

## Description of a blind and flightless species of *Thinobius* from South Africa (Coleoptera: Staphylinidae: Oxytelinae)

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**Abstract.** A blind and flightless new species, *Thinobius crypticola* sp. nov. from South Africa is described. The habitat and the relationships of the species are discussed. The habitus of the new species is illustrated by a colour photo, terminalia and genitalia are depicted by line drawings.

**Key words.** Coleoptera, Staphylinidae, Oxytelinae, new species, South Africa, Afrotropical Region

### Introduction

The genus *Thinobius* Kiesenwetter, 1844 comprised 125 named species at the time of the most recent catalogue (HERMAN 2001). These beetles are remarkable for their small body size but also good dispersal ability. Their regular habitat is sandy-gravelly banks of rivers and streams, although some species have been found in still waters or muddy spots in swampy areas. Quite recently, however, some *Thinobius* species have been discovered to be soil-dwelling lacking eyes and wings, and with depigmented body. These modifications make the so far discovered soil-dwelling species from Central Europe, Japan – and now South Africa – rather similar looking. Currently the classification of the genus is unsettled (discussed in detail in MAKRANCZY 2014a,b) but it is practical to distinguish two rather distinct groups: one with female modified genital appendages (the type species of the genus belongs to this group) and the other, probably more primitive, group without this modification. The second author has been conducting a long-term study on the latter assemblage and so far has distinguished a few species groups based on similarities of genitalia as well as external characters.

Two similar species are *Thinobius korbelti* Löbl & Rychlík, 1994 and *T. kuroshio* (Sawada, 1971) (originally described as *Yosiityphlus kuroshio* in the subfamily Leptotyphlinae and moved to *Thinobius* by GUSAROV & MAKRANCZY 2004) from Slovakia/Hungary and Japan

(Honshu), respectively. These completely blind and flightless species apparently use rather different habitats. *Thinobius kuroshio* was collected under rotting seaweed on a pebbly beach (SAWADA 1971). The current finding is suggestive of a wide occurrence of such highly modified *Thinobius* species and possible discovery of many more related species as cryptic habitats are better explored over the globe, especially in the temperate zones of both the Northern and Southern Hemisphere.

### Material and methods

Besides the material recently collected by the first author, a similar collection was made at the same and nearby spots ten years earlier. This material (deposited in FMNH) contains the same species plus a larval specimen in poor condition. The following codens indicate collections in which the listed specimens are deposited:

FMNH Field Museum of Natural History, Chicago, Illinois, USA;

HNHM Hungarian Natural History Museum, Budapest, Hungary;

JJRC Jiří Janák private collection, Rtyně nad Bílinou, Czech Republic;

NHMW Naturhistorisches Museum Wien, Vienna, Austria;

NMPC National Museum, Prague, Czech Republic;

TMSA Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa.

The full label text of the holotype is listed between single quotation marks ‘ ’ and individual labels are separated by backslash symbol \. For the paratypes only the collecting label is listed and enclosed in single quotation marks ‘ ’. Data enclosed in square brackets [ ] are supplementary and were not present in the original labels. Sample sizes are given between curly brackets { } for each collecting event. The following codes are used for the measurements: HW = maximum head width (widest part of temples); PW = maximum width of pronotum; EW = maximum width of elytra; AW = maximum width of abdomen; HL = head length (in middle line, from front margin of clypeus to the beginning of neck); PL = length of pronotum in the middle-line; SL = length of elytra from shoulder; SC = length of elytra from hind apex of scutellum; FB = forebody length (combined length of head, pronotum and elytra); BL = approximate body length. All measured in dorsal view. For descriptions and measurements a Leica MZ 12.5 stereoscopic microscope was used. For the line drawings permanent preparations were made in Euparal mounting medium on plastic cards pinned with the specimens. Techniques are described in detail in MAKRANCZY (2006). Drawings were made using a Jenalab (Carl Zeiss, Jena) compound microscope and drawing tube (camera lucida). For the colour habitus photograph of the adult a Nikon D4 camera with Mitutoyo PlanApo 20× ELDW lens was used and layers combined with ZereneStacker, for the larva photo a Canon EOS 6D camera through Infinity K2 microscope with CF4 lens attached was used and layers combined with Helicon Focus.

All samples were sifted and specimens extracted using Berlese funnels. The extraction method used is rather similar to the one described by the collectors at FMNH ([http://archive.fieldmuseum.org/peet\\_staph/substrate.html](http://archive.fieldmuseum.org/peet_staph/substrate.html)). Sifting of forest and log litter – preferably near big trees and logs with deep layer of humus – is done using a sifter with 9–10 mm mesh. The sifted litter is kept in flaxen/cotton bags, about 3 kg in each, and subsequently placed into large Berlese funnels (45 cm in diameter), about 1 kg per funnel spread in a layer about

2–4 cm thick. For heating/lighting a 100 W incandescent bulb is used. The distance between the sample and the bulb is about 10–13 cm. Processing time is about 8–12 hours. Instead of ethanol wet tissue paper is used in the collecting container to keep the extracted insects alive until representative specimens are selected to be preserved in 96% ethanol. The rest of the specimens are placed in plastic bags with about 43% alcohol which is replaced at least once before samples are put into a freezer.

## Taxonomy

### *Thinobius crypticola* sp. nov.

(Figs 1–2, 5–13)

**Type locality.** South Africa, Western Cape Province, Ysternek Nature Reserve, Dal van Varings Trail, off Highway R339, 33°54.8'S, 23°8.7'E (Fig. 3).

**Type material.** HOLOTYPE: ♂, 'South Africa, Western Cape, Ysternek N.R. [Nature Reserve], Dal van Varings Tr.[ail], off Hwy R339; 33°54.8'S 23°8.7'E; 7.ii.2014, J. Janák lgt. \ Berlese extraction, leaf & log litter, sifting \



Figs 1–2. *Thinobius crypticola* sp. nov.: 1 – male holotype, dorsal habitus; 2 – suspected larva (maximum width of head capsule 0.16 mm).





Figs 3–4. Habitats of *Thinobius crypticola* sp. nov. 3 – Knysna, Dal van Varings Trail (type locality); 4 – Knysna, Diepwalle State Forest (photos by J. Janák).

Holotypus *Thinobius crypticola* sp. nov., J. Janák & Gy. Makranczy det. 2015' (TMSA). PARATYPES (76 specimens): 19 ♂♂ 15 ♀♀: same data as holotype (1 ♂ 1 ♀ in TMSA, 1 ♂ 1 ♀ in NMPC, 1 ♂ 1 ♀ NHMW, 1 ♂ 1 ♀ in HNHM, 15 ♂♂ 11 ♀♀ in JJRC) {19.4 kg}; 2 ♂♂ 2 ♀♀: 'South Africa, Western Cape, Diepwalle S.F.[State Forest] (14 km ENE Knysna); 33°57.2'S 23°9.5'E; 7.ii.2014, J. Janák lgt., Berlese extraction, leaf & log litter, sifting' (JJRC) {16.7 kg, Fig. 4}; 6 ♂♂ 4 ♀♀: 'South Africa, Western Cape, Diepwalle S. F., Kom Se Pad, Red Elephant Tr.[Trail]; 33°56.0'S 23°8.0'E; 9.ii.2014, J. Janák lgt., Berlese extraction, leaf & log litter, sifting' (1 ♂ TMSA, 5 ♂♂ 4 ♀♀ JJRC) {13.4 kg}; 6 ♂♂ 5 ♀♀: 'South Africa, Western Cape, Diepwalle S.F.[State Forest], Kom Se Pad, 1.7 km W Hwy[Highway] R339; 33°56.7'S 23°8.0'E; 9.ii.2014, J. Janák lgt., Berlese extraction, leaf & log litter, sifting' (1 ♂ 1 ♀ TMSA, 5 ♂♂ 4 ♀♀ JJRC) {5.6 kg}; 4 ♂♂ 4 ♀♀: 'South Africa: Western Cape: Ysternek N.R., Dal van Varings Tr., off Hwy R339, 650m, 33°54.8'S, 23°08.7'E, 30.i.2004, tall Afromontane forest w/abundant tree ferns; FMHD #2004-022, berl., leaf & log litter, Newton, Thayer et al. 1080 Field Museum Nat. Hist.' (all FMNH, in 70% ethanol) {8.2 kg}; 5 ♂♂ 1 ♀ (+ 1 larva): 'South Africa: Western Cape: Diepwalle S.F., Kom Se Pad, 1.7 km W Hwy R339, 420m, 33°56.7'S, 23°08'E, 30.i.2004, tall Afromontane forest; FMHD #2004-024, berl., leaf & log litter, Newton, Solodovnikov et al. 1081 Field Museum Nat. Hist.' (all FMNH, in 70% ethanol) {10.0 kg}; 1 ♂ 2 ♀♀: 'South Africa: Western Cape: Gouna S.F., Kom Se Pad, 6.2 km W Hwy R339, 440m, 33°56.7'S, 23°05.6'E, 31.i.2004, Afromontane forest w/ground ferns, few lianas; FMHD #2004-030, berl., leaf & log litter, Newton 1083 Field Museum Nat. Hist.' (all FMNH, in 70% ethanol) {3.0 kg}.

**Description.** *Measurements* (in mm, n = 10): HW = 0.175 (0.165–0.185); PW = 0.180 (0.170–0.185); EW = 0.170 (0.160–0.180); AW = 0.210 (0.190–0.230); HL = 0.160 (0.150–0.170); PL = 0.145 (0.135–0.150); SL = 0.130 (0.120–0.135); SC = 0.115 (0.105–0.120); FB = 0.440 (0.420–0.460); BL = 1.110 (0.955–1.235). *Body* (Fig. 1) straw yellow, moderately lustrous, although microsculpture weak (inconspicuous on forebody). Forebody sparsely punctate, punctures moderately small, interspaces on average 4–5× puncture diameters. Body rather translucent, area between supraantennal tubercles (around epistomal suture) darker, pronotal marginal bead laterally and posteriorly marked as thin darker line. A few thicker setae dark brown, finer setae match overall body colour. Apex of antennomere II with slightly darker rim.

*Head* slightly transverse, eyes absent, sides of head gently curved. Neck not separated by groove, although sides of head constricted before it and narrowly rounded there. Disc of head gently convex, with feeble coriaceous microsculpture (with isodiametric cells of varying sizes), at obscure demarcation line of neck microsculpture turning transverse; supraantennal tubercles slightly elevated. Maxillary palps (Fig. 6) with penultimate segment fusiform, last segment not acicular but asymmetrical, bulbous at base. *Antennae* (Fig. 5) rather short, antennomeres I, II and XI quite stout, mid antennomeres strongly transverse; antennomere V significantly smaller than neighbouring antennomeres, latter may appear somewhat asymmetrical from a certain viewpoint. Antennomeres IX–XI with modified setae (remarkably thicker, less pointed), similar to those in other endogean staphylinids like leptotyphlines, antennomere VII also occasionally with few small and short modified setae.

*Pronotum* transverse, insignificantly wider than head, corners rounded, posteriorly more broadly than anteriorly. Arched sides somewhat constricted towards base, although widest point still around or little behind middle. Pronotal marginal bead very thin, anteriorly mostly missing. Disc with similar microsculpture as vertex, in middle with two parallel longitudinal impressions (leaving free anterior fourth). Scutellum as in Fig. 7, sculpture rather reduced, short setae only in postero-lateral and lateral parts. *Elytra* combined significantly broader than long, dilated towards apex, together less wide than pronotum, anterior margin at sutural corners slightly concave. Humeri poorly developed, posterior elytral corners broadly rounded, disc mostly convex, along suture with marginal bead. Hind wings absent. *Legs* short and

rather stout, tibiae spindle-shaped. Tarsi two segmented as in other *Thinobius*, basal article with setae modified as tarsal lobes.

**Abdomen** weakly fusiform, sides more or less straight and parallel, widest around middle and slightly wider than elytra. Tergites with narrow laterosclerites, basal ridges and basolateral ridges separated and running parallel in the middle, basolateral ridges marked in dark brown colour medially. Surface with strongly transverse coriaceous microsculpture, apical margin of tergite VII with thin palisade fringe consisting of short and somewhat sparse setae (not tightly arranged). **Primary and secondary sexual characters.** Sexes do not differ in external characters except terminalia. Male sternite VIII as in Fig. 8, tergites IX as in Fig. 9, sternite IX as in Fig. 10, tergite X similar in both sexes. Aedeagus as in Fig. 11. Female modified genital appendages as in Fig. 12, spermatheca as in Fig. 13.

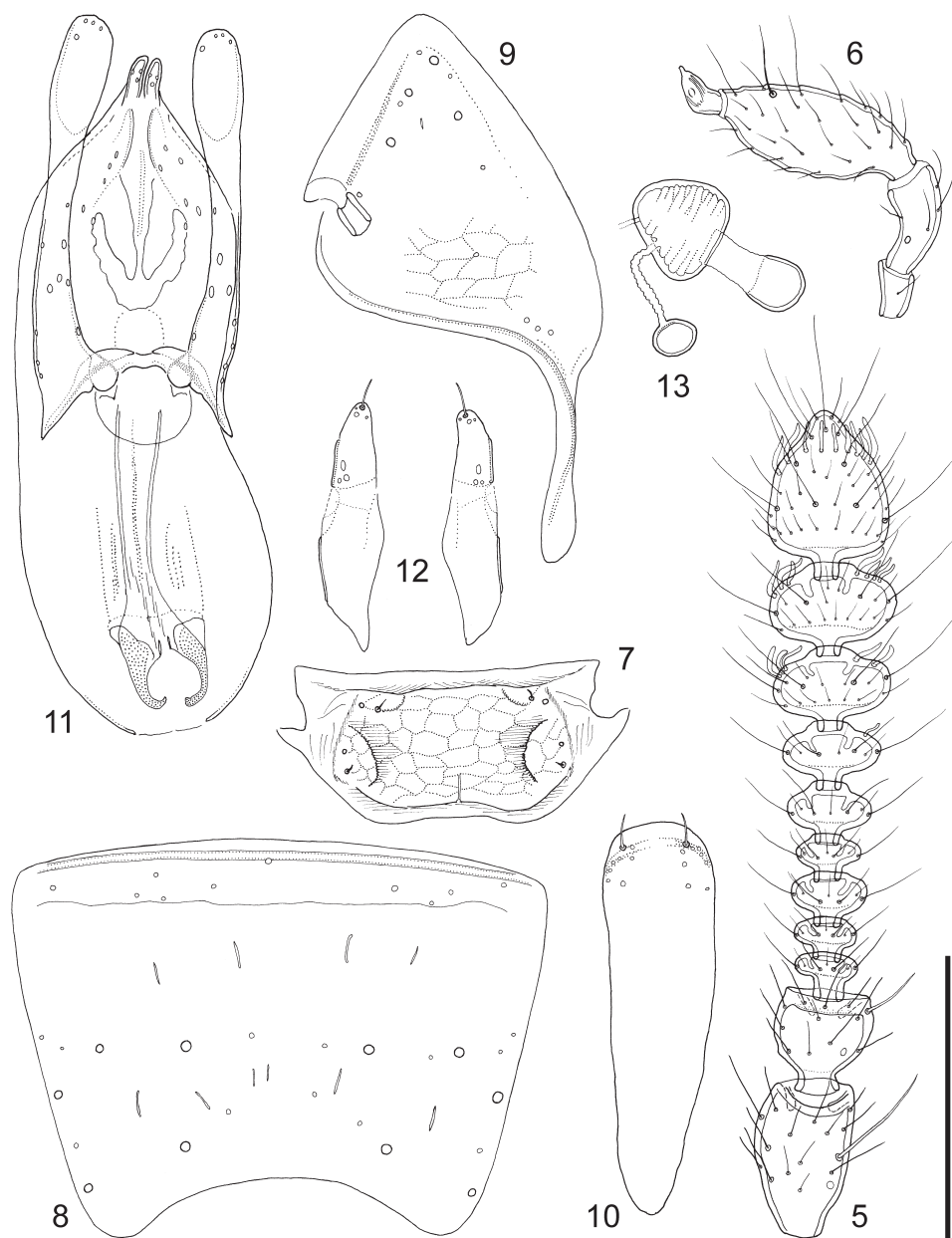
**Differential diagnosis.** The new species bears similarity only to *Thinobius korbelti* Löbl & Rychlík, 1994 from Slovakia and Hungary (LÖBL & RYCHLÍK 1994, MAKRANCZY 2008) and *T. kuroshio* (Sawada, 1971) from Japan (GUSAROV & MAKRANCZY 2004) in the absence of eyes and functional wings. The male genitalia of *T. crypticola* sp. nov. are similar to those of many other *Thinobius* species. *Thinobius kuroshio* has much longer antennae with more elongate antennomeres, while *T. korbelti* also has less transverse mid-antennal segments. In the new species these are conspicuously transverse (approximately twice as broad as long) and maxillary palps are remarkably different from both other blind species: the normally acicular last palpomere is swollen and curved in the middle and the penultimate palpomere is more slender. The two species of the Northern Hemisphere seem to be united by a more swollen penultimate palpomere and an acicular last segment.

**Etymology.** The species epithet refers to its hidden way of life, the Latin word '*crypticola*' is a noun in apposition.

**Distribution and habitat.** Only known from South Africa. The type locality is situated in the Ysternek Nature Reserve (currently part of the Knysna Section of Garden Route National Park) at an elevation of about 650 m a.s.l. It is an Afromontane indigenous forest with abundant fern trees. All the other collecting sites are within a 6 km sided triangle, in a rather similar Afromontane forest (with less frequent fern trees); the FMNH localities, in the sequence listed, are roughly from wetter to drier sites with elevations 420–650 m a.s.l. The highest abundance of *T. crypticola* sp. nov. in sifted material was about two specimens per kg in Dal van Varings Trail (2014, Janák lgt.) and Kom Se Pad, 1.7 km W Hwy R339 (2014, Janák lgt.). As far as habitats are concerned, *T. korbelti* is more similar to the new species described here, as it was collected 10–40 cm deep in soil in riverine forests.

**Larva.** In one of the three FMNH samples (collected in 2004) one oxyteline larva was found that almost certainly is conspecific with *T. crypticola* sp. nov. This larva was identified by A. Newton as Oxytelinae based on agreement with published characterizations of larvae of this subfamily by KASULE (1968) and NEWTON (1982) and general knowledge of larval characteristics of this group, including the presence of two subapical teeth on each mandible giving a 'trifid' appearance, a penultimate maxillary palp segment that is shorter than the preceding and ultimate segments, a long looped gut with visible but unidentifiable organic matter, and short pigmented urogomphi that appear one-segmented. It was further attributed to this *Thinobius* by association with adults in the same microhabitat, the absence of stemmata





Figs 5–13. *Thinobius crypticola* sp. nov. 5 – antenna; 6 – maxillary palp; 7 – scutellum; 8 – male sternite VIII; 9 – male tergite IX; 10 – male sternite IX; 11 – aedeagus, frontal; 12 – female genital appendage; 13 – spermatheca. Scale bars: 0.075 mm for 11, 13; 0.09 mm for 5–7, 9–10, 12; 0.1 mm for 8.

(unusual in oxyteline larvae, and in agreement with the lack of eyes in adults), and agreement with the only described larva of *Thinobius*, *T. frizzelli* Hatch, 1957 (a partial description by KINCAID 1961). In addition, there were no other Oxytelinae in these samples.

The total length (including urogomphi) is 1.25 mm. The rather slender shaped specimen has the head and urogomphi more sclerotized than the rest of the body, the thoracic segments and the middle part appear soft and at least partly dissolved. A possible explanation is that the cuticle of this delicate specimen does not withstand extended storage in ethanol. The same observation was made by the second author with a larva of *T. korbelti*. This state of preservation (Fig. 2) does not allow a proper description.

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