERS & THOMAES, 2017; 2018; SCHEERS, 2018) and this fourth publication deals with the genus *Thermonectus* Dejean, 1833.

The genus *Thermonectus* is the only genus of the subtribe Aciliini in the Neotropical Region and the counterpart of the Oriental genus *Sandracottus* Sharp, 1882. It is distributed from Southern Canada to Argentina and comprises 20 species (NILSSON & HAJEK, 2019). *Thermonectus* are medium sized beetles, and some species have a striking color pattern. Males have pro- and mesotarsal segments 1-3 widened and bearing sucker like setae and smooth elytra, females have pro- and mesotarsal segments unmodified and in most cases with distinct elongated striae on the lateral parts of the pronotum and the basal half of the elytra. Most

species occur in various types of lentic habitats such as ponds, lakes and marshes in the lowlands and a few species also occur in pools of intermittent streams and backwaters.

### Material and methods

During a field survey in 2015 carried out from April 13 to May 9, 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. Additionally, standard baited bottle traps were used at several sites in Bladen Nature Reserve and the Deep River Forest Reserve and in one pond near Punta Gorda. All beetles were conserved in the field in 90% alcohol. All material was dry mounted and deposited in the private collection of the first author. The nomenclature follows NILSSON & HAJEK, 2019. Habitus photographs (Fig. 1A-C) 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. Distribution maps (Fig. 2A-C) were made with ArcGIS 10.4.1 and are based on the specimens collected during the field survey in 2015.

### Results

A total 74 specimens were collected belonging to three species. The species are arranged alphabetically and the nomenclature follows NILSSON & HAJEK, 2019.

#### *Thermonectus basillaris* (Harris, 1829)

(Figs 1A, 2A)

MATERIAL EXAMINED: CAYO DISTRICT: Nochuch, small pool on parking lot, 17°12'28,2"N, 88°39'1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (1ind.); TOLEDO DISTRICT: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 13.IV.2015, Leg. K. Scheers & A. Thomaes (12ind.); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (15ind.); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (2ind.); Punta Gorda, puddle in temporary marsh, 16°05'19,3"N, 88°52'3,7"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 04.V.2015, Leg. K. Scheers & A. Thomaes (2ind.); Punta Gorda, shallow pool, 16°05'19,7"N, 88°48'53,4"W, 05.V.2015, Leg. K. Scheers & A. Thomaes (2ind.).

DIAGNOSIS. Length 8,0–11,5 mm. Head testaceous with black markings on the vertex, pronotum testaceous with a black band at the anterior and posterior margins, elytra testaceous with extended black irrorations and a subbasal testaceous fascia, irrorations denser and confluent towards the suture as to leave the center and a basal fascia completely black. The density of the irrorations are variable and for some specimens nearly entirely black with the irrorations only visible at the lateral and apical part of the elytra (Fig. 1A). The ventral parts entirely rufous.

DISTRIBUTION. Very widely distributed from southern Ontario through the United States, the Antilles and Central America. In Central America this species is recorded from Belize (**first records**), Costa Rica, Guatemala and Mexico (TRÉMOUILLES, 1989; ALERIE *et al.*, 2009).

HABITAT. *T. basillaris* is found in different types of lentic habitats. In both Cuba and Guadeloupe this species was also found in brackish water near the coast (ALERIE *et al.*, 2009; SCHEERS, unpublished data).

***Thermonectus circumscriptus* (Latreille, 1809)**

(Figs 1B, 2B)

MATERIAL EXAMINED: BELIZE DISTRICT: La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (1ind.); La Democracia, Belize ZOO, concrete pond in enclosure, 17°21'6,3"N, 88°33'12,6"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (1ind.); La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 10.V.2015, Leg. K. Scheers & A. Thomaes (1ind.); CAYO DISTRICT: Nochuch, small pool on parking lot, 17°12'28,2"N, 88°39'1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (2ind.); TOLEDO DISTRICT: Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 13.IV.2015, Leg. K. Scheers & A. Thomaes (3ind.); BFree, Agami lagoon, 16°33'27,7"N, 88°42'14,8"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Bladen NR, Tyre track pools, 16°33'4,82"N, 88°42'58,08"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (5ind.); Punta Gorda, puddle in temporary marsh, 16°05'19,3"N, 88°52'3,7"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Punta Gorda, small stream, 16°05'17,8"N, 88°52'4"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Punta Gorda, tyre track puddle, 16°05'24"N, 88°51'6,5"W, 25.IV.2015, Leg. K. Scheers & A. Thomaes (3ind.); Punta Gorda, lights basketball field, 16°06'15,1"N, 88°48'14"W, 03.V.2015, Leg. K. Scheers & A. Thomaes (4ind.).

DIAGNOSIS. Length 10,5–13,5 mm. Head testaceous with black markings on the vertex, pronotum testaceous with a black band at the anterior and posterior margins, elytra testaceous, completely covered with black irrorations, with exception of some parts along the lateral margin, and with a transverse dark fascia of denser irrorations on the posterior part (Fig. 1B). The ventral parts entirely rufous.

DISTRIBUTION. Distributed from Mexico and the West Indies to Argentina. In Central America this species is recorded from Belize (first records), Costa Rica, Guatemala, Mexico and Nicaragua (TRÉMOUILLES, 1989; ALERIE *et al.*, 2009).

HABITAT. This species is found in all types of lentic water, both permanent and temporary. Several specimens were attracted by light.



Fig. 1. Dorsal view of *Thermonectus* species in Belize: A, *T. basillaris* (Harris, 1829); B, *T. circumscriptus* (Latreille, 1809); C, *T. margineguttatus* (Aubé, 1838). Scale bar: 1 mm, Pictures Florence Trus. © Kevin Scheers.

NOTE. Although this was the most commonly encountered species of the genus in Belize, it was however never abundant.

***Thermonectus margineguttatus* (Aubé, 1838)**

(Figs 1C, 2C)

MATERIAL EXAMINED: BELIZE DISTRICT: La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 09.V.2015, Leg. K. Scheers & A. Thomaes (3ind.); La Democracia, ditch next to road, 17°21'38,7"N, 88°32'42,1"W, 10.V.2015, Leg. K. Scheers & A. Thomaes (3ind.); 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 (2ind.); TOLEDO DISTRICT: Bladen NR, Tyre track pools, 16°33'4,82"N, 88°42'58,08"W, 17.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Deep River FR, pond savannah, 16°31'11,7"N, 88°42'3,8"W, 19.IV.2015, Leg. K. Scheers & A. Thomaes (2ind.); BFree, Agami lagoon, 16°33'27,7"N, 88°42'14,8"W, 21.IV.2015, Leg. K. Scheers & A. Thomaes (1ind.); Punta Gorda, fishpond, 16°06'24,6"N, 88°48'25,5"W, 23.IV.2015, Leg. K. Scheers & A. Thomaes (2ind.); Punta Gorda, lights basketball field, 16°06'15,1"N, 88°48'14"W, 03.V.2015, Leg. K. Scheers & A. Thomaes (1ind.).

DIAGNOSIS. Length 8,5–10,0 mm. Head testaceous with black markings on the vertex, pronotum testaceous with a broad black band at the anterior and posterior margins, elytra black, each with a subapical, a central and a humeral testaceous marking along the lateral margin and a subbasal transverse fascia connected with the humeral marking (Fig. 1C). The coloration of *T. margineguttatus* is variable and the subbasal fascia on the elytra is often reduced or even completely lacking in some specimens and the black bands on the pronotum can be confluent. The ventral parts entirely rufous.

DISTRIBUTION. Distributed from Mexico and the West Indies to Argentina. In Central America it is recorded from Belize (first records), Costa Rica, Guatemala, Mexico and Panama (TRÉMOUILLES, 1989; ALERIE *et al.*, 2009).

HABITAT. We found this species in various types of lentic habitat, from tyre ruts in jungle dirt roads to exposed ponds in the savannah. Additionally, we also found two specimens in a stream in the Cockscomb Basin Wildlife Sanctuary and one specimen at light.

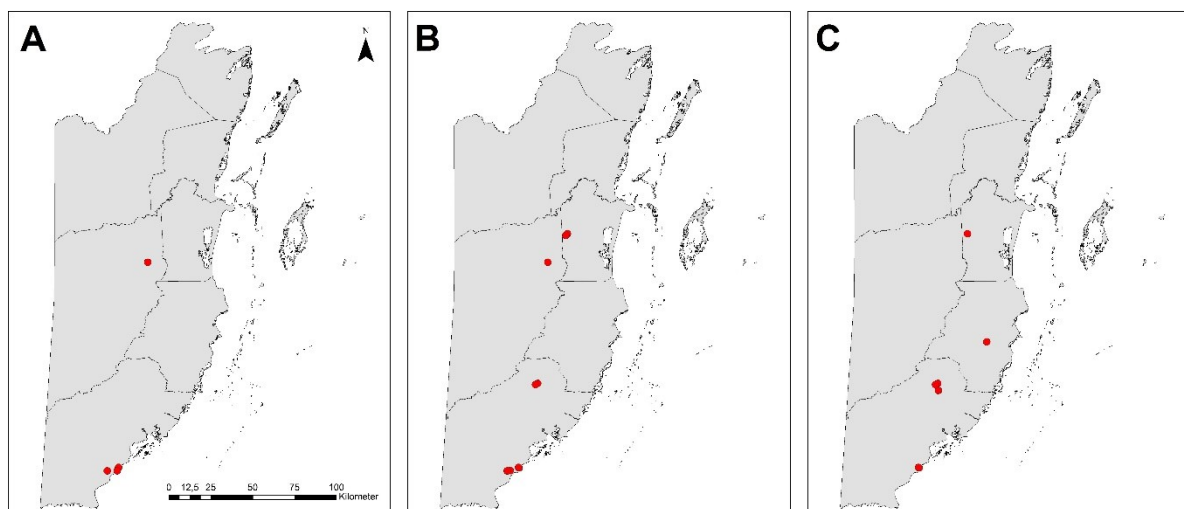


Fig. 2. Distribution of *Thermonectus* in Belize: A, *T. basillaris* (Harris, 1829); B, *T. circumscriptus* (Latreille, 1809); C, *T. margineguttatus* (Aubé, 1838).



### Key to the species

Two species that could also occur in Belize, *T. marmoratus* (Gray, 1831) and *T. succinctus* (Aubé, 1838), are included in the identification key and are indicated by an asterisk\*.

- 1a Elytra black without irrorations and with contrasting, well-defined testaceous markings ..... 2
- 1b Elytra testaceous with black irrorations, at least visible in the lateral portions, with or without well-defined testaceous markings ..... 3
- 2a Each elytra with 1 prominent, more or less circular testaceous central spot and 6 to 9 additional spots ..... *T. marmoratus* (Gray, 1831)\*
- 2b Each elytra with a subapical, a central and a humeral testaceous marking along the lateral margin and a subbasal transverse fascia which is often reduced or even completely lacking ..... *T. margineguttatus* (Aubé, 1838)
- 3a The basal black band on the pronotum consists of two lens-shaped markings resembling spectacles and the anterior black band is separated from the anterior margin by a testaceous space ..... *T. succinctus* (Aubé, 1838)\*
- 3b Pronotum with the anterior black band directly connected to the anterior margin and the basal band simply sinuate i.e. not consisting of two lens-shaped markings ..... 4
- 4a Elytra with a subbasal transverse testaceous fascia ..... *T. basillaris basillaris* (Harris, 1829)
- 4b Elytra without a subbasal testaceous fascia ..... *T. circumscriptus* (Latreille, 1809)

### Discussion

A total of three species of *Thermonectus* was found during this study. These three species are the most common species of the genus in Central America with a wide distribution from the United States to South-America. Two more species could possibly occur in Belize: *Thermonectus marmoratus* known from the neighboring countries Mexico and Guatemala and with an unconfirmed record from Honduras (BLACKWELDER, 1944) and *T. succinctus* which has a distribution ranging from southern United States to Brazil. *T. marmoratus* is known in southwestern United States as a species that typically lives in pools in intermittent streams in the desert and savannah (VELASCO & MILLAN, 1998). *T. succinctus* is found in semi-permanent ponds with very little vegetation and clear water (GOODHUE-MCWILLIAMS, 1968) and in Cuba, although found in a wider scala of habitats, it was found typically in semi-permanent habitats with a muddy bottom (ALERIE *et al.*, 2009). The habitat of both these species is most common in the northern parts of Belize, a region not included in the present survey.

### 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 Foundation for Research and Environmental Education (BFREE) is acknowledged for permitting sampling at their field station. 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. We are grateful to Florence Trus (RBINS) who made the habitus photos and Wouter Dekoninck (RBINS) for his 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.

## References

- ALERIE Y., MEGNA Y.S., DELER-HERNANDEZ A., 2009. – First West Indies records of *Thermonectus succinctus* (Aubé, 1838) with notes on other Cuban species (Coleoptera: Dytiscidae). *Koleopterologische Rundschau*, 79: 5–16.
- BLACKWELDER R.E., 1944. – *Checklist of the coleopterous insects of Mexico, Central America, the West Indies, and South America. Parts 1 and 2*. Smithsonian Institution 341 pp.
- BRECKO J., MATHYS A., DEKONINCK W., LEPONCE M., VANDEN SPIEGEL D. & SEMAL P., 2014. – Focus stacking: Comparing commercial top-end set-ups with a semi-automatic low budget approach. A possible solution for mass digitization of type specimens. *ZooKeys*, 464: 1–23.
- CARRIE R., 2015. – *A Checklist of the Freshwater Macroinvertebrates of Belize*. [https://www.researchgate.net/publication/283351464\\_A\\_checklist\\_of\\_the\\_freshwater\\_macroinvertebrates\\_of\\_Belize](https://www.researchgate.net/publication/283351464_A_checklist_of_the_freshwater_macroinvertebrates_of_Belize) (accessed 20 May 2019).
- GOODHUE-MCWILLIAMS, K.L. 1968 – *A taxonomic revision of the North American species of the genus Thermonectus Dejean (Coleoptera: Dytiscidae)*. Indiana University. Unpublished thesis.
- NILSSON A.N. & HAJEK J., 2019. – *A world catalogue of the family Dytiscidae, or the diving beetles (Coleoptera, Adephaga)*. Version 2019. [http://www.waterbeetles.eu/documents/W\\_CAT\\_Dytiscidae\\_2017.pdf](http://www.waterbeetles.eu/documents/W_CAT_Dytiscidae_2017.pdf) [accessed 20 May 2019].
- PECK, S. B. 2005. – A checklist of the beetles of Cuba with data on distribution and bionomics (Insecta: Coleoptera). *Arthropods of Florida and Neighboring Land Areas*, 18: 1–241.
- SCHEERS K., 2018. - *Copelatus yaguarete* sp. nov. a new species of the *Copelatus erichsoni* group from Central America (Coleoptera: Dytiscidae). *Belgian Journal of Entomology*, 66: 1–11.
- SCHEERS K. & THOMAES A., 2017. – A review of the Burrowing Water Beetles of Belize with a key to the species (Coleoptera: Noteridae). *Belgian Journal of Entomology*, 51: 1–17.
- SCHEERS K. & THOMAES A., 2018. – The Laccophilinae Gistel, 1848 of Belize (Coleoptera: Dytiscidae). *Belgian Journal of Entomology*, 65: 1–18.
- TRÉMOUILLES E.R. 1989. – Contribución para el conocimiento del género *Thermonectus* Dejean en la Argentina y áreas limítrofes (Coleoptera, Dytiscidae). *Revista de la Sociedad Entomológica Argentina*, 46: 95–115.
- VELASCO, J. & MILLAN A., 1998. – Feedings habits of two large insects from a desert stream: *Abedus herberti* (Hemiptera: Belostomatidae) and *Thermonectus marmoratus* (Coleoptera: Dytiscidae). *Aquatic Insects*, 20(2): 85–96.
-