Blind, flightless termitophiles of the genus *Termitotrox* in East Africa: three new species with a generic review (Coleoptera: Scarabaeidae: Termitotroginae)

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The Indo-Afrotropical scarab subfamily Termitotroginae is briefly reviewed, and the two genera currently recognized are resynonymized: *Termitotrox* Reichensperger, 1915 (= *Aphodiocopris* Arrow, 1920). Their type-species are not significantly different (*contra* Paulian 1985). The genus *Termitotrox* and its type-species, *T. consobrinus* Reichensperger, 1915, are rediagnosed. Ten species of *Termitotrox* are keyed and listed, including three new species from East Africa described in this paper: *T. usambaricus* (North Tanzania), *vanbruggeni* (South Kenya), and *turkanicus* (North Kenya). The four species now known from East Africa are compared in a table of diagnostic characters. All termitotrogines are blind and flightless. The new species were, like several of their congeners, found in fungus gardens of termite colonies (Macrotermitinae).
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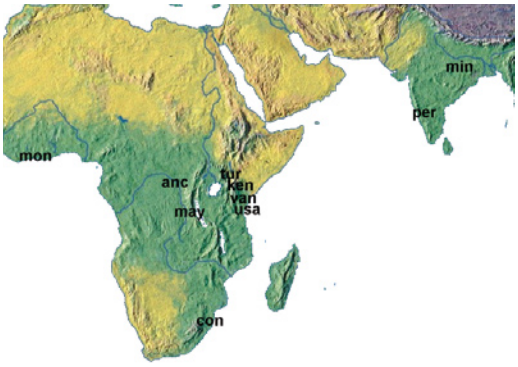

Fig. 1. Map indicating regions where *Termitotrox* species have been found. First three letters of species name given, see list of species in main text.

Introduction

Since their discovery in India during the years 1897-1898 (first formal description not until 1915) roughly every one or two decades a new species, always one at a time, has been added to the group of minute, blind, flightless scarabs called Termitotroginae Wasmann, 1918 (= Aphodiocoprinae Arrow, 1920). In this paper three new species of *Termitotrox* Reichensperger, 1915 are described from Kenya and Tanzania. They were found in the fungus gardens of termite colonies, as were most of the seven species described previously. Paulian (1985) is the only one to have reviewed the genus, recognizing five African species, and commenting on the two species in their Indian counterpart genus *Aphodiocopris* Arrow, 1920. He reinstated *Aphodiocopris*, which had been merged with *Termitotrox* since Boucomont (1927); the two genera were accepted in the catalogue compiled by Dellacasa (1988).

Termitotrogines are real scarab oddities: apart from

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lacking eyes and hind wings, their pronotum and elytra are covered with a peculiar, species-specific pattern of ribs and grooves – analogous to similar structures in other termitophilous scarabs in the Aphodiinae (like Corythoderini, Stereomerini, Rhyparini) and possibly certain Ceratocanthinae, like Ivieolini (Howden & Gill 2000). The interior of these convexities might be filled with glandular tissue producing chemical messengers, but, unlike certain forms in the groups mentioned, termitotrogines lack distinct exudatory trichomes. Some of the Aphodiinae in the tribes mentioned are also blind and flightless. Little more can be said about the biological context of termitotrogines, but, somehow, they must intimately fit into the environment of their fungus-growing termite hosts. The Indo-Afrotropical distribution of the group is analogous to that of the Corythoderini (Tangelder & Krikken 1982), which are also associated with fungus-growing termites. Compare their ranges with discussions on the evolution and current "out-of-Africa" notions regarding their hosts, e.g. in Aanen & Eggleton (2005).

Paulian (1985) elaborated on the somewhat messy nomenclature and on the taxonomic merits of termitotrogine adult morphology, and his conclusions are here accepted, with one major exception: *Aphodiocopris* should remain a junior synonym of *Termitotrox* (see argumentation under the generic diagnosis, below). Paulian's key to the species is rectified and adapted to accommodate all Termitotroginae now known. The key is undoubtedly capable of improvement, and further action, including a full character assessment, will be opportune when, inevitably, more termitotrogines are discovered. The four East African species are compared in a synoptic table of characters.

The rank of the family-group name has varied from tribe (in the original proposal of the Termitotrogini by Wasmann 1918) to full family (Tangelder & Krikken 1982, Dellacasa 1988), always, without reservations, within the Scarabaeoidea. With the knowledge now available we have no problem following Smith (2006) in his treatment of the group as a subfamily in the Scarabaeidae, somewhere between the Aphodiinae and Scarabaeinae, irrespective of phylogenetic detail. Scholtz & Grebennikov (2006) placed *Termitotrox* in the Aphodiinae, without reference to its still enigmatic position. The genus is also mentioned (and pictured), with a question mark as to its family-group position, on the CD-ROM of Lawrence et al. (1999); we do not recognize some of the features given in their description.

Technical remarks

At first sight the dorsal pattern of elevations and associated depressions is confusing. However, an unambiguous terminology and numbering of the pronotal and elytral elevations clarifies the basic termitotrogine pattern, facilitating the recognition of homologous elements; this basic pattern follows from the generic diagnosis below and the generalized picture (Fig. 5) – based on the literature and a closer study of six species. Important point: count the elytral costae from the suture (laterad) along the caudal end, to compensate for modifications (fusions) rostrad (which are indicated in the descriptions by an ampersand &). Although the morphological analysis of Paulian (1985) is accepted here for operational reasons, a reassessment of the homology of the various structures in relation to those in other scarabs is definitely required. Micropunctures are those distinct at magnifications of at least $\times 40$. For the size of the elements depicted see the measurements given at the end of the three species descriptions.

In view of the rarity of *Termitotrox* in collections and the diminutive size and extreme fragility of the specimens, the holotypes of the new species have not been dissected and sexed. The variation and sexual dimorphism are assumed to be limited, judged from species available in small series (like *T. usambaricus* sp.n.), and, as can be seen from the information below, at present species identification needs no anatomical action.

This paper is part of a series on scarab groups associated with eusocial insects.

Genus *Termitotrox* Reichensperger

Termitotrox Reichensperger, 1915 (type-species *Termitotrox consobrinus* Reichensperger, 1915, by monotypy)
Aphodiocopris Arrow, 1920 (type-species *Aphodiocopris minutus* Arrow, 1920, by monotypy). **stat. rev.**

Generic diagnosis

Elytra rigid, fused, strongly transversely convex, each with ten (discally costiform) interstriae; most discal costae running from (near) base to (near) apical edge (individual costae may be fused, narrowed, or more or less effaced, according to species; juxtepipleural costae may be indistinct); costae separated by (variably wide) strial impressions (punctures proper usually vague or effaced). Elytral base concave in dorsal view, tightly fitting against more or less rounded pronotal base; humerus strongly, sharply produced rostrad. Pronotum with (nearly) symmetric pattern of longitudinal elevations (usually nine), including (from midline laterad) median, paramedian, sublateral, lateral, and marginal costa (which all may be

variably effaced, fused, locally narrowed, depressed, all according to species). Pronotal centre distinctly concave. Head a transverse, generally slightly convex (deflexed) plate, with widely rounded anterior border; genal tip (sub)angular (in full-face view), fitting between projecting, perpendicular anterolateral sides of prothorax. Clypeogenal transition continuous at edge. Mouthparts reduced, concealed by clypeus. Antenna 9-segmented, including 3-segmented club. Compound eyes absent. Alae absent. Scutellum indistinct (juxtasutural costae in some species divergent in front, creating pseudoscutellum). Anterolateral underside of prothorax concave, cavity well delimited. Mesosternum extending caudally between widely separated mesocoxae, posteriorly limited by transverse groove. Abdomen with five distinct sternites; pygidium generally convex, but may have distinct impression(s); propygidium with deep, broad median longitudinal sulcus (covered by elytra). Elytral epipleuron reaching apex, tightly "clasped", without sharp juxtepipleural crest, over thoracic and abdominal sides. Protibia entirely complanate-dilated, with one or two external denticles. Protarsus fine, slender, set on apico-internal border; paired claws minute; segment 1 longer than each subsequent segment. Femora relatively broad, outline (underside) more or less elliptic. Meso- and metatibiae broad, roughly parallel-sided or dilated to apex (sides smooth-edged), complanate, with two fine, acuminate (apico-internal) terminal spurs. Meso- and metatarsi short, compact, 5-segmented, claws simple, paired, minute; segment 1 always very short, segment 5 longer than preceding one. Parameres long, simply tapering, evenly curved downward in profile. Habitus elongate, hunched, body not capable of conglobation; general colour (rufous-)brown to black; body length 1.5-3 mm. Upper- and undersides largely glabrous, lacking scales and other vestiture.

Biology

Probably obligatory termitophiles, living with fungus-growing termites (in the Termitidae: Macrotermitinae; the genera *Odontotermes* Holmgren, 1912 and *Protermes* Holmgren, 1910 are mentioned). Body grooves filled with hardly removable traces of earth are apparently witnesses of their microhabitat. Immature stages unknown.

Range

Afrotropical (eight species), Oriental (known from Indian Subregion only, two species), species list with countries below, approximately known occurrences mapped (Fig. 1).

Comments

The single known type of the type-species of *Termitotrox* was not available to Paulian (1985), but in the material before us are two specimens of *T. consobrinus,* from the type region of Natal and fitting the original description of Reichensperger (1915, more on this below, under the species). Paulian did not see any *T. consobrinus*, and it is therefore understandable that he assumed this species to have a pair of (more or less "swollen") mesosternal fields, as in some other African species, which he all referred to *Termitotrox*. This is not the case, and *consobrinus* and other Africans would in his key actually run to (fit his concept of) *Aphodiocopris* (which he thought exclusively Indian), and not *Termitotrox* (which he thought exclusively Afrotropical). The presence or absence of a mesosternal bipartition, considered so important by Paulian, shows more variation than he suggested, not justifying a simple separation into two genera, and this applies to other characters as well. At any rate, the two type-species are definitely congeneric, and *Aphodiocopris* must therefore again be treated as a junior synonym of *Termitotrox*.

List of *Termitotrox* species

Africa

T. ancoroides (Petrovitz, 1956) (*Corythoderus*) – Congo-K: East
T. consobrinus Reichensperger, 1915 – RSA: KwazuluNatal
T. kenyensis Paulian, 1985 – Kenya
T. maynei Reichensperger, 1956 – Congo-K: East
T. monodi Paulian, 1947 – Ivory Coast
T. turkanicus **sp.n.** – Kenya
T. usambaricus **sp.n.** – Tanzania
T. vanbruggeni **sp.n.** – Kenya

Asia

T. minutus (Arrow, 1920) (*Aphodiocopris*) – India
T. permirus Wasmann, 1918 – India

Key to *Termitotrox* species

1. Occurs in Indian Subregion. Elytral costae 1 and 2 posteriorly separate, joined a ca 0.4 elytral length from elytral base 9
– Occurs in sub-Saharan Africa. Elytral costae 1 and 2 not joined at 0.4 or more from base .. 2
2. Elytral interstrial costae 4 etc interrupted near base by strong subtransverse depression. Head posteriorly with 3 callosities. Length 1.5 mm ..... *consobrinus*
– Elytral interstrial costae 4 etc not transversely interrupted. Head at most with slight central callosity 3

Figs 2-4. Habitus of *Termitotrox usambaricus*, holotype. – 2, dorsal view; 3, lateral view; 4, ventral view.

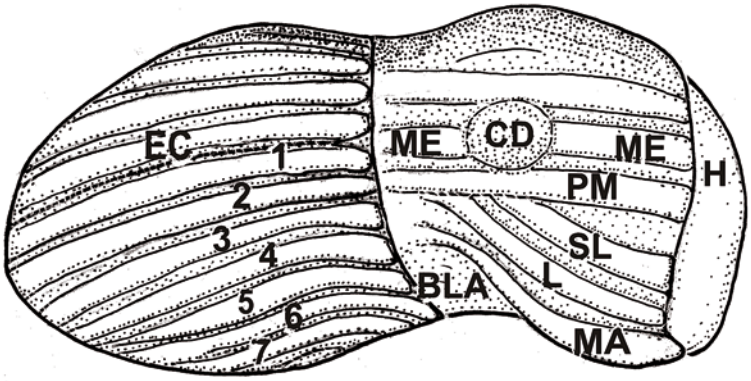
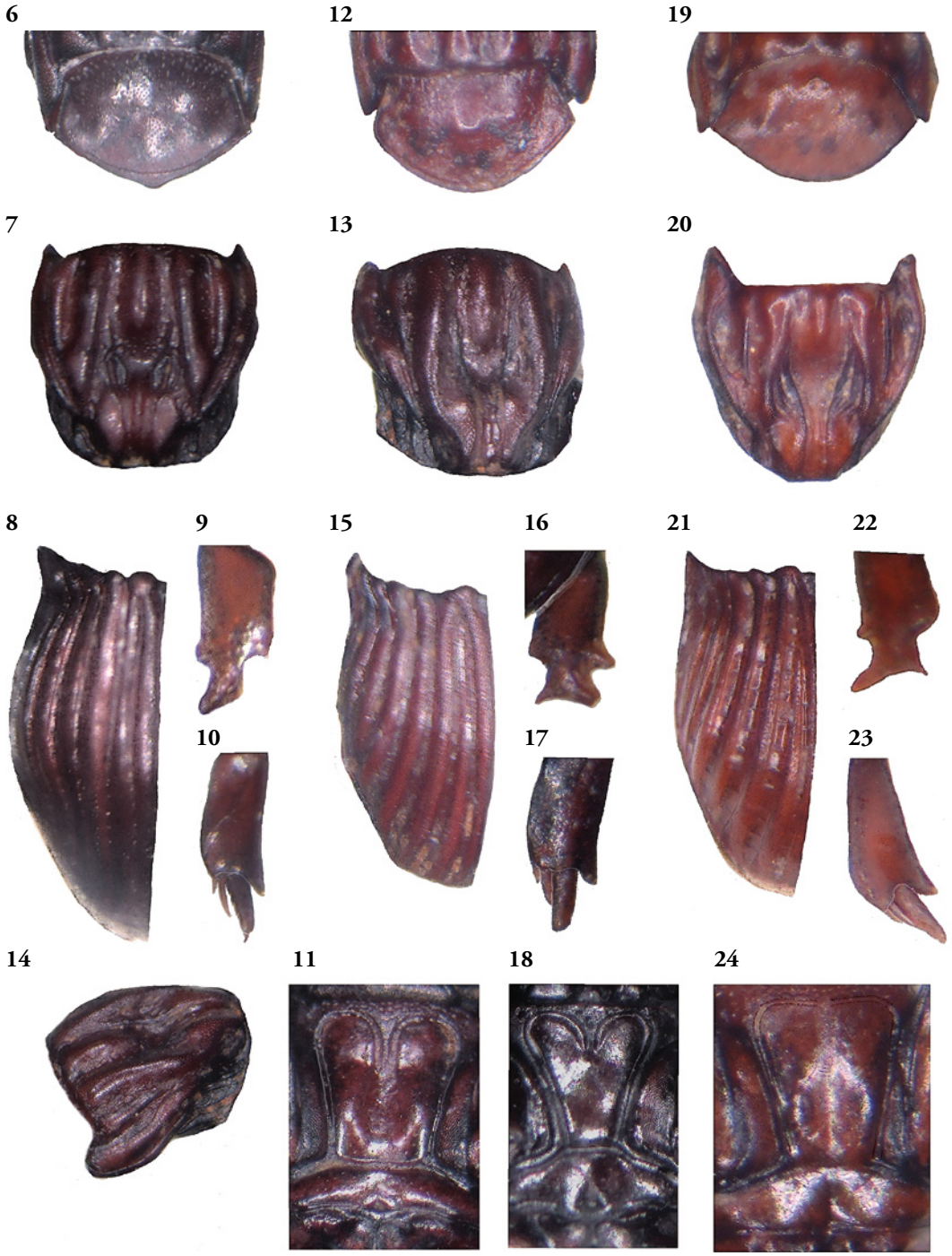


Fig. 5. Terminology of (schematized) pronotal and elytral elements (dorsolateral view). – Pronotum: ME median costa, PM paramedian L lateral, SL sublateral, MA marginal, CD central depression, BLA basolateral area. Elytra: EC1-7 interstrial costa 1-7. H head.

3. Median longitudinal costa of pronotum complete from apex to base, though lowered and narrowed in central depression 4
– Median longitudinal costa of pronotum incomplete, effaced in central depression, base with pair of callosities 5
4. Oblique fold cuts off paramedian pronotal costa behind middle. Length 2.3 mm .... *ancoroides*
– Paramedian pronotal costae complete. Length 1.5 mm ..... *kenyensis*
5. Protibia with single apico-external denticle and with apico-internal denticle. Length 2.3 mm ..... *maynei*
– Protibia with two external denticles, with or without apico-internal denticle 6
6. Protibia with apico-internal denticle. Elytral striae 1 and 2 fused at some distance behind base, interstrial costa 2 thus effaced in front, all basal tubercles poorly developed 7
– Protibia without apico-internal denticle. Elytral striae all separate, interstrial costae complete, basal tubercles well developed. Length 3 mm ..... *usambaricus*
7. Sublateral costa of pronotum tapering caudad and isolated, not fused to paramedian costa 8
– Sublateral costa of pronotum fused to (= joining) paramedian costa. Length 3 mm ..... *monodi*



Figs 6-24. Contours of selected elements of new *Termitotrox*. – 6, 12, 19, head (full-face view); 7, 13, 14, 20, pronotum (dorsal, 13 slightly tilted, 14 dorsolateral); 8, 15, 21, elytron (dorsal); 11, 18, 24, mesosternum + middle of metasternum; 9, 16, 22, protibia (distal part, upper side; 9, 22 right, 16 left); 10, 17, 23, metatibia, with tarsus (distal part, 10, 17 upperside, 23 underside); 6-11, *usambaricus*; 12-18, *vanbruggeni*; 19-24, *turkanicus.* All holotypes.

8. Interstrial costae of elytra well-defined, discally narrow, top surface deplanate, striae nearly as wide as adjacent costae. Pronotal base with paramedian costae only. Length 2.5 mm ..... *turkanicus*
– Interstrial costae of elytra transversely broadly convex, striae narrow over entire length. Basomedian costa distinct. Pronotal base with median and paramedian costae. Length 3 mm ..... *vanbruggeni*
9. Interstrial costa 3 in profile creating (angular) humpback appearance (costa abruptly curved downward on generally depressed posterior surface of elytron), and costa 5 evenly curved caudad, around general depression, to elytral apex. Length 2-2.2 mm ..... *permirus*
– Elytra with discal costae in profile generally evenly curved caudad, all interstrial costae evenly extending caudad. Length 1.5 mm ..... *minutus*

Species accounts

Termitotrox usambaricus sp. n.

Figs 2-4, 6-11

Material examined. Holotype (Leiden museum) with the following label data: Tanzania: Amani, 3/vi/1970, no. 2240, J.R. Clover e.a., ex fungus garden of nest T-356. Four paratypes with same data (two partially dissected, a male and a female).

Description

Holotype. General colour uniformly brownish-black, matt, body length ca 3 mm.

Head surface generally evenly convex, only with slight callosity at clypeofrontal transition. Outer border of head entirely marginate, thickened margin well defined. Clypeal outline generally evenly rounded, apex with slight but distinct, rounded denticle. Clypeofrons brownish-black, glabrous, distinctly, abundantly micropunctate; vertex with numerous sharply defined, elongate (almost striolate) primary punctures, several elongate punctures on frons. Clypeofrontal border at (vague) suture straight to obtusely angular genal tip (full-face view); genal surface depressed.

Prothorax brownish-black, about as wide as hind body, sides (in dorsal view) evenly rounded over anterior 0.7. Emargination along vertex immarginate, anterolateral lobe fully rounded, edge projecting downward (forming side of anterolateral propectoral cavity). Pronotal sides steeply declivous. Posterolateral section of pronotum rounded. Base of pronotum evenly rounded, immarginate; basoateral area with fine oblique ridges and grooves. Pronotal surface glabrous. Costae abundantly micropunctate, intercostal sulci rugulate-punctate. Discal depression very deep; surface, apart from some local micropunctation, smooth.

Pronotal pattern of nine major longitudinal costae as follows: Median costa broad, distinct in front, effaced in deep central depression, basomedian section narrow. Central depression posterolaterally with fine extra groove. Paramedian costa broad, distinct, posteriorly interrupted by deep sulcus, leaving basal section isolated on either side of basomedian costa. Sublateral costa broad, distinct, joining paramedian costa at about halfway pronotal length. Lateral costa broad, distinct, extending from anterolateral lobe caudad, joining paramedian costa at ca 0.75 of pronotal length. Marginal costa evenly curved, flat, not reaching base.

Elytra elongate-convex, brownish-black, glabrous, with 9 interstrial costae and intervening striae. Humeral and apical elytral umbone absent; apicosutural edge virtually rectangular, slightly protruding. Epipleuron wide. Elytral striae very distinct, deeply impressed; punctures of discal striae widely separated (4-6 diameters); stria 1 not reaching base, stopping at basal tubercle 1&2. Discal interstrial costae generally rounded (on cross-section), surface with abundant, scattered micropunctation.

Elytral pattern of interstrial costae as follows: Costa 1 (juxtasutural) moderately developed, slightly divergent in front (creating small pseudoscutellum), ending at joint basal tubercle 1&2. Costa 2 moderately developed, narrowed in front, ending at joint basal tubercle 1&2. Costa 3 strongly developed, reaching basal tubercle 3. Costa 4 moderately developed, reaching basal tubercle 4. Costa 5 strongly developed, divergent at base to tubercle 5. Costa 6 moderately developed, divergent at base to tubercle 6. Costa 7 moderately developed, divergent at base to tubercle 7. Costae 8 and 9 flat, short, joined at non-tuberculate base.

Antennal club yellow-brown. Anterolateral part of propectus deeply excavate. Preprosternal apophysis slight, with numerous setae. Remainder of propectus glabrous, brownish-black. Posterolateral surface of propectus with oblique densely arranged ridges and grooves. Postprosternal surface with small semielliptically defined impression. Transverse mesometasternal groove between posterior edges of mesocoxae distinct, straight. Mesosternum with pair of mirrored, question-mark-like grooves issuing from this groove, their full curve in front; mesosternal surface dark brown, glabrous, abundantly micropunctate. Metasternum with median and sublateral impression, and with fine perimarginal groove all around; dark brown. Abdominal venter with 5 distinct

Comparative table of East African *Termitrox*

	usambaricus	*vanbruggeni*	*turkanicus*	*kenyensis*
1. Clypeal apex	angulate	rounded	rounded	rounded
2. Median pronotal costa in central depression	interrupted	interrupted	interrupted	continuous
3. Basomedian pronotal costa	narrow	narrow	absent	narrow
4. Paramedian pronotal costa	interrupted	continuous	continuous	continuous
5. Basolateral area with supplementary ridges (dorsal view)	distinct	distinct	indistinct	indistinct
6. Elytral costae on disc	broad	broad	narrow	broad
7. Elytral stria 1	not reaching base	reaching base	reaching base	reaching base
8. Elytral costa 2	reaching base	not reaching base	not reaching base	not reaching base
9. Protibial apico-internal spine	absent	present	present	absent
10. Length in mm ca	3	3	2.5	1.5
11. Distribution (region)	Usambara	S Kenya	Turkana	S Kenya

sternites, all dark brown, matt, sternite 2-3 with series of distinct, short, longitudinal striolae along base at middle, ditto series on 4-5 extending laterally. Pygidium dark brown, glabrous, base broadly marginate; surface generally convex, with very distinct basomedian groove and slight basolateral depression on either side; surface lacking distinct microsculpture.
Procoxa protuberant. Profemur dark brown, underside glabrous, abundantly micropunctate; outline broadly elliptic, marginate all around; subangular at junction with trochanter. Protibia brown, broad, with short setae, microsculpture poorly pronounced; general shape strongly complanate, with two external denticles, no basal serration; apex oblique-sinuate, with fine apico-internal bristle only; internal side strongly dilated from slender base. Protarsus much longer than width of tibial apex (×2), slender, yellowish; segment 1 inserted in fine groove, as long as segments 2-4 combined. Mesocoxae brown, widely separated, slightly divergent rostrad. Meso- and metafemora brown, broadly elliptic in outline, marginate all around, surface abundantly micropunctate, glabrous. Meso- and metatibiae brown, with several setae; broad, abruptly dilated from base, edges entire; tibial apex slightly emarginate, with pair of acuminate apico-internal spurs, external one long, slightly curved, internal one short, straight; upper side of meso- and metatibiae with fine longitudinal ridge near outer edge, underside with fine sinuate ridge from base to apico-internal section. Meso- and metatarsi brown, compacted-complanate, segments 1-4 very short. Length of long spur of metatibia 3 times short spur, reaching tarsal segment 5.
Measurements in mm. Maximum width of head 1.05; median dorsal length of pronotum 1.25, maximum width 1.30; sutural length of elytron 1.75, maximum width 1.30.

Etymology
Named after the Usambaras, the mountainous region of northeastern Tanzania where Amani is situated.

Diagnostic comments
This new species has no direct relationships with its East African congeners, judged from the shape of the protibiae. The angular clypeal apex is most characteristic. In addition to the characters in the table above there are more distinguishing *usambaricus* from the next species, for instance, the punctation on the head and the abdominal venter, and the mesosternal pattern of grooves. The variation and sexual dimorphism among the five individuals is negligible.

Termitotrox vanbruggeni sp. n.
Figs 12-18

Material examined. Holotype (Leiden museum), with the following label data: Kenya: Karen, 18/vi/1966, G.R. Cunningham-van Someren, field no. 1559, ex fungus gardens nest T185. (The locality Karen is a suburb of Nairobi.)

Description
Holotype. General colour uniformly dark brown, matt; body length ca 3 mm.
Head surface generally evenly convex, only with slight callosity at clypeofrontal transition. Outer border of head entirely distinctly marginate. Clypeal outline generally evenly rounded over entire length. Clypeofrons brown, glabrous, distinctly, abundantly micropunctate; vertex with numerous (10-15) sharply defined, elongate primary punctures. Clypeofrontal border at (vague) suture straight to obtusely angular genal tip (full-face view); genal surface depressed.
Prothorax dark brown, nearly as wide as hind body,

sides (in dorsal view) evenly widely rounded over anterior 0.7. Emargination along vertex immarginate, anterolateral lobe fully rounded, edge projecting downward (forming side of anterolateral propectoral cavity). Pronotal sides steeply declivous. Posterolateral section of pronotum rounded. Base of pronotum evenly rounded, immarginate; basolateral area with 3 deplanate ridges, inner one continued from lateral costa. Pronotal surface glabrous. Costae abundantly micropunctate, broader intercostal sulci inconspicuously rugulate. Discal depression very deep; surface, apart from some local micropunctation, smooth.

Pronotal pattern of nine major longitudinal costae as follows: Median costa broad, distinct in front, effaced in deep central depression; basomedian section narrow, surface deplanate, almost concave. Central depression posterolaterally delimited by depressed area of paramedian costa. Paramedian costa anteriorly broad, distinct, continuing caudad to narrow basal section. Sublateral costa narrow, distinct, tapering caudad, to ca 0.5 of pronotal length. Lateral costa anteriorly broad, distinct, extending from anterolateral lobe caudad, tapering to ca 0.75 of pronotal length. Marginal costa evenly curved, flat, ending at depressed basolateral area.

Elytra elongate-convex, dark brown, matt, glabrous, with 9 interstrial costae and intervening striae. Humeral and apical elytral umbone absent; apicosutural edge virtually rectangular, slightly protruding. Epipleuron wide. Elytral striae moderately distinct, deeply impressed; punctures of discal striae widely separated (4-6 diameters); striae 1 and 2 not reaching base, stopping at basal tubercle 1&3. Discal interstrial costae generally broadly rounded (on cross-section), surface with dense, scattered micropunctation.

Elytral pattern of interstrial costae as follows: Costa 1 (juxtasutural) strongly developed, divergent in front (creating distinct pseudoscutellum), ending at joint basal tubercle 1&3. Costa 2 moderately developed, shiny, tapering in front, stopping short of joint basal tubercle 1&3. Costa 3 strongly developed, reaching basal tubercle 1&3. Costa 4 moderately developed, reaching basal tubercle 4. Costa 5 moderately developed, divergent at base to low tubercle 5. Costa 6 moderately developed, divergent at base. Costa 7 moderately developed, divergent at base. Costae 8 and 9 flat, reaching base.

Antennal club yellow-brown. Anterolateral part of propectus deeply excavate. Preprosternal apophysis distinct, with numerous setae. Remainder of propectus glabrous, dark brown to brownish-black. Posterolateral area of propectus with some ridges and grooves. Postprosternal surface with small, shallow median impression. Transverse mesometasternal groove between posterior edges of mesocoxae distinct. Mesosternum with pair of mirrored, question-mark shaped grooves issuing from this groove, their full curve in front; mesosternal surface dark brown, glabrous, with shallow but very distinct median impression; anterior surface densely micropunctate. Metasternum with median and sublateral impression, and with fine perimarginal groove all around; dark brown. Abdominal venter with 5 visible sternites, all dark brown, matt, sternite 2 with series of distinct, short, elongate punctures along base at middle, punctures on sternites 3-5 less distinct in basal groove. Pygidium dark brown, glabrous, base broadly marginate; surface generally convex, with distinct basomedian groove and very slight basolateral depression on either side; surface lacking distinct microsculpture, matt.

Procoxa protuberant. Profemur brown, underside glabrous, abundantly micropunctate; outline broadly elliptic, marginate all around. Protibia brown, broad, with short setae, microsculpture poorly pronounced; general shape strongly complanate, with two external denticles, no basal serration; apex straight, transverse, with distinct apico-internal spine; internal side strongly dilated from slender base. Protarsus much longer than width of tibial apex (× 2.5), slender, yellowish; segment 1 inserted in fine groove, as long as segments 2-4 combined. Mesocoxae brown, widely separated, slightly divergent rostrad. Meso- and metafemora brown, broadly elliptic in outline, marginate all around, surface abundantly micropunctate, glabrous. Meso- and metatibiae brown, with several setae; broad, abruptly dilated from base, edges entire; tibial apex slightly emarginate, with pair of acuminate apico-internal spurs, external one long, slightly curved, internal one short, straight; upper side of meso- and metatibiae with fine longitudinal ridge near outer edge, underside with fine sinuate ridge from base to apico-internal section. Meso- and metatarsi brown, compacted-complanate, segments 1-4 very short. Length of long spur of metatibia 4 times short spur, reaching tarsal segment 5.

Measurements in mm. Maximum width of head 0.95; median dorsal length of pronotum 1.25 maximum width 1.15; sutural length of elytron 1.50, maximum width 1.20.

Etymology

Dedicated to Dr A.C. van Bruggen (Leiden, The Netherlands) – ever stimulating colleague, and expert on the terrestrial malacofauna of Africa.

Diagnostic comments

Although generally similar to the next species, *vanbruggeni* is more robust, and this applies also to the development of the dorsal costae. The presence of

a basomedian costa between the paramedian costae on the middle of the pronotal base also distinguishes it from *turkanicus*. The mesosternum of *vanbruggeni* has a pair of question-mark-like grooves, like in *usambaricus*, but differs by its distinct median depression. The abdominal venter also has a different sculpture.

Termitotrox turkanicus sp.n.

Figs 19-24

Material examined. Holotype (The Natural History Museum, London), with the following label data: N Kenya: S Turkana District: Lokori, on Kerio River, vii/1969, W.A. Sands, in fungus combs of *Odontotermes latericius* (Haviland, 1898).

Description

Holotype. General colour uniformly brown, largely matt; body length ca 2.5 mm.

Head surface generally evenly convex, only with slight callosity slightly behind clypeofrontal transition. Outer border of head entirely finely marginate. Clypeal outline generally evenly rounded over entire length. Clypeofrons brown, glabrous, densely microsculptured on clypeus, densely micropunctate on frontovertex; vertex lacking larger punctures. Clypeofrontal border at (vague) suture straight to obtusely angular genal tip (full-face view); genal surface depressed.

Prothorax brown, about as wide as hind body, sides (in dorsal view) largely very widely rounded. Emargination along vertex immarginate, anterolateral lobe with shortly rounded tip, edge projecting downward (forming side of anterolateral propectoral cavity). Pronotal sides steeply declivous. Posterolateral section of pronotum rounded. Base of pronotum evenly rounded, immarginate; no pronounced basolateral area (some fine grooves and ridges between regular costae). Pronotal surface glabrous. Costae abundantly micropunctate, lateral intercostal sulci locally punctate-rugulate, smooth and matt elsewhere. Discal depression very deep; surface, apart from some local micropunctation, smooth.

Pronotal pattern of nine major longitudinal costae as follows: Median costa narrow, distinct in front, effaced in deep central depression; basomedian section narrow, surface very deplanate, almost concave, delimited on either side by distinct narrow groove. Central depression posterolaterally delimited by depressed area of paramedian costa (this area has 2 fine ridges). Paramedian costa anteriorly broad, distinct, halfway declivous caudad to broad, deplanate, tapering basal section. Sublateral costa narrow, distinct, tapering shortly behind anterior border, narrowly extending caudad, to ca 0.4 of pronotal length. Lateral costa narrow, distinct, sinuate from anterolateral lobe to base, base on either side with some fine subparallel grooves. Marginal costa sinuate, narrow, ending near base.

Elytra elongate-convex, brown, matt, glabrous, with 9 interstrial costae and intervening striae. Humeral and apical elytral umbone absent; apicosutural edge virtually rectangular. Epipleuron wide. Elytral strial grooves very distinct, deeply impressed; punctures of discal striae indistinct; striae 1 and 2 not reaching base, stopping at basal tubercle 1&3; stria 3 broad. Discal interstrial costae generally narrow, slightly deplanate, intercostal grooves well defined (on cross-section), 3 broad; costal surfaces with dense, scattered micropunctation.

Elytral pattern of interstrial costae as follows: Costa 1 (juxtasutural) narrow on disc, strongly developed, divergent in front (creating distinct pseudoscutellum), ending at joint basal tubercle 1&3. Costa 2 moderately developed, tapering in front, stopping short well in front of joint basal tubercle 1&3. Costa 3 narrow on disc, strongly developed, reaching basal tubercle 1&3. Costa 4 moderately developed, reaching slight basal tubercle 4. Costa 5 moderately developed, reaching very slight basal tubercle 5. Costa 6 moderately developed, reaching base. Costa 7 moderately developed, reaching base. Costae 8 and 9 distinct, flat, contiguous at base.

Antennal club yellow-brown. Anterolateral part of propectus deeply excavate. Preprosternal apophysis slight, with numerous setae. Remainder of propectus glabrous, brown. Posterolateral area of propectus unmodified (no area with some ridges and grooves). Postprosternal surface with well delimited shallow median impression. Transverse mesometasternal groove between posterior edges of mesocoxae distinct, straight. Mesosternum with fine peridiscal grooves issuing from this groove, contiguous in front; mesosternal surface brown, glabrous, with very shallow median impression. Metasternum with median impression, and with fine perimarginal groove all around; brown. Abdominal venter with 5 visible sternites, all brown, matt, sternites 2-5 with narrow groove containing a series of very fine punctures along base. Pygidium dark brown, glabrous, base broadly marginate; surface generally convex, with distinct basomedian groove and very slight basolateral depression on either side; surface lacking distinct microsculpture, matt.

Procoxa protuberant. Profemur brown, underside glabrous, abundantly micropunctate; outline broadly elliptic, marginate all around. Protibia brown, broad, with short setae, microsculpture poorly pronounced; general shape strongly complanate, with two

external denticles, no basal serration; apex straight, transverse, with distinct apico-internal spine; internal side strongly dilated from slender base. Protarsus much longer than width of tibial apex (×2.5), slender, yellowish; segment 1 inserted in fine groove, as long as segments 2-4 combined. Mesocoxae brown, widely separated, slightly divergent rostrad. Meso- and metafemora brown, broadly elliptic in outline, marginate all around, surface abundantly micropunctate, glabrous. Meso- and metatibiae brown, with several setae; broad, abruptly dilated from base, edges entire; tibial apex slightly emarginate, with pair of acuminate apico-internal spurs, external one long, slightly curved, internal one short, straight; upper side of meso- and metatibiae with fine longitudinal ridge near outer edge, underside with fine sinuate ridge from base to apico-internal section. Meso- and metatarsi brown, compacted-complanate, segments 1-4 very short. Length of long spur of metatibia 3 times short spur, reaching tarsal segment 5.

Measurements in mm. Maximum width of head 0.80; median dorsal length of pronotum 0.85, maximum width 0.95, sutural length of elytron 1.15, maximum width 0.95.

Etymology

Named after the Turkana region in north-western Kenya, home of the Turkana people, and this *Termitotrox*.

Diagnostic comments

Although similar to the previous species, *turkanicus* is smaller and its pronotal and elytral costae are generally narrower in relation to the impressed intervals; the presence on the middle of the pronotal base of paramedian costae only distinguishes it from the other known East African *Termitotrox*, which have a narrow median costa between them. The basolateral areas of the pronotum are indistinct in dorsal view. The mesosternal grooves of *turkanicus* are not shaped like " question-marks".

Remarks

This species was collected with an undescribed species of the physogastric genus *Termitoderus* Mateu, 1966 (Scarabaeidae: Aphodiinae); a paper on this genus has been submitted for publication. The termite host *O. latericius* is not mentioned for Kenya in the list of Wanyonyi et al. (1984, neither for Ethiopia, Cowie et al., 1990).

Termitotrox kenyensis Paulian

Remarks

Based on a single specimen from Kenya: Nyandarua: 10 km SE Njabini., at 2550 m altitude, collected during September 1977 (Museum d'Histoire Naturelle, Geneva). Termite host unknown. The Nyandarua region is NNW of Nairobi, on the eastern edge of the Rift Valley. The combination of its small size and a continuous median pronotal costa should make this species readily identifiable (for more, see table above). Paulian (l.c.) gave, in addition to the detailed description, a useful outline drawing of the pronotum and its ornamentation.

Termitotrox consobrinus Reichensperger

Material examined. 2 specimens (Leiden museum), from South Africa: KwaZulu-Natal: Farm Wonderboom, (27/3-31/2), 14/v/1977, J.L. Sheasby, nest Tm32747, T-999; ditto, 15/v/1977, nest Tm32750, T-1005 (damaged specimen).

Remarks and diagnostic comments

The original description is detailed, and the pattern of dorsal costae seems adequately, though somewhat schematically depicted. The present notes are intended to confirm some of the key characters. The head, near the pronotal edge indeed has three longitudinal callosities. The elytral costae 4 etc. are remarkably interrupted by a subtransverse impression, parallel to the elytral base. There is no pseudoscutellum and the sections of elytral costa 8 and 9 in front of the postbasal interruption are completely fused into a single (humeral) pseudo-umbone. The mesosternal disc is almost identical to that of *T. turkanicus*, as described above: no distinct bipartition.

The type locality of *T. consobrinus* is "Natal" in South Africa, where our two specimens also come from. The single known type of *consobrinus*, supposed to be in the Gothenburg museum, was reported by Paulian (1985) to have disappeared, but Forshage (2002) recorded and depicted the holotype again. Whatever the type situation, the specimens at hand agree quite well with Reichensperger 's description, and, in our view, there can be no doubt about their identity.

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