

Canuschiza of Socotra Island
(Coleoptera: Scarabaeidae: Melolonthinae)
Part 2. *Canuschiza minuta* species group

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Abstract. The *Canuschiza minuta* Lacroix, 1999 species group of the genus *Canuschiza* Lacroix, 1999 is revised. *Canuschiza zerig* sp. nov. and previously unknown female of *C. minuta* are described. Variability in number of antennomeres observed in females of *C. minuta* is briefly discussed. An identification key to males and females of the species group is provided, and photographs illustrate external morphology and male genitalia.

Key words. Coleoptera, Scarabaeoidea, Scarabaeidae, Melolonthinae, Schizonychini, *Canuschiza*, new species, description, antennomeres, key, taxonomy, distribution, Yemen, Socotra

Introduction

The schizonychine genus *Canuschiza* (Scarabaeidae: Melolonthinae: Schizonychini) was established by LACROIX (1999) for two newly described species: *C. insularis* Lacroix, 1999 (type of the genus) and *C. minuta* Lacroix, 1999. Later on, SEHNAL et al. (2014) split this genus into two groups of species based on external morphology, the *C. insularis* species group and the *C. minuta* species group. They dealt with the *C. insularis* species group and described seven new *Canuschiza* species belonging to this group.

In the present article, a revision of the *C. minuta* species group is provided based on the study of specimens collected during the Czech biological expeditions to Socotra in 1999–2012. *Canuschiza minuta* is redescribed and its female is described for the first time. Females of *C. minuta* exhibit an interesting variability in number of antennomeres (eight or nine). One new species is discovered, *C. zerig* sp. nov., which enforced minor modification of the *C. minuta* species group delimitation as proposed by SEHNAL et al. (2014) – see below (identification key to *Canuschiza*).

Material and methods

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

BMNH	The Natural History Museum [former British Museum (Natural History)], London, United Kingdom (Maxwell V. L. Barclay, Michael Geiser);
IECA	Institute of Entomology, Biology Centre CAS, České Budějovice, Czech Republic (Aleš Bezděk);
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.

Altogether 115 specimens (see material below) were studied. Genitalia of at least eight males of each species 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 1–5× Macro attached to a Canon EOS 550D camera. Partially focused images of each specimen were combined using Helicon Focus 3.20.2 Pro software. Specimens of the newly described species are provided with one printed red label: '*Canuschiza zerig* sp. nov., HOLOTYPUS, [or PARATYPUS with type number], sex symbol, Richard Sehnal, David Král & Aleš Bezděk det. 2016'. Exact label data are cited for the type material examined. Separate labels are indicated by a double vertical bar '||', lines within each label are separated by a single vertical bar '|'. Information in quotation marks indicates the original spelling. Our remarks and additional comments are placed in brackets, [p] – preceding data (within quotation marks) are printed; [h] – the same but handwritten. HT – holotype, PT – paratype.

Morphological terminology largely follows SEHNAL et al. (2014).

Taxonomy

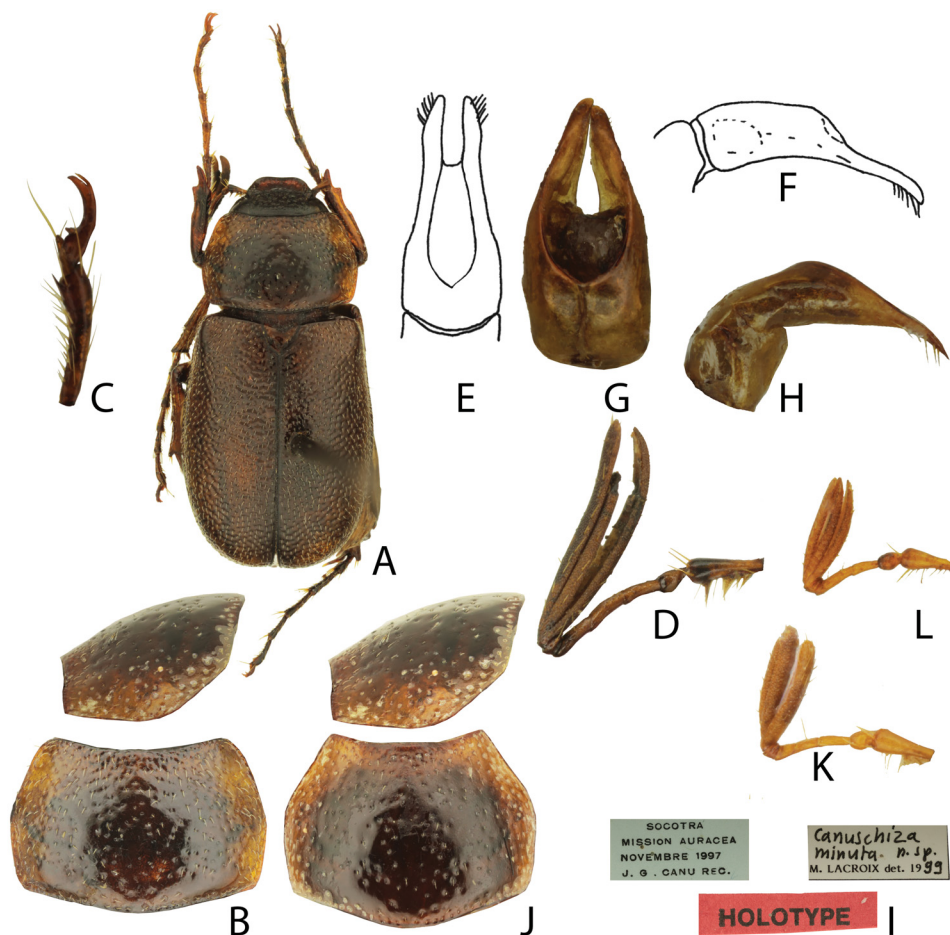
Canuschiza minuta Lacroix, 1999

(Figs 1A–L, 2A–F)

Canuschiza minuta Lacroix, 1999: 88, figs 2, 12, 14, 16, 18, 20, 22, 24, 26 (original description); LACROIX (2002): 404, figs 13–17, 22–25 (review); BEZDĚK (2006): 228 (catalogue); LACROIX (2010): 207 (catalogue); SEHNAL et al. (2014): 168, fig. 1B (comparison); BEZDĚK (2016): 280 (catalogue).

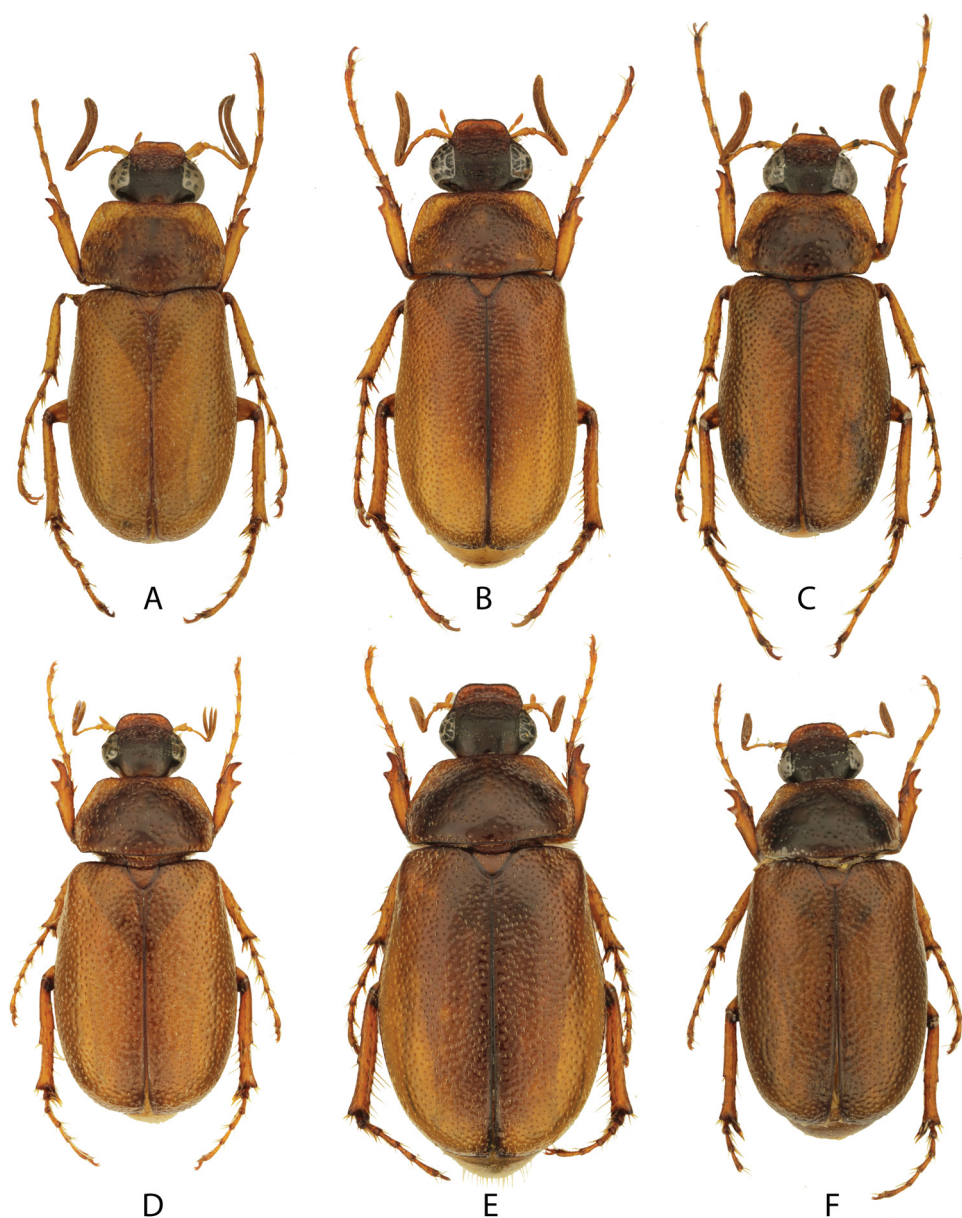
Type locality. 'Socotra'.

Type material examined. HOLOTYPE: ♂, labelled: 'HOLOTYPE [p, red label] || SOCOTRA | MISSION AURACEA | NOVEMBRE 1997 | J. G. CANU REC. [p, pale blue label] || Canuschiza | minuta n.sp. [h] | M. LACROIX det. 19 [p] 99 [h]' (MNHN, Figs 1A,I).



Figs 1A–L. *Canuschiza minuta* Lacroix, 1999: A–I – male, holotype, body length 7.5 mm; J–K – female, specimen from Zerig, body length 7.2 mm; L – female, another specimen from Zerig. A – habitus; B, J – pronotum in lateral and dorsal views; C – protarsal claw; D – antenna; E, F – aedeagus in dorsal and lateral views (adopted and modified from LACROIX 1999); G, H – aedeagus in dorsal and lateral views; I – labels; K – antenna with eight antennomeres; L – antenna with nine antennomeres. Not to scale.

Additional material examined (93 specimens). **YEMEN: SOCOTRA ISLAND:** Wadi Ayhaft, 12°36'38"N 53°58'49"E, 190 m a.s.l., 14.–26.xi.2003, D. Král leg., 1 ♂ 2 ♀♀ (NMPC); Dixam plateau, Wadi Es Gego, 12°28'09"N 54°00'36"E, 300 m a.s.l., J. Farkač leg., 1 ♂ (NMPC); same data but D. Král leg., 1 ♂ 2 ♀♀ (IECA); same data but P. Kabátek leg., 2 ♂♂ 1 ♀ (RSCV); Wadi Es Gego, 12°28'18"N 54°00'34"E, 300 m a.s.l., 13.v.2004, A. Reiter leg., 1 ♂ 7 ♀♀ (NMPC); Dixam plateau, Wadi Zerig, 12°29.6'N 53°59.5'E, 655 m a.s.l., 13.–14.vi.2012, J. Bezděk, J. Hájek, V. Hula, P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg., 32 ♂♂ 5 ♀♀ (NMPC), 10 ♂♂ 5 ♀♀ (IECA), 10 ♂♂ 5 ♀♀ (RSCV), 2 ♂♂ 2 ♀♀ (BMNH), 2 ♂♂ 2 ♀♀ (MNHN).



Figs 2A–F. *Canuschiza minuta* Lacroix, 1999, dorsal view: A – male, specimen from Esgego, body length 7.0 mm; B – male, specimen from Ayhaft, body length 7.5 mm; C – male, specimen from Zerig, body length 7.2 mm; D – female, specimen from Esgego, body length 7.4 mm; E – female, specimen from Ayhaft, body length 8.5 mm; F – female, specimen from Zerig, body length 7.2 mm. Not to scale.

Redescription. Male (holotype). Body elongate, almost parallel, remarkably convex. Dorsal and ventral surface moderately shiny, elytra somewhat alutaceous, chestnut brown, macrosetation pale (Fig. 1A). Dorsal surface of head, pronotum, scutellar shield and elytra covered with white short, remarkably minute recumbent scale-like macrosetae, ventral surface of thorax and abdomen with sparsely spaced, white recumbent scale-like macrosetae. Head appendages and legs covered with yellowish moderately long macrosetae, mixed with a few white recumbent scale-like macrosetae on metafemora.

Head. Labrum transverse, deeply bilobed, lobes rounded, irregularly and coarsely punctate, covered with long erect macrosetae. Clypeus transverse, anterior margin weakly upturned and shallowly sinuate, anterior angles rounded. Frontoclypeal suture present, forming continuous elevated carina. Clypeus and frons densely (to confluent), irregularly, coarsely punctate, each puncture with short, minute erect macroseta. Occiput sparsely, regularly, moderately punctate. Eye-canthus narrow, short, bare. Frons relatively narrow, width of frons / width of eye ratio = 2.02–2.28 (10 specimens measured). Antenna with nine antennomeres; club with three antennomeres, almost straight (Fig. 1D), distinctly shorter than antennal shaft (antennomeres I–VI combined). Antennomeres I–VI with sparse long macrosetae, club with sparse short macrosetae. Terminal maxillary palpomere elongate, apically rounded, approximately as long as palpomeres II and III combined.

Pronotum transverse, moderately convex, widest approximately in middle. Basal and lateral borders complete, anterior border missing. Lateral outline regularly rounded, margins not crenate, bare. Anterior margin regularly, broadly sinuate. Anterior angles moderately produced, obtuse-angular; posterior angles remarkably broadly rounded (Fig. 1B). Punctuation consisting of coarse, umbilicate, almost regularly spaced punctures becoming somewhat denser laterad; each puncture bearing short, narrow, white scale-like, almost recumbent macroseta; transversal, weakly convex, nude area anteriorly of base present.

Scutellar shield large, almost equilaterally triangular, sides and apex round; disc punctate laterally, each puncture bearing short, narrow, white scale-like, almost recumbent macroseta.

Elytra weakly convex, parallel-sided, rounded apically, apical angle approximately rectangular. Striae missing, excepting feebly visible sutural stria. Humeral umbones present, vaguely swollen. Surface finely microsculptured (shagreened), alutaceous; punctuation coarse, almost regularly spaced, punctures separated by 1–2 their diameter. Each puncture bearing short, narrow, white scale-like, almost recumbent macroseta. Epipleura distinct, complete, narrow, with several macrosetae in basal third.

Macropterous.

Legs. Femora narrow, shiny, irregularly punctate, almost nude. Protibia narrow, distinctly tridentate, terminal calcar inserted against emargination between medial and basal tooth. Meso- and metatibia slightly expanded apicad, with two macrosetiferous longitudinal and one obliquely transversal carinae. Upper terminal calcar of metatibia flattened, slightly curved, acute apically, almost two times as long as lower, apically truncate chisel-shaped metatibial calcar. Claws bifid, with ventrobasal teeth (Fig. 1C).

Ventral surface covered with sparsely spaced, short, recumbent, white scale-like macrosetae. Pygidium convex, all around bordered, apically broadly rounded, irregularly covered with coarse macrosetiferous punctures.

Male genitalia. Parameres symmetrical, approximately as long as phallobasis, regularly curved in lateral aspect, rounded apically in dorsal aspect; apex with tuft of long yellowish macrosetae (Figs 1G,H).

Sexual dimorphism. Female differs from male in the following characters: body slightly broadened posteriad (Figs 2D–F); antennal club straight, distinctly shorter (Figs 1K,L); metatibia more strongly expanded apically; tarsomeres of all legs shorter; claws shorter, more robust.

Variability. Material of both males and females slightly varies in length (see measurements), colour and punctuation of dorsal surface, length and distribution of scale-like macrosetation of pronotum and elytra. In addition, all three specimens originating from Wadi Ayhaft are characterized by more wrinkled frons than those from Wadi Es Gego and Wadi Zerig; on the other hand specimens found in Wadi Zerig are characterized by blackish coloured terminal parts of scapus and pedicellus and by dorsal surface irregularly bicolorous with dark elytral suture (Figs 2C,F) while specimens from Wadi Ayhaft and Wadi Es Gego are predominantly unicolorous (incl. brownish scapus and pedicellus). Seven female specimens from Wadi Zerig have only eight antennomeres in both antennae. Despite the above mentioned differences, these specimens are tentatively considered conspecific because of identical shape of the aedeagus.

Measurements. Total body length: ♂♂ 6.5–7.5 mm (holotype 7.5 mm); ♀♀ 6.8–8.5 mm.

Collecting circumstances. As far as it is known, the majority of specimens was captured attracted to light (J. Bezděk, pers. comm.); all specimens collected by A. Reiter were found climbing on vegetation after the dusk (A. Reiter, pers. comm.).

Geographical distribution. Endemic species of the Socotra Island, so far known from Wadi Ayhaft, Wadi Es Gego and Wadi Zerig. See BEZDĚK et al. (2012) for precise location.

Remarks. Line drawings of the holotype parameres accompanying the original description (Figs 1E,F; see also LACROIX (1999: fig. 2) for originals) do not entirely correspond to reality, mainly in the lateral aspect. Dark colouration of the holotype is probably unnatural as the type specimen appears to be partly rotten.

Out of 19 female specimens collected in Wadi Zerig area, seven exhibit reduction of antennomere number to eight in both antennae. This is due to the fusion of two antennomeres, most likely between antennomere III to V. An analogous situation is to be found relatively frequently in several members of Rhizotrogini, for more details see e. g. BRANCO (1990), BUNALSKI (1994), COCA-ÁBIA (1992) or MONTREUIL (2000), but so far has never been recorded in the tribe Schizonychini.

Canuschiza zerig sp. nov.

(Figs 3A–J)

Type locality. Yemen, Socotra Island, Dixam [= Diksam], Wadi Zerig, 12°29.6'N, 53°59.5'E, 655 m a. s. l.

Type material (19 specimens). Holotype: ♂, labelled: '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 || SOCOTRA expedition 2012 | J. Bezděk, J. Hájek, V. Hula | P. Kment, I. Malenovský, J. Niedobová & L. Purchart leg. [p]'. PARATYPES: Nos. 1–6 (2 ♂♂ 4 ♀♀): same label data as holotype; Nos. 7–17 (5 ♂♂ 6 ♀♀): 'YEMEN, SOKOTRA Island | MARSHIM cave, DIKSAM | plateau; 970 m a.s.l. | 12°30'32"N; 53°56'19"E | 9.V.2004 lgt. A. REITER [p]'; No. 18 (♀): 'YEMEN, Socotra isl. | Firmihin, x.2000 | V. Bejček & K. Štátný lgt. [p]'.

Type depositories. HT and PT Nos. 3, 9, 15, 18 in NMPC, PT Nos. 1, 2, 4–6 in IECA, PT Nos. 7, 8, 12–14 in RSCV, PT Nos. 10, 16 in BMNH, PT Nos. 11, 17 in MNHN.

Additional material examined (2 specimens). **YEMEN: SOCOTRA ISLAND:** Zemhon area, 16.–17.vi.2010, 12°20.58'N, 54°06.39'E, 270–300 m a.s.l., V. Hula leg., 2 ♀♀ (IECA).

Description. Male (holotype). Body elongate, almost parallel, remarkably convex. Dorsal and ventral surface moderately shiny, elytra somewhat alutaceous, light chestnut brown, macrosetation pale (Fig. 3A). Dorsal surface of head, pronotum, scutellar shield and elytra covered with white, small, recumbent scale-like macrosetae, ventral surface of thorax and abdomen with densely spaced, white recumbent scale-like macrosetae. Head appendages and legs covered with yellowish moderately long macrosetae, mixed with few white recumbent scale-like macrosetae on metafemora.

Head. Labrum transverse, deeply bilobed, lobes rounded, irregularly and coarsely punctate, covered with long erect macrosetae. Clypeus transverse, anterior margin weakly upturned and shallowly sinuate, anterior angles rounded. Frontoclypeal suture present, forming continuous bisinuate flat line. Clypeus and frons densely (to confluent), irregularly, coarsely punctate, each puncture with short, minute recumbent macroseta. Occiput sparsely regularly, moderately punctate. Eye-canthus narrow, short, with row of 5–6 long, erect macrosetae. Frons relatively broad, width of frons / width of eye ratio = 2.37–2.94 (10 specimens measured), distinctly extending beyond eye-canthus. Antenna with nine antennomeres; club with three antennomeres, slightly cambered (Fig. 3D), approximately as long as antennal shaft (antennomeres I–VI combined). Antennomeres I–VI with sparse long macrosetae, club with sparse short macrosetae. Terminal maxillary palpomere elongate, apically rounded, approximately as long as palpomeres II and III combined.

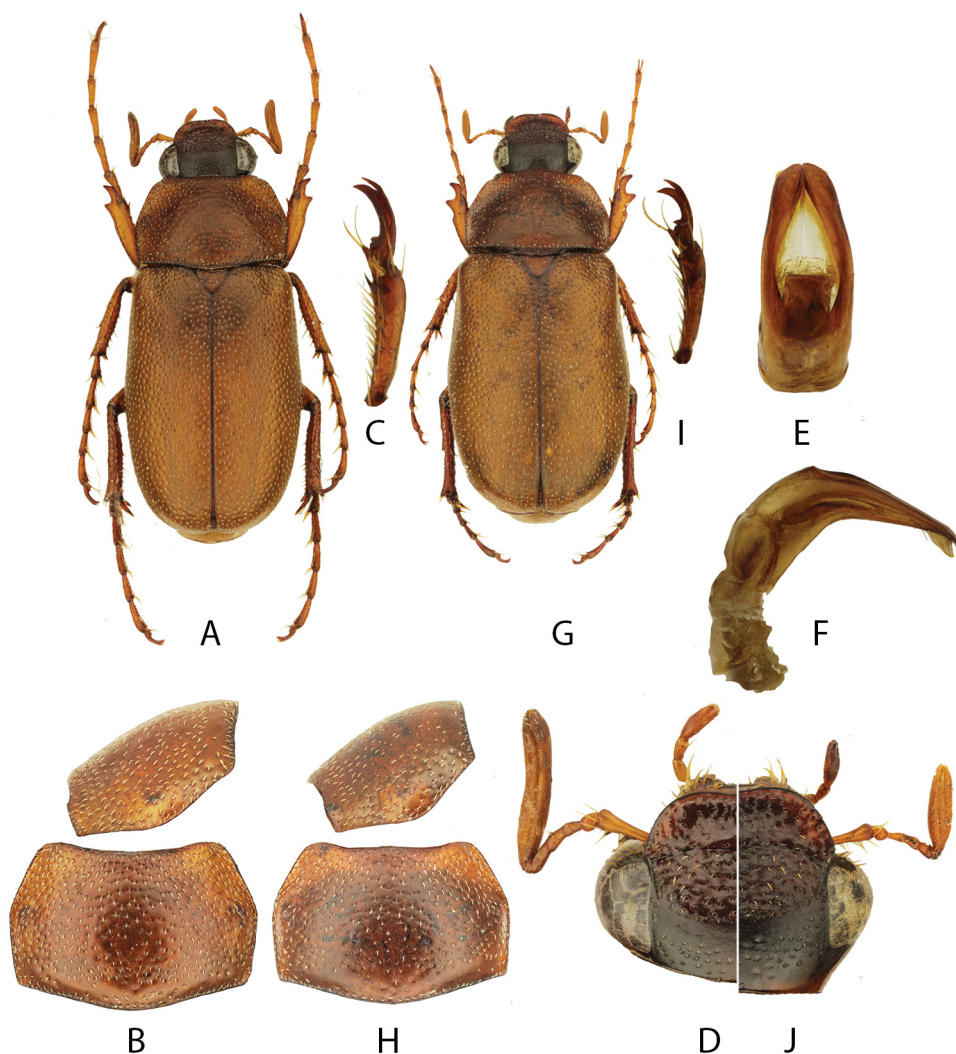
Pronotum transverse, moderately convex, widest approximately in middle. Basal and lateral borders complete, anterior border missing. Lateral outline regularly rounded, margins not crenate, bare. Anterior margin regularly, broadly sinuate. Anterior angles moderately produced, obtuse-angular; posterior angles remarkably broadly rounded (Fig. 3B). Punctuation consisting of coarse, umbilicate, almost regularly spaced punctures becoming somewhat denser laterad, each puncture bearing short, narrow, white scale-like, recumbent macroseta; transversal, weakly convex, nude area anteriorly of base present.

Scutellar shield large, almost equilaterally triangular, sides and apex rounded; disc punctate laterally, each puncture bearing short, narrow, white scale-like, almost recumbent macroseta.

Elytra weakly convex, parallel-sided, rounded apically, apical angle approximately rectangular. Striae missing, excepting feebly visible sutural stria. Humeral umbones present, vaguely swollen. Surface finely microsculptured (shagreened), alutaceous; punctuation coarse, almost regularly spaced, punctures separated by 2–3 their diameters. Each puncture bearing short, narrow, white scale-like, almost recumbent macroseta. Epipleura distinct, complete, narrow, with several macrosetae in basal third.

Macropterous.

Legs. Femora narrow, shiny, irregularly punctate, almost nude. Protibia narrow, distinctly tridentate, terminal calcar inserted against emargination between medial and basal dens. Meso- and metatibia slightly expanded apicad, with two macrosetiferous longitudinal and one obliquely transversal carinae. Upper terminal calcar of metatibia flattened, slightly curved,



Figs 3A–J. *Canuschiza zerig* sp. nov.: A–F – male, holotype, body length 9.0 mm; G–J – female, paratype No. 3, body length 9.0 mm. A, G – habitus; B, H – pronotum in lateral and dorsal views; C, I – protarsal claw; D, J – head; E, F – aedeagus in dorsal and lateral views. Not to scale.

acute apically, almost two times as long as lower, apically truncate chisel-shaped metatibial calcar. Claws bifid, with ventrobasal teeth (Fig. 3C).

Ventral surface covered with a densely spaced, short, recumbent, white, scale-like macrosetae. Pygidium convex, all around bordered, apically broadly rounded, irregularly covered with coarse macrosetiferous punctures.

Male genitalia. Parameres symmetrical, approximately as long as phallobasis, regularly curved in lateral aspect, rounded apically in dorsal aspect; apex with tuft of long yellowish macrosetae laterally (Figs 3E,F).

Sexual dimorphism. Female differs from male in the following characters: body slightly broadened posteriad (Fig. 3G); antennal club straight, distinctly shorter (Fig. 3J); metatibia more strongly expanded apically; tarsomeres of all legs shorter (Fig. 3I).

Variability. Paratypes slightly vary in length (see measurements), colour and punctuation of dorsal surface, length and distribution of scale-like macrosetation of pronotum and elytra. Because two females coming from the Zemhon area possess more rounded posterior pronotal angles than the other material, they are not included in the types series.

Measurements. Total body length: ♂♂ 8.0–10.6 mm (holotype 9.0 mm); ♀♀ 8.5–10.0 mm.

Differential diagnosis. The new species is classified in the *Canuschiza minuta* species group because of having body shape remarkably convex, posterior angles of pronotum broadly rounded (Figs 3A,G), antennae with nine antennomeres (rarely with eight in some females of *C. minuta*). For differentiation from *C. minuta* see the identification key below.

Etymology. Derived from the area of origin of the new species, Wadi Zerig, Socotra Island; noun in nominative case, in apposition.

Collecting circumstances. As far as it is known, the majority of specimens was captured attracted to light (J. Bezděk, pers. comm.); all specimens collected by A. Reiter were found climbing on vegetation after the dusk (A. Reiter, pers. comm.).

Geographical distribution. Endemic species of the Socotra Island, so far known from the Dixam plateau: Wadi Zerig and the Zemhon area, for details see BEZDĚK et al. (2012).

Identification key to *Canuschiza*

- a (b) Body shape remarkably convex, posterior angles of pronotum broadly rounded, antennae with nine antennomeres (rarely with eight in some females of *C. minuta*).
..... *C. minuta* species group
- b (a) Body shape almost flat; posterior angles of pronotum rectangular or even distinctly produced posteriad; antennae with eight or ten antennomeres.
..... *C. insularis* species group

Identification key to the *Canuschiza minuta* species group

- 1 (2) Frontoclypeal suture forming elevated carina; scale-like macrosetae of dorsal surface remarkably minute; macrosetation of ventral surface sparse; parameres of different shape (Figs 1G,H); smaller in size (6.5–8.5 mm).
..... *Canuschiza minuta* Lacroix, 1999
- 2 (1) Frontoclypeal suture forming bisinuate flat line; scale-like macrosetae of dorsal surface relatively larger and more robust; macrosetation of ventral surface remarkably close; parameres of different shape (Figs 3E,F); larger in size (8.0–10.6 mm).
..... *Canuschiza zerig* sp. nov.

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