

A new species of *Lamiogethes* from Socotra Island (Coleoptera: Nitidulidae: Meligethinae)

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Abstract. A new species of pollen beetle of the genus *Lamiogethes* Audisio & Cline, 2009, *L. socotranus* sp. nov., is described from Socotra Island (Yemen). The new species is isolated from other East African representatives of this genus, exhibiting a general shape of male genitalia partially resembling certain *Lamiogethes* species known from southern Indian Peninsula. The new species is the first described Meligethinae recorded from Socotra Island, where further specialized research could enable discovery of other endemic or new species, chiefly in the genera *Lamiogethes*, *Afrogethes* Audisio & Cline, 2009, and *Pria* Stephens, 1830. *Lamiogethes socotranus* sp. nov. was regularly collected on *Cephalocroton socotranus* Balf.f. (Euphorbiaceae), but it could be more likely associated as larvae with an unidentified species of *Leucas* L. (Lamiaceae), which includes seven species endemic to Socotra Island.

Key words. Coleoptera, Nitidulidae, Meligethinae, *Lamiogethes*, new species, Yemen, Socotra

Introduction

Socotra is a relatively large island (3665 km²) located 380 kilometres south of the Arabian Peninsula and ~240 kilometres east of the Horn of Africa. The island is characterized by a high rate of endemic plant and animal species (WRANIK 2003; MILLER & MORRIS 2004; KILIAN & HEIN 2006; BELLÉS 2009; PURCHART 2012; COLONNELLI, in prep.). Beetles are represented by ~370 species (WRANIK 2003; J. Hájek, pers. comm.), with a little less than half of them being endemic, but this number is probably an underestimate. On average, beetles are represented by an overall species number that, in well-explored countries, usually doubles the species number of native plants (the latter being a recognized synthetic indicator of overall biodiversity). In Italy the number of native plant species is around 6000 (PIGNATTI 1982), while the number of native species of beetles is around 12,000 (FAUNA EUROPAEA 2012). This 2:1 proportion seems to be relatively stable throughout most of temperate continental countries in the world, whereas the

value increases in tropical and subtropical areas where the number of beetle species is usually largely underestimated as compared to plants. In insular conditions, chiefly in ancient islands with limited long-distance colonization by beetles, this proportion decreases consistently to ~1:1 (e.g. the Canary Islands with ~2000 native species of plants and beetles (BRAMWELL & BRAMWELL 1974, HANSEN & SUNDING 1993, MACHADO & OROMI 2000). Nearly the same proportion occurs in Sardinia, where ~2000 native plant species are recorded (PIGNATTI 1982), and a comparable number of beetle species is known (FAUNA EUROPAEA 2012). Based on these assumptions, and considering that ~850 plant species are known from Socotra (MILLER & MORRIS 2004, KILIAN & HEIN 2006), an estimate of at least some 800–1000 beetle species should be present on the island with nearly half of them being endemic. This estimate suggests that more than half of the actual local beetle diversity remains undiscovered (e.g. COLONNELLI, in prep.).

Pollen beetles (Nitidulidae: Meligethinae) are all strictly associated with flowering plants for their larval development, and species numbers throughout most temperate continental countries of the Palearctic are represented by an average fraction of ~2 % of the native plant species number (in Italy ~100 pollen beetle species are known with a corresponding ~6000 species of native plants; AUDISIO 1993 and unpublished data). Nearly the same percentage seems to be present in South Africa (more than 20,000 native plant species, compared to ~300 species of described and undescribed pollen beetles: AUDISIO et al. 2009 and unpublished data). In insular conditions, again, this percentage decreases consistently (~0.5 % in the Canary Islands, where ~2,000 native plant species are recorded compared to less than 10 species of described and undescribed pollen beetles: MACHADO & OROMI 2000; P. AUDISIO, unpublished data). This percentage rises to ~1.5 % in Sardinia, where some 2000 native plant species are recorded compared to ~30 species of known pollen beetle species (AUDISIO 2011). Assuming for Socotra an average estimate of ~1 % of the native plant species number, we could then hypothesize that some 5–10 species [1% over 850 = 8.5] of Meligethinae should be present on this island. However, until now no species has been described from the region, which is likely due to lack of specialized field research (see Discussion below).

My colleague Jiří Hájek sent me a series of Meligethinae specimens that were recently collected by Czech entomologists in Socotra Island and deposited in the collections of the National Museum of Prague. As expected, this interesting material included a new species whose description is presented herein.

Materials and methods

All specimens of the new species were obtained from The National Museum, Prague, Czech Republic (NMPC). Some paratypes are preserved in the author's collection, Sapienza Rome University, Italy (PACR), and in the Natural History Museum, London, England (BMNH).

Habitus dorsal view images of the type specimen were taken with a Canon EOS 550D digital camera with a Canon MP-E 65 mm objective. Images of the same specimen at different focal planes were combined using the Helicon Focus 5.1.19 software. The aedeagus of the holotype was mounted in EUPARAL on the same card as the type specimen. The aedeagus was drawn by hand with a drawing tube mounted on a BX50 OLYMPUS® upright microscope (magnification = 200–1000x).

Total length of specimens is here defined as the distance between anterior margin of clypeus and posterior apex of pygidium. Maximum width is defined as the maximum (combined) width of elytra. Elytral length was considered the distance between posterior apex of scutellum and elytral distal apex.

Systematics

Lamiogethes socotranus sp. nov.

(Figs. 1–5)

Type material. HOLOTYPE: ♂ (NMPC), ‘YEMEN, SOCOTRA Island, Hagher Mts., Skant, N 12°34.557', E 54°01.514', V. Hula & J. Niedobová leg., 7-8.vi.2010, collected on *Cephalocroton socotranus*'. PARATYPES: same data as holotype, 6 ♂♂, 3 ♀♀ (NMPC, PACR, BMNH); YEMEN: Socotra Island, Homhil Protected area, N12°34'27" E54°18'32", 364 m a.s.l., 28-29.xi.2003. D. Král lgt, 1 ♀ (NMPC); YEMEN: Socotra Island, Al Haghier Mts., Wadi Madar, N12°33'20" E54°00'40", 1180-1230 m a.s.l., 12-14.xi.2010, J. Bezděk lgt, 1 ♀ (NMPC); YEMEN: Socotra Island, Wadi Zirik, N12°29.584' E53°59.475', ca. 500 m a.s.l., 12.vi.2010, V. Hula & J. Niedobová lgt, 2 ♂♂, 1 ♀ (NMPC, PACR); YEMEN: Socotra Island, Dixam plateau, Wadi Zeeriq, N12°31'08" E53°59'09", 750 m a.s.l., 3.xii.2003. D. Král lgt, 1 ♀ (NMPC); YEMEN: Socotra Island, eastern part, Zemhon area, N12°20'58" E54°06'39", 270-300 m a.s.l., 16-17.vi.2010, V. Hula lgt, 1 ♂, 1 ♀ (NMPC).

Diagnosis. Small to medium-sized, almost glabrous dorsally, reddish-brown with yellowish legs and antennae (Fig. 1), frequently with darker, blackish elytra and ventrites, similar to *Lamiogethes leucasi* (Easton, 1960) from Central and Eastern Africa in general appearance, with differently toothed protibiae (these markedly similar in shape to the European *Lamiogethes difficilis* (Heer, 1841): Fig. 5), and different male genitalia (Figs. 2–3).

Description (male holotype). Body medium-sized, length: 2.3 mm; width: 1.2 mm, moderately elongate and convex (Fig. 1); unicolorous reddish-brown, shining, almost glabrous dorsally, with peculiarly fine and barely distinct golden pubescence on head only, glabrous elsewhere (ventral pubescence fine and short, golden), frequently with darker, blackish elytra and ventrites.

Head with deep punctures nearly 1.5× as large as eye facets, separated by one diameter or less, surface between them smooth, shining; anterior margin of clypeus almost truncate, with lateral angles rather blunt (Fig. 1).

Antennae yellowish, medium-sized, antennomere 3 slender, much narrower, but slightly shorter than antennomere 2; club small and symmetrical (Fig. 1).

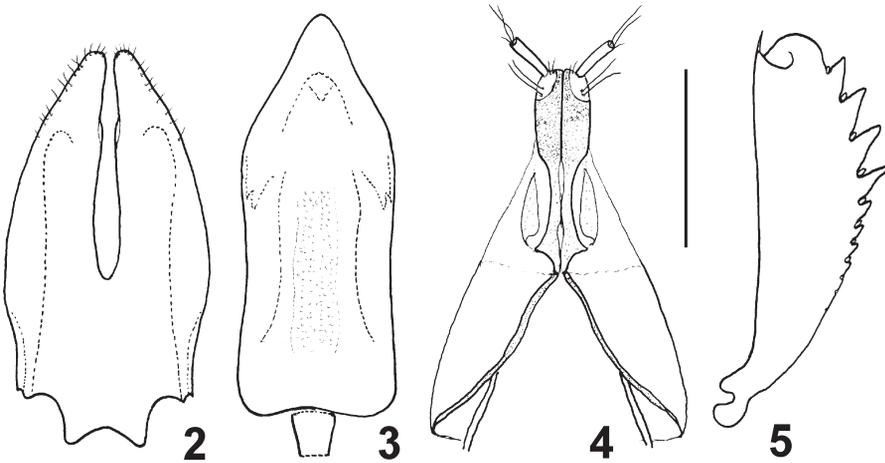
Thorax. Pronotum convex, transverse, 1.85× as wide as long, moderately arcuate at sides, broadest near posterior angles, more narrowed anteriorly, sides distinctly bordered and narrowly explanate; posterior angles slightly obtuse but distinct; posterior basal margin markedly sinuate on either side of scutellum; discal punctures deep, 1.5–2.0× as large as eye facets, absent in posterior angles, separated by one diameter or more, surface between them shining.

Scutellum medium-sized, sparsely punctate in anterior half, shining and almost impunctate posteriorly.

Elytra long, 1.0× as long as wide, broadest at basal second fifth, ca. 1.15× as wide as pronotum; humeri moderately raised, humeral striae absent; punctures as deep and large as those on pronotum; spaces between punctures smooth and shining.



Fig. 1. *Lamiogethes socotranus* sp. nov. 1 – habitus of a male paratype (Body length: 2.4 mm).



Figs. 2–5. *Lamiogethes socotranus* sp. nov. 2–3 – male genitalia (tegmen and median lobe of the aedeagus, dorsal view) of a male paratype; 4 – ovipositor of a female paratype; 5 – front tibia of a male paratype. Scale bar = 0.2 mm.

Thoracic ventrites with fine short golden pubescence. Prosternal antennal ridges strongly marked; prosternal process distinctly wider (ca. 1.5 \times) than antennal club, apex flatly rounded; punctures rather deep, ca. 1.5 \times diameter of eye facet, separated by nearly one diameter; surface smooth. Mesoventrite with posterior edge straight. Metaventrite flatly convex, with punctures shallower, as large as or slightly larger than eye facets, separated by one diameter or more, surface smooth and shining; secondary sexual characters represented by distinct wide impression on posterior two thirds of male metaventrite (appearing flat and simple in females). Metaventral 'axillary line' simple.

Legs yellowish. Protibiae (Figs 1, 5) with outer edge serrate in distal half, with a series of 4–5 longer, rather sharp teeth; protarsi in both sexes short, narrow, much shorter than antennae, protarsal plate in males slightly narrower than antennal club (Fig. 1), more narrow in females; meso- and metatibiae rather long (Fig. 1), with arc-like outer edge, bearing a regular series of strong, sharp and heavily sclerotized spinules; tarsal claws simple, not toothed at base.

Ventrites. Last abdominal ventrites simple, without distinct secondary sexual characters (posterior edge in middle barely emarginate in males), in both sexes with deep and strongly marked arc-like impression on each side.

Tegmen (Fig. 2) long, arcuately narrowed distad, distinctly setose at apex, apical excision deep and peculiarly narrow; aedeagus elongate (Fig. 3), abruptly narrowed from distal third, and markedly pointed distad.

Female. Ovipositor yellowish, with rather blunt and slightly darker apex, bearing quite long styli inserted close to apex (Fig. 4); 'central point' placed at distal three sevenths, without ventral spicule; transverse suture narrowly V-shaped, with arcuate base of gonocoxites.

Variation. The new species exhibits relatively strong variation in body colour (from unicolorous pale orange to orange-brown with blackish elytra and ventrites) and size (length: 1.8–2.4 mm; width: 0.95–1.25 mm).

Biology. Several specimens of the new species were collected on flowering shrubs of *Cephalocroton socotranus* Balf.f. (Euphorbiaceae), a Socotran endemic inhabiting subtropical dry shrublands in mountainous areas of the island. Euphorbiaceae are among the relatively few plant families colonized by Meligethinae larvae (larvae of a single unrelated genus in Central Africa were recently collected on inflorescences of *Macaranga* spp., Euphorbiaceae; P. AUDISIO, unpublished data), but *Lamiogethes* species appear to be all strictly associated with Lamiaceae. This occurrence of a *Lamiogethes* on a non-Lamiaceae host suggests that the hypothesis of a possible larval-host plant relationship of *Lamiogethes socotranus* sp. nov. with *Cephalocroton* Hochst. is rather unlikely, which is also supported by the low ratio of collected females to males. Combining the relatively close morphological relationships of the new species with *L. leucasi* (Easton, 1960) and related species from Eastern and Central Africa, mostly associated with *Leucas* spp. (Lamiaceae; EASTON 1959, 1960; AUDISIO unpublished data), as well as the occurrence of seven Socotran endemics in this botanical genus (*Leucas flagellifolia* (Balf.f.) Guerke, *L. haggierensis* Al-Gifri & Cortés-Burns, *L. kishenensis* (Radcl.-Sm.) Sebald, *L. penduliflora* Al-Gifri & Cortés-Burns, *L. samhaensis* Cortés-Burns & A.G.Mill., *L. spiculifera* (Balf.f.) Guerke, and *L. virgata* Balf.f.; SEBALD 1980; SCHEEN & ALBERT 2009), I suspect that at larval stages the new species could be associated with one of the above cited *Leucas* species. However, further more recent (June, 2012) field research on

the island seems to confirm a regular association of adults of *Lamiogethes socotranus* sp. nov. with *Cephalocroton socotranus* (J. Hájek, pers. comm.). During the same recent expedition, some specimens of the new species were also found in flowers of *Carphalea obovata* (Balf. f.) Verdc. (Rubiaceae), but none was observed at the top of Haghier Mts., where *Leucas haggierensis* was one of the dominant plants. These combined circumstances could then suggest that the hypothesis of a possible ecological shift of *Lamiogethes socotranus* sp. nov. on *Cephalocroton* should not be excluded. On the other hand, nothing is known about the larval host-plant relationships of the several southern Indian *Lamiogethes* related to the new Socotran species (see discussion below).

Etymology. The new species is named after its area of occurrence, i.e. Socotra Island.

Distribution. *Lamiogethes socotranus* sp. n. is only known from the above cited type localities on Socotra Island, Yemen.

Discussion

The new species described herein is easily distinguished from the other African species of the *Lamiogethes ruficollis/gloriosus* group (EASTON 1960) by the characteristically shaped protibiae (Fig. 5) that are similar to those of the European *L. difficilis* (Heer, 1841), by the peculiar male genitalia with a narrowly and deeply incised tegmen (Figs. 2–3), and by almost glabrous dorsal body surface. The shape of both tegmen and median lobe of the aedeagus of the new species is, in fact, markedly distinct from the typical shape observed in most African members of the *Lamiogethes ruficollis* group (EASTON 1959, 1960). The genus *Lamiogethes* includes (AUDISIO et al. 2009) nearly one hundred described species from Palearctic, tropical and subtropical Africa, India, and Madagascar. Species are attributed to four main species-groups, including: the *L. difficilis* group from Palearctic areas; the *L. ruficollis/gloriosus* group from tropical and subtropical Africa; the *L. convexus* group from southern Africa; and the *L. luminosus/politus* group from India and Madagascar. *Lamiogethes socotranus* sp. nov. occupies a particularly interesting phylogenetic position that likely links it to the *L. luminosus/politus* and *L. ruficollis/gloriosus* groups via shared morphological characters and biogeographical tendencies. This new species, in fact, combines a general body shape similar to that of most African species of the *L. ruficollis/gloriosus* group, including an almost glabrous body, and male genitalia more closely resembling certain species of the *L. luminosus/politus* group from the Indian Subcontinent (see, e.g., KIREJTSHUK 1988). Overall body shape and colour are particularly similar to those of *Lamiogethes mixtus* (Grouvelle, 1908) from southern India.

As discussed in the Introduction, it is likely that at least a few other Meligethinae species occur in Socotra, chiefly in the genera *Lamiogethes* (several endemic Lamiaceae and Euphorbiaceae are recorded from the Island; SEBALD 1980; MILLER & MORRIS 2004, SCHEEL & ALBERT 2009), *Afrogethes* Audisio & Cline, 2009 (mostly associated with Fabaceae, Boraginaceae, and Verbenaceae, relatively well represented in the island; MIES & BEYHL 1996, MILLER & MORRIS 2004, KÜRSCHNER et al. 2006), and *Pria* Stephens, 1830 (associated with several plant families including Solanaceae, Mesembryanthemaceae, Ericaceae, and others). These three genera include most of the Meligethinae fauna known to occur on the Arabian Peninsula

(EASTON 1954; JELÍNEK 1979, 1988; COOPER 1982; AUDISIO et al. 2009). Further field work in Socotra aimed to specifically collect Meligethinae will very likely enable the discovery of other thus far undetected and undescribed species.

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