

Cassidinae (Coleoptera: Chrysomelidae) from Socotra Island

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Abstract. Two Cassidinae species known from Socotra Island are discussed. *Cassida rothschildi* Spaeth, 1922 is redescribed, and its last instar larva is described for the first time. *Lycium socotranum* Wagn. & Vierh. and *L. shawii* Roem. & Schult. (Solanaceae) are the first host records for this species. Record of *Oxylepus deflexicollis* (Boheman, 1862) from Socotra is based on misidentified specimen of *Oxylepus kossmati* Spaeth, 1901.

Key words. Coleoptera, Chrysomelidae, Cassidinae, *Cassida rothschildi*, redescription, larva, new host record, new record, Yemen, Socotra

Introduction

Only seven species of the Cassidinae sensu stricto (tortoise beetles) are known from the Arabian Peninsula and adjacent islands, and only one has been recorded from Socotra Island but misidentified: *Aspidimorpha gruevi* Borowiec, 1985, *Cassida pellegrini* Marseul, 1868, *Cassida praetimida* Spaeth, 1912, *Cassida rothschildi* Spaeth, 1922, *Nabathaea pygmaea* Spaeth, 1911, *Oxylepus kossmati* Spaeth, 1901 (the only species known from Socotra) and *Seminabathea arabica* (Spaeth, 1911) (WRANIK 2003, BOROWIEC & SEKERKA 2010). According to the attached photo, the record of *Cassida liquefacta* Spaeth, 1912 (junior synonym of *Cassida praetimida*) from the United Arab Emirates by LOPATIN (2008) belongs to *Nabathaea pygmaea*, although true *Cassida praetimida* was collected in Yemen.

Among unidentified material collected on Socotra by Czech expeditions we have found specimens of *Cassida rothschildi*, species hitherto not recorded from the island. It is redescribed along with the first description of the last instar larva and the first host plant record. Correct identification for the second cassidine species known from Socotra is also given.

Material and methods

The locality data of the type material are cited verbatim; a slash (/) is used to divide the data on different rows of the same label, and double slash (//) to divide the data on different labels.

Larvae initially killed and preserved in 75 % ethanol were removed and boiled in 10% NaOH solution, cleared in distilled water and then mounted on slides with Swan's liquid (distilled water 20 g, gum arabic 15 g, chlorhydrate 60 g, glucose 3 g, glacial acetic acid 2 g) and glycerine for light microcopy. Heads of the larvae were separated from the rest of the body and then mouthparts were dissected.

Slides and measurements of larvae were made using a Nikon SMZ 1500 stereomicroscope. A Nikon ECLIPSE 80i microscope with phase contrast was used for specimen examination and drawing of figures. The photos of mature larvae were made using a Nikon COOLPIX MDC Lens camera and Nikon SMZ 1500 stereomicroscope.

All studied specimens are deposited in the following collections: Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław, Poland (DBET), National Museum Prague, Czech Republic (NMPC), Naturhistorisches Museum Basel (NHMB), Jan Bezděk collection, Brno, Czech Republic (JBCB), Jan Batelka collection, Prague, Czech Republic (JBCP) and Lukáš Sekerka collection, Liberec, Czech Republic (LSCL).

Taxonomy

Cassida (Tylocentra) rothschildi Spaeth, 1922

(Figs. 1–27)

Cassida Rothschildi Spaeth, 1922: 1002.

Cassida rothschildi: BOROWIEC (1999): 277 (catalogue); BOROWIEC & SEKERKA (2010): 377 (catalogue).

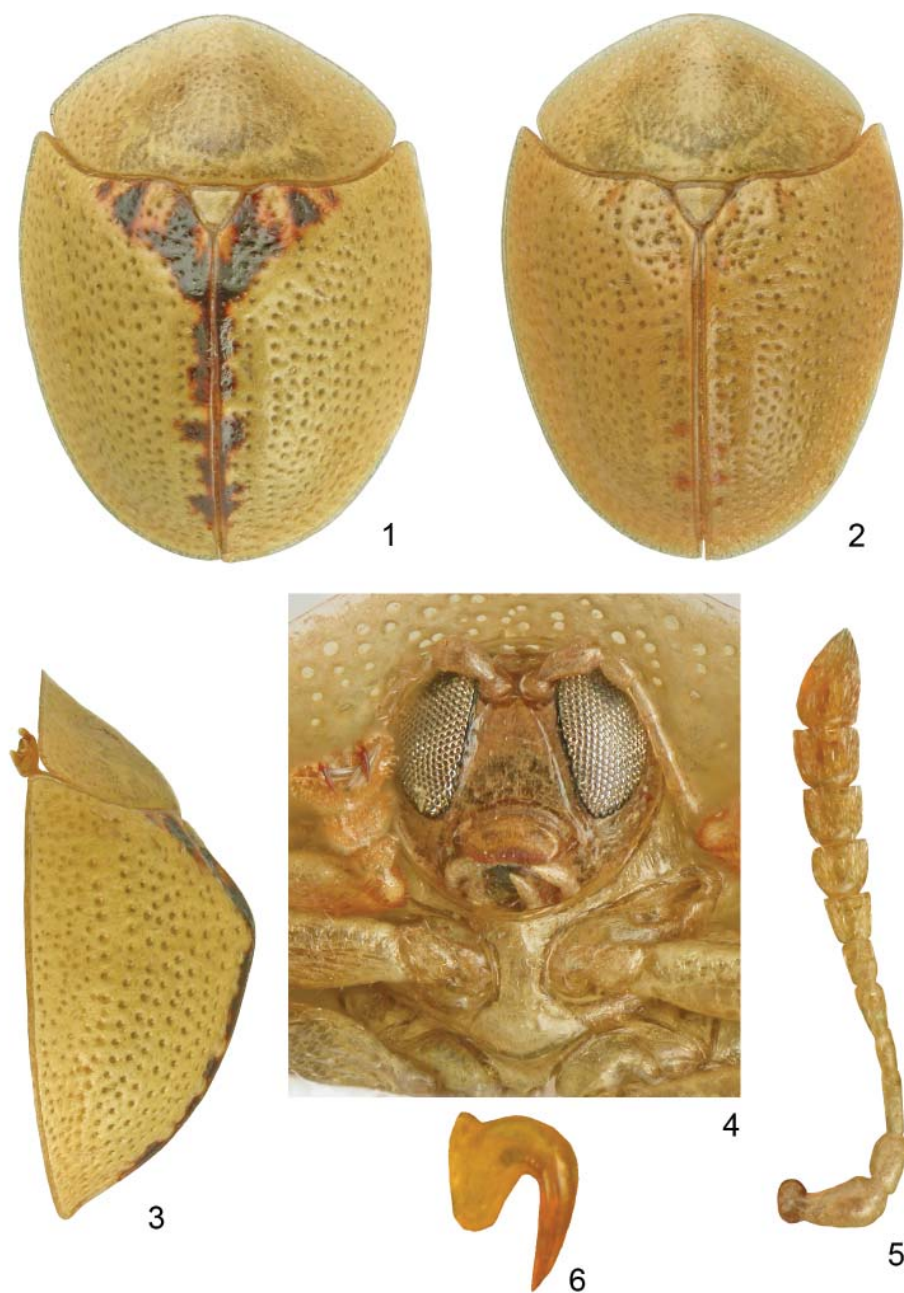
Type locality. Lasami in Randile region (northern Kenya, close to Turkana Lake).

Type material. HOLOTYPE: 'Afrique Orient. Angl. / Lesammise Rendile / Maurice de Rothschild 1906 // TYPE' (preserved in Muséum National d'Histoire Naturelle, Paris, France).

Material examined (94 spec.). **YEMEN: SOCOTRA ISLAND:** Firmihin plato, Dracena tree forest, 12°28'465"N 54°00'89830"E, 22.-25.vi.2009, 21 spec. and 2 larvae, V. Hula leg. (7 spec. and 2 larvae in DBET, rest in JBCB); Dixam plateau, Firmihin (Dracaena forest), 12°28.6'N 54°01.1'E, 490 m, 15.-16.xi.2010, 28 spec., J. Bezděk leg. (JBCB); same data, but L. Purchart leg., 7 spec. (JBCB); same data, but J. Hájek leg., 8 spec. (NMPC); same data, but J. Batelka leg., 3 spec. (JBCP); Diksam plateau, 12°31'24"N 53°58'29"E, 850-920 m, 5.ii.2010, 20 spec., L. Purchart & J. Vybiral leg. (JBCB, 10 spec. in LSCL); Wadi Zirik, 12°29.584'N 53°59.475'E, 12.vi.2010, 2 spec., V. Hula & J. Niedobová leg. (JBCB); Noged, Farmihin, Steroh, Wadi, 12°24'26"N 54°08'40"E, 24.x.2000, 1 spec., T. Van Harten leg. (NHMB). **KENYA:** Elsamere, 7.iv.1998, on *Lycium shawii*, 2 spec., ABD (DBET). **SAUDI ARABIA:** BAC Camp, Khamis Mushayt, 2000 m, 17.-18.iv.1976, 1 spec., Wittmer & Buettiker leg. (NHMB). **SUDAN:** Kassala, Abend Pass, 5.xii.1962, 1 spec., Linnavuori leg. (DBET).

Redescription of imago. Length: 3.8–4.4 mm, width: 2.9–3.3 mm, length of pronotum: 1.4–1.5 mm, width of pronotum: 2.4–2.8 mm, length/width ratio: 1.31–1.35, width/length ratio of pronotum: 1.72–1.83. Body broadly oval, sides distinctly converging posterad (Figs. 1, 2).

Dorsum yellow (in fresh specimens green), basal impression of elytra and suture usually marked with reddish to brown spots. In palest specimens sides of basal impressions and close to scutellum, apex of disc, and suture in posterior half with few small, reddish spots (Fig. 2).



Figs. 1–6. *Cassida rothschildi* Spaeth, 1922. 1, 2 – habitus dorsal; 3 – habitus lateral; 4 – head and prothorax; 5 – antenna; 6 – tarsal claw.

In darkest specimens almost whole basal impression and along suture with irregular, dark brown spots, often margined with red (Fig. 1). Between palest and darkest form all intermediate forms were observed. Ventrites, legs and antennae uniformly yellow.

Pronotum ellipsoidal, with subangulate sides, no basal corners, widest approximately in middle. Disc indistinctly bordered from explanate margin, moderately convex, with small but dense punctation, distance between punctures smaller than puncture diameter, interspaces shiny. Explanate margin with dense but very shallow punctation, appears rather irregular than punctate, transparent with honeycomb structure.

Scutellum triangular, impunctate, without transverse sulci. Base of elytra only slightly wider than pronotum, humeral angles distinctly protruding anteriorly, angulate. Disc strongly convex, subangulate in profile (Fig. 3). Postscutellar impression well marked, lateral impressions not present. Punctation arranged in regular rows, only postscutellar impression with partly irregular punctures. Rows not impressed, punctures moderately coarse, distance between punctures mostly wider than puncture diameter. Marginal row distinct, its punctures not coarser than punctures in lateral rows. Intervals flat, 1.5–2.0 times wider than rows, surface microreticulate but shiny. Marginal interval distinct, in anterior half twice wider than lateral intervals, without transverse folds. Explanate margins strongly declivous, in widest part approximately twice narrower than each elytron, their surface sparsely irregularly punctate, punctures approximately twice smaller than in rows.

Eyes large, gena almost obsolete. Clypeus broad, approximately 1.4 times as wide as long. Clypeal lines distinct, running close to margin of eyes and converging in obtuse triangle. Surface of clypeal plate flat, shiny, with several small, setose punctures. Labrum without median emargination (Fig. 4). Antennae stout, antennomeres IX and X approximately 1.2 times as wide as long, length ratio of antennomeres: 100:65:72:43:57:50:52:57:64:66:118, antennomere II slightly shorter than antennomere III, antennomere III approximately 1.6 times as long as antennomere IV (Fig. 5).

Prosternal collar very short, forms narrow transparent margin. Prosternal process in middle slightly narrower than mid coxa, strongly expanded apically, rhomboidal apex twice wider than intercoxal space. Area between coxae flat or shallowly impressed, without special sculpture, shiny; rhomboidal apex flat or slightly convex, impunctate (Fig. 4).

Legs stout, tarsi moderately elongate, claws segment not extending behind marginal setae. Claws simple, on inner side with distinct micropecten (Fig. 6).

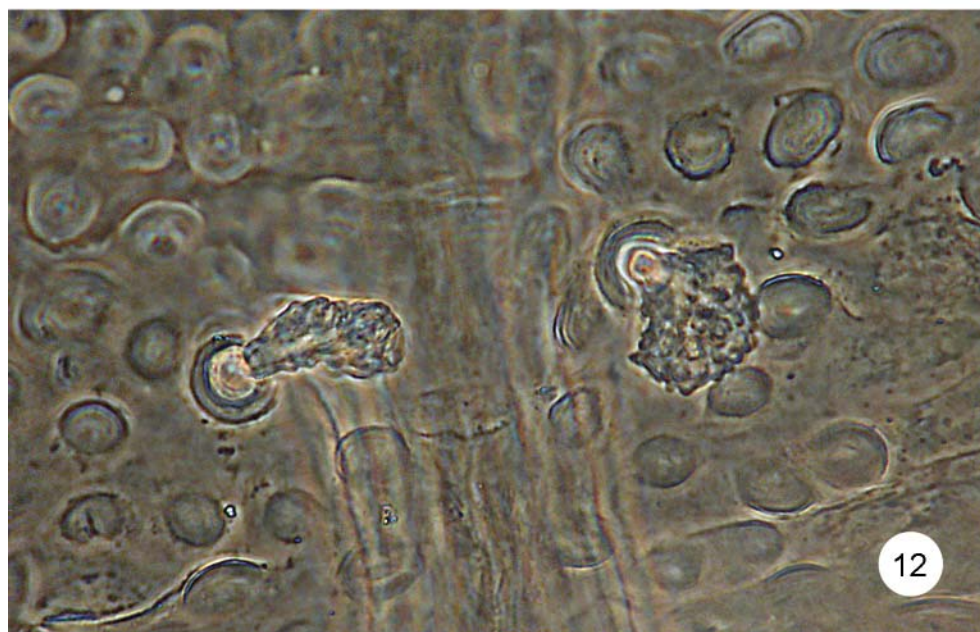
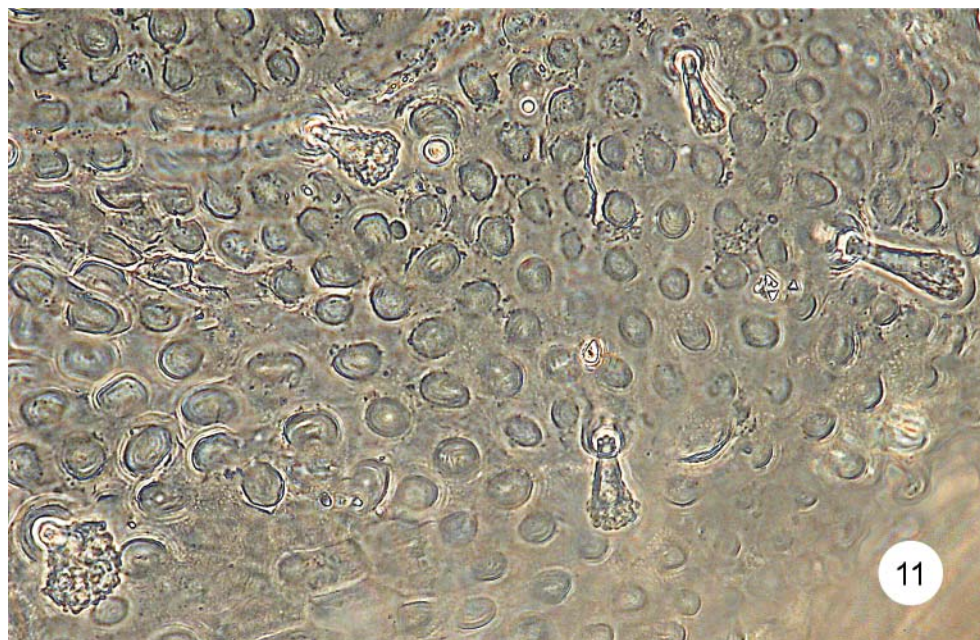
Description of mature larva. Measurements ($n = 2$). Length without head, from anterior border of pronotum to base of supra-anal processes: 4.10–4.30 mm; width of metathorax, without lateral scoli: 1.90–2.15 mm. Length of supra-anal processes, from base on abdominal segment IX to the top of processes: 1.55–1.70 mm. Width of head: 0.76–0.78 mm.

Body elongate-oval, widest across meso- and metathorax, narrowed posteriorly (Figs. 7–9). Anterior part of body convex (Fig. 10). Body of larvae preserved in alcohol yellowish with brown basal half of supra-anal processes.

Body with 16 pairs of lateral scoli and a single pair of supra-anal processes (Figs. 7, 8). Lateral scoli short, stout, conical, approximately same size. All scoli covered with numerous cauliflower-shaped sensilla (Figs. 17, 18). Scoli of thorax with short, stout lateral processes,



Figs. 7–10. *Cassida rotschildi* Spaeth, 1922, mature larva. 7 – dorsal aspect; 8 – ventral aspect; 9 – larva with previous larval skin, dorsal aspect; 10 – larva with previous larval skin, lateral aspect.



Figs. 11–12. *Cassida rotschildi* Spaeth, 1922, mature larva, cauliflower-like sensilla of head.

each armed apically with cauliflower-shaped sensillum, scoli of abdomen simple without lateral processes. Scoli of first two pairs placed very close to each other (Fig. 17). Scoli of thorax directed anteriorly, of abdomen posteriorly. Supra-anal processes long, approximately as long as half of body.

Dorsal and ventral side of the body distinctly granulate (Figs. 13–16). Minute setae at anterior border of each tergites and sternites. Tergites covered with cauliflower-shaped sensilla (Figs. 13, 14). Pro-, meso- and metasternum and first two abdominal sternites with pointed setae medially and cauliflower-shaped sensilla laterally (Fig. 15). Remaining abdominal sternites with cauliflower-shaped sensilla (Fig. 16).

Pronotum with numerous cauliflower-shaped sensilla distributed regularly (Fig. 13). Meso-, metanotum and abdominal tergites with two irregular rows of numerous cauliflower-shaped sensilla running across segment and two minute setae at anterior border medially (Fig. 14).

Two minute setae at anterior border of pro-, meso- and metasternum. Pro-, meso- and metasternum also with two groups of around four setae antero-medially and pair of setae postero-medially (Fig. 15). Two minute setae at anterior border of each abdominal sternite (Fig. 16). First two abdominal sternites with numerous setae medially and numerous cauliflower-shaped sensilla laterally. Abdominal sternites III–VIII with numerous cauliflower-shaped sensilla distributed regularly.

Anal turret distinctly consists of two segments.

Nine pairs of distinctly elevated spiracles: one on thorax and eight on abdomen. Diameter of spiracles slightly decreasing posterad, spiracles of abdominal segment eight smallest.

Head well sclerotised, hypognathous, retracted into pronotum (Figs. 8, 10). Median suture complete, connected with fronto-clypeal suture (Figs. 20, 21). Clypeus distinct, wider than long, with one seta and one campaniform sensilla on each lateral side (Fig. 20). Frontal and epicranial suture absent, fronto-clypeal and clypeo-labral suture well developed.

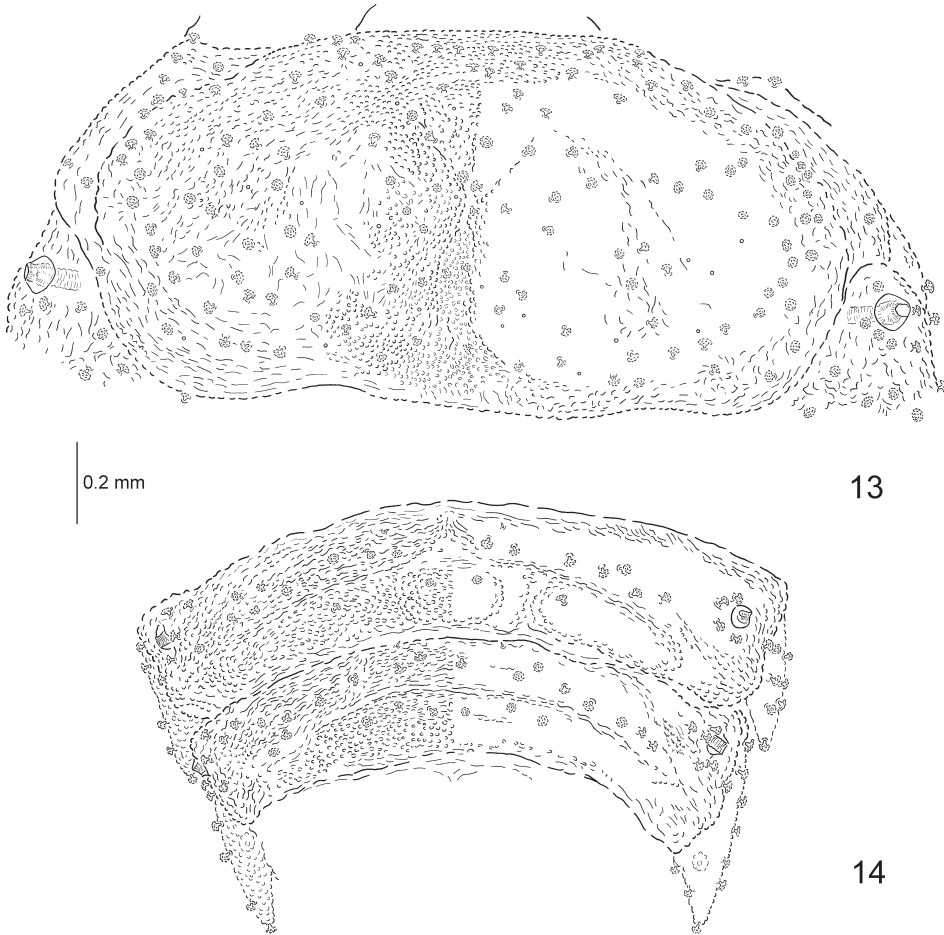
Six stemmata on each side of head.

Frontal side of head with four small, vertical, pointed setae (V 1–4); five frontal rows of cauliflower-shaped sensilla (Figs 11, 12) and setae: row Fa with three sensilla, Fb with four sensilla, Fc with three sensilla, Fd with single sensillum, Fe with two sensilla; and three campaniform sensilla above sensilla Fc1 and Fe1 (Fig. 20). Temporal side of head with two setae (T 2, T3) and two campaniform sensilla (Fig. 21).

Antennae dimerous, set in membranous ring (Fig. 26). Antennomere I transverse, wider than antennomere II. Antennomere II stout, longer than wide, with small seta and a group of three peg-like sensilla at the apex: one prominent (sensory appendix) and two smaller.

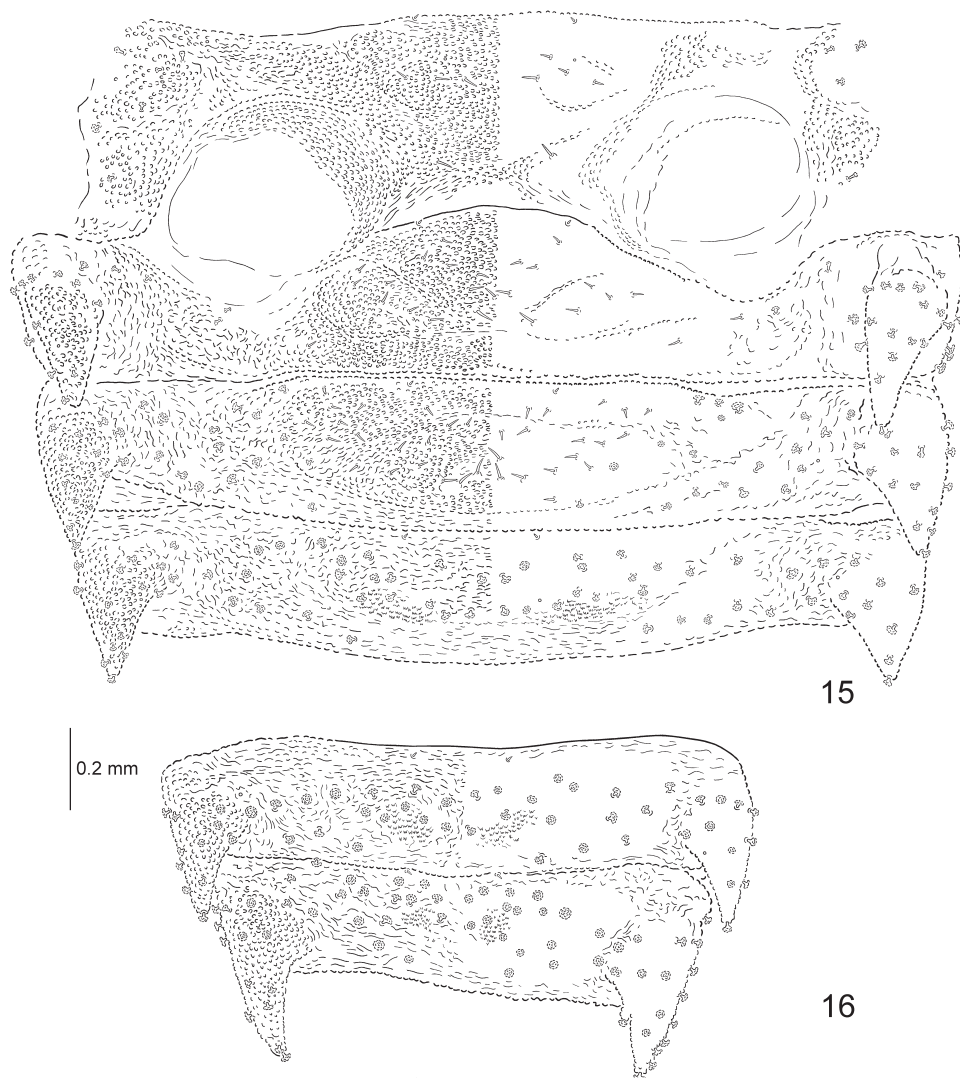
Labrum wider than long, anterior margin not emarginate (Figs. 22, 23). Anterior margin with six stout setae medially and two short setae on each side. Dorsally: four long setae placed in the middle in one row running across width, two setae close to anterior margin, and two pairs of campaniform sensilla medially. Mid part of ventral surface (epipharyngeal area) with pair of small setae, and two pairs of campaniform sensilla. Numerous small spines medially and on each lateral side.

Mandibles heavily sclerotised, palmate, with five apical teeth in one row and one tooth slightly moved back. Two setae and two campaniform sensilla at base dorsally (Figs. 24, 25).



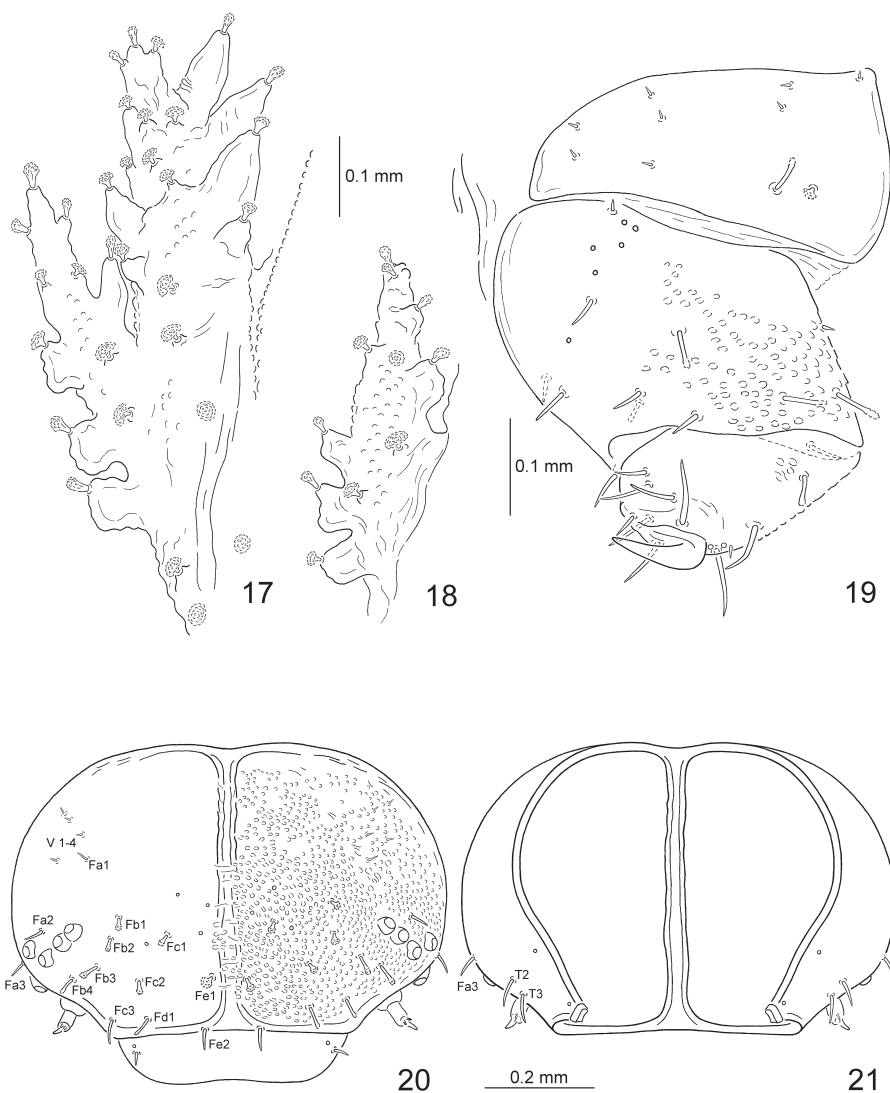
Figs. 13–14. *Cassida rotschildi* Spaeth, 1922, mature larva. 13 – pronotum; 14 – sixth and seventh abdominal tergites.

Maxillae and labium connate (Fig. 27). Each stipes (st) with two long setae. Palpifer (pp) with two setae and two campaniform sensilla ventrally and with numerous spines dorsally. Mala (mal) not distinctly bordered from palpifer, bearing six long pointed setae, one long blunt seta, and one short blunt seta (or peg like sensilla?). Maxillary palp one-segmented with three pointed setae, one blunt seta (digitiform sensillum – ds), two campaniform sensilla on sides, and a group of twelve small peg-like sensilla at the apex. Labial palp (lp) one-segmented with group of nine small peg-like sensilla at apex and one campaniform sensillum below apex. Hypopharynx (hyp) covered with numerous spines, and with four campaniform sensilla at base. Prementum (pre) with two long setae and four campaniform sensilla. Postmentum (post) with four setae.



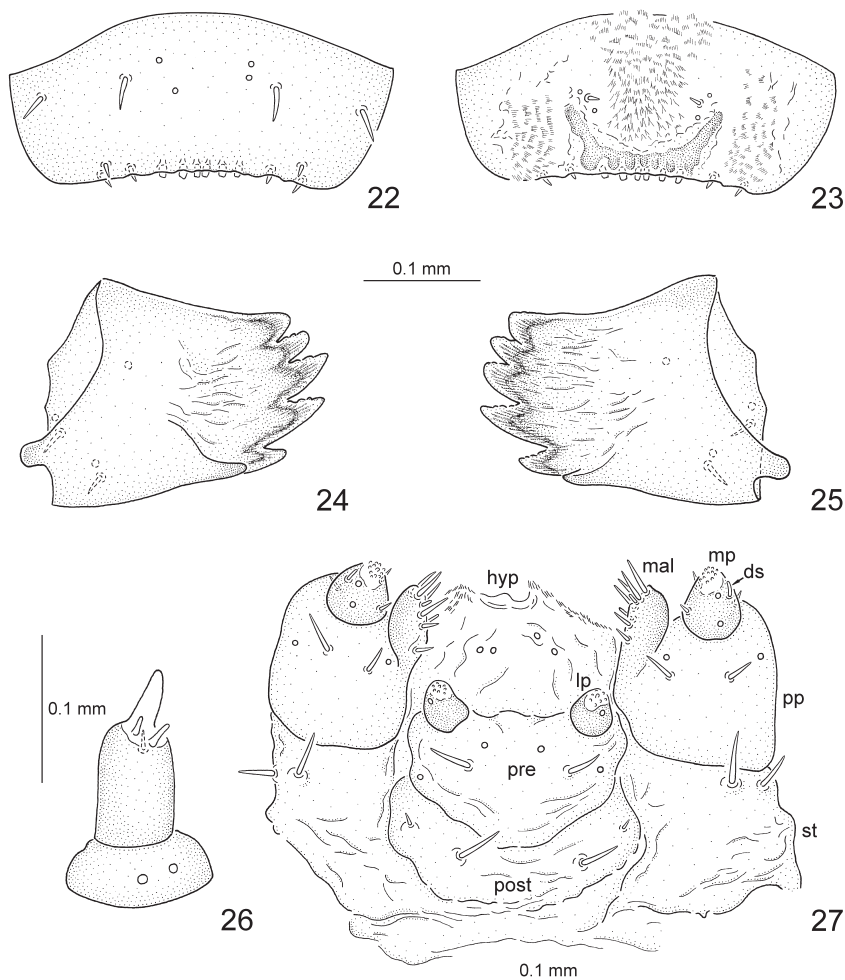
Figs. 15–16. *Cassida rotschildi* Spaeth, 1922, mature larva. 15 – metasternum and first three abdominal sternites; 16 – sixth and seventh abdominal sternites.

Legs stout, consist of three segments: coxa, femur and tibiotarsus (Fig. 19). Internal side of coxa with setae arranged in three groups: first group with two short setae (placed close to border between coxa and body); second with three short setae; third with three short setae, and with one elongate and one short cauliflower-shaped sensillum. Femur with eleven moderately long pointed or blunt setae and one short pointed seta placed dorsally close to the base. Basally on



Figs. 17–21. *Cassida rotschildi* Spaeth, 1922, mature larva. 17 – first two lateral scolus; 18 – third lateral scolus; 19 – leg; 20 – head frontal side; 21 – head temporal side.

internal side of femur a group of five campaniform sensilla and one short pointed seta; at base ventrally one campaniform sensillum. Tibiotarsus apically with heavily sclerotised, curved, single and simple claw armed basally with a pointed seta. Claw and pointed seta surrounded by a complex of six long pointed setae. Tibiotarsus also with three long setae dorsally and two campaniform sensilla and small seta above claw.



Figs. 22–27. *Cassida rotschildi* Spaeth, 1922, mature larva. 22 – labrum dorsally; 23 – labrum, epipharyngeal area; 24, 25 – mandibles; 26 – antenna; 27 – maxillae and labium ventrally. Abbreviations: ds – digitiform sensillum; hyp – hypopharynx; lp – labial palp; mal – mala; mp – maxillary palp; post – postmentum; pp – palpiger; pre – prementum; st – stipes.

Diagnosis of larva. Mature larva of *C. rotschildi* is in general body shape very similar to the larva of another *Tylocentra* Reitter, 1926 species – *C. turkmenica* (Weise, 1892) described by MEDVEDEV & MATYS (1975). The description is superficial and we found only one distinctive character: body length. Mature larva of *C. turkmenica* is approximately 6 mm long while larva of *C. rotschildi* at most 4.3 mm, and it is correlated with body length of imagines: 5.0–6.5 mm in *C. turkmenica*, 3.8–4.4 mm in *C. rotschildi*. Both larvae differ from the typical larva

of the genus *Cassida* in very short and simple scoli and convex anterior part of body (ŚWIĘTOJAŃSKA 2009). In these characters *Tylocentra* is at first glance similar to larvae of *Oxylepus* Desbrochers, 1884 and *Ischyronota* Weise, 1891 but *Ischyronota* species distinctly differ in completely lacking thoracic and more or less reduced abdominal scoli, and *Oxylepus* larva differs in short supra-anal processes. In our opinion, the similarity is an effect of evolutionary parallelism correlated with feeding on saline plants.

Host plant. Solanaceae: *Lycium socotranum* Wagn. & Vierh. (all specimens from Socotra were beaten from *L. socotranum* – V. Hula, J. Bezděk & L. Purchart 2010 observ.), *Lycium shawii* Roem. et Schult. (based on label data from specimen collected in Kenya: Elsamere).

Distribution. Kenya (SPAETH 1922, present paper), Saudi Arabia, Sudan and Yemen (BOROWIEC 1999, present paper). BOROWIEC (1999) recorded it generally from Saudi Arabia and Sudan based on unpublished data, in this paper detailed data are given. **First record from Socotra Island.**

Comments. BOROWIEC (1999) placed *C. rothschildi* within the subgenus *Tylocentra*. This placement is now supported by the structure of larva described in this paper and by association with plants of the family Solanaceae, especially various *Lycium* species.

Cassida rothschildi is the only member of the subgenus *Tylocentra* known from Africa south of Sahara. The most related species is *C. pellegrini* Marseul, 1868 recorded from Cyprus, Israel, Lebanon, Saudi Arabia and Tunisia (SEKERKA & BOROWIEC 2011). Both taxa belong to the group of species with regularly punctate lateral rows on elytral disc but *C. pellegrini* distinctly differs in more elongate body and less convex elytral disc (see figs. 3 and 4 in SEKERKA & BOROWIEC 2011). *Cassida rothschildi* is the smallest member of the subgenus with body length below 4.5 mm; other species usually have length above 4.7 mm, although the smallest specimens of *C. pellegrini* are 4.5 mm in length.

Based on the structure of larva of *C. turkmenica* Weise, 1892, MEDVEDEV (1982) raised the subgenus *Tylocentra* to the genus rank, but he did so without discussion and only noted 'traditionally it [*Tylocentra*] was included in *Cassida* as subgenus but study of larva showed that it should be raised to genus, although imago only indistinctly differs from members of other *Cassida*'. Larva of *C. rothschildi* is very similar to larva of *C. turkmenica* and has the same unique characters – strongly reduced lateral scoli and quite convex body. In other characters it is very similar to many other *Cassida* species of various subgenera, and reduction of scoli and body convexity is, in our opinion, distinctly correlated with feeding on semisucculent, saline–habitat plants. The tendency to scoli reduction and body convexity was observed also in other Cassidini genera associated with saline plants, e.g. *Ischyronota* spp. and *Oxylepus deflexicollis* (Boheman, 1862) (BORDY 2000; ŚWIĘTOJAŃSKA & BOROWIEC 2007). Imagines of *Tylocentra* members have no unique characters, although they form monophyletic and morphologically and biologically coherent group (BOROWIEC 2007). However, treating it as a separate genus based only on homoplastic larval characters is unjustified.

Oxylepus kossmati Spaeth, 1901

Oxylepus Kossmati Spaeth, 1901: 752.

Oxylepus kossmati: BOROWIEC (1986): 804, (1999): 314 (catalogue), (2002): 180; BOROWIEC & SEKERKA (2010): 380 (catalogue).

Oxylepis Kossmati: SPAETH (1914): 87.

Oxylepus deflexicollis (Boheman, 1862): WRANIK (2003): 361 and pl. 176: fig. g (misidentification).

Type locality. Yemen, Aden.

Type material. SYNTYPES: 2 specimens, 'Aden' (preserved in Manchester Museum, Manchester, England).

Comment. In book on animal life of the Socotra Archipelago WRANIK (2003) showed a photo of a cassidine beetle identified as *Oxylepus deflexicollis*. Although we had no opportunity to study the specimen, in our opinion it was misidentified. In this area the only species of this genus occurs – *O. kossmati*. It was recorded from Aden, Oman, Erythrea, Djibuti, Somalia and Tanzania (BOROWIEC 2002). The species was described based on maculate form, thus in key to the Palearctic Cassidinae (SPAETH & REITTER 1926) the main distinguishing character of *O. kossmati* from other species was maculate elytra. Recent material showed that it is a variable species and forms both maculate and immaculate morphs; thus immaculate specimens can be misidentified with very similar *O. deflexicollis* which differs only in distinctly shorter scutellum. Detailed redescription of *O. kossmati* and colour photos are available in BOROWIEC (2002).

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