

Two new tiger beetle species of the *Therates fasciatus* group (Coleoptera: Carabidae: Cicindelinae)

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Abstract

Two species of tiger beetles, *Therates negrosicola* sp.n. and *Therates monticola* sp.n. are described. They are endemic to the Philippine islands of Negros and Luzon, respectively. The new species belong to the *Therates fasciatus* group and are closely related to *T. semperi* SCHAUM, 1860, an endemic species of Luzon, and *T. pseudosemperi* HORN, 1928, endemic to Mindoro.

Key words: Carabidae, Cicindelinae, tiger beetle, endemism, new species, Philippines.

Zusammenfassung

Zwei Sandlaufkäferarten, *Therates negrosicola* sp.n. und *Therates monticola* sp.n., werden beschrieben. Es handelt sich um Endemiten der philippinischen Inseln Negros beziehungsweise Luzon. Die neuen Arten gehören in die *Therates fasciatus*-Gruppe und sind nächstverwandt mit *T. semperi* SCHAUM, 1860 von der Insel Luzon und *T. pseudosemperi* HORN, 1928, einem Endemiten von Mindoro.

Introduction

Tiger beetles (Cicindelinae) have been identified as an important indicator group for biodiversity assessment and conservation aspects (CASSOLA & PEARSON 2000). This is especially true for the Philippines, which are inhabited by an extremely rich tiger beetle fauna with more than 130 described species, about 95 % of them endemic.

This study describes two new species of the charismatic genus *Therates* LATREILLE, 1816. This genus is chiefly distributed in the Oriental Region, from India to southern Japan and the Solomon Islands. It was revised by WIESNER (1988) and only a few taxa were added later. According to WIESNER (1988) and BOGENBERGER (1988) the Philippines are inhabited by six species of *Therates* plus about seven badly limited “subspecies”. However, recent collections by the authors and other researchers have shown that the taxonomy is very complicated, with several large Philippine islands having their own endemic “forms”. The major obstacle to modern revisions of *Therates* and other tiger beetles of the Philippines is that a high number of taxa was described insufficiently (e.g., for *Therates*, FABRICIUS 1801, SCHAUM 1860, 1862, BATES 1872, HORN 1895, 1905, 1928) and often based on specimens of obscure or inaccurate geographical origin. However, well documented material collected in the last decades reflects distribution patterns of species and allopatric subspecies that are in accordance with the distribution of many other terrestrial organisms (compare, e.g., ONG & al. 2002, CATIBOG-SINHA & HEANEY 2006).

The six hitherto recognized Philippine species of *Therates* belong to three species groups (sensu WIESNER 1988). Among them are three species of the *T. fasciatus* group, a clade also distributed on Sulawesi, the Moluccas, and New Guinea. In the Philippines species of the *T. fasciatus* group can be identified by the combination of two characters (see also the key below): (I) clypeus without setae; (II) elytron without tumescence at mid-length and with weak anteapical tumescence. The group shows a distinct sexual dimorphism of the head structure: In males, the frons is more elevated and anteriorly steeply declivitous to the clypeus, whereas in females the frons is gently rounded. The Philippine species of the *T. fasciatus* group are relatively small and coloured orange and black (non-metallic). They live predominantly terricolous or on low vegetation, whereas the large species of the *Therates labiatus* group are often found in the same habitats, but usually hunt on the leaves of bushes and trees (authors' personal observations).

The Philippine species of the *T. fasciatus* group can be divided into two subunits: *Therates fasciatus* (FABRICIUS, 1801) and its subspecies (some may deserve species status) have a black pronotum, an entirely orange coloured base of elytra (except ssp. *flavohumeralis* MANDL, 1964), and the aedeagus has a weak, but characteristic dorsal emargination (Fig. 15); its various forms are distributed in the southern parts of the Philippines – specifically on the island group of “Greater Mindanao” (for terminology see, e.g., ONG & al. 2002, CATIBOG-SINHA & HEANEY 2006) – and also on Sulawesi and Halmahera in Indonesia. The second array of species has an entirely or partially orange pronotum (with some individual exceptions), the base of the elytra often with a black circumscutellary mark, and an aedeagus without dorsal emargination (see Figs. 5, 10). This set of allopatric species is known from the islands of Luzon (*Therates semperi* SCHAUM, 1860) and Mindoro (*Therates pseudosemperi* HORN, 1928), and also contains the two new species from Negros and northern Luzon; all are distributed in the country's north and west.

Material and methods

Material of *T. negrosicola* sp.n. was chiefly collected by the authors, but four specimens were loaned from Jürgen Wiesner, Wolfsburg, Germany, and Miroslav Kliča, Karlovy Vary, Czech Republic. The type series of *T. monticola* sp.n. was chiefly provided by the same two researchers, but three female paratypes, previously identified as *T. semperi*, were loaned from Senckenberg Deutsches Entomologisches Institut, Müncheberg. In addition we borrowed material of *Therates semperi* and *Therates pseudosemperi* (including paratypes) from Senckenberg Deutsches Entomologisches Institut, Müncheberg, and Senckenberg Naturhistorische Sammlungen Dresden for comparison. We have examined pictures of the type of *T. manillicus* THOMSON, 1860 deposited at the Natural History Museum, London, to confirm synonymy with *T. semperi*.

Measurements (all in millimetres):

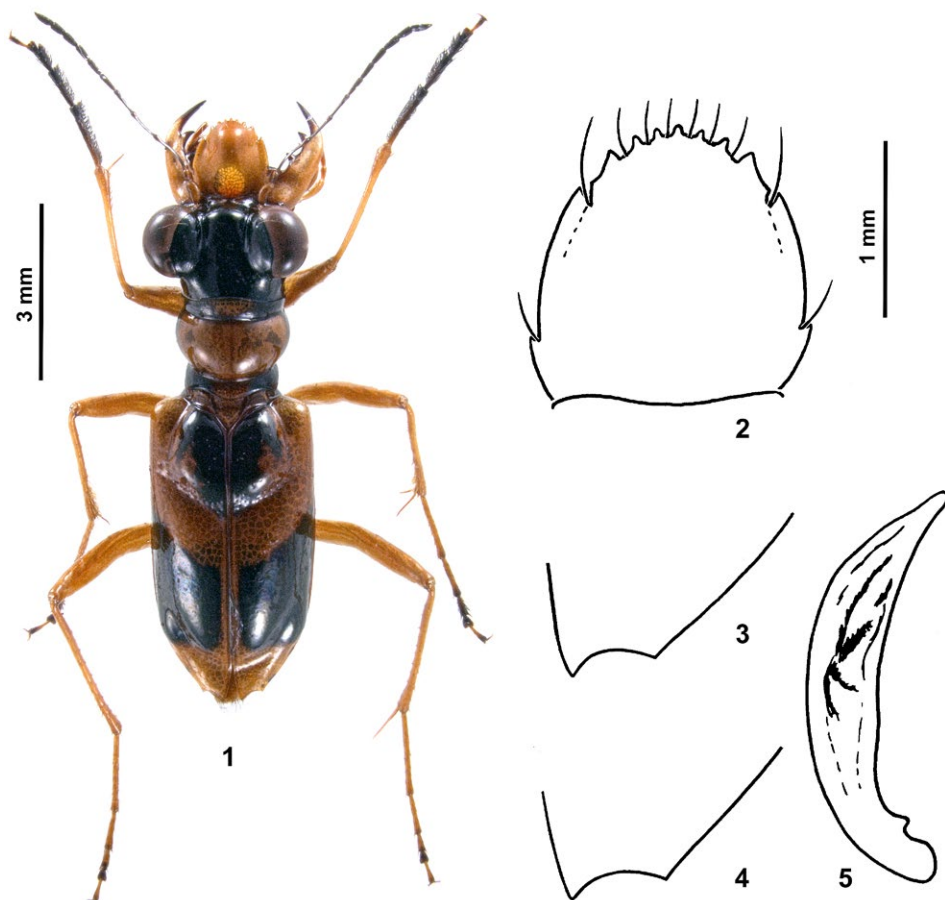
BL Body length. Maximum length along body axis from apex of labrum to apex of elytra.

HW Head width. Maximum width of head, including eyes, in dorsal aspect.

PW Pronotum width. Maximum width of pronotum, in dorsal aspect.

PL Pronotum length. Length of pronotum along midline, in dorsal aspect.

EL Elytron length. Length of elytron along suture.



Figs. 1–5: *Therates negrosicola* sp.n.; (1) habitus of holotype (male); (2) labrum of holotype; (3) apex of elytra of holotype; (4) apex of elytra of female paratype; (5) aedeagus of paratype.

Stacked digital photos were taken with a Leica DFC camera attached to a Leica MZ16 binocular microscope with the help of Leica Application Suite V3, stacked with Zerene-Stacker 64-bit, and processed with Adobe Photoshop 7.0. Line drawings were made with the help of a Wild M10 binocular microscope with a camera lucida.

Taxonomy

Therates negrosicola sp.n. (Figs. 1–5)

E t y m o l o g y : The Latinized noun *negrosicola* (masculine) means “inhabitant of Negros” and refers to the distribution on Negros Island.

T y p e l o c a l i t y : Philippines, Negros Oriental Province, Valencia, Apolong, Casaroro Falls, N9°16'50", E 123°12'35", 535 m a.s.l.

Type material: Holotype (male, National Museum of the Philippines, Manila) from Philippines, Negros Oriental Province, Cuernos de Negros, Valencia, Apolong, Casaroro Falls, leg. H. Zettel. Paratypes (National Museum of the Philippines, Manila; Natural History Museum Vienna, Austria; Coll. Herbert Zettel, Vienna, Austria; Coll. Jürgen Wiesner, Wolfsburg, Germany; Coll. Miroslav Kliča, Karlovy Vary, Czech Republic): 5 males, 5 females from the same locality, leg. H. Zettel & C. V. Pangantihon; 1 male, 1 female, Negros Oriental Province, Sibulan, Twin Lakes, leg. C. V. Pangantihon; 1 male, Negros, Mt. Canla-On (Kanlaon), 400–900 m a.s.l., local collector; 2 females, Negros Oriental, without details on locality, leg. Romeo Lumawig.

Additional material examined: 1 female (Coll. Jürgen Wiesner, Wolfsburg, Germany), obviously mislabelled “Philippines, N.Luzon, Mt. Province 27.V.1986, leg. R.M. Lumawig”.

Diagnosis: Head black. Pronotum orange coloured, its sides infuscated, at least on collar. Elytra with medium-sized to large black basomedial mark and large paired black marks at midlength distinctly separated at suture. Metapleura not infuscated. Basal tumescence of elytra high, ovate, posteriorly sharply limited by a transverse, deeply puncturated impression. Sutural tooth and subapical tooth both well developed. Aedeagus dorsally not emarginated, distally slender, especially the extreme apex.

Description: Measurements (in millimetres): Holotype: BL = 11.4, HW = 3.13, PW = 2.15, PL = 2.00, EL = 5.69. Paratypes, males (n = 7): BL = 10.4–11.5, HW = 2.87–3.13, PW = 1.95–2.10, PL = 1.85–1.95, EL = 5.28–5.69. Paratypes, females (n = 8): BL = 11.0–11.8, HW = 3.03–3.28, PW = 1.95–2.20, PL = 1.90–2.05, EL = 5.79–6.05.

Colour (Fig. 1): Head capsule black except gula orange-coloured. Labrum entirely orange. Mouthparts orange, except teeth of mandibles black. Antenna dark brown to black, antennomeres 1 and 2 yellowish. Prothorax orange; sides at least slightly infuscated; in the more common dark specimens most of propleuron black and sides of pronotum dark brown over entire length; in palest specimens pronotum only at corners infuscated at least dorsally, and a narrow line along lateral sutures of disc brown. Mesoepisternum more or less infuscated. Other parts of thorax and abdominal sterna orange. Elytra with characteristic, but variable pattern: an anteromedial black mark often covering the entire anterior tumescence or, rarely, only its medial half; a very broad transverse stripe slightly interrupted at suture and laterally not extended to epipleura; its hind margin almost straight, its anterior margin slightly oblique, more or less parallel with hind margin of anterior tumescence. Legs orange, with distal tarsomeres (3–5, or only 4) more or less infuscated; in males, protarsi entirely black.

Structures: Body, except puncturated elytra, entirely smooth. Frons anteriorly evenly convex in dorsal view; in lateral view outline evenly convex in female, but subangular in male. Clypeus medially with wide, shallow impression. Labrum (Fig. 2) with one pair of short basal teeth, one pair of distinct distolateral teeth, and middle lobe bearing one pair of blunt teeth laterally and 5–7 sharp teeth medially.

Pronotum hardly wider than long, with the two transverse impressions deep and almost straight; anterior and posterior sections relatively long, medial section occupying only ca. 60% of median length.

Elytra (Fig. 1) with distinct mediobasal tumescence and low posterolateral tumescences, as typical for the group. Mediobasal tumescence posteriorly well delimited by convex impression, also at suture; with few scattered setiferous punctures (setae mostly broken), but without additional punctures posteriorly. Few coarse punctures on anterior depression, arranged in a narrow band, soon becoming gradually finer posteriorly. Fine punctures usually only distinct on anterior depression, in some individuals few indistinct punctures

may be present on black transverse stripe, never further behind. Apical tooth sharp; subapical tooth distinct, although less developed than apical tooth (Figs. 3, 4). Aedeagus (Fig. 5) dorsally not emarginated, distally slender, especially the extreme apex.

Distribution: Negros Island: Negros Oriental Province, municipalities of Valencia and Sibulan; Mt. Canla-On at the border between Negros Oriental Province and Negros Occidental Province.

Comparative notes: *Therates negrosicola* sp.n. has a characteristic colour pattern with an orange coloured, laterally infuscated pronotum, a large black basal mark and moderately large black central marks on the elytra. *Therates semperi* from Luzon differs by the entirely orange-coloured pronotum, and *T. monticola* sp.n. by smaller size, short black medial marks of the elytra and more extended deep puncturation behind the basal tumescence. Based on colour pattern, puncturation and aedeagus shape *T. negrosicola* sp.n. is most similar to *T. pseudosemperi* from Mindoro. In *T. pseudosemperi* the basal tumescence is distinctly punctured on its posterior part and posteromedially less sharply delimited so that it appears heart-shaped, and the subapical teeth are obtuse (Figs. 13, 14), whereas in *T. negrosicola* sp.n. the basal tumescence is ovate and bears only the normal setiferous punctures, and the subapical teeth are sharp (Figs. 3, 4). The apex of the aedeagus appears slightly more acuminate in *T. negrosicola* sp.n. than in *T. pseudosemperi*.

***Therates monticola* sp.n. (Figs. 6–10)**

Etymology: The Latin noun *monticola* (masculine) means “inhabitant of the mountains” and refers to the distribution of this species in the Cordillera Central of northern Luzon.

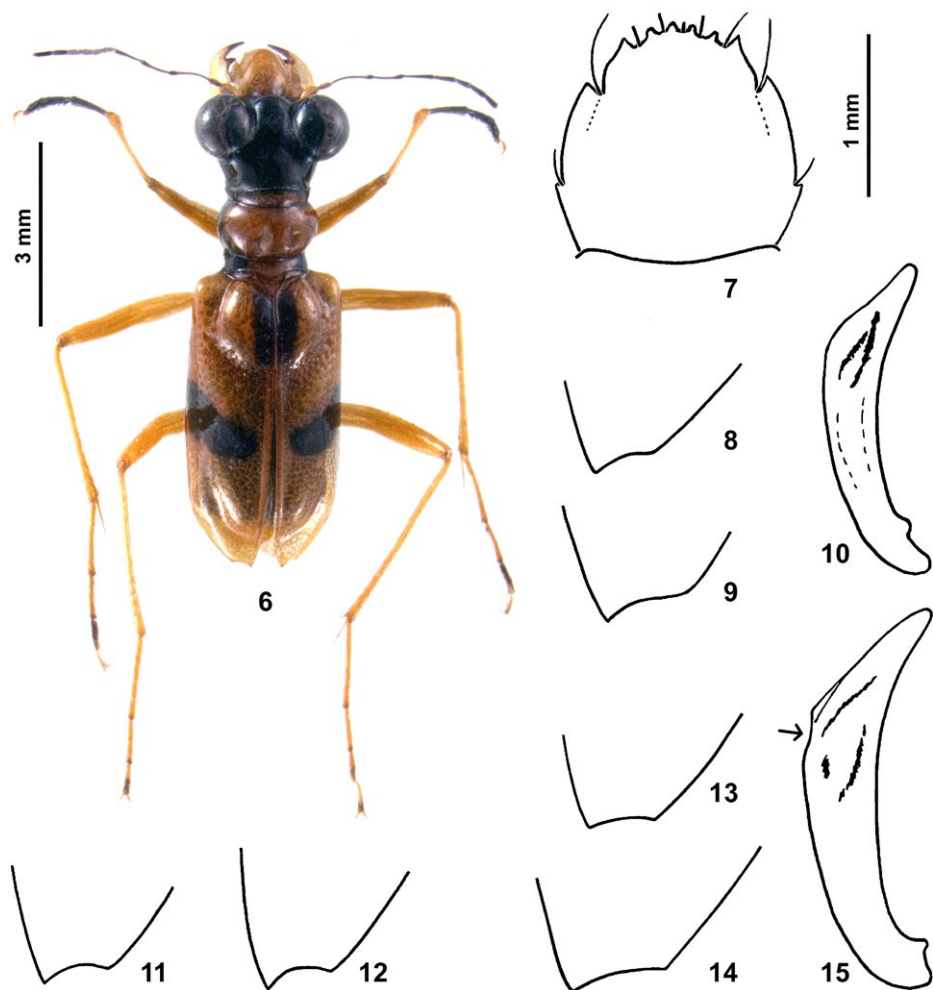
Type locality: Philippines, North Luzon, Mountain Province, no exact locality given.

Type material: Holotype (male, Coll. Jürgen Wiesner, Wolfsburg, Germany) from Philippines, North Luzon, Mountain Province, no exact locality given, leg. R. M. Lumawig. Paratypes (Coll. Jürgen Wiesner, Wolfsburg, Germany; Coll. Miroslav Klich, Karlovy Vary, Czech Republic; Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany; Coll. Herbert Zettel, Vienna, Austria): 3 males, 1 female with same labels as the holotype; 1 male, 1 female, North Luzon, Nueva Viscaya Province, Belance, local collector; 3 females, Nueva Viscaya Province, Imugan, leg. G. Boettcher.

Diagnosis: Head black. Pronotum orange-coloured to brown; sides infuscated. Elytra with narrow black basomedial mark and small paired black marks at midlength widely separated from each other and far distant from apex. Metapleura not infuscated. Basal tumescence of elytra high, heart-shaped, posteromedially not sharply limited by the deeply punctured impression. Sutural tooth sharp, subapical tooth blunt. Aedeagus dorsally not emarginated, distally moderately slender.

Description: Measurements (in millimetres): Holotype: BL = 9.5, HW = 2.88, PW = 1.59, PL = 1.64, EL = 5.13. Paratypes, males (n = 4): BL = 8.8–10.3, HW = 2.62–3.03, PW = 1.59–1.95, PL = 1.53–1.85, EL = 4.82–5.49. Paratypes, females (n = 5): BL = 8.7–10.5, HW = 2.58–3.17, PW = 1.55–1.85, PL = 1.53–1.95, EL = 4.67–5.90.

Colour (Fig. 6): Head capsule black except gula orange-coloured. Labrum orange, extreme base more or less infuscated; rarely a larger mediobasal area light brown. Mouthparts orange, except teeth of mandibles black. Antenna dark brown to black, antennomeres 1 and 2 yellowish. Prothorax orange, with distinctly infuscated sides; in one historical specimen, possibly due to preservation, disc of pronotum dark brown. Mesoepisternum



Figs. 6–15: (6–10) *Therates monticola* sp.n.; (6) habitus of holotype (male); (7) labrum of holotype (apical setae mostly broken); (8) apex of elytra of holotype; (9) apex of elytra of female paratype; (10) aedeagus of paratype. (11, 12) *Therates semperi*, apex of elytra of male (11) and female (12). (13, 14) *Therates pseudosemperi*, apex of elytra of male (13) and female (14). (15) Aedeagus of *Therates fasciatus* s.l., male from Samar.

entirely or only dorsally black. Other parts of thorax and abdominal sterna orange. Elytra with characteristic reduced black pattern: anteromedial black mark narrow, not covering entire anterior tumescence (usually about half of it); a narrow transverse stripe at about midlength widely interrupted at suture, laterally not extended to epipleura, and far distant from elytral apex; its hind margin almost straight, its anterior margin slightly oblique, more or less parallel with hind margin of anterior tumescence. Legs orange, with tarsomeres 3–4 (or only 4) more or less infuscated; in males protarsi entirely black.

Structures: Body, except puncturated elytra, entirely smooth. Frons anteriorly evenly convex in dorsal view; in lateral view outline evenly convex in female, but subangular in

male. Clypeus medially with wide shallow impression. Labrum (Fig. 7) with one pair of short basal teeth, one pair of distinct distolateral teeth, and middle lobe bearing 6 sharp teeth. Pronotum slightly wider than long, with the two transverse impressions deep and almost straight; anterior and posterior sections relatively long, medial section occupying only ca. 0.6 of median length. Elytra with distinct mediobasal tumescence and low posterolateral tumescences, as typical for the group. Anterior impression weak near suture resulting in a rather heart-shaped mediobasal tumescence. Mediobasal tumescence with few scattered setiferous punctures (setae mostly broken), but without additional punctures posteriorly. Coarse punctures on anterior depression numerous, arranged in a broad band (several rows), laterally until sides of elytron, anterolaterally close to humeri. Area with distinct fine punctures reaching posteriorly until posterior impression. Apical tooth sharp; subapical tooth blunt or rounded (Figs. 8, 9). Aedeagus (Fig. 10) dorsally not emarginated, distally moderately slender.

Distribution: Luzon Island: Cordillera Central, Mountain Province (details unknown) and Nueva Viscaya Province (municipalities of Dupax del Norte and Santa Fe).

Comparative notes: *Therates monticola* sp.n. can be well recognized by colour pattern, especially by the short medial transverse stripe of elytra (Fig. 6). It is of rather small size, smaller than *T. fasciatus*, *T. pseudosemperi*, and *T. negrosicola* sp.n., but of similar size as specimens of *T. semperi* from Central Luzon. *Therates monticola* sp.n. and *T. semperi* also share very blunt subapical teeth of elytra (Figs. 8, 9, 11, 12). *Therates semperi* differs from *T. monticola* sp.n, among others, by much reduced puncturation of elytra, entirely orange prothorax and mesoepisternum, absent or small black circumscutellary mark and large black medial marks on elytra.

Key for the identification of the new species

Note: This key treats only species groups and species distributed in the Philippines.

- 1 Clypeus with one pair of setae. *T. labiatus* group
- Clypeus without setae. 2
- 2 Elytron with three tumescences (including one at midlength). *T. batesii* group
(Only *T. palawanensis* BOGENBERGER, 1988 from Palawan.)
- Elytron without tumescence at midlength. *T. fasciatus* group 3
- 3 Pronotum entirely black. Elytron usually with a continuously orange base (rarely anterior half of elytron black with orange humeral mark) and one or two black transverse stripes (see WIESNER 1988: figs. 176–186). Aedeagus with weak dorsal emargination (Fig. 15). Southeastern Philippines, Sulawesi, Halmahera. *T. fasciatus* s.l.
- Pronotum entirely or partly orange to brown, at least in middle of disc; if disc entirely black (some individuals of *T. pseudosemperi*), then a black circumscutellary mark present. Aedeagus without dorsal emargination (Figs. 5, 10). Northern and western Philippines. 4
- 4 Pronotum and mesoepisternum entirely orange. Black circumscutellary mark often lacking. Luzon. *T. semperi*
- Pronotum laterally more or less infuscated, at least on collar. Mesoepisternum black or at least dorsally infuscated. Black circumscutellary mark always present. 5
- 5 Small species, body length 8.8–10.5 mm. Black central mark of elytron short, for more than its length distant from apex (Fig. 6). Area with coarse puncturation on anterior depression extended posteriorly. Northern Luzon. *T. monticola* sp.n.

- Body length 10.7–12.0 mm. Black central mark of elytron long, reaching closer to apex (Fig. 1). Different distribution areas. 6
- 6 Subapical tooth of elytron obtuse. Coarse puncturation of anterior depression of elytron extended to posterior part of basal tumescence. Basal tumescence posteromedially weakly limited, thus appearing heart-shaped. Mindoro. *T. pseudosemperi*
- Subapical tooth of elytron well developed. Coarse puncturation of anterior depression of elytron not extended to basal tumescence. Basal tumescence posteromedially well limited, thus appearing ovate. Negros. *T. negrosicola* sp.n.

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