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A new eye-bearing *Macrodasys* (Gastrotricha: Macrodasyida) from Jamaica

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Abstract

A new macrodasyidan gastrotrich is described from fine-medium sand collected at Doctor's cave beach of Montego Bay, Jamaica. *Macrodasys ommatus* n. sp. is the first gastrotrich to be reported from Jamaica and the second described species in the genus to bear eye-spots. The shape of the frontal organ distinguishes the Jamaican species from its sibling *M. nigrocellus:* elongate and undulate without an accessory lateral chamber in the former vs. rather short with an accessory lateral chamber in the latter. The following combination of characters further distinguish the new species from its congeners: up to 7 anterior adhesive tubes per side arranged in a transversal row, three pairs of lateral adhesive tubes equally spaced along the intestinal region, up to 21 ventro-lateral adhesive tubes per side, two of which arise along the posterior region of the pharynx.

Key words: meiofauna, biodiversity, benthos, taxonomy, Caribbean Sea

Introduction

The study is part of a larger research programme aimed at shedding light on the diversity and phylogeny of gastrotrich species of the Tropical North-Western Atlantic (TNWA), with a focus on Small Islands Developing States (SIDS), whose sedimentary habitats are under environmental pressure from rising sea levels/shoreline erosion. Several international groups of researchers, along with students, are surveying gastrotrichs on several islands in the South Floridian, Bahamian, Lesser Antilles & Central Caribbean ecoregions. Preliminary accounts of these and related research can be found in Atherton & Hochberg (2012a,b), Hochberg & Atherton (2010, 2011) and Hummon (2010a). Teams including the first author have so far visited three islands: St. John in the US-Virgin islands, Jamaica, and Curaçao. Part of the information and/or material from the visited islands appear in several works (e.g., Hummon et al. 2010; Kånneby et al. 2012a, 2012b; Todaro et al. 2012). We describe here a new species in the family Macrodasyidae encountered in 2011 during a survey on the northern shore of Jamaica; it is also the first gastrotrich to be reported from Jamaica and the and the eight species of Macrodasys described from the TNWA (cf. Hummon 2010).

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Material and methods

The sampling campaign took place in February 2011 and included 10 locations along the North and West coasts of Jamaica. The species described herein was found in sublittoral samples collected at 1–4 m water depth, at Doctor's cave beach, Montego Bay. About 1 liter of sediment was sampled by skin-diving, collected into 500 ml plastic jars and soon after brought to the field laboratory (Discovery Bay Marine Laboratory). Here, the specimens were extracted daily with the narcotisation-decantation technique using a 7 % magnesium chloride solution within one week from collection; the supernatant was poured into plastic Petri dishes (3 cm diameter) and scanned for gastrotrichs at 50× under a Wild M3 stereomicroscope (Todaro & Hummon, 2008). When located, each individual gastrotrich specimen was mounted on glass slides and observed in vivo with Nomarski differential interference contrast optics using a Zeiss Axio Scope.A1. During observation, the specimens were photographed with a DS-5M Nikon digital camera and measured using the Nikon NIS-F software. Two specimens were fixed in 95 % ethanol and stored for future DNA analysis. The description of the new species follows the standardized scheme by Hummon et al. (1993), whereas the locations of some morphological characteristics along the body are given in percentage units (U) of total body length measured from anterior to posterior. Granulometric analysis of the substrata was carried out according to Todaro et al. (2006). Mean grain size, sorting coefficient, kurtosis, and skewness were calculated by a computerised programme based on the equation of Seward-Thompson & Hails (1973).

Taxonomic accout

Order Macrodasyida Remane, 1925 [Rao & Clausen, 1970]
Family Macrodasyidae Remane, 1926
Genus *Macrodasys* Remane, 1924

Macrodasys ommatus new species
(Figs. 1–3)

Diagnosis. A *Macrodasys* species with a relatively stout body, with trunk longer than the pharyngeal region; head bearing sensory pits; pharyngeo-intestinal junction (PhIJ) at U40; anterior adhesive tubes (TbA), ventral in one row of six to seven tubes on each side of body, near anterior margin of head; lateral adhesive tubes (TbL), three per side along the intestinal region; ventro-lateral adhesive tubes (TbVL), about 20–21 per side, one anterior- and one at the pharyngeal-intestinal junction, the remainder along the intestinal region; posterior adhesive tubes (TbP), 14 per side at the base and along the tail; frontal organ elongate (77 µm long and 9 µm wide), roughly spindle-shaped with an undulating border, lacking a clear differentiation between a spermathecal and a seminal receptacle region; nozzle not clearly cuticularised; caudal organ large, roughly S-shaped with anterior portion of the glandulomuscular organ showing curved, broadly-tipped apex and about the same length of the posterior portion; copulatory tube straight.

Type material. The description of *Macrodasys ommatus* n. sp. is derived from 3 specimens, two adults and a single juvenile, all collected from the same location. The holotype, LT = 513 µm, is the adult shown in Figure 2, (International Code of Zoological Nomenclature, Article 73.1.1), after observation it was fixed in 95 % ethanol and kept in the meiofauna collection of MAT for future DNA analysis. Likewise stored in ethanol is the paratypic juvenile, LT = 253 µm, shown in Figure 3 (ICZN Article 72.4.5); the second observed adult is not longer extant.

Type locality. The sediment samples were collected on 17th February 2011 from Doctor's cave beach, Montego Bay, Jamaica (Lat. 18°29'12" N; Long. 77°55'46" W).

Etymology. The specific name alludes to the presence of eye-spots (Gr. *omma*, eye)

Ecology. Occasional in frequency of occurrence (10–30 % of samples), rare in abundance (fewer than 1 % of a sample); sublittoral at 1–4 m water depth in fine sand (2.271 phi), moderately sorted (0.743 phi); water temperature, 26 °C; salinity, 33 psu.

Description. Adult specimens up to 513 µm total body length; PhIJ at U40; body strap-shaped, widest at the anterior trunk, head bearing piston pits and a pair of brown-to-black eye spots; each pigmented spot is contained in a cup-like, grayish structure; posterior trunk tapering gradually

into a short tail; widths at head, mid-pharynx, trunk and base of tail as follows: 53, 62, 77, 21 µm at U05/U28/U55/U89, respectively; dorsal and lateral surface covered with sensory hairs more densely packed on head; epidermal glands not observed.

Ciliature. The ventral locomotory ciliature is in the form of a continuous field spanning from posterior of the TbA to the caudal tail. Several pairs of sensorial bristles (12–18 µm in length) are visible along the margins and dorsal side of the body; other cilia (8–15 µm in length) with a putative sensorial function emerge from around the head.

Adhesive tubes. TbA (7–10 µm long), in a ventral, single row, forming an arc of 6–7 tubes, on each side of the body, adjacent to the mouth; TbL (18–21 µm long), 3 per side along the intestinal region at U46, U58 and U74 respectively; TbVL (14–16 µm long), 20–21 per side, one anterior- and one at the pharyngeal-intestinal junction (at U28 and U40 respectively), the remaining tubes emerge along the intestinal region more or less regularly spaced the one from the other; TbP (15–10 µm long), 14 per side at the base and along the tail. There is no distinct cut off between TbVL and TbP but a rather continuous switch between the two groups at around U90.

Digestive tract. Mouth terminal (16 µm in diameter), leading to a small buccal cavity (16 µm × 20 µm) which opens into a 180–189 µm long and 32–34 µm wide pharynx; pharyngeal pores at U28; intestine increases in width from the pharyngeal-intestine junction to U57, and gradually narrows up to the posterior body end; anus ventral at U86.

Reproductive tract. Hermaphroditic; elongate testes with the anterior-most portion at U40 and with vasa deferentia opening ventrally, approximately at U67. Frontal organ elongate, roughly spindle shaped, with an undulating appearance, about 77 µm long and 9 µm wide, without a clear differentiation between the posterior spermathecal and the anterior seminal receptacle regions; nozzle not clearly cuticularised. Caudal organ large (about 113 µm in length), roughly S-shaped with anterior region of the glandulomuscular portion showing curved, broadly-tipped apex and about the same length of the posterior portion; copulatory tube straight. Ovary adjacent to spermatheca; eggs maturing and increasing in size anteriorly, the full-grown one (54 µm long × 41 µm wide) centered at U53.

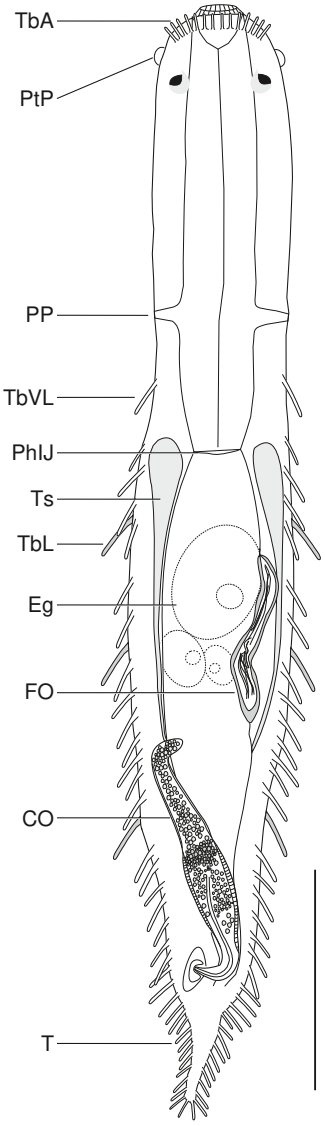

Fig. 1. *Macrodasys ommatus* n. sp., schematic drawing of an adult specimen. Habitus as seen from the ventral side; sensorial- and locomotor ciliature omitted. CO, caudal organ; T, tail; Eg, egg; FO, frontal organ; PhlJ, pharyngeo-intestinal junction; PP, pharyngeal pores; PtP, Piston pit; TbA, anterior adhesive tubes; TbL, lateral adhesive tubes; TbVL, ventro-lateral adhesive tubes; Ts, testis. Scale bar = 100 µm

Remarks. The juvenile specimen reached 258.6 µm in total length with PhlJ at U41. It had piston pits and brown eye-spots along with 3 TbA and 6 TbVL per side; the tail was well developed and furnished with eight adhesive tubes along its

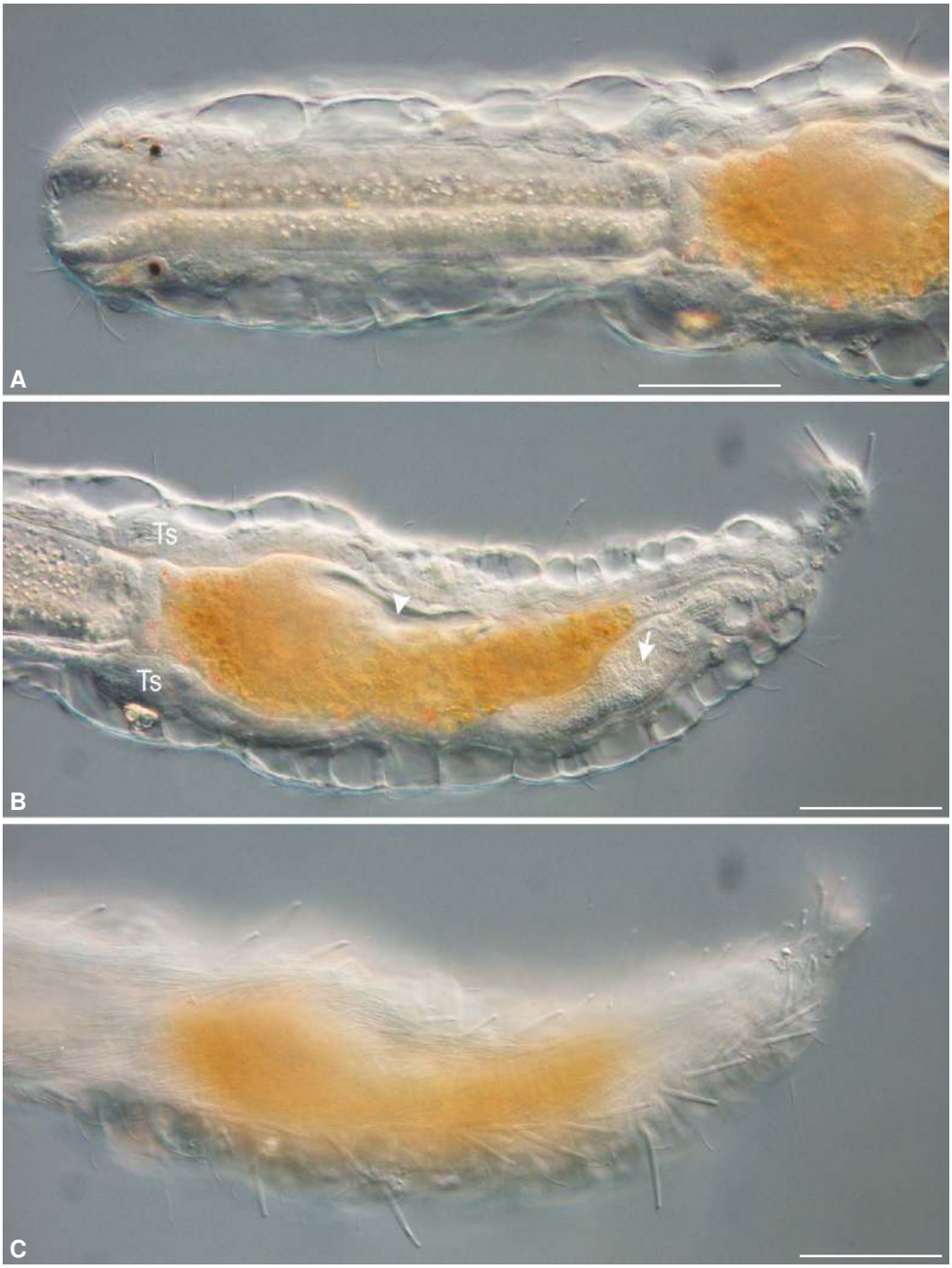

Fig. 2. *Macrodasys ommatus* n. sp., adult specimen, DIC photomicrographs. **A.** anterior region showing the eye-spots, buccal cavity and the pharynx. **B.** mid-and posterior trunk region, showing the testes (Ts), frontal organ (arrowhead) and caudal organ (arrow). **C.** mid- and posterior trunk region at different focal plane showing the adhesive tubes of the lateral and ventrolateral series. Scale bars = 50 µm.

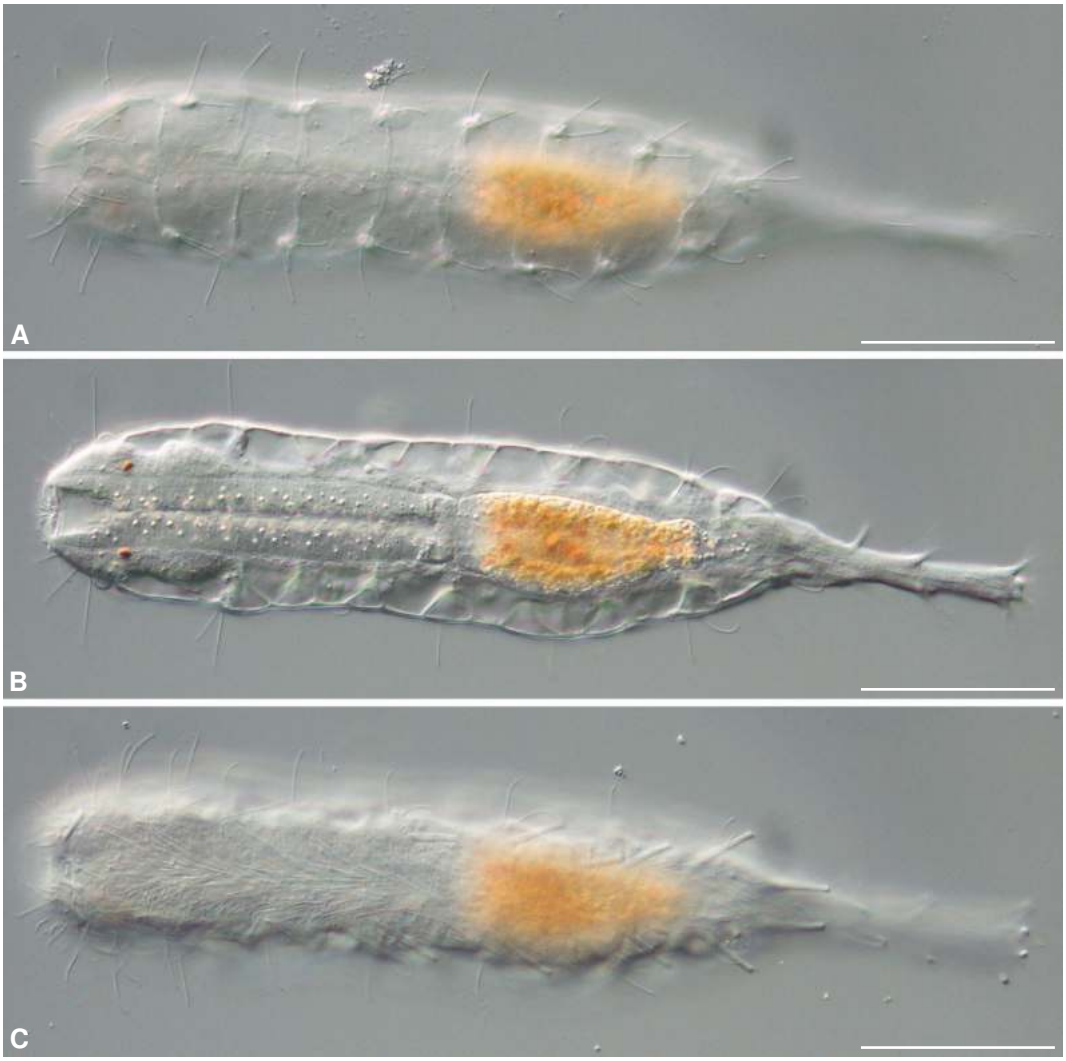

Fig. 3. *Macrodasys ommatus* n. sp., juvenile specimen, DIC photomicrographs. **A.** habitus, dorsal side, showing the insertion of the sensorial bristles. **B.** habitus, showing the internal structures. **C.** habitus, ventral side, showing the adhesive tubes. Scale bars = 50 µm.

margins. Seven pairs of sensorial bristles were visible on the dorsal side.

Taxonomic affinities. *Macrodasys* is one of the most speciose genera within the order Macrodasyida; currently, it includes 36 species (Hummon 2010a,b, 2011; Hummon & Todaro 2010); among these, only *Macrodasys nigrocellus* Hummon, 2011 bears eye spots like *M. ommatus* n. sp. The new species from Jamaica shares with *M. nigrocellus* from the Red Sea additional characteristics such as the number and arrangement of the TbA, the presence of 2 pairs of TbVL along the posterior region of the pharyngeal region and 3 pairs of TbL along the intestinal region. The general appearance and especially the shape of the tail contribute further to make the two species appear similar. However, the shape of the frontal organ, elongate and with an undulate edge without an accessory lateral chamber in *M. ommatus* n. sp. vs. rather short with an accessory lateral chamber in *M. nigrocellus* n. sp. clearly differentiate the two taxa.

To our knowledge, beside *M. nigrocelllus* and *M. ommatus* n. sp. at least three additional populations of *Macrodasys* specimens with eyes have been recorded. One from the Maldives, *Macrodasys* sp. (see Gerlach 1961), one from Belize (R. Hochberg, personal communication) and one (or two?) from Bahamas (A. Kieneke, personal communication). Based on the available information, none of these animals can be identified as *M. nigrocellus* or to *M. ommatus* n. sp. In fact, the scanty description of the Maldivian specimens is insufficient to make possible comparison with any other eye-bearing *Macrodasys* while additional information on the specimens from Belize and the Bahamas are needed to definitely clarify their taxonomic status.

Acknowledgements

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