

Tanyproctini (Coleoptera: Scarabaeidae: Melolonthinae) of Socotra Island

David KRÁL¹⁾, Richard SEHNAL²⁾ & Aleš BEZDĚK³⁾

¹⁾Department of Zoology, Faculty of Science, Charles University in Prague, Viničná 7, CZ-128 43 Praha 2, Czech Republic; e-mail: kral@natur.cuni.cz

²⁾Department of Zoology and Fisheries, Faculty of Agrobiolgy, Food and Natural Resources, Czech University of Life Sciences Prague, Kamýcká 129, CZ-165 21 Praha 6, Czech Republic; e-mail: richard.sehnal@seznam.cz

³⁾Biology Centre ASCR, Institute of Entomology, Branišovská 31, CZ-370 05 České Budějovice, Czech Republic; e-mail: bezdek@entu.cas.cz

Abstract. A review of the Socotran species of the melolonthine tribe Tanyproctini is provided. In addition to three species previously known from this island, five more including one new genus are described: *Canudemema homhil* sp. nov. is closely related to *C. socotrae* Lacroix, 1994; both species differ mainly in the shape of antennomeres and external male genitalia. *Tanyproctus (Tanyproctus) keithi* sp. nov., *T. (T.) lacroixi* sp. nov. and *T. (T.) wraniki* sp. nov. are considered morphologically similar to *T. (T.) canui* Lacroix, 1999 and *T. (T.) puncticeps* (Waterhouse, 1881). *Socotraproctus haghier* gen. et sp. nov. can be characterized mainly by having considerably small eyes and elytra with longitudinal strips of scale-like shaped, whitish macrosetae. A key to Socotran Tanyproctini species is given along with their diagnostic characters including illustrations of copulatory organs and external morphology. The daily activity pattern of the taxa is discussed.

Key words. Coleoptera, Scarabaeoidea, Scarabaeidae, Melolonthinae, Tanyproctini, taxonomy, new genus, new species, key, distribution, Yemen, Socotra

Introduction

The melolonthine tribe Tanyproctini (formerly Pachydemini, see BOUCHARD et al. (2011) for the explanation), is a species-rich taxon with a world-wide distribution. A recently published catalogue of this group (LACROIX 2007) listed altogether 564 valid species, with the majority of taxa being distributed in the Palearctic and Afrotropical regions.

Socotran fauna of Tanyproctini is known rather insufficiently. For a long time, only *Tanyproctus puncticeps* (Waterhouse, 1881) was recorded from this island (e.g. GAHAN 1903).

Additional species were discovered as late as the end of 20th century by LACROIX (1994, 1999), who described a new genus *Canudemema* Lacroix, 1994 with the type species *C. socotrae* Lacroix, 1994, and a new species *Tanyproctus canui* Lacroix, 1999, both based on a very low number of specimens.

Recently, the authors had the opportunity to study rich material of Tanyproctini collected during several Czech biological expeditions to Socotra, as well as a few specimens found by the German herpetologist Wolfgang Wranik and Lithuanian entomologist Aidas Saldaitis. Examination of this material allowed us to describe four new species and improve our knowledge about the geographic distribution of the previously known species.

Material and methods

The following acronyms identify the collections housing the material examined (curators' names are in parentheses):

ABCC	Aleš Bezděk collection, České Budějovice, Czech Republic;
BMNH	The Natural History Museum [former British Museum (Natural History)], London, United Kingdom, (Maxwell V. L. Barclay);
DKCC	Denis Keith collection, Chartres, France;
GSCA	Guido Sabatinelli collection, Amman, Jordan;
IBUR	Institut für Biowissenschaften, Lehrstuhl der allgemeine und spezielle Zoologie, Universität Rostock, Rostock, Germany (Ragnar Kinzelbach);
ISNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (Alain Drumont);
JBCP	Jan Batelka collection, Praha, Czech Republic;
MLCP	Marc Lacroix collection, Paris, France;
MNHN	Muséum National d'Histoire naturelle, Paris, France (Antoine Mantilleri, Olivier Montreuil);
NMPC	Národní muzeum, Praha, Czech Republic (Jiří Hájek);
RSCV	Richard Sehnal collection, Velenice, Czech Republic;
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig, Bonn, Germany (Dirk Ahrens).

Altogether 183 specimens (see material below) were studied. Genitalia of at least three males of each species, if available, were dissected for examination. Specimens were examined with an Olympus SZ61 stereomicroscope; measurements were taken with an ocular grid. The habitus photographs were taken using a Canon MP-E 65mm/2.8 1-5x Macro on bellows attached to a Canon EOS 550D camera. Partially focused images of each specimen were combined using the Helicon Focus 3.20.2 Pro software. Specimens of the newly described species are provided with one printed red label: '[name of the taxon] sp. n., HOLOTYPE, [or PARATYPE with type number], sex symbol, David Král, Richard Sehnal & Aleš Bezděk det. 2011 [or 2012]'. Exact label data are cited for the material examined. Separate labels are indicated by double slash '//', lines within each label are separated by a slash '/'. Information in quotation marks indicates the original spelling. Authors' remarks and additional comments are placed in square brackets: [p] – preceding data (within quotation marks) are printed; [h] – the same but handwritten. HT – holotype, LT – lectotype, PT – paratype. For details and comments on individual localities visited, including the prevailing spelling, see BEZDĚK et al. (2012).

Systematics

Genus *Canudema* Lacroix, 1994

(Figs. 1–4, 24, 25, 32, 33)

Canudema Lacroix, 1994: 154, Figs. 1, 2, 5, 8, 12, 14 (description); LACROIX (2002): 410, Figs. 44–52 (review);

KRÁL & SMETANA (2006): 199 (catalogue); LACROIX (2007): 47, Figs. 279–288 (review, key).

Canaudema [sic!; incorrect subsequent spelling]: SABATINELLI & PONTUALE (1998): 130 (key).

Type species. *Canudema socotrae* Lacroix, 1994, by original designation.

Diagnosis. Medium sized, elongate, colour black, extremities and elytra dark brownish; dorsal surface alutaceous, pronotum and elytra finely whitish tomentose. Labrum small, bilobed; lobes rounded. Outline of clypeus almost trapezoidal or bilobed. Genae narrow, rounded. Frontoclypeal suture broadly arcuate, distinctly impressed. Eyes large, exceeding genae externally in dorsal aspect. Antennae decamerous, club hexa- or heptamerous, regularly arcuate, considerably long, twice as long as antennal shaft (antennomeres 1–4 combined). Terminal maxillary palpomeres elongate, with oval alutaceous flat area subbasally. Pronotum approximately hexagonal, with subobsolete longitudinal midline, excepting basal margin all around bordered; surface coarsely, almost regularly punctate. Elytra moderately convex, only very slightly dilated posteriad, sutural corner angular; sutural interval moderately convex, other intervals flat, even intervals (2, 4, 6, 8, 10) considerably wider than odd (3, 5, 7, 9) ones, Macropterous. Protibiae bidentate, subapical calcar stout, long, inserting against basal tooth; meso- and metatibiae moderately expanded apicad, with one oblique carina externally, apical edge with row of short, stout, equal macrosetae; terminal calcars stout, long, acute apically, lower calcar little shorter than upper; pro- and mesotarsomeres 2–4 not considerably widened (Figs. 32, 33), with patches of short, dense macrosetae; claws deeply cleft, both portions acute apically. Aedeagus symmetrical, parameres slender, relatively long, dorsoapical third densely covered with whitish microsetae.

Comparisons. Refer to the identification key below.

Geographical distribution. Genus endemic to Socotra Island.

Canudema homhil sp. nov.

(Figs. 1, 2, 24, 32)

Type locality. Yemen, Soqatra Island, Homhil protected area, 364 m a.s.l., 12°34'27"N 54°18'27"E.

Type material. HOLOTYPE: ♂, labelled: 'Yemen, Soqotra Is., HOMHIL protected area / 28–29/xi.2003, 364m / N12°34'27"E54°18'32" / [GPS], David Král lgt. // YEMEN – SOQOTRA 2003 / Expedition; Jan Farkač, / Petr Kabátek & David Král [p]'; paratypes Nos. 1–7 (♂♂), same data.

Type depositories. HT and PT Nos. 1–3 in NMPC, PT No. 4 in R SVC, PT No. 5 in ABCC, PT No. 6 in MNHN, PT No. 7 in BMNH.

Description of holotype (♂). Body length 12.4 mm. Body elongate, almost parallel; colour black, extremities and elytra dark brownish; dorsal surface alutaceous, pronotum and elytra finely whitish tomentose, macrosetation whitish (Figs. 1, 2).

Head. Labrum small, bilobed; lobes rounded, coarsely, regularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, surface depressed, anterior margin shallowly emarginate, anterior angles rounded, sides weakly rounded, divergent posteriad.

Genae narrow, rounded. Frontoclypeal suture broadly arcuate, distinctly impressed. Eyes large, exceeding genae externally in dorsal aspect; distance between eyes in ventral aspect shorter than diameter of eye. Punctuation of clypeus considerably coarse and dense, almost regularly distributed, punctures separated by less than their diameter, each puncture bearing short, fine, recumbent macroseta. Vertex and occiput distinctly rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing long, fine, recumbent macroseta. Genae rugo-punctate, with group of long, robust setae. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3, 4 elongate; club hexamerous (Fig. 2), regularly arcuate, considerably long, twice as long as antennal shaft (antennomeres 1–4 combined); antennomeres 1–4 with sparse, long macrosetae, club inconspicuously macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, with oval alutaceous flat area subbasally, approximately of same length as palpomeres 2 and 3 combined.

Pronotum weakly convex, approximately hexagonal, broadest approximately in middle, with subobsolete longitudinal midline, excepting basal margin all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly coarsely punctate, macrosetation long, recumbent, directed posteriad; lateral margin considerably coarsely crenate, with row of long, erect macrosetae; basal margin with row of fine, almost regularly distributed punctures bearing mainly in posterior angles short, recumbent macrosetae directed anteriad. Anterior angles prominent, projecting over anterior margin, acute-angular with rounded apex; sides in approximately anterior half almost straight, divergent posteriad, then almost straight, convergent to very broadly obtuse posterior angles; basal margin broadly rounded. Surface coarsely, almost regularly punctate, punctures separated by their 1–2 diameters, most punctures bearing very short, fine, recumbent macrosetae, macrosetation becoming considerably longer and more robust anterolaterally and along anterior margin.

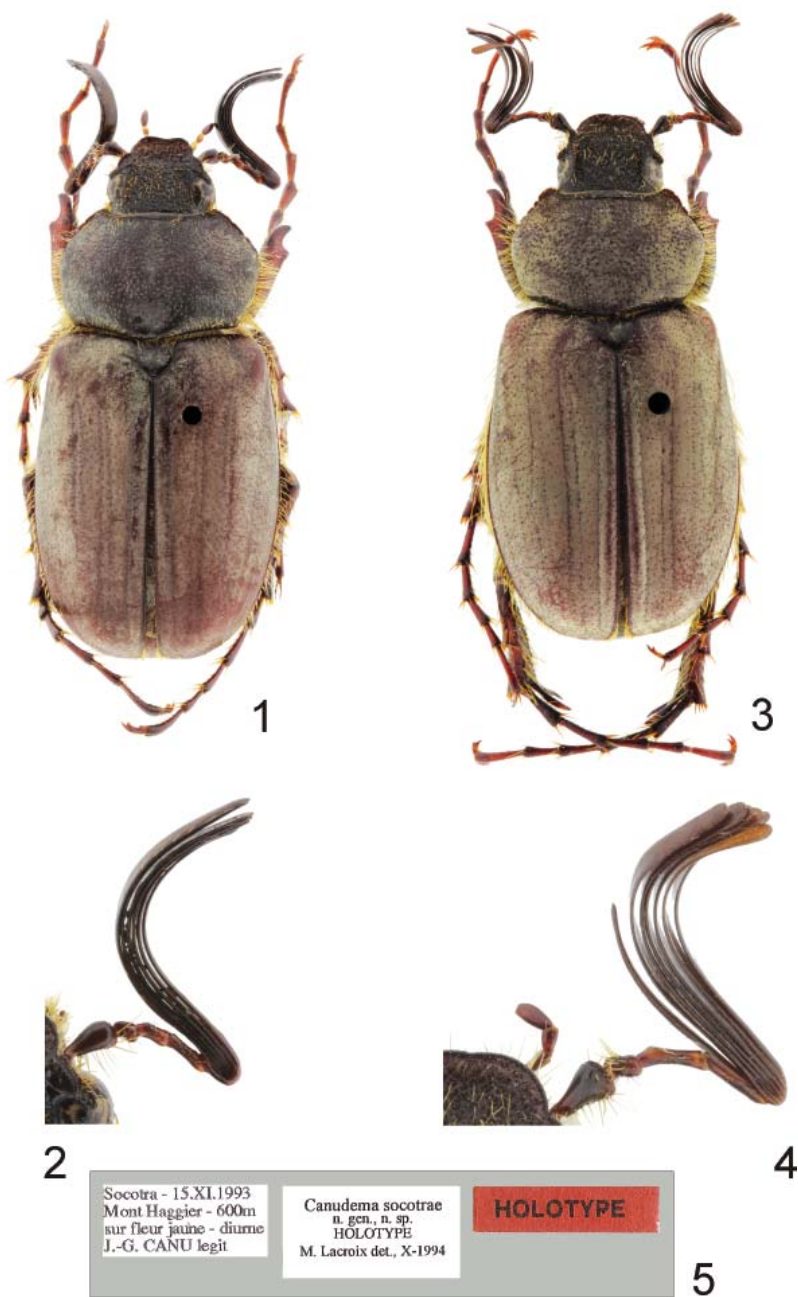
Scutellar shield approximately as wide as long, triangular; sides broadly arcuate, apex acute with several punctures, along lateral margin inconspicuously macrosetaceous.

Elytra moderately convex, only very slightly dilated posteriad, sutural corner angular; striae distinctly impressed, with rows of coarse, dense, almost regularly distributed punctures, punctures separated approximately by more than twice their diameters; sutural interval moderately convex, other intervals flat, even intervals (2, 4, 6, 8, 10) considerably wider than odd (3, 5, 7, 9) ones, all coarsely, sparsely, almost regularly punctate, punctures separated by more than twice their diameter; lateral margin and sutural corner with row of robust, short, regularly distributed macrosetae, surface almost nude.

Macropterous.

Legs. All femora shiny, irregularly coarsely punctate, macrosetae considerably long; pro-tibiae bidentate, coarsely punctate dorsally, subapical calcar stout, long, inserted against basal tooth; meso- and metatibiae moderately expanded apicad, with one oblique carina externally, apical edge with row of short, stout, equal macrosetae; terminal calcars stout, long, acute apically, lower calcar little shorter than upper; pro- and mesotarsomeres 2–4 not considerably widened, with patches of short, dense macrosetae; claws deeply cleft, both portions acute apically (Fig. 32).

Ventrites clothed with dense recumbent macrosetation; propygidium irregularly rugo-punctate and shortly recumbently macrosetaceous; pygidium all along bordered, shallowly,



Figs. 1–5. 1, 2 – *Canudemema homhil* sp. nov., paratype No. 4, male: 1 – habitus; 2 – right antenna. 3–5 – *C. socotrae* Lacroix, 1994, holotype, male: 3 – habitus; 4 – right antenna; 5 – labels. Not in scale.

Table 1. Differential characters of *Canudema homhil* sp. nov. and *C. socotrae* Lacroix, 1994

	<i>Canudema homhil</i> sp. nov.	<i>Canudema socotrae</i> Lacroix
shape of clypeus	almost trapezoidal	almost bilobed
punctuation of clypeus	coarser	a little finer
antennal club	hexamerous (antennomeres 5–10)	heptamerous (antennomeres 4–10)
shape of antennomere 4	elongate, lamelle absent	prolonged basally in lamelle (club antennomere 1), reaching to two thirds of antennomere 5
shape of terminal maxillary palpomeres	elongate to subacute	truncate apically
shape of parameres	distal part not dilated in dorsal aspect	distal part slightly dilated in dorsal aspect
distribution	E Socotra (Homhil basin)	C Socotra (Hagher massif)

irregularly rugo-punctate to rugose, surface becoming smother basally and shiny apicad, excepting few macrosetae on apical margin nude.

Male genitalia (Fig. 24). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect, dorsoapical third densely covered with whitish microsetae.

Variability in males. Paratypes somewhat variable in body length (11.7–15.3 mm), colour of dorsal surface and length and distribution of macrosetae.

Female. Unknown.

Differential diagnosis. The new species is closely related to *C. socotrae* Lacroix, 1994. For differentiation see the complex of diagnostic characters in the identification key below and Table 1.

Etymology. Derived from the area of origin of the new species, the Homhil basin; noun in apposition.

Collecting circumstances. Probably diurnal species; all type specimens were captured climbing on vegetation (lower *Croton* L. and *Jatropha* L. (Euphorbiaceae) shrubs) during a sunny day late in the afternoon.

Geographical distribution. Species endemic to Socotra Island; the whole type series originates from the Homhil basin in NE part of Socotra (Fig. 41).

Canudema socotrae Lacroix, 1994

(Figs. 3–5, 25, 33)

Canudema socotrae Lacroix, 1994: 155, Figs. 1, 2, 5, 8, 12, 14 (description); Lacroix (1999): 95; Lacroix (2002): 411, Figs. 44–52 (review); Král & Smetana (2006): 199 (catalogue); Lacroix (2007): 48, Figs. 279–288 (catalogue).

Canaudema [sic!] *socotrae*: Sabatinelli & Pontuale (1998: 130) (review) [incorrect subsequent spelling].

Type locality. ‘Socotra, Mont Haggier, 600 m’.

Type material examined. HOLOTYPE: ♂, labelled: ‘Socotra – 15.XI.1993 / Mont Haggier – 600m / sur fleur jaune – diurne / J.-G. CANU legit. [p] // HOLOTYPE [p, red label] // *Canudema socotrae* / n.gen., n.sp. / HOLOTYPE / M. Lacroix det., X-1994 [p]’ in MNHN.

Additional material examined. YEMEN: SOCOTRA ISLAND: 'G. of ADEN: / Socotra / No further / data [p] // Oxford Exped. / B.M. 1957-25 [p] // Melolonthidae / gen. nr. / Pachydemocera [h] / R.D. Pope det. 1969 [p] // Tanyproctus / sp. [h] / DET. A.V. EVANS [p] '87 [h]', 1 ♂ in BMNH.

Diagnostic characters (♂♂). Body length 14.2–14.8 mm. Body elongate, almost parallel; colour black, extremities and elytra dark brownish; dorsal surface alutaceous, pronotum and elytra finely whitish tomentose, macrosetation whitish (Fig. 3).

Head. Outline of clypeus almost trapezoidal, with considerably upturned margin, surface depressed, anterior margin shallowly emarginate, anterior angles rounded, sides weakly rounded, divergent posteriad. Genae narrow, rounded. Frontoclypeal suture broadly arcuate, distinctly impressed. Eyes large, exceeding genae externally in dorsal aspect. Punctuation of clypeus coarse and dense, each puncture bearing short, fine, recumbent macroseta. Vertex and occiput distinctly rugo-punctate, each puncture bearing long, fine, recumbent macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomere 3 elongate; club heptamerous (Fig. 4), regularly arcuate, considerably long, twice as long as antennal shaft (antennomeres 1–3 combined), antennomere 4 prolonged basally in lamelle (club antennomere 1), reaching to two thirds of antennomere 5. Terminal maxillary palpomeres slightly truncate, with oval alutaceous flat area subbasally.

Pronotum weakly convex, approximately hexagonal, broadest approximately in middle, with subobsolete longitudinal midline, excepting basal margin all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly coarsely punctate, macrosetation long, recumbent, directed posteriad; lateral margin considerably coarsely crenate, with row of long, erect macrosetae; basal margin with row of fine, almost regularly distributed punctures bearing mainly in posterior angles short, recumbent macrosetae directed anteriorly. Anterior angles prominent, projecting over anterior margin, acute-angular, with rounded apex; sides in approximately anterior half almost straight, divergent posteriad, than almost straight convergent to very broadly obtuse posterior angles; basal margin broadly rounded. Surface coarsely, almost regularly punctate.

Scutellar shield approximately as wide as long, triangular; sides broadly arcuate, apex acute, surface with several punctures.

Elytra moderately convex, only very slightly dilated posteriad; striae distinctly impressed, with rows of coarse, dense, almost regularly distributed punctures; sutural interval moderately convex, other intervals flat, even intervals (2, 4, 6, 8, 10) considerably wider than odd (3, 5, 7, 9) ones, all coarsely, sparsely, almost regularly punctate; lateral margin and sutural corner with row of robust, short, regularly distributed macrosetae, surface almost nude.

Macropterous.

Legs. Protibiae bidentate, coarsely punctate dorsally, subapical calcar stout, long, inserting against basal tooth; pro- and mesotarsomeres 2–4 not considerably widened, with patches of short, dense macrosetae (Fig. 33).

Ventrites clothed with dense recumbent macrosetation; propygidium irregularly rugo-punctate and shortly recumbently macrosetaceous; pygidium shallowly, irregularly rugo-punctate to rugose, surface becoming smother basally and shiny apicad, excepting few macrosetae on apical margin nude.

Male genitalia (Fig. 25). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part slightly dilated in dorsal aspect, dorsoapical third densely covered with whitish microsetae.

Variability in males. Both specimens examined vary only slightly in body length (14.2–14.8 mm). Non-type specimen from BMNH is abraded, macrosetation on elytra is almost missing.

Female. Unknown.

Differential diagnosis. Refer to the identification key below and Table 1.

Collecting circumstances. Probably diurnal species; holotype was collected from a yellow flower (see holotype label).

Geographical distribution. Species endemic to Socotra Island, so far known only from the Haghier massif situated in central part of Socotra.

Genus *Socotraproctus* gen. nov.

(Figs. 6–9, 26, 34)

Type species. *Socotraproctus haghier* sp. nov., by original designation.

Diagnosis. Male. Medium sized, elongate, colour black; dorsal surface moderately shiny (Fig. 6). Labrum small, bilobed; lobes rounded. Outline of clypeus almost trapezoidal, with considerably upturned margin, surface depressed (Fig. 7). Genae narrow. Frontoclypeal suture feebly bisinuate. Eyes relatively small, not extending beyond genae externally in dorsal aspect; distance between both eyes in ventral aspect exceeding remarkably diameter of eye. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined). Terminal maxillary palpomeres elongate, rounded apically, with oval alutaceous flat area subbasally. Pronotum moderately convex, transversal, broadest approximately in middle, with narrow, impunctate, medial longitudinal strip, excepting basal margin all around bordered; surface coarsely, almost regularly punctate. Elytra moderately convex, only very slightly dilated posteriad; striae distinctly impressed, with rows of coarse, dense, almost regularly distributed punctures, each puncture bearing minute, recumbent macroseta; sutural interval moderately convex, other intervals flat, even intervals (2, 4, 6, 8, 10) considerably wider than odd (3, 5, 7, 9) ones, all coarsely, densely, almost regularly punctate; odd intervals (mainly interval 3) covered with narrowly scale-like shaped, recumbent macrosetae, forming irregular, longitudinal, whitish strips. Protibiae tridentate, with only very weakly indicated basal teeth, subapical calcar inserted against medial tooth; meso- and metatibiae moderately expanded apicad, with two oblique carinae externally, apical edge with row of short, stout, equal macrosetae; terminal calcars stout, long, acute apically, lower calcar little shorter than upper; pro- and mesotarsomeres 2–4 not considerably widened, with patches of short, dense macrosetae; claws deeply cleft, both portions acute apically (Fig. 34).

Male genitalia (Fig. 26). Aedeagus symmetrical, parameres long, slender, remarkably shorter than phallobasis, with longitudinal elevated carina dorsally, apical half opaque, densely covered with whitish microsetae in dorsal aspect.

Female. Remarkably robust, moderately dilated posteriad (Fig. 8); outline of clypeus semicircular; eyes considerably small; elytra coalescent, finely pointed subapically, without

scale-like shaped macrosetae; brachypterous; protibiae bidentate; meso- and metatibiae strongly expanded apicad; pro- and mesotarsomeres simply shaped.

Comparisons. Refer to the identification key below.

Etymology. Denotes the geographical distribution (Socotra Island) and relevance to the genus *Tanyproctus* Ménétrières, 1832. Masculine gender.

Geographical distribution. Genus endemic to Socotra Island.

***Socotraproctus haghier* sp. nov.**

(Figs. 6–9, 26, 34)

Type locality. Yemen, Socotra Island, Haghier Mountains, Skant, 12°34.557'N 54°01.514'E.

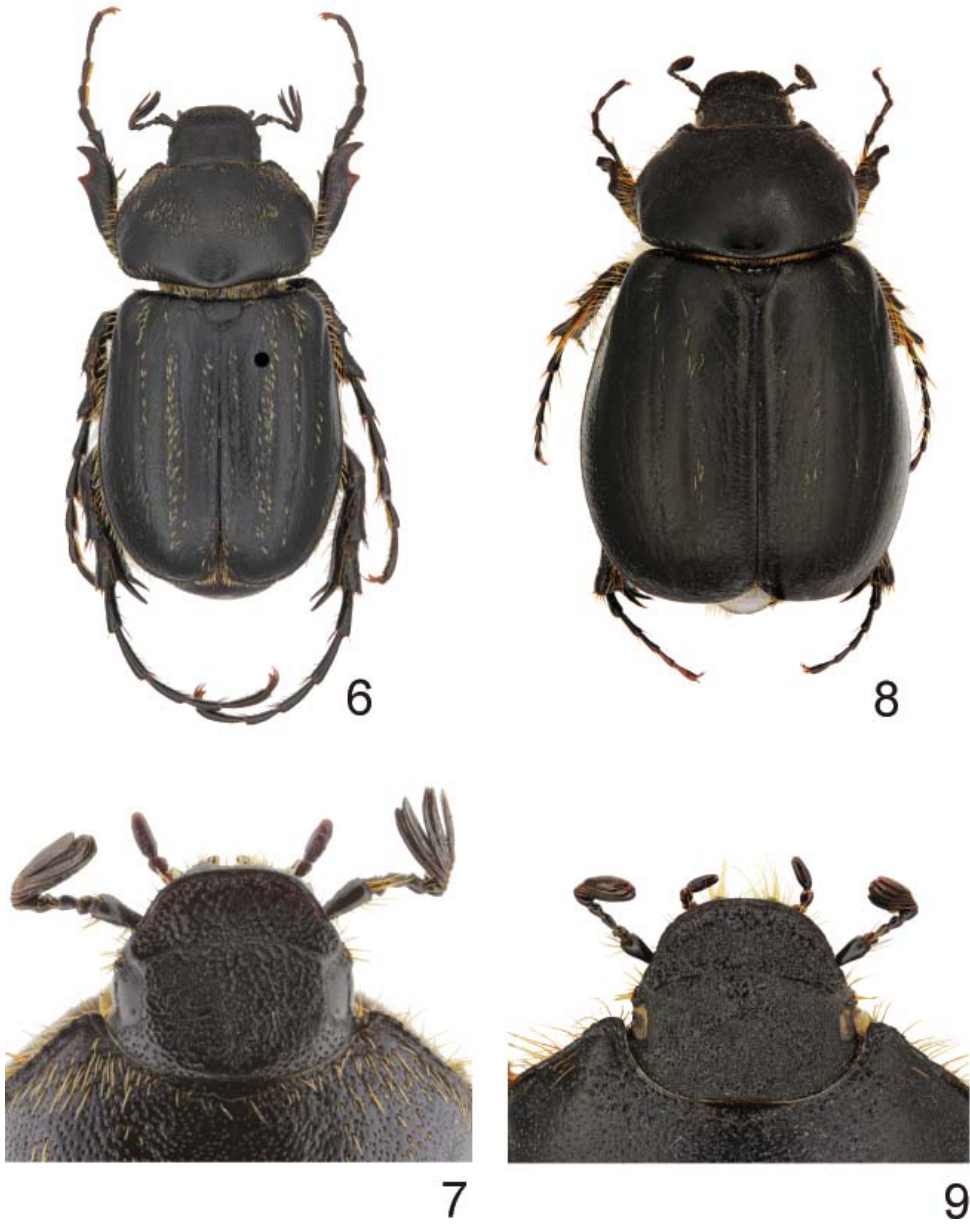
Type material. HOLOTYPE: ♂, labelled: 'YEMEN, Socotra Isl. / Hagher Mts., Skant / N 12°34,557', E 054°01,514' / 7.-8.vi.2010 / V. Hula & J. Niedobová let. [p]'; paratypes Nos. 1–5 (♂♂), same data; paratypes Nos. 6–12 (1 ♂ and 6 ♀♀): 'YEMEN, SOCOTRA Island / Hagher Mts., SCAND Mt. env. / montane evergreen woodland / 16.–18.vi.2012 / 12°34.6'N, 54°01.5'E, 1450 m [p] // SOCOTRA expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský / J. Niedobová & L. Purchart leg. [p]'.

Type depositories. HT and PT Nos. 1, 6–10 in NMPC, PT Nos. 2, 11 in RSCV, PT Nos. 3, 12 in ABCC, PT No. 4 in BMNH, PT No. 5 MNHN.

Description of holotype (♂). Body length 14.6 mm. Body elongate; colour black; dorsal surface moderately shiny, macrosetation pale to whitish (Fig. 6).

Head. Labrum small, bilobed; lobes rounded, coarsely, regularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, surface depressed, anterior margin almost straight, anterior angles rounded, sides almost straight, divergent posteriad (Fig. 7). Genae narrow, rounded. Frontoclypeal suture feebly bisinuate, distinctly impressed. Eyes relatively small, not extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus considerably coarse and dense, almost regularly distributed, punctures separated by less than their diameter, each puncture bearing short, fine, recumbent macroseta. Vertex and occiput distinctly rugopunctate, punctures separated by less than their diameter to confluent, macrosetation absent. Genae rugopunctate, with tuft of long, robust setae. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined); antennomeres 1–5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, with oval alutaceous flat area subbasally, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately at middle, with narrow, impunctate, medial longitudinal strip, excepting basal margin all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly coarsely punctate; lateral margin considerably coarsely crenate, with row of long, erect macrosetae; basal margin except medial area with row of fine, almost regularly distributed punctures bearing mainly in posterior angles short, recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angular with rounded apex; sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; basal margin broadly rounded. Surface coarsely, almost regularly punctate, punctures separated by their 1–2 diameters, punctuation



Figs. 6–9. *Socotraproctus haghier* gen. nov. et sp. nov. 6–7 – male, paratype No. 1, body length 16.8 mm; 8–9 – female, paratype No. 7, body length 21.7 mm. 6, 8 – habitus; 7, 9 – head. Not to scale.

becoming denser and coarser discally (excepting longitudinal medial strip) and anterolaterally; most punctures bearing very short, fine, recumbent macrosetae, macrosetation becoming considerably longer and more robust anterolaterally and along anterior margin.

Scutellar shield approximately as wide as long, triangular; sides broadly arcuate, apex acute, surface with several punctures basally.

Elytra moderately convex, only very slightly dilated posteriad, sutural corner angular; striae distinctly impressed, with rows of coarse, dense, almost regularly distributed punctures, punctures separated approximately by their two diameters, each puncture bearing minute, recumbent macroseta; sutural interval moderately convex, other intervals flat, even intervals (2, 4, 6, 8, 10) considerably wider than odd (3, 5, 7, 9) ones, all coarsely, densely, almost regularly punctate, punctures separated approximately by more than their diameter; odd intervals (mainly interval 3) covered with narrowly scale-shaped, recumbent macrosetae forming irregular, longitudinal whitish strips; lateral margin and sutural corner with row of stout, long, regularly distributed macrosetae.

Macropterous.

Legs. All femora shiny, irregularly coarsely punctate, row of long, recumbent macrosetae, medially; protibiae tridentate, with only very weakly indicated basal teeth, coarsely punctate dorsally, subapical calcar stout, long, inserted against medial tooth; meso- and metatibiae moderately expanded apicad, with two oblique carinae externally, apical edge with row of short, stout, equal macrosetae; terminal calcars stout, long, acute apically, lower calcar little shorter than upper; pro- and mesotarsomeres 2–4 not considerably widened, with patches of short, dense macrosetae; claws deeply cleft, both portions acute apically (Fig. 34).

Ventrites clothed with dense, recumbent macrosetation; propygidium irregularly rugo-punctate and shortly, recumbently macrosetaceous; pygidium all along bordered, shallowly, irregularly rugo-punctate to rugose, surface becoming smother basally and shiny apicad, excepting few macrosetae on apical margin nude.

Male genitalia (Fig. 26). Aedeagus symmetrical, parameres long, slender, remarkably shorter than phallobasis, dorsally with longitudinal elevated carina, apical half opaque, densely covered with whitish microsetae in dorsal aspect.

Variability in males. Paratypes only slightly variable in body length (14.5–16.8 mm), punctuation of dorsal surface, length and distribution of macrosetae including scale-like shaped setae forming longitudinal elytral strips.

Female. Body length 18.6–21.7 mm, differs from male in the following characters: body size larger, considerably robust, convex, moderately dilated posteriad, macrosetation pale (Fig. 8); outline of clypeus almost semicircular, sides more divergent posteriad (Fig. 9); eyes distinctly smaller; surface of clypeus bare, without macrosetation; antennal club considerably shorter; pronotum strongly convex, sides shallowly emarginate in posterior third, macrosetation much sparser, restricted approximately only to anterior angles; scutellar shield impunctate; elytra coalescent, strongly convex, moderately dilated posteriad, finely pointed subapically (prolonged stria 3), surface shinier, striae indistinctly impressed, sutural interval strongly convex, macrosetation much sparser, odd intervals covered only with very sparsely and irregularly distributed, recumbent, long macrosetae; macrosetae of lateral margin distinctly longer and recumbent, macrosetae of sutural corner considerably dense, erect; brachypterous, metathoracic wings little

longer than length of elytron; meso- and metafemora more robust; protibiae bidentate, subapical calcar shorter, slender, sharply pointed apically; meso- and metatibiae strongly expanded apicad; pro- and mesotarsomeres slender, not widened; pygidium shallowly concave subapically.

Differential diagnosis. Refer to the identification key below.

Etymology. Derived from the area of origin of the new species, the Haghier massif, Socotra; noun in apposition.

Collecting circumstances. Probably nocturnal species; all males collected in 2010 were picked at light (V. Hula, pers. comm); specimens collected in 2012 were found dead at ecotone of clearings surrounded predominantly with *Leucas haghierensis* Al-Gifri & Cortés-Burns (Lamiaceae) and *Hypericum scopulorum* Balf. f. (Hypericaceae) shrubs in the montane evergreen woodland (J. Hájek, pers. comm.).

Geographical distribution. Species endemic to Socotra Island; the whole type series originates from the Haghier massif situated in central part of the Socotra (Fig. 42).

Genus *Tanyproctus* Ménériès, 1832

(Figs. 10–23, 27–31, 35–39)

Tanyproctus Ménériès, 1832: 185 (description); SABATINELLI & PONTUALE (1998): 131 (review); LACROIX (2002): 406, Figs. 26–43 (review); LACROIX (2004): 157, Figs. 3, 6, 9, 13, 15 (key); KRÁL & SMETANA (2006): 205 (catalogue); LACROIX (1999): 92, Figs. 28–43; LACROIX (2007): 166, Figs. 880–956 (catalogue, review). Only references dealing with the Socotran fauna are listed, for extensive bibliography, see LACROIX (2007).

Type species. *Tanyproctus persicus* Ménériès, 1832, by monotypy.

Diagnosis. Body convex, more or less parallel, rarely dilated posteriad; clypeus transversal, anterior angles rounded, with more or less developed emargination; antennae decamerous, antennomere 2 remarkably prolonged, antennal club pentamerous (tetramerous in subgenus *Tetraproctus* Iablokoff-Khnzorian, 1953), all club antennomeres (6–10) of same length; anterior margin of pronotum bordered; protarsomeres 2–4 in males more or less strongly dilated, with patches of short macrosetae ventrally.

Geographical distribution. Widely distributed genus, known from south-eastern Europe (Greece and Transcaucasia), northern Africa, Turkey, Near East including Sinai, Middle Asia, Afghanistan, Iran, Iraq to SW China and Laos, Myanmar and Thailand (see, e.g., KRÁL & SMETANA 2006, LACROIX 2007, KEITH 2009).

Taxonomic remarks. Relatively large genus with 94 described species (LACROIX 2007, KEITH 2009), recently divided into three subgenera (LACROIX 2007). They are *Tanyproctocera* Reitter, 1902, *Tanyproctus* Ménériès, 1832 and *Tetraproctus* Iablokoff-Khnzorian, 1953. All so far known *Tanyproctus* species from Socotra (including species described in this paper) could be classified into the nominotypical subgenus due to the following diagnostic characters: antennal club pentamerous (tetramerous in *Tetraproctus*) and outline of clypeus trapezoidal with straight or emarginate anterior margin (semicircular in *Tanyproctocera*).

Tanyproctus (Tanyproctus) canui Lacroix, 1999

(Figs. 21–23, 27, 36)

Tanyproctus canui Lacroix, 1999: 92, Figs. 28–43 (description); LACROIX (2002): 408, Figs. 35–43 (review); WRANIK (2003): 360, Pl. 173 (note, photo of ♂ and ♀); LACROIX (2007): 172, Figs. 881–896 (catalogue).

Tanyproctus (Tanyproctus) canui: KRÁL & SMETANA (2006): 206 (catalogue).

Type locality. 'Île de Socotra, intérieur'.

Type material examined. HOLOTYPE: ♂, labelled: 'Île de Socotra / Intérieur – XI – 1997 / Canu leg. [p] // HOLOTYPE [p, red label] // Tanyproctus / canui n.sp. [h] / M. LACROIX det. 19 [p] 99 [h]' in MNHN.

Additional material examined. YEMEN: SOCOTRA ISLAND: 'Yemen, Soqotra Is. / 21.xi.-12.xii.2003 / HADIBOH env., ca 10-100m / N12°65'02" E54°02'04" / [GPS], David Král lgt. [p] // YEMEN – SOQOTRA 2003 / Expedition; Jan Farkač / Petr Kabátek & David Král [p]', 7 ♂♂ in NMPC; 'Yemen, Soqotra Is. / 24-26.xi.2003 / WADI AYHAFT, 190m / N12°36'38" E53°58'49" / [GPS], David Král lgt. [p] // YEMEN – SOQOTRA 2003 / Expedition; Jan Farkač / Petr Kabátek & David Král [p]', 9 ♂♂ and 1 ♀ in NMPC; 'Yemen: Soqotra Is. / 24-26.xi.2003 / WADI AYHAFT / N12°36'38" E53°58'49" / 190 m [GPS]; Jan Farkač lgt. [p] // YEMEN – SOQOTRA 2003 / Expedition; Jan Farkač / Petr Kabátek & David Král [p]', 2 ♂♂ in NMPC; 'Yemen: Soqotra Is. / 28-29.xi. / HOMHIL protected area, 2003 / N12°34'27" E54°18'32" / 364 m [GPS]; Jan Farkač lgt. [p] // YEMEN – SOQOTRA 2003 / Expedition; Jan Farkač / Petr Kabátek & David Král [p]', 1 ♂ in NMPC; 'E SOCOTRA / sand dunes near / Irissey, 18.1.2010 / Saldaitis leg. [p] // Coll. I.R.Sc.N.B. / Material purchased / from Aidas SALDAITIS / I.G.: 32.084 [p]', 3 ♀♀ in ISNB; 'YEMEN, SOCOTRA Island / wadi Ayhaft / 12°36.5'N, 53°58.9'E, 200m / Jiří Hájek leg., 7.-8.xi.2010 [p]', 1 ♂ and 2 ♀♀ in NMPC; 'SOCOTRA Is. (YE) wadi Ayhaft / 12°36.5'N, 53°58.9'E, 200m / Jan Batelka leg., 7.-8.xi.2010 [p]', 5 ♂♂ and 2 ♀♀ in JBCP; 'YEMEN, SOCOTRA Island / wadi Ayhaft / 12°36.5'N, 53°58.9'E, 200m / J. Bezděk leg., 7.-8.xi.2010 [p]', 5 ♀♀ in ABCC; 'YEMEN, SOCOTRA Island / wadi Ayhaft / 12°36.5'N, 53°58.9'E, 200m / 7.-8.xi.2010, L. Purchart lgt. [p]', 1 ♀ in ABCC.

Diagnostic characters (♂♂). Body length 11.8–17.2 mm. Body elongate; excepting dark brown to blackish head whole body light brownish; dorsal surface shiny, macrosetation pale (Fig. 21).

Head. Labrum small, bilobed; lobes rounded, coarsely, irregularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, only distinctly depressed along margin and centrally, anterior margin almost straight, anterior angles rounded, sides broadly arcuate (Fig. 22). Genae narrow, rounded. Frontoclypeal suture feebly arcuate, considerably impressed. Eyes relatively small, distinctly extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus coarse and dense, almost regularly distributed, punctures separated by approximately their diameter, each puncture bearing short, semierect macroseta. Vertex rather rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing very short, erect macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined); antennomeres 1–5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, absent from depression, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately at middle, with very finely impressed medial line, excepting broad basal interruption all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly punctate; lateral margin considerably coarsely crenate, with row of long macrosetae; basal margin with row of finely and irregularly distributed punctures bearing mainly in posterior angles recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angled, with rounded apex; sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; posterior margin broadly rounded. Surface bare, microsculptured and finely, densely, almost regularly punctate, punctures separated by their 2–4 diameters, area along medial longitudinal line smooth.

Scutellar shield approximately as wide as long, triangulate, sides broadly arcuate, apex acute, surface with several punctures basally.

Elytra convex, slightly dilated posteriad, sutural angle rounded; striae excepting sutural stria missing or only very feebly indicated; distinctly microsculptured and discally feebly transversally wrinkled, punctation coarse, dense, almost regular, punctures separated by their 1–2 diameters, each puncture bearing very short, erect seta, sutural interval very slightly convex; sutural stria with row of irregularly distributed punctures; lateral margin distinctly bordered, with row of long erect setae.

Macropterous.

Legs. Femora moderately shiny, very sparsely irregularly punctate, punctures bearing long, recumbent macrosetae. Protibia tridentate, basal tooth considerably weak, terminal calcar long, sharp, slightly curved externally, acute apically, inserted against emargination between basal and medial teeth. Meso- and metatibia slightly expanded apicad, with two setiferous transversal carinae. Mesotibial terminal calcars equal in length, flattened, acute apically. Metatibial terminal calcars equal in length, considerably flattened, acute apically. Protarsomeres 2–4 dilated (Fig. 36), mesotarsomeres 2–4 more slightly dilated than those of mesotibiae; pro- and mesotarsomeres 1–4 with remarkably shortly and densely macrosetaceous pads ventrally, metatarsomeres covered with long sparse macrosetae ventrally. Claws bifid.

Ventral surface of thorax with dense, long and recumbent macrosetation.

Propygidium microsculptured, coarsely, sparsely and irregularly punctate; pygidium finely microsculptured, all around bordered, coarsely and irregularly punctate.

Ventrites almost bare, remarkably coarsely and irregularly punctate.

Male genitalia (Fig. 27). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect.

Female. Body length 13.2–17.3 mm, differs from male as follows: clypeus prolonged, anterior margin rounded; eye canthus remarkably short; eyes smaller; punctation of clypeus rugo-punctate; antennal club short; pronotum more transverse, anterior angles more prominent, sides more coarsely crenate, with considerably long macrosetation; elytra plump, distinctly convex, strongly dilated in anterior third; striae more distinct; pygidium wider than long; femora and tibiae more expanded; apical teeth of protibia more robust, distinctly prominent; pro- and mesotarsomeres simple, without patches of macrosetae ventrally.

Differential diagnosis. The species is closely related to the other known Socotran *Tanyproctus* species. For differentiation see the complex of diagnostic characters in the identification key below.

Collecting circumstances. Probably nocturnal species; all specimens originating from the Socotra expedition 2003 and 2010 (J. Hájek, pers. comm.) were collected at light.

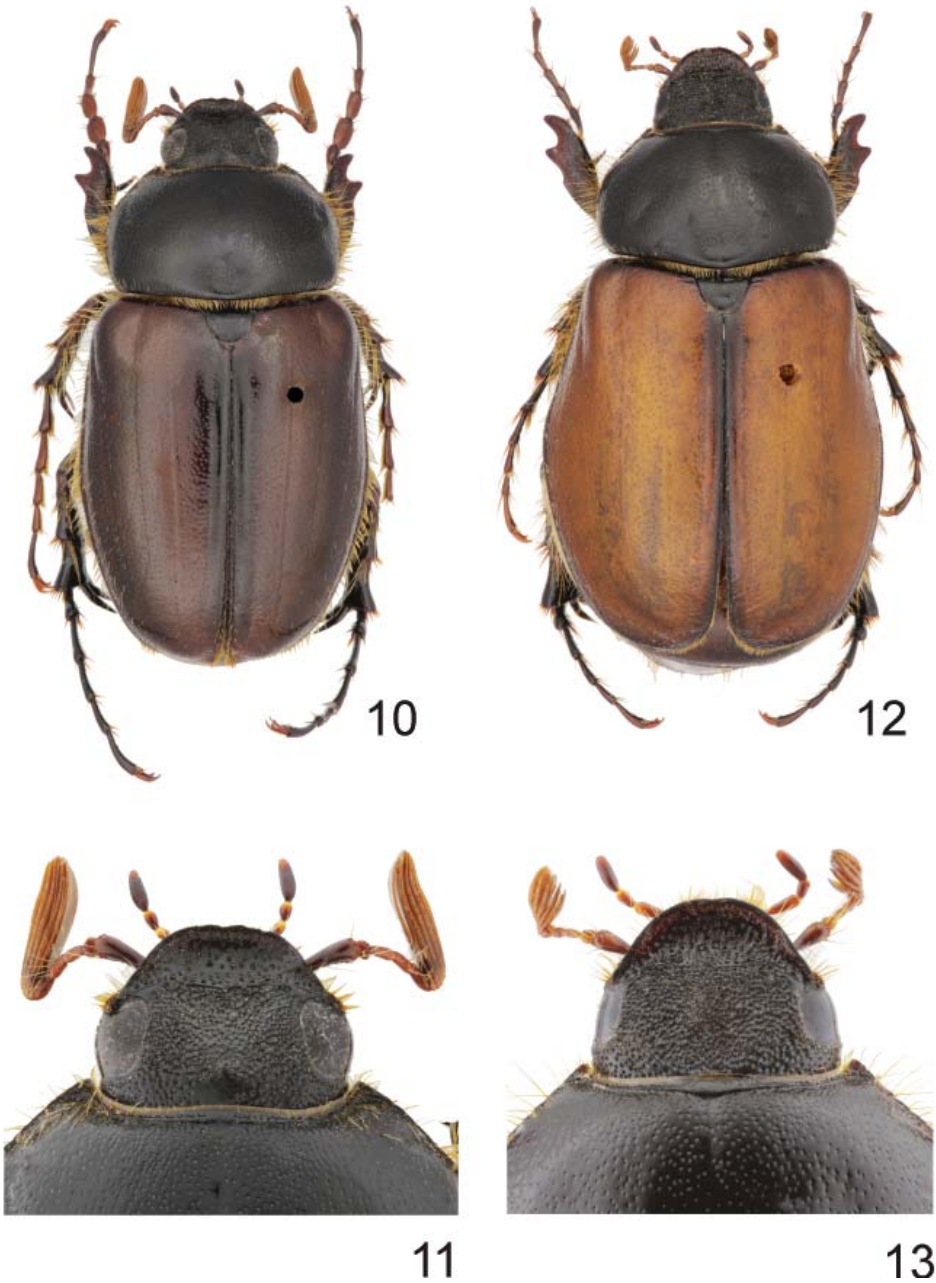
Geographical distribution. Species endemic to Socotra Island; so far recorded from the vicinity of Hadiboh, Wadi Ayhaft (Fig. 40), Homhil (Fig. 41) and Irisseyl.

Tanyproctus (Tanyproctus) keithi sp. nov.

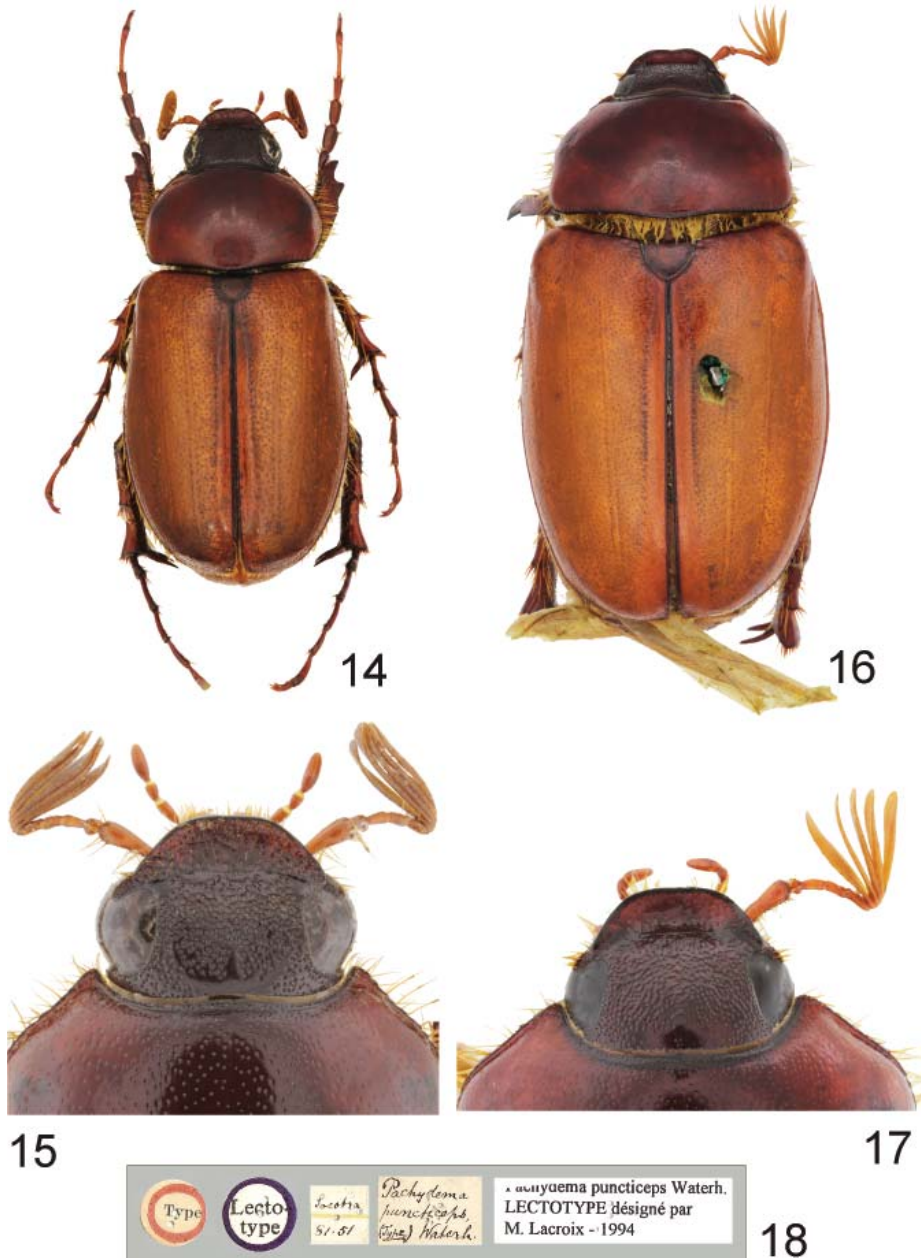
(Figs. 10–13, 28, 37)

Type locality. Yemen, Socotra Island, Firmihin plateau, 400–500 m a.s.l., 12°28'46"N 54°00'89"E.

Type material. HOLOTYPE: ♂, labelled: 'Republic of Yemen, Socotra Isl. / Firmihin plato – Dracena tree forest / N12°28'465", E54°00'89830" / V. Hula lgt. 22.-25.6.2009 [p]'; paratypes Nos. 1–8 (♂♂): 'Republic of Yemen, Socotra Isl. / Firmihin plato – Dracena tree forest / N12°28'465", E54°00'89830" / V. Hula lgt. 22.-25.6.2009 [p]';



Figs. 10–13. *Tanyproctus (T.) keithi* sp. nov.: 10–11 – male, holotype, body length 16.1 mm; 12–13 – female, paratype No. 18, body length 15.4 mm. 10, 12 – habitus; 11, 13 – head. Not to scale.



Figs. 14–18. 14–15 – *Tanyproctus (T.) lacroixi* sp. nov., male, paratype No. 20, body length 13.2 mm; 16–18 – *T. (T.) puncticeps* (Waterhouse, 1881), male, lectotype, body length 22.0 mm. 14, 16 – habitus; 15, 17 – head, 18 – labels. Not to scale.



19



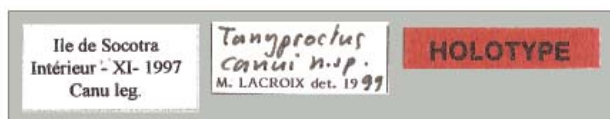
21



20



22



23

Figs. 19–23. 19–20 – *Tanyproctus (T.) wraniki* sp. nov., male, holotype, body length 6.8 mm; 21–23 – *T. (T.) canui* Lacroix, 1999: (21, 23 – male, holotype, body length 13.1 mm; 22 – specimen from Hadiboh). 19, 21 – habitus; 20, 22 – head; 23 – labels. Not to scale.

paratype No. 9 (♂): 'ZOOLOGISCHE EXKURSION [p] / Diksam [centroid ca. 12°31'N 53°58'E] / Soc. / 28. 9. [h] 199 [p] 8 [h] / leg. [p] Wranik [h] // SOKOTRA / Coll. Wranik / Zoologisches Institut / der Universität Roskock [p] // Tanyproctus / n. sp. 2 from Socotra / det. G. Sabatinelli 2008 [p, white label with black frame]'; paratypes Nos. 10-11 (♂♂): 'YEMEN, SOCOTRA Island / MARSHIM cave, DIKSAM / plateau; 970 m a.s.l. / 12°30'32"N 53°58'19"E / 9. V. 2004 lgt. A. REITTER [p]'; paratype No. 12 (♂): 'Repulic of Yemen / Socotra Isl., Shibhon / N12°28'8807", E053°59'57520" / 18.vi.2009, L. Purchart leg. [p]'; paratypes Nos. 13-14 (♂♂): 'Republic of Yemen / Socotra Isl., 490-520 m / N12°26'434" E053°59'124" / V. Nerad lgt. 13.6.2009 [p]'; paratype No. 15 (♂): 'YEMEN, Socotra Isl. / Firmihin plato, 400-500 m / N12°28'46", E54°00'89" / 18.-19.vi.2010 / V. Hula & J. Niedobová leg. [p]'; paratypes Nos. 16-17 (♂♂): 'YEMEN, Socotra Isl. / Wadi Zirik, 12.vi.2010 / N12°29,584', E053°59,475' / V. Hula & J. Niedobová leg. [p]'; paratype No. 18 (♀): 'YEMEN, Socotra Isl. / Deiqub cave env. / 10.vi.2010 / V. Hula & J. Niedobová leg. [p]'; paratypes Nos. 19-51 (♂♂): 'YEMEN, SOCOTRA Island / Shibhon plateau / ESERHE, 13.vi.2012 / *Croton socotranus* shrubland / 12°25.2'N, 53°56.6'E, 547 m [p] // SOCOTRA expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský / J. Niedobová & L. Purchart leg. [p]'; paratypes 52-63 (9 ♂♂, 1 ♀): 'YEMEN, SOCOTRA Island / Dixam plateau, wadi ZERIG / pools, *Juncus* marsh; *Dracaena* / trees; cave 13.-14.vi.2012 / 12°29.6'N, 53°59.5'E, 655 m [p] // SOCOTRA expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský / J. Niedobová & L. Purchart leg. [p]'.

Type depositories. HT and PT Nos. 10-12, 19-45, 52-56, 61 in NMPC, PT Nos. 1-2, 5, 16, 48-49, 57 in RSCV, PT Nos. 3-4, 13, 15, 17-18, 50-51, 58-60 in ABCC, PT No. 6 in DKCC, PT No. 7 in MLCP, PT No. 8 in BMNH, PT No. 9 in IBUR, PT No. 14 in MNHN, PT No. 46 in GSCA, PT No. 47 in ISNB, PT Nos. 62-63 in ZFMK.

Description of holotype (♂). Body length 16.1 mm. Body elongate; excepting blackish head whole body castaneous; dorsal surface moderately shiny, macrosetation pale (Fig. 10).

Head. Labrum small, bilobed; lobes rounded, coarsely, irregularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, only distinctly depressed along margin and centrally, anterior margin almost straight, anterior angles rounded, sides broadly arcuate (Fig. 11). Genae narrow, rounded. Frontoclypeal suture feebly arcuate, considerably impressed. Eyes relatively small, distinctly extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus coarse and dense, almost regularly distributed, punctures separated by approximately their diameter, each puncture bearing short, semierect macroseta. Vertex rather rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing very short, erect macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3-5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1-5 combined); antennomeres 1-5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, absent from depression, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately in middle, with very finely impressed medial line, excepting broad basal interruption all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly punctate; lateral margin considerably coarsely crenate, with row of long macrosetae; basal margin with row of finely and irregularly distributed punctures bearing mainly in posterior angles recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angled, with rounded apex; sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; posterior margin broadly rounded. Surface bare, microsculptured and finely, densely, almost regularly punctate, punctures separated by their 2-4 diameters, area along medial longitudinal line smooth.

Scutellar shield approximately as wide as long, triangulate, sides broadly arcuate, apex acute; with several punctures basally.

Elytra convex, slightly dilated posteriad, sutural angle rounded; striae excepting sutural stria missing or only very feebly indicated; distinctly microsculptured and discally feebly transversally wrinkled, punctation coarse, dense, almost regular, punctures separated by their 1–2 diameters, each puncture bearing very short, erect seta, sutural interval very slightly convex; sutural stria with row of irregularly distributed punctures; lateral margin distinctly bordered, with row of long erect setae.

Macropterous.

Legs. Femora moderately shiny, very sparsely irregularly punctate, punctures bearing long, recumbent macrosetae. Protibia tridentate, basal tooth considerably weak, terminal calcar long, sharp, slightly curved externally, acute apically, inserted against emargination between basal and medial teeth. Meso- and metatibia slightly expanded apicad, with two setiferous transversal carinae. Mesotibial terminal calcars equal in length, flattened, acute apically. Metatibial terminal calcars equal in length, considerably flattened, acute apically. Protarsomeres 2–4 dilated (Fig. 37), mesotarsomeres 2–4 dilated more slightly than those of mesotibiae; pro- and mesotarsomeres 1–4 with remarkably shortly and densely macrosetaceous pads ventrally, metatarsomeres covered with long sparse macrosetae ventrally. Claws bifid.

Ventral surface of thorax with dense, long and recumbent macrosetation.

Propygidium microsculptured, coarsely, sparsely and irregularly punctate; pygidium finely microsculptured, all around bordered, coarsely and irregularly punctate.

Ventrites almost bare, remarkably coarsely and irregularly punctate.

Male genitalia (Fig. 28). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect.

Variability in males. Paratypes somewhat variable in body length (12.2–16.8 mm), slightly variable in punctation density of dorsal surface, length and distribution of macrosetae, and colour of elytron being from light to dark brown.

Female. Body length 15.4–17.3 mm, differs from male as follows: clypeus prolonged, anterior margin rounded; eye canthus remarkably short; eyes smaller; punctation of clypeus rugo-punctate; antennal club short (Fig. 13); pronotum more transverse, anterior angles more prominent, sides more coarsely crenate, with considerably long macrosetation; elytra plump, distinctly convex, strongly dilated in anterior third; striae more distinct (Fig. 12); pygidium wider than long; femora and tibiae more expanded; apical teeth of protibia more robust, distinctly prominent; pro- and mesotarsomeres simple, without patches of macrosetae.

Differential diagnosis. The new species is closely related to the other known Socotran *Tanyproctus* species. For differentiation see the complex of diagnostic characters in the identification key below.

Etymology. Patronymic; named in honour of our friend Denis Keith (Chartres, France), an excellent student of scarab beetles.

Collecting circumstances. Probably crepuscular or nocturnal species; specimens from Es-erhe were collected at flight over *Croton* shrubland between 4–5 p.m. (i.e. 2–1 hour(s) before sunset) with majority of specimens around 5 p.m. (J. Hájek, pers. comm.), other specimens of the type series were collected at light (V. Hula & L. Purchart, pers. comm.).

Geographical distribution. Species endemic to Socotra Island; so far recorded from central areas.

Tanyproctus (Tanyproctus) lacroixi sp. nov.

(Figs. 14, 15, 30, 38)

Type locality. Yemen, Socotra Island, Firmihin plateau, 400–500 m a.s.l., 12°28'46"N 54°00'89"E.**Type material.** HOLOTYPE: ♂, labelled: 'YEMEN, Socotra Isl. / Firmihin plato, 400-500 m / N12°28'46", E54°00'89" / 18.-19.vi.2010 / V. Hula & J. Niedobová leg. [p]'; paratypes Nos. 1–14 (♂♂): 'YEMEN, Socotra Isl. / Firmihin plato, 400-500 m / N12°28'46", E54°00'89" / 18.-19.vi.2010 / V. Hula & J. Niedobová leg. [p]'; paratypes Nos. 15–22 (♂♂): 'Republic of Yemen, Socotra Isl. / Firmihin plato – Dracena tree forest / N12°28'465", E54°00'89830" / V. Hula lgt. 22.-25.6.2009 [p]'; paratype No. 23 (♂): 'Republic of Yemen / Socotra Isl., Firmihin plato / Dracena tree forest / N12°28'465", E54°00'89830" / 22.-25.6.2009, L. Purchart leg. [p]'; paratypes Nos. 24–52 (♂♂): 'YEMEN, SOCOTRA Island / Dixam plateau 14.-15.vi.2012 / FIRMIHIN, Dracaena woodland / 12°28.6'N, 54°01.1', 490 m [p] // SOCOTRA expedition 2012 / J. Bezděk, J. Hájek, V. Hula / P. Kment, I. Malenovský / J. Niedobová & L. Purchart leg. [p]'.
Type depositories. HT and PT Nos. 1–5, 24–31 in NMPC, PT Nos. 6–10, 47–50 in RSCV, PT Nos. 11–18, 23, 32–44 in ABCC, PT No. 19 in MLCP, PT No. 20 in DKCC, PT No. 21 in MNHN, PT No. 22 in BMNH, PT No. 45 in GSCA, PT No. 46 in ISNB, PT Nos. 51–52 ZFMK.**Description of holotype** (♂). Body length 11.5 mm. Body elongate; excepting blackish head whole body light brownish; dorsal surface moderately shiny, macrosetation pale (Fig. 14).

Head. Labrum small, bilobed; lobes rounded, coarsely, irregularly punctate. Outline of clypeus semielliptic, with distinctly upturned margin, only weakly depressed along margin and centrally, medial emargination almost absolute, anterior angles rounded, sides broadly arcuate (Fig. 15). Genae narrow, rounded. Frontoclypeal suture feebly arcuate, distinctly impressed. Eyes relatively small, distinctly extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus coarse and dense, almost regularly distributed, punctures separated by approximately their diameter, each puncture bearing short, semierect macroseta. Vertex rather rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing very short, erect macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined); antennomeres 1–5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, absent from depression, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately in middle, with very finely impressed medial line, excepting broad basal interruption all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly punctate; lateral margin considerably coarsely crenate, with row of long macrosetae; basal margin with row of finely and irregularly distributed punctures bearing mainly in posterior angles recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angled, with rounded apex; sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; posterior margin broadly rounded. Surface bare, microsculptured and finely, densely, almost regularly punctate, punctures separated by their 2–4 diameters, area along medial longitudinal line smooth.

Scutellar shield approximately as wide as long, triangulate, sides broadly arcuate, apex acute, surface with several punctures basally.

Elytra convex, slightly dilated posteriad, sutural angle rounded; striae excepting sutural stria missing or only very feebly indicated; distinctly microsculptured and discally feebly

transversally wrinkled, punctation coarse, dense, almost regular, punctures separated by 1–2 their diameters, each puncture bearing very short, erect seta, sutural interval very slightly convex; sutural stria with row of irregularly distributed punctures; lateral margin distinctly bordered, with row of long erect setae.

Macropterous.

Legs. Femora moderately shiny, very sparsely, irregularly punctate, punctures bearing long, recumbent macrosetae. Protibia tridentate, basal tooth considerably weak, terminal calcar long, sharp, slightly curved externally, acute apically, inserted against emargination between basal and medial teeth. Meso- and metatibia slightly expanded apicad, with two setiferous transversal carinae. Mesotibial terminal calcars equal in length, flattened, acute apically. Metatibial terminal calcars equal in length, considerably flattened, acute apically. Protarsomeres 2–4 dilated (Fig. 38), mesotarsomeres 2–4 dilated more slightly than those of mesotibiae; pro- and mesotarsomeres 1–4 with remarkably shortly and densely macrosetaceous pads ventrally, metatarsomeres covered with long sparse macrosetae ventrally. Claws bifid.

Ventral surface of thorax with dense, long and recumbent macrosetation.

Propygidium microsculptured, coarsely, sparsely and irregularly punctate; pygidium finely microsculptured, all around bordered, coarsely and irregularly punctate.

Ventrites almost bare, remarkably coarsely and irregularly punctate.

Male genitalia (Fig. 30). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect.

Variability in males. Paratypes somewhat variable in body length (11.1–16.0 mm), slightly variable in punctation density of dorsal surface and length and distribution of macrosetae.

Female. Unknown.

Differential diagnosis. The new species is closely related to the other known Socotran *Tanyproctus* species. For differentiation see the complex of diagnostic characters in the identification key below.

Etymology. Patronymic; named in honour of our colleague Marc Lacroix (Paris, France), an excellent specialist on Melolonthinae, especially *Tanyproctini*.

Collecting circumstances. Probably nocturnal species; all specimens of the type series were collected at light (V. Hula & L. Purchart, pers. comm.).

Geographical distribution. Species endemic to Socotra Island; the whole type series originates from the Firmihin plateau (central part of the island) (Fig. 43).

Tanyproctus (Tanyproctus) puncticeps (Waterhouse, 1881)

(Figs. 16–18, 29, 35)

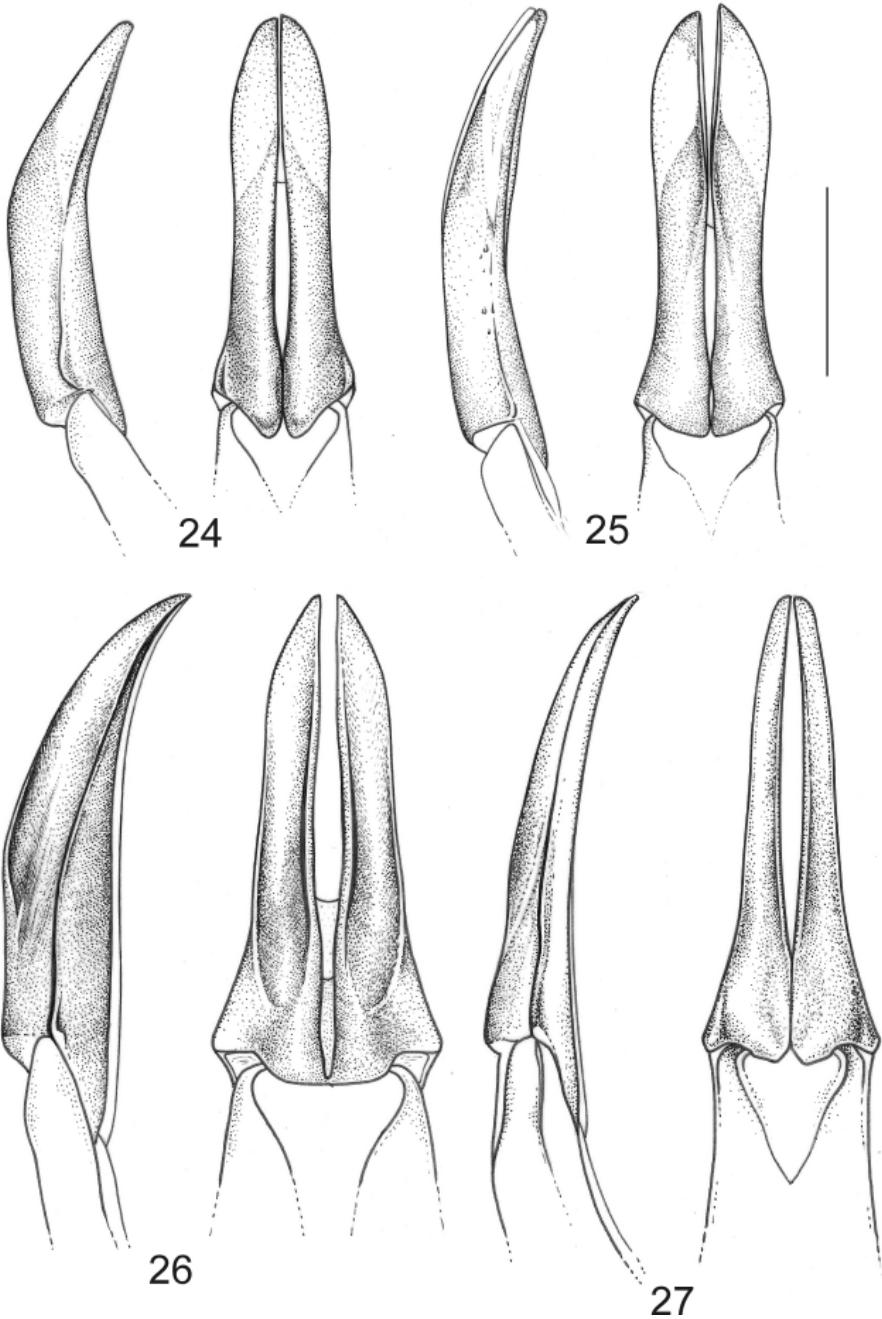
Pachydemia puncticeps Waterhouse, 1881: 471; GAHAN (1903): 268; DALLA TORRE (1913): 301 (catalogue).

Tanyproctus puncticeps: LACROIX (1994): 157, Figs. 3, 6, 9, 13, 15; SABATINELLI & PONTUALE (1998): 130; LACROIX (1999): 92; LACROIX (2002): 406, Figs. 26–34 (review); LACROIX (2007): 183 (catalogue).

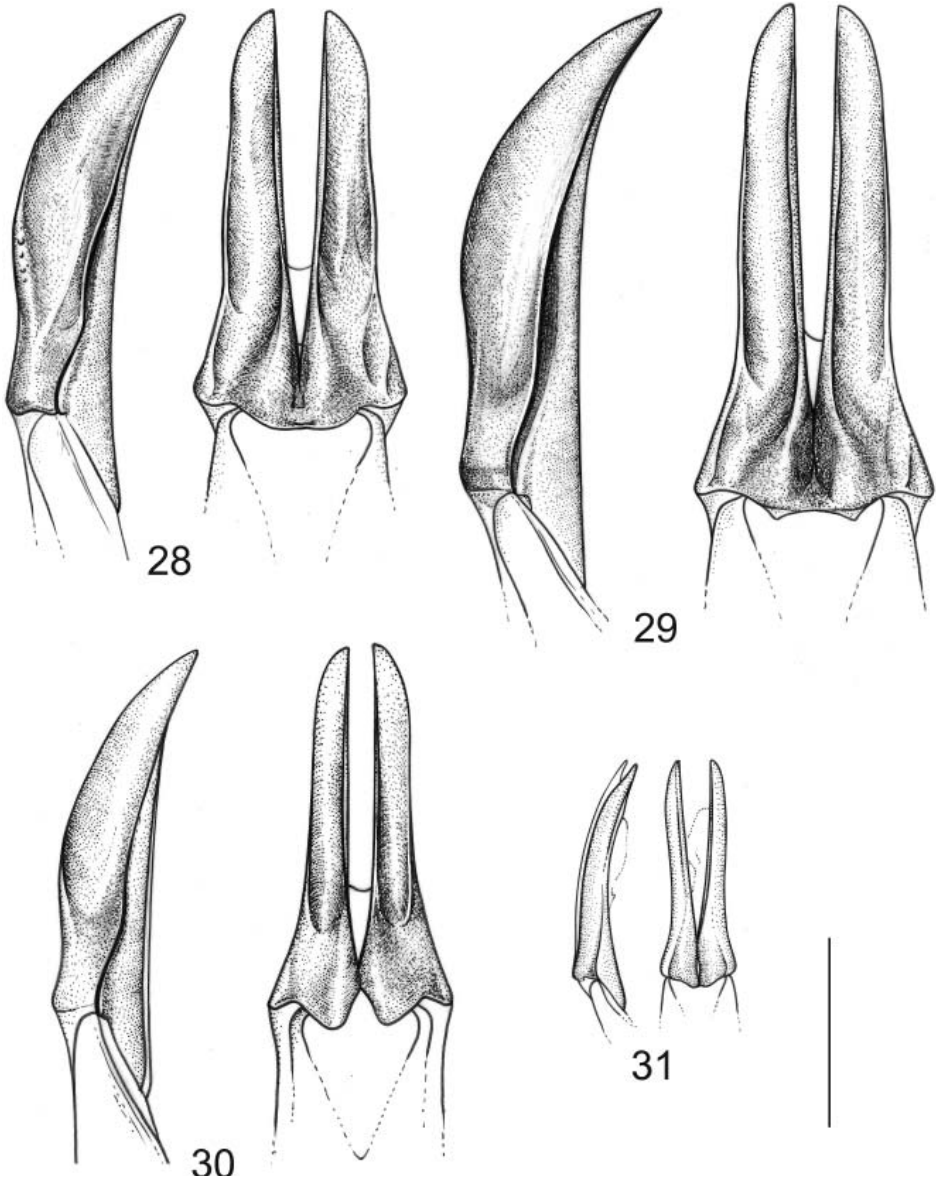
Tanyproctus (Tanyproctus) puncticeps: KRÁL & SMETANA (2006): 207 (catalogue).

Type locality. ‘Socotra’.

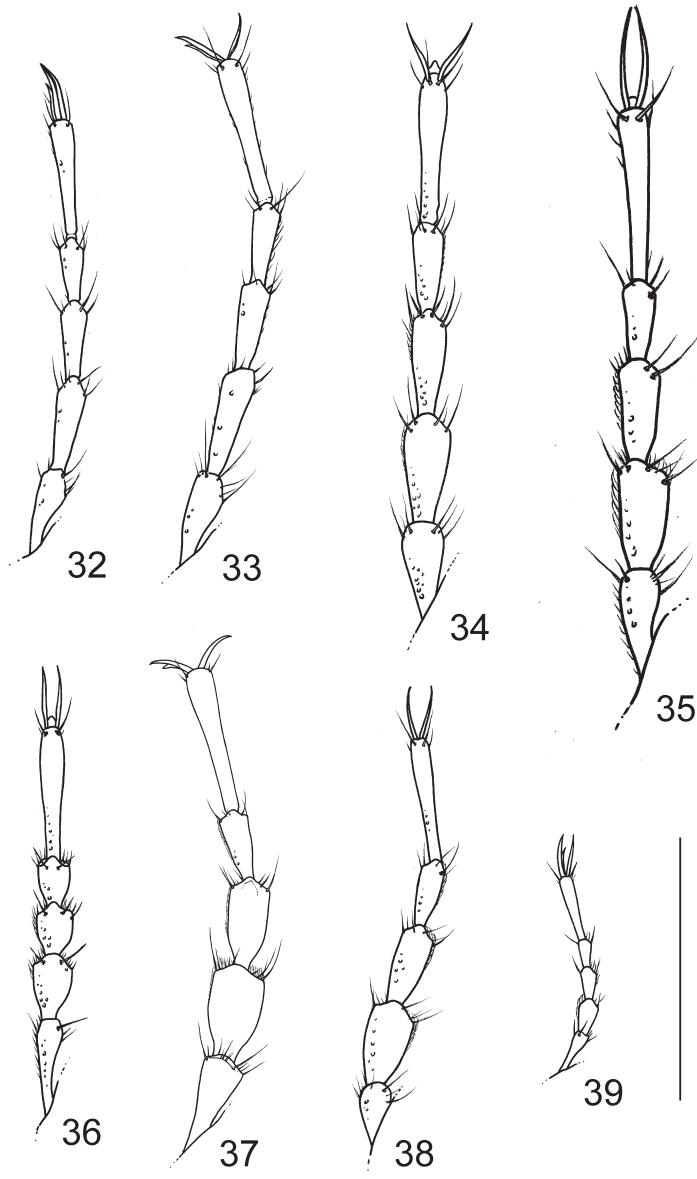
Type material examined. LECTOTYPE: ♂ (designated by LACROIX 1999), labelled: ‘Type [p, round label, red frame] // Lecto- / type [p, round label, violet frame] // Socotra / 81.51 [h] // Pachydemia / puncticeps / (Type) Waterh. [h] // Pachydemia puncticeps Waterh. / LECTOTYPE désigné par / M. Lacroix – 1994 [p]’ in BMNH.



Figs. 24–27. Aedeagus in lateral (left) and dorsal (right) aspect: 24 – *Canudemema homhil* sp. nov., holotype; 25 – *C. socotrae* Lacroix, 1994, holotype; 26 – *Socotraproctus haghier* gen. nov. et sp. nov., holotype; 27 – *Tanyproctus (T.) canui* Lacroix, 1999, specimen from Hadiboh. Scale bar: 1.0 mm.



Figs. 28–31. Aedeagus in lateral (left) and dorsal (right) view: 28 – *Tanyproctus (T.) keithi* sp. nov., holotype; 29 – *T. (T.) puncticeps* (Waterhouse, 1881), lectotype; 30 – *T. (T.) lacroixi* sp. nov., holotype; 31 – *T. (T.) wraniki* sp. nov., holotype. Scale bar: 1.0 mm.



Figs. 32–39. Male right protarsus in dorsal aspect: 32 – *Canudemema homhil* sp. nov., holotype; 33 – *C. socotrae* Lacroix, 1994, holotype; 34 – *Socotraproctus haghier* gen. nov. et sp. nov., paratype No. 2; 35 – *Tanyprotus (T.) puncticeps* (Waterhouse, 1881), lectotype; 36 – *T. (T.) canui* Lacroix, 1999, specimen from Hadiboh; 37 – *T. (T.) keithi* sp. nov., holotype; 38 – *T. (T.) lacroixi* sp. nov., paratype No. 2; 39 – *T. (T.) wraniki* sp. nov., holotype. Scale bar: 3.0 mm.

Description of lectotype (♂). Body length 22.0 mm. Body elongate; excepting blackish head whole body light brownish; dorsal surface moderately shiny, macrosetation pale (Fig. 16).

Head. Labrum small, bilobed; lobes rounded, coarsely, irregularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, only distinctly depressed along margin and centrally, anterior margin almost straight, anterior angles rounded, sides broadly arcuate (Fig. 17). Genae narrow, rounded. Frontoclypeal suture feebly arcuate, considerably impressed. Eyes relatively small, distinctly extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus coarse and dense, almost regularly distributed, punctures separated by approximately their diameter, each puncture bearing short, semierect macroseta. Vertex rather rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing very short, erect macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined); antennomeres 1–5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, absent from depression, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately in middle, with very finely impressed medial line, excepting broad basal interruption all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly punctate; lateral margin considerably coarsely crenate, with row of long macrosetae; basal margin with row of finely and irregularly distributed punctures bearing mainly in posterior angles recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angled, with rounded apex; sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; posterior margin broadly rounded. Surface bare, microsculptured and finely, densely, almost regularly punctate, punctures separated by their 2–4 diameters, area along medial longitudinal line smooth.

Scutellar shield approximately as wide as long, triangulate, sides broadly arcuate, apex acute, surface with several punctures basally.

Elytra convex, slightly dilated posteriad, sutural angle rounded; striae excepting sutural stria missing or only very feebly indicated; distinctly microsculptured and discally feebly transversally wrinkled, punctuation coarse, dense, almost regular, punctures separated by their 1–2 diameters, each puncture bearing very short, erect seta, sutural interval very slightly convex; sutural stria with row of irregularly distributed punctures; lateral margin distinctly bordered, with row of long erect setae.

Macropterous.

Legs. Femora moderately shiny, very sparsely irregularly punctate, punctures bearing long, recumbent macrosetae. Protibia tridentate, basal tooth considerably weak, terminal calcar long, sharp, slightly curved externally, acute apically, inserted against emargination between basal and medial teeth. Meso- and metatibia slightly expanded apicad, with two setiferous transversal carinae. Mesotibial terminal calcars equal in length, flattened, acute apically. Metatibial terminal calcars equal in length, considerably flattened, acute apically. Protarsomeres 2–4 dilated (Fig. 35), mesotarsomeres 2–4 dilated more slightly than those of mesotibiae; pro- and mesotarsomeres 1–4 with remarkably shortly and densely macrosetaceous pads ventrally, metatarsomeres covered with long sparse macrosetae ventrally. Claws bifid.

Ventral surface of thorax with dense, long and recumbent macrosetation.

Propygidium microsculptured, coarsely, sparsely and irregularly punctate; pygidium finely microsculptured, all around bordered, coarsely and irregularly punctate.

Ventrites almost bare, remarkably coarsely and irregularly punctate.

Male genitalia (Fig. 29). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect.

Female. Unknown.

Differential diagnosis. The species is closely related to the other known Socotran *Tanyproctus* species. For differentiation see the complex of diagnostic characters in the identification key below.

Collecting circumstances. Unknown.

Geographical distribution. Species endemic to Socotra Island.

Remark. LACROIX (1999) reported the type specimen as a female, nevertheless the dissection proved it was a male.

Tanyproctus (Tanyproctus) wraniki sp. nov.

(Figs. 19, 20, 31, 39)

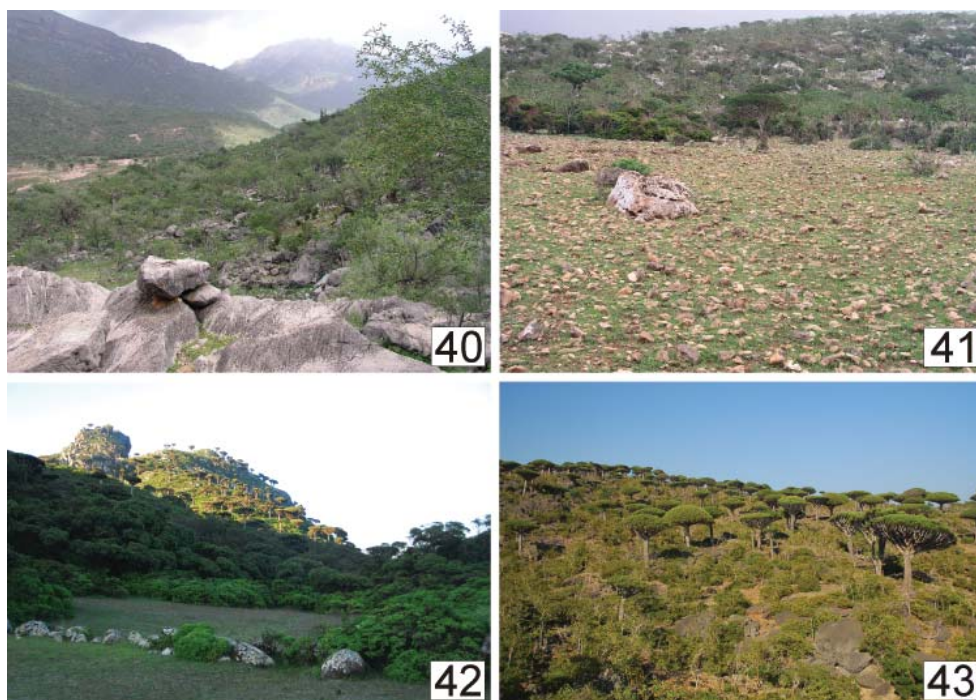
Type locality. Socotra, Diksam plateau, centroid ca. 12°31'N 53°58'E.

Type material. HOLOTYPE: ♂, labelled: 'ZOOLOGISCHE EXKURSION [p] / Diksam / Nov. [h] 199 [p] 8 [h] / leg. [p] Wranik [h] // SOKOTRA / Coll. Wranik / Zoologisches Institut / der Universität Roskock [p] // Tanyproctus / n. sp. 1 from Socotra / det. G. Sabatinelli 2008 [p, white label with black frame]' in IBUR.

Description of holotype (♂). Body length 6.8 mm. Body elongate; excepting blackish head whole body light brownish; dorsal surface moderately shiny, macrosetation pale (Fig. 19).

Head. Labrum small, bilobed; lobes rounded, coarsely, irregularly punctate. Outline of clypeus almost trapezoidal, with considerably upturned margin, only distinctly depressed along margin and centrally, anterior margin almost straight, anterior angles rounded, sides broadly arcuate (Fig. 20). Genae narrow, rounded. Frontoclypeal suture feebly arcuate, considerably impressed. Eyes relatively small, distinctly extending beyond genae externally in dorsal aspect; distance between eyes in ventral aspect exceeding remarkably diameter of eye. Punctuation of clypeus coarse and dense, almost regularly distributed, punctures separated by approximately their diameter, each puncture bearing short, semierect macroseta. Vertex rather rugo-punctate, punctures separated by less than their diameter to confluent, each puncture bearing very short, erect macroseta. Antennae decamerous, antennomere 2 short, approximately as long as wide, antennomeres 3–5 elongate; club pentamerous, straight, shorter than antennal shaft (antennomeres 1–5 combined); antennomeres 1–5 with sparse, long macrosetae, club sparsely shortly macrosetaceous. Terminal maxillary palpomeres elongate, rounded apically, absent from depression, approximately of same length as palpomeres 2 and 3 combined.

Pronotum moderately convex, transversal, broadest approximately in middle, with very finely impressed medial line, excepting broad basal interruption all around bordered; anterior bead flat, narrow, distinctly widened medially, irregularly punctate; lateral margin considerably coarsely crenate, with row of long macrosetae; basal margin with row of finely and irregularly distributed punctures bearing mainly in posterior angles recumbent macrosetae. Anterior angles prominent, projecting over anterior margin, acute-angled, with rounded apex;



Figs. 40–43. Habitats of Tanyproctini in Socotra: 40 – Typical habitat of *Tanyproctus (T.) canui* Lacroix, 1999, Wadi Ayhaft, November 2003 (photo by DK); 41 – Type locality of *Canudemema homhil* sp. nov. and habitat of *T. (T.) canui* Lacroix, 1999, Homhil massif, November 2003 (photo by DK); 42 – Type locality of *Socotraproctus haghier* gen. nov. et sp. nov., Haghier Mountains, Skant, November 2010 (photo by J. Hájek); 43 – Type locality of *T. (T.) keithi* sp. nov. and *T. (T.) lacroixi* sp. nov., Dixam plateau, Firmihin, November 2010 (photo by J. Hájek).

sides in approximately anterior half almost straight, divergent posteriad to very broadly obtuse posterior angles; posterior margin broadly rounded. Surface bare, microsculptured and finely, densely, almost regularly punctate, punctures separated by their 2–4 diameters, area along medial longitudinal line smooth.

Scutellar shield approximately as wide as long, triangulate, sides broadly arcuate, apex acute, surface with several punctures basally.

Elytra convex, slightly dilated posteriad, sutural angle rounded; striae excepting sutural stria missing or only very feebly indicated; distinctly microsculptured and discally feebly transversally wrinkled, punctation coarse, dense, almost regular, punctures separated by their 1–2 diameters, each puncture bearing very short, erect seta, sutural interval very slightly convex; sutural stria with row of irregularly distributed punctures; lateral margin distinctly bordered, with row of long erect setae.

Macropterous.

Legs. Femora moderately shiny, very sparsely, irregularly punctate, punctures bearing long, recumbent macrosetae setae. Protibia tridentate, basal tooth considerably weak, terminal calcar long, sharp, slightly curved externally, acute apically, inserted against emargination between basal and medial teeth. Meso- and metatibia slightly expanded apicad, with two setiferous transversal carinae. Mesotibial terminal calcars equal in length, flattened, acute apically. Metatibial terminal calcars equal in length, considerably flattened, acute apically. Protarsomeres 2–4 dilated, mesotarsomeres 2–4 more slightly dilated than those of mesotibiae; pro- and mesotarsomeres 1–4 with remarkably shortly and densely macrosetaceous pads ventrally (Fig. 39), metatarsomeres covered with long sparse macrosetae ventrally. Claws bifid.

Ventral surface of thorax with dense, long and recumbent macrosetation.

Propygidium microsculptured, coarsely, sparsely and irregularly punctate; pygidium finely microsculptured, all around bordered, coarsely and irregularly punctate.

Ventrites almost bare, remarkably coarsely and irregularly punctate.

Male genitalia (Fig. 31). Aedeagus symmetrical, parameres slender, relatively long, only slightly shorter than phallobasis, distal part not dilated in dorsal aspect.

Female. Unknown.

Differential diagnosis. The species is closely related to the other known Socotran *Tanyproctus* species. For differentiation see the complex of diagnostic characters in the identification key below.

Etymology. Patronymic; named in honour of Wolfgang Wranik (Rostock, Germany), a great connoisseur of the Socotran nature and the collector of the new species.

Collecting circumstances. Unknown.

Geographical distribution. Species endemic to Socotra Island; a single known specimen so far originates from the Diksam plateau.

Tanyproctus (Tanyproctus) sp.

Material examined. ♂, labelled: 'ZOOLOGISCHE EXKURSION [p] / Homil / Soc. / 3. 10. [h] 199 [p] 8 [h] / leg. [p] Wranik [h] // SOKOTRA / Coll. Wranik / Zoologisches Institut / der Universität Roskock [p] // Tanyproctus / n. sp. 3 from Socotra / det. G. Sabatinelli 2008 [p, white label with black frame]' in IBUR.

Remark. This specimen seems to be almost identical with *T. canui* in general assemblance including shape of aedeagus. But its metatarsomeres are more slender and almost lacking short macrosetae ventrally. Because there are no additional specimens at our disposal, we are not able to decide on its taxonomic status at the moment.

Identification key for males of Tanyproctini known from Socotra

- 1 (4) Antennal club hexa- or heptamerous; protibia bidentate; pro- and mesotarsomeres 2–4 elongate; dorsal surface of pronotum and elytra with fine whitish toment in fresh specimens. *Canudemema* Lacroix, 1994
- 2 (3) Antennal club hexamerous (Fig. 2). *C. homhil* sp. nov.
- 3 (2) Antennal club heptamerous (Fig. 4). *C. socotrae* Lacroix, 1994

- 4 (1) Antenal club pentamerous; protibia tridentate (in *Socotraproctus* gen. nov. basal tooth only weakly indicated); pro- and mesotarsomeres 2–4 elongate or strongly dilated; whitish toment of dorsal surface absent.
- 5 (6) Dorsal surface moderately shiny; punctation considerably coarse; elytron covered with distinctly narrowly scale-like shaped, recumbent, whitish macrosetae arranged in longitudinal strips (Fig. 6); pro- and mesotarsomeres 2–4 elongate; eyes small, not exceeding lateral outline of genae in dorsal aspect (Fig. 7). *Socotraproctus haghier* gen. et sp. nov.
- 6 (5) Dorsal surface shiny; punctation (except of head) more or less fine; elytron glabrous or covered with not scale-like shaped macrosetae arranged in longitudinal strips; pro- and mesotarsomeres 2–4 strongly dilated; eyes large, distinctly protruding, exceeding lateral outline of genae in dorsal aspect. *Tanyproctus* Ménétrière, 1832
- 7 (8) Protarsomeres 2–4 more dilated than those of mesotarsomeres (Fig. 39); considerably small in size – 6.8 mm. *T. (T.) wraniki* sp. nov.
- 8 (7) Pro- and mesotarsomeres 2–4 equally dilated; larger in size (11.8–22.0 mm).
- 9 (10) Pronotal lateral margin shallowly emarginate in posterior half; punctation of pronotum and elytra fine, sparse; considerably large in size – 22.0 mm. *T. (T.) puncticeps* (Waterhouse, 1881)
- 10 (9) Pronotal lateral margin broadly rounded or straight in posterior half; punctation of pronotum coarser and denser; medium sized – 11.1–17.2 mm.
- 11 (12) Unicoloured; slender in body shape; clypeus almost trapezoidal, distinctly emarginate anteriorly; occiput flat, coarsely, more or less densely punctate; propygidium simply, sparsely punctate. *T. (T.) canui* Lacroix, 1999
- 12 (11) Unicoloured or bicoloured; more robust in shape; clypeus almost bilobed, shallowly emarginate to straight anteriorly; occiput flat to gibbous, punctate to impunctate; propygidium rugo-punctate in about basal half.
- 13 (14) Unicoloured; eyes large, remarkably prominent; occiput never gibbous, only slightly elevate in maximum sized specimens. *T. (T.) lacroixi* sp. nov.
- 14 (13) Unicoloured or bicoloured; eyes smaller, less prominent; occiput remarkably gibbous in maximum sized specimens. *T. (T.) keithi* sp. nov.

Acknowledgement

We are very grateful to Maxwell V. L. Barclay (BMNH), Antoine Mantilleri (MNHN) and Jiří Hájek (NMPC) for the opportunity to study the material in their care. Guido Sabatinelli (Amman, Jordan) kindly provided us with the specimens collected by Wolfgang Wranik, Zuzana Čadová (Liberec, Czech Republic) executed all line-drawings and Vladimír Bejček, Jan Farkač, Petr Kabátek and Karel Šťastný (all Prague) were excellent companions during the Socotra expedition 2003 (DK). We also thank Dirk Ahrens (ZFMK) and Guido Sabatinelli for helpful comments on the manuscript. This study was supported by the grant No. LA10036/MSMT 'Participation of young scientists of MZLU Brno to the research activities of IUFRO - The Global Network for Forest Science Cooperation' - financed by the Ministry

of Education, Youth and Sports of the Czech Republic; David Král was also supported by the institutional resources of the Ministry of Education, Youth and Sports of the Czech Republic for the support of science and research.

References

- BEZDĚK J., PURCHART L., KRÁL K. & HULA V. 2012: List of local Socotran geographical names used in entomological literature. Pp. 27–67. In: HÁJEK J. & BEZDĚK J. (eds.): Insect biodiversity of the Socotra Archipelago. *Acta Entomologica Musei Nationalis Pragae* **52 (supplementum 2)**: i–vi + 1–557.
- BOUCHARD P., BOUSQUET Y., DAVIES A. E., ALFONSO-ZARAZAGA M. A., LAWRENCE J. F., LYAL C. H. C., NEWTON A. F., REID C. A. M., SCHMITT M., ŚLIPIŃSKI S. A. & SMITH A. B. T. 2011: Family-group names in Coleoptera (Insecta). *ZooKeys* **88**: 1–972.
- GAHAN C. J. 1903: Insecta: Coleoptera. Pp. 261–292. In: FORBES H. O. (ed.): The natural history of Sokotra and Abd-el-Kuri: Being the report upon the results of the conjoint expedition to these islands in 1898–9. *Special Bulletin of the Liverpool Museums*, xlvii + 598 pp.
- DALLA TORRE K. W. 1913: Pars 50: Fam. Scarabaeidae. Subfam. Melolonthinae, IV. Pp. 291–450. In: JUNK W. & SCHENKLING S. (eds.): *Coleopterorum Catalogus. Volumen XX*. W. Junk, Berlin, 450 pp.
- KEITH D. 2009: Contribution à la connaissance de la faune des Pachydeminae asiatiques (Coleoptera: Scarabaeoidea: Melolonthidae). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Entomologie* **79**: 73–88.
- KRÁL D. & SMETANA A. 2006: Tribe Pachydemini Burmeister, 1855. Pp. 199–207. In: LÖBL I. & SMETANA A. (eds.): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea – Scirtoidea – Dasciloidea – Buprestoidea – Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.
- LACROIX M. 1994: Pachydeminae des regions limitrophes du Golfe d'Aden et description de *Canudema socotrae* n. gen., n. sp. (Coleoptera, Scarabaeoidea, Melolonthinae). *Revue Française d'Entomologie (Nouvelle Série)* **16**: 153–170.
- LACROIX M. 1999: Melolonthidae de Socotra (Coleoptera, Scarabaeoidea). *Revue Française d'Entomologie (Nouvelle Série)* **21**: 87–96.
- LACROIX M. 2002: Melolonthinae (Coleoptera: Scarabaeoidea) of Socotra island, Yemen. *Fauna of Arabia* **19**: 399–414.
- LACROIX M. 2007: *Pachydeminae du monde, genera et catalogue (Coleoptera, Melolonthidae)*. Editions Marc Lacroix, Paris, 450 pp.
- MÉNÉTRIÈS E. 1832: *Catalogue raisonné des objets de zoologie recueillis dans un voyage au Caucase et jusqu'aux frontières actuelles de la Perse entrepris par l'ordre de S. M. l'Empereur*. Académie Impériale des Sciences, St.-Petersbourg, xxxiii + 272 + iv + [1] pp., 5 pls.
- SABATINELLI G. & PONTUALE G. 1998: Melolonthinae and Pachydeminae of Arabia (Coleoptera: Scarabaeoidea: Melolonthidae). *Fauna of Saudi Arabia* **17**: 107–146.
- WRANIK W. 2003: *Fauna of the Socotra Archipelago: field guide*. Universitätsdruckerei, Rostock, 542 pp.