

*This contribution is published
to honor Prof. Vladimir Chikatunov,
a scientist, a colleague and a friend,
on the occasion of his 80th birthday.*

A review of the jewel beetles of the genus *Meliboeus* in Israel (Coleoptera: Buprestidae)

MANFRED NIEHUIS

Im Vorderen Großthal 5, Albersweiler, D-76857 Germany. E-mail: niehuis@t-online.de

ABSTRACT

The fauna of *Meliboeus* Deyrolle of Israel has been surveyed. Twelve species are recorded and illustrated, one was found immediately adjacent to Israel's southern border, another one may merit a new species description, and we cannot exclude the possibility of other species yet to be discovered. Data on the taxonomy, distribution and ecology of recorded species are summarised. Two species are recorded for the first time from Israel, *Meliboeus fulgidicollis* and *M. monnerati*. *Meliboeus aureolus*, *Meliboeus fulgidicollis*, *Meliboeus parvulus* are recorded for the first time from Jordan. These findings underline the importance of Israel as a biological hotspot in the Mediterranean region. An identification key to the *Meliboeus* species of Israel is provided.

This contribution is dedicated to Prof. Vladimir I. Chikatunov, the curator *emeritus* of the Coleoptera collection at the Steinhardt Museum of Natural History, Tel Aviv University (SMNH-TAU). Prof. Chikatunov has contributed a lot to our knowledge and understanding of Buprestidae in general, and *Meliboeus* in particular, in Israel, with many of the specimens collected by himself. I wish him many more good years in the service for science and his homeland.

KEYWORDS: Biodiversity, Coleoptera, Buprestidae, jewel beetles, Middle East, Palearctic, new records, identification key.

INTRODUCTION

The genus *Meliboeus* Deyrolle, 1864 was erected for the widely distributed Palearctic *Coraebus fulgidicollis* Lucas, 1846, whose larval development in Fagaceae (*Castanea*, *Quercus*) and Salicaceae (*Salix*) (Bílý 2002) constitutes an extraordinary habit in the genus. Most of the species, which are predominantly European and whose biology is known, develop on the Asteraceae and only a few on the Apiaceae and Lamiaceae (Bílý 2002). Bellamy (2008) listed 287 species of *Meliboeus* (including 63 species listed under *Nalanda*) in the world fauna throughout the Palearctic Region and the Old World tropics; the Palearctic fauna comprises 95 species (Kubáň 2016a, b).

The eminent buprestologist V. Kubáň proposed to use only the genus name *Meliboeus*, until the genus and most related genera/subgenera are completely revised. In his catalogue of the Palearctic buprestids, Kubáň (2006) divided the *Meliboeus*

species into two subgenera only, the nominate *Meliboeus* and *Meliboeoides* Théry, 1942. Bellamy (2008) in his world catalogue followed same scheme, with all species being listed under *Meliboeus*. Kubáň (2016a) finally declared *Nalanda* Théry, 1904 and *Melixes* Schaefer 1950 (former genera/subgenera) as junior synonyms of *Meliboeus*. Thus, we lack a system to group these species at present.

Treating the *Meliboeus* species of Israel is a challenging task, as transpires in some recent publications including this paper. This is sometimes due to the lack of material that prevents progress; however, new species are being found and described. The present endeavour gives me an excellent opportunity to summarise available information about this interesting group of jewel beetles.

MATERIALS AND METHODS

The examined material that has been used for preparation of this article is kept in the following research institutions and private collections:

- CBS – Coll. Joern Buse, Seebach, Germany;
- CCMN – Coll. Christian Monnerat, Neuchâtel, Switzerland;
- CGC – Coll. Domenico Gianasso Castelnovo don Bosco, Italy;
- CKB – Coll. Vítězslav Kubáň, Brno, Czech Republic;
- CMN – Coll. Hans Mühle, Nußdorf, Germany;
- CNA – Coll. Manfred Niehuis, Albersweiler, Germany;
- CZR – Coll. Wolfgang Ziegler, Rondeshagen, Germany;
- NMB – Naturhistorisches Museum Basel, Switzerland;
- NMPC – Narodní Museum Praha, Czech Republic;
- MNHN – Muséum national d’Histoire naturelle, Paris, France;
- SMNHTAU – The Steinhardt Museum of Natural History, Tel Aviv University (= TAUZM in Halperin & Argaman (2000));
- ZIN – Zoological Institute, St. Petersburg, Russia.

All photographs of the beetles were taken by Gerhard Strauss with a Panasonic G9 camera with Zeiss Luminar objectives (16 mm and 25 mm) and 11 mm and 21 mm extension tubes, and an electronically-controlled stepping motor focusing rack Novoflex CASTEL MICRO, producing 100–200 layer images for every specimen, which were combined using the Helicon Focus 7 software and processed in Adobe Photoshop.

Transliterated names of localities in Israel follow the *Israel Touring Map* and *List of settlements* published by the Survey of Israel (2009). Where names of localities have changed, the most recent transliterated Hebrew names are given followed by the old names in brackets, e.g. Nahal Perat [Wadi Qelt]. Erroneous or alternative spellings are also included in brackets following the correct spelling. Label data of specimens originated from other countries are cited verbatim.

TAXONOMY

Genus *Meliboeus* Deyrolle, 1864Key to the *Meliboeus* species from Israel

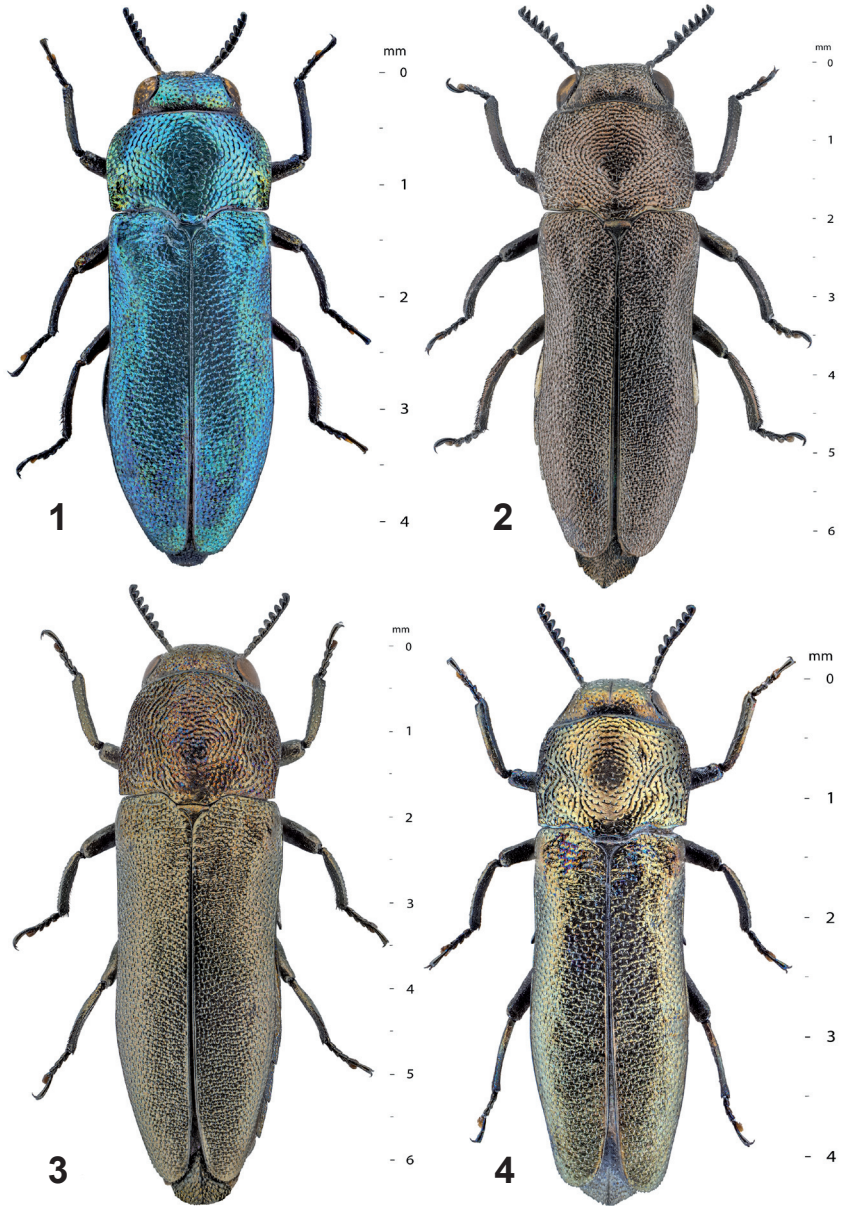
- 1 Antennal segments from segment VI to apex transversely dentate, thus antennal club consists of six segments. Dorsal and ventral side bronze coloured with rather long and small squamose hairs forming white spots on enlarged bases of metacoxae..... *halperini*
- Antennal segments from antennal segment V to apex transversely dentate, thus antennal club is composed of seven segments. Coloration of dorsal and ventral side variable, vestiture at ventral part of different pattern 2
- 2 Antennal groove under lateral border of pronotum abruptly ends exactly at its midlength, where sharp keel meets border of pronotum at acute angle and merges with it. With or without unpaired onychium between claws..... 3
- Antennal groove flattens out distally without sharp edge; sharp keel does not merge with border of pronotum, but runs parallel next to border up to hind edge of pronotum. Without unpaired onychium between the claws..... 4
- 3 Protarsus with two long claws, without unpaired onychium between them. Pronotum transversely evenly convex. Elytra bronze coloured with sparse, extremely short white hairs *aureolus*
- Protarsus with two short claws, with unpaired onychium between them. Posterior margins of red-cupreous or greenish pronotum flattened, concave. Elytra black with short, thin, bright shining hair *fulgidicollis*
- 4 Prementum completely undivided or more or less deeply excavated. Ventral side of pronotum under its margin always without antennal grooves. Lateral parts of pronotum more or less broadly flattened. Body elongated-oval, metallic blue to blue-green..... 5
- Prementum completely divided into two widely distant semicircular lobes. Epipleura of the pronotum excavated forming antennal groove. Pronotum transversely convex up to border. Body cylindrical, *Agrilus*-shaped, bronze coloured, at most with slight greenish hue 7
- 5 Hairs on elytra extremely short, dot-like. Pronotum shagreened, with weak silky lustre. Penis from base to apex doubling in width, at apex abruptly narrowed, with short small median tip *adlbaueri*
- Hairs on elytra longer, semi-erected or recurved. Pronotum stronger shining, smooth. Penis slightly wider toward its apex and with narrowed, short, small median tip..... 6
- 6 Hairs on elytra semi-erected, stout, not curved backward at apex. Tibiae cupreous. Lateral parts of penis (in cross-section) impressed, concave, apex of penis points down..... *oliveri*
- Hairs on elytra recurved at apex, thus appearing ‘woolly’. Tibiae black to plumbeous. Lateral parts of penis (in cross-section) convex, apex of penis points straight..... *parvulus*

- 7 Claws of all tarsi without basal denticle*monnerati*
 – Claws of all tarsi with slender basal denticle, 0.3–0.5× as long as claw..... 8
- 8 Last four antennomeres with distal angle drawn into elongated pointed extensions. Hairs on dorsal and ventral sides small, squamous, white, condensed in grooves of pro- and metacoxae, on outer margins of metacoxae, on epipleura of both first sternites and/or on metapleura, forming white spots 9
 – Last four antennal segments with distal angle drawn into massive blunt extensions. Hairs sometimes bright or white, but thin and inconspicuous, on ventral part of thorax not forming white spots 10
- 9 Hind angles of pronotum diagonally trimmed and obtuse, lateral margin often slightly concave, with secondary edge, also obtusely-angled, immediately adjacent to true hind edge. Aedeagus broadest at midpoint, from there to its apex wedge-shapedly narrowing, also narrowing toward base. Lateral lobes of sensitive part reach to the top of aedeagus or even surpass it. Apex of penis conically narrowed and rounded, without longitudinal dorsal groove *heydeni*
 – Hind angles of pronotum without secondary edge, right-angled to obtuse. Sensory lobes of aedeagus without prominent lateral lobes. Aedeagus broadest subapically. Apex of penis broad, with small longitudinal dorsal groove*aeratus hoscheki*
- 10 Gibbosity of pronotum ends posteriorly in fine tip at level of pronotal posterior angles. Apex of penis attenuated in shape of pipette. Parameres firmly fused, heavily sclerotized, dark, at apex rounded, pliers-like.....*guyoti*
 – Gibbosity of pronotum rounded posteriorly, without fine tip reaching basal third of pronotum..... 11
- 11 Apex of penis attenuated in shape of pipette. Parameres firmly fused, heavily sclerotized, dark, at apex rounded, pliers-like. Body length 0.5–0.8 mm
 *sinaiticus*
 – Apex of penis broadly rounded. Parameres separated into two sclerites, medially weakly sclerotized, nearly transparent (aedeagus visible), with single contact point in apical third. Body length 0.5–1.1 mm 12
- 12 Pronotum impressed medio-laterally, before middle, with lateral margin straight to slightly concave. Pronotum appears parallel-sided with right-angled outline. Fourth antennomere bearing weak tooth, not always well developed. Body length 0.7–1.1 mm.....*impressthorax*
 – Pronotum not impressed medio-laterally, with lateral margin rounded at midlength. Fourth antennomere more or less symmetrical, with slight conical enlargement, nearly cylindrical. Body length 0.5–0.8 mm *alfierianus*

Meliboeus adlbaueri Niehuis, 1989

(Fig. 1)

The species was described in the subgenus *Meliboeoides* and so it was recorded by Volkovitsh (2004).



Figs 1–4: *Meliboeus* spp., dorsal view: (1) *Meliboeus adlbaueri*; (2) *Meliboeus aeratus hoscheki*; (3) *Meliboeus alfierianus*; (4) *Meliboeus alfierianus*, possibly a new subspecies.

Material examined: Israel: *Judean Desert*: 1 ex., Nahal Perat north-facing slope Kefar Adimmin, 27.ii.2007, A. Freidberg (SMNHTAU). *Northern Negev*: 1♂ 'En Rimmon, 29.iii–26.iv.1987, A. Richter (CNA) (Niehuis 1989). *Central Negev*: 1♂ Sede Boqer, 30.iii.2004, L. Friedman (SMNHTAU); 1♂ 'En 'Avedat, 30.iii.2004, L. Friedman (SMNHTAU); 1♀ PT, Nahal Nizzana [Nizanah], Negev, 21.iv.1982, H. Mühle; 1♂ Nahal Nizzana, 14 km WSW of Mizpe Ramon, 18–19.iv.1994, M. Volkovitsh & M. Dolgovskaya (CNA); 1 ex., Har Harif, 11.iv.2002, V. Chikatunov (SMNHTAU). **Syria:** 2♂ Homs, 10.v.1952, G. Seidenstücker (CNA); 1♀ Aleppo, 29.v.1952, G. Seidenstücker (CNA); 1♀ b. occ. Aingara Wald/Feld 20 km NW Aleppo 20.iv.1996, L. Behne (CNA); b. occ. Khan-al-Assal, 10 km S Aleppo, 25.iv.1996, L. Behne (CNA); 1♂ b. oc. Idlib, 35 km W Aleppo, Plantage, 26.iv.1996, L. Behne (CNA); 1♀ b. oc. Samaan Qalaat (Simeons-Kloster), 28.iv.1996, L. Behne (CNA).

Distribution: Niehuis (1989) described this species from the Middle East, the type material was collected in Turkey (holotype), Israel (allotype, paratypes), Iran (paratypes) and Syria (paratypes).

Host plants: Volkovitsh (2004) noted that the species was collected by sweeping *Onopordum*.

Meliboeus aeratus hoscheki Obenberger, 1916

(Fig. 2)

Meliboeus cyprius (Zürcher, 1911).

Meliboeus alfieri Théry, 1929.

Halperin and Argaman (2000) listed it as *M. aeratus aeratus* (Mulsant & Rey, 1863); Volkovitsh *et al.* (2006) as a subspecies *M. a. hoscheki* Obenberger, 1916; Kubáň (2006) treated *M. aeratus* and *M. hoscheki* as separate species. Indeed, the characteristic aedeagi of subspecies of *M. aeratus* do not differ. This is one of the reasons why I think that *M. aeratus* can be divided into three subspecies: the nominal Atlanto-Mediterranean subspecies, distributed from Northern Africa to Southwest Europa; the Ponto-Mediterranean *M. a. sculpticollis* (Abeille de Perrin, 1896), distributed from the Balkans to Turkey and Cyprus; and the Middle Eastern *M. a. hoscheki*, distributed in Southern Levant (Israel, Lebanon, Syria and Egypt: Sinai).

Material examined: Israel: *Upper Galilee*: 1 ex., Nahal Bezet [Wadi Karkara] (NMPC); 1♂ Ramot Naftali, 2.vi.2004, V. Chikatunov (SMNHTAU); 2♂ 2♀ Loc. 26, Har Meron, 7–11 km WNW Zefat, 22–24.vii.1996, M. Volkovitsh & M. Dolgovskaya. *Lower Galilee*: Alonim (NMPC). *Judean Hills*: Qiryat 'Anavim [Anawim], 2.vi.1946, Bytinski-Salz (NMPC); Qiryat 'Anavim [Kirjat Anawim], 20.vii.19[.], Bytinski-Salz (CMN). *Carmel Ridge*: Nahal Oren, 9.vi.1978, D. Furth (CMN); Nahal Oren, 16.v.1999, V. Chikatunov & T. Pavlíček (SMNHTAU); Mt. Carmel, Nahal Oren south facing slope, window trap on *Ceratonia*, 5–19.vi.2009 T. Pavlíček & J. Buse (CBS). **Egypt:** Cairo Aegypt. TYPUS *Meliboeus Hoscheki* Type Det. D^f. Obenberger (NMPC); 1♂ Sinai Mts., El-Arbain, 14.vii.1974, A. Freidberg (CMN). **Lebanon:** Liban TYPUS *Meliboeus hoscheki v. Libanonis* m. Det. D^f. Obenberger (NMPC); 1 ex., Beirut (Bscharré), 4.vii.2005 A. Kairouz (CMN); 1 ex., Tripoli, Novicky (NMPC). **Syria:** 1 ex., bor. occ., 800 m, Djebel Ansariya, Mardash, 18.vi.1989, J. Macek (CKB).

Distribution: Israel, Lebanon, Syria and Egypt (Sinai).

Host plants: The host plant in Israel is unknown. Volkovitsh (2004) obtained the specimens by sweeping Lamiaceae. The nominal form develops, according to Schaefer (1949), in the lower parts of the stems and in the roots of *Thymus vulgaris* (Lamiaceae) up to 15 cm deep.

Meliboeus alfierianus Théry, 1935

(Fig. 3)

Meliboeus hoberlandti Obenberger, 1944.

The examination of the types in MNHN by V. Kubáň and me allowed us to separate *M. alfierianus* and *M. impressithorax*. At present, I regard them as two distinct species.

Material examined: **Israel:** *Southern Coastal Plain:* 1♂ Nizzanim, 6.vi.2006, V. Chikatunov (SMNHATAU); 6♂ 6♀ 0.5 km SW Nizzan Bet [Nitsan Bet], dunes near Ashkelon, 31°34'08"N 34°37'11"E, 2.vi.2012, M. & O. Niehuis (CNA), 1 ex. SMNHATAU, 2 ex. ZIN). *Arava Valley:* 1♀ 45 km N Elat, sand dunes E Qetura [Quetura], 9.v.1996, M. Hauser (CMN). **Iran:** Djiroft, Bandar, Kerman, iv.1971 (CKB). **Egypt:** 1♂ El Ghazal, 25.v.1930, Alfieri, Egypte *Meliboeus alfierianus* Théry TYPE (MNHN); Cairo Aegyptus (♀) *Meliboeus Hoberlandti* Obenberger TYPUS (NMPC).

Distribution: Egypt, Iran, Israel. In Israel collected in sand dunes.

Host plants: Caught in series on yellow Asteraceae in the dunes of Ashqelon.

Comments: A series (6♂♂ CNA) of smaller individuals (Fig. 4) were collected by O. and M. Niehuis early in spring (12.iv.1992) in the Dead Sea Area, between 'En Gedi and Mezada. All specimens were collected on *Pulicaria incisa* (Asteraceae) (Dr Walter Lang (Erpolzheim, Germany), pers. comm., 2020). It is possible, that *M. alfierianus* has a distinct population, which is active earlier in the season in these extreme habitats, develops on a small host plant, and comprises therefore smaller individuals. Another possibility is that the small specimens represent a morphological or ecological subspecies, or even a separate species. Further study is needed to determine a status of this form.

Meliboeus aureolus (Abeille de Perrin, 1893)

(Fig. 5)

Meliboeus latesculptus Obenberger, 1916.

The species was originally described in the genus *Coraebus*. Théry (1904) did not move it to his genus *Nalanda*, although its characters fit those of *Nalanda*; Niehuis (1996) listed it under *Nalanda aureola* (see Bellamy 2008). Now it is moved to *Meliboeus* again.

Material examined: **Morocco:** S, Vallée Draa zw. Agdz und Zagora, 27.v.1995, F. Brechtel (CNA); Agdz env., 13.v.2003, M. Snižek (CKB); Prov. Zagora, w Tazzarine, R108, 7.v.2018, W. Ziegler (CZR). **Algeria:** Amguid, Tassili occidl. female fin 00.04.1928 (sub *aeneolus* Ab.) Coll. Alfieri (coll. Frey in NMB); Amguid, Tassili ouest Mission du Hoggar Février – Mai iv.1928 (NMPC); Biskra, 29–30.v.1971, A. Hoffer & J. Horák (CKB) [Biskra, Montagne de Sable, according to Théry (1929) is the type locality of *M. aureolus*]. **Egypt:** Egypte Alexandria TYPUS *Meliboeus latesculptus* m. Type Det. Dr. Obenberger (NMPC). **Israel:** *Arava Valley:* 1♂ 'Iddan, 135 km N Elat, 30°47'N 35°17'E, 8.v.1996, M.E. Irwin, Malaise trap (CNA). **Jordan:** Jordan m.-occ., At-Tafilah govern., Jibal Al-Batra Mts., 8 km SE Feifa vil., 250 m, 21.iv.2018, J. Simandl, det. M. Niehuis (CNA).

Distribution: This very rarely collected species was only once recorded in Israel (Niehuis 1996; Halperin & Argaman 2000, as *Meliboeus aureola*). It is now known from Morocco over Algeria and Egypt to Jordan and Israel. In Israel, it occurs only

in the northern part of the Arava Valley, or south of the Dead Sea, which is not far from the locality in Jordan.

Host plants: Unknown. J. Simandl (pers. comm., 2020) wrote me the following: “I found the species on a small semi-shrub with narrow leaves. Specimens were sitting on twigs of only one plant, the several others (of the same species) were without beetles.”

Meliboeus fulgidicollis (Lucas, 1846)

(Fig. 6)

Théry (1929) presented a long list of synonyms and placed the species in the genus *Nalanda*. Now, for the reasons mentioned above, it is listed in the genus *Meliboeus* (Kubáň 2006).

Material examined: **Israel:** *Upper Galilee:* 1♀ Kefar Meron, 700 m, 11.v.1996, D. Gianasso (CNA). **Jordan:** 1 ex., 4 km NE Ajlun, 32.36542N / 35.77664E, 1010 m, 10.vi.2011, C. Monnerat (CCMN).

Distribution: These are first records of the species for Israel and Jordan. The species has a circum-mediterranean distribution that extends northward up to Austria and eastward to the Ukraine, Turkey, Syria and Kazakhstan (Kubáň 2006).

This widespread Mediterranean species is found in Israel and Jordan only at high altitudes, on Mount Meron (700 m) and on Gilead Mts. (1010 m), respectively, where the climate is more temperate, and flora and fauna include significant percent of ‘northern’ elements. It is most possible that this species pupates and hatches in Israel earlier in the season (March or even February), when Mt Meron is usually not visited by entomologists, due to cold and wet weather, and therefore, has not been found until recently.

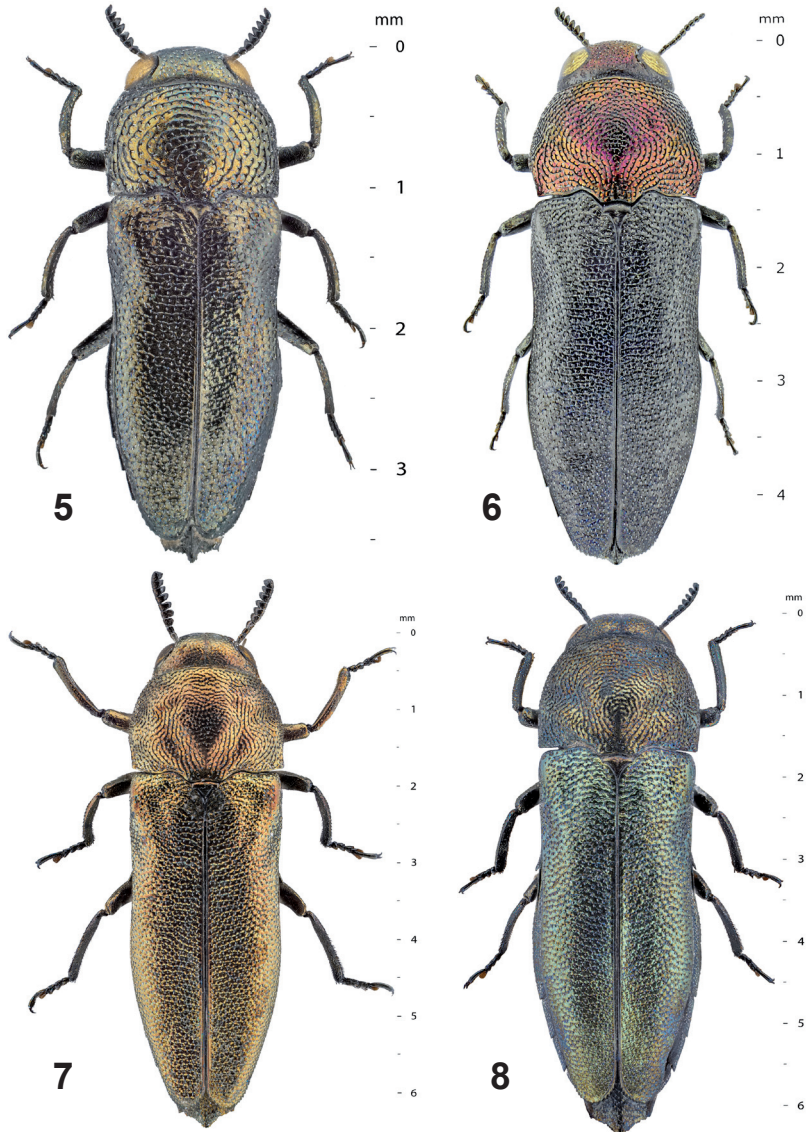
Host plants: According to Schaefer (1949) the larva develops under the bark of small twigs, mainly of treetops, and in cut branches. Pupation is in April, in sap wood. According to Bílý (2002) the larva develops in *Castanea sativa* Mill. and in different *Quercus* species, like *Q. cerris* L., *Q. coccifera* L., *Q. ilex* L., *Q. petraea* (Matt.) Liebl., *Q. pubescens* Willd., *Q. robur* L., and *Q. suber* L. (Fagaceae). In Israel on the slopes of Meron Mts. occur three species of oaks: *Q. calliprinos* Webb, *Q. boissieri* Reut. and *Q. ithaburensis* Decne., the two latter are good candidates for being host plants.

Meliboeus guyoti Obenberger, 1920

(Fig. 7)

The female holotype deviates strongly in colour from the material collected in Israel, but the morphological characters match. It presently keys to *Meliboeus* (s. str.). The shape of the penis, which is distally attenuated in the form of a pipette, supports the opinion that the species belongs to the complex *M. graminis* (Panzer, 1799) and related species.

Material examined: *Meliboeus guyoti*: 1♂ **Israel:** *Southern Coastal Plain:* Nizzanim, 1♂ 8.vi.1998 (CNA), 1 ex., 9.vi.1999, 1 ex., 6.vi.2006, all V. Chikatunov (SMNHTAU). *Central Negev:* 1 ex., Nizzana, 9.vi.1999, V. Chikatunov (SMNHTAU). **Egypt:** Sinai Kneucker Andres TYPUS *Meliboeus Guyoti* Type det. Dr. Obenberger (NMPC); 1 ex., Sinai, Mts. El-Arbain, 14.vii.1974, A. Freidberg (CMN), 4 exx., Sinai, Wadi Ahmar, 2000–2300 m, 25.vi.1998, A. Freidberg & F. Kaplan (SMNHTAU).



Figs 5–8: Dorsal view: (5) *Meliboeus aureolus*; (6) *Meliboeus fulgidicollis*; (7) *Meliboeus guyoti*; (8) *Meliboeus theryi*.

Meliboëus theryi: **Tunisia**: 1♂ 1♀ *Theryi* Entre Spax et Gafsa / MNHN Coll Abeille de Perrin 1919; 1 ex. (not genit.) Gafsa / MNHN Coll Abeille de Perrin; 4 ex. (two of them genit. ♂♂) Mezouna (Tunisie) De Vauloger / *Coræbus theryi* Ab. / *Artemisia herba alba* [= *Artemisia herba-alba*] / MNHN Coll. L. Bedel 1922; 1♂1♀ Mezouna (Tunisie) De Vauloger / *Coræbus Theryi* Abeille comparé au Type; 4 ex. (genit. 1♂) Mezzouna Tunisie Méridionale D^r. A. Chobaut / MNHN Coll. A. Argod, 1931 / *Coræbus theryi* Ab. Tunisia Reitter, det. S. Bílý 1983 (CNA).

Distribution: Egypt, Israel. Volkovitsch (2004) recorded *M. guyoti* in the Central Negev and Dead Sea Area, so finding it in Nizzanim represents an extension of its distribution in the country. All Israeli specimens were collected in sand dunes.

Host plants: Unknown; Alfieri (1976) mentioned *Artemisia judaica* L.

Comments: A possible synonymy of *M. guyoti* with *M. theryi* (Abeille de Perrin, 1893) (Fig. 8) from Algeria and Tunisia remains an unresolved problem. The morphological similarity of this species with *M. guyoti* is obvious. There is only one specimen of each in my collection (*M. guyoti* ♂, *M. theryi* ♀). At present, we recognize two species (see Kubáň 2006). However, it is not impossible that *M. guyoti* represents a subspecies of *M. theryi*, which differs in its coloration from the nominative form (i.e. *M. theryi*).

Meliboëus halperini (Niehuis, 1997)

(Fig. 9)

I originally assigned this species in the genus *Nalanda*, which is currently considered a junior synonym of *Meliboëus* (Kubáň 2006). Still, the taxonomic position of *M. halperini* is doubtful, as its antennal club has six segments like in *Melibaëopsis* Kerremans, 1903. Niehuis and Strauss (2018a) recently described a very similar and possibly related species, *Meliboëus dhaferi*, from Saudi Arabia.

Material examined: **Israel:** *Central Negev:* 1♂ 'En 'Avedat, 30°49'N 34°46'E, 24.x.1988, J. Halperin (SMNHTAU); 1♂ 'En 'Mor, 29.vi.1994, A. Freidberg (SMNHTAU); 2 ex., Nahal Neqarot, 11 km SE Mizpe Ramon, 7.vii.1996, M. Volkovitsh & M. Dolgovskaya (ZIN). *Arava Valley:* 1 ex., Samar, 29°50'N 35°05'E, 1.x. 1989, J. Halperin (SMNHTAU).

Distribution: Known only from southern Israel (Central Negev and Arava).

Host plants: Unknown. Halperin (Niehuis 1997) collected one type specimen on *Nitraria retusa* (Forssk.) Asch. (Zygophyllaceae) (Halperin & Argaman 2000; Volkovitsch 2004). Volkovitsch (2004) got the species by sweeping shrubs.

Meliboëus heydeni (Abeille de Perrin, 1897)

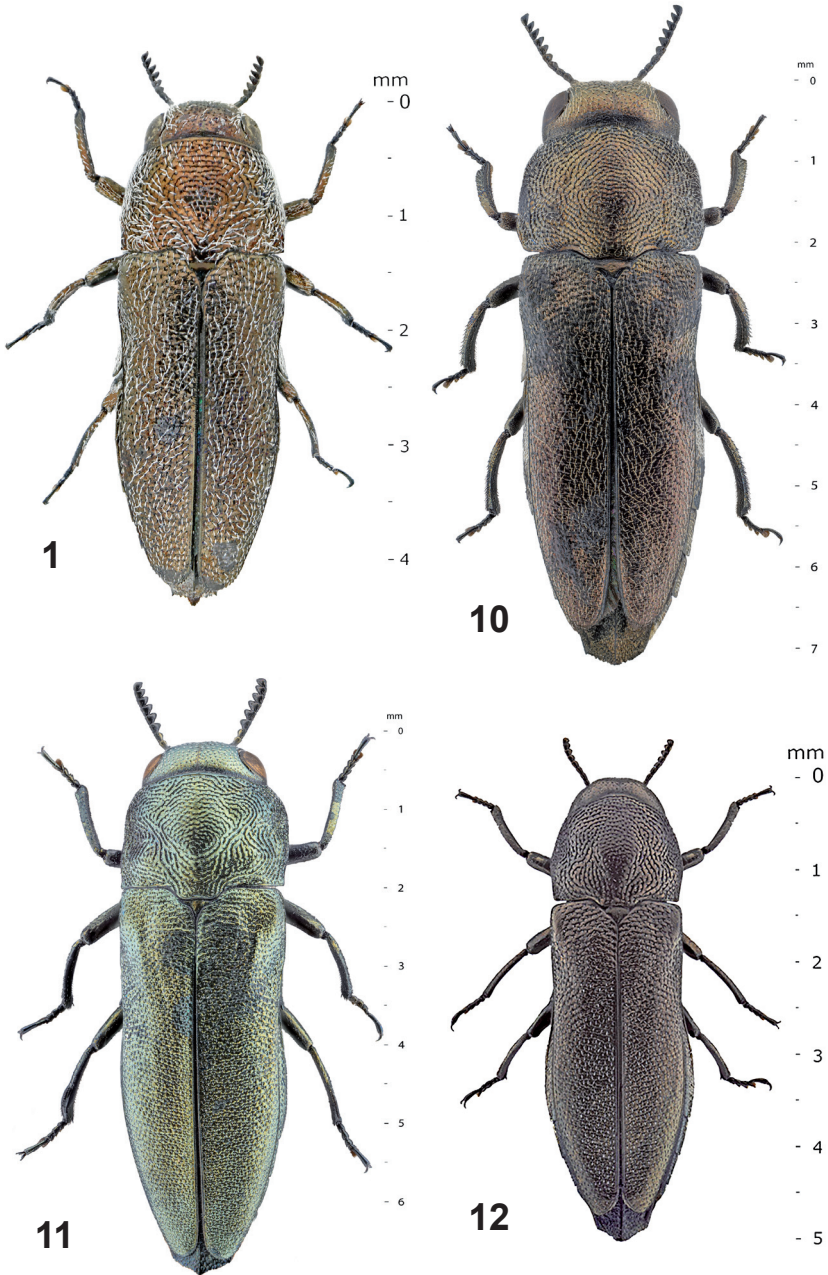
(Fig. 10)

Meliboëus xerophilus Obenberger, 1916.

Meliboëus staneki Obenberger, 1937.

Meliboëus bodenheimeri Théry, 1938.

Volkovitsch *et al.* (2000) listed this species in the subgenus *Melixes*, an opinion that I support. Recently *Melixes* has been considered a junior synonym of *Meliboëus* (Kubáň 2016a).



Figs 9–12: Dorsal view: (9) *Meliboeus halperini*; (10) *Meliboeus heydeni*; (11) *Meliboeus impressithorax*; (12) *Meliboeus monnerati*.

Material examined: Israel: *Upper Galilee:* 1♂ Har Meron, 7–11 km WNW Zefat, Loc. 26, 22–24.vii.1996, V. Zaitzev (CNA); 1♀ Har Meron, 7–11 km WNW Zefat, Loc. 26, 22–24.vii.1996, M. Volkovitsh & M. Dolgovskaya (CNA). *Carmel Ridge:* Nahal Oren, Mt Carmel, 2.vii.1996, T. Pavliček & V. Chikatunov (CKB). *Samaria:* Shekhem [Nablus], 21.vi.1957, J. Klapperich (CMN). *Jordan Valley:* Northern Dist., Moshav Rewaya (nr Bet She'an), 200 m, 22.v.1999, I. Trojan (CKB). *Judean Desert:* Nahal Perat, 'En Mabua' [Wadi Qelt, Ein-El-Fawwar], 1.vi.1991, K. Warncke (CMN); 3♂ Nahal Perat (Ost) [Wadi Qelt], 31°50'38"N 035°24'49"E, 70 m, 24.v.2012, M. & O. Niehuis (CNA). **Jordan:** Jordanien (Ost), Jerash/Dehbeen, 19.vi.1956, J. Klapperich (CMN); Jordanien (Ost) Arda Road, 14.vi.1957, J. Klapperich (CMN, CKB); (West) Amman 13.v.1965 Klapperich (CMN). **Syria:** Syria, Lederer ex Meyer-Darcis TYPUS *Meliboëus xerophilus* m. Type Det. D. Obenberger (NMPC). **Lebanon:** Syria, Tripoli, Novicki (NMPC).

Distribution: The species was recorded from Israel several times (e.g. Halperin & Argaman 2000; Volkovitsh *et al.* 2000; Volkovitsh 2004; Volkovitsh & Niehuis 2012). Known from Armenia, Iran, Israel, Jordan, Syria, Turkmenistan, Turkey.

Host plants: According to Volkovitsh *et al.* (2000) the host plant of *M. heydeni* is unknown. Volkovitsh and Dolgovskaya collected the specimens by sweeping Lamiaceae. I caught my specimens in Israel on *Vitex agnus-castus* L. (Verbenaceae), in Turkey on *Paliurus spina-christi* Mill. (Rhamnaceae), which the buprestids probably used as a mating or resting place.

Meliboëus impressithorax Pic, 1924

(Fig. 11)

The examination of the types in MNHN by V. Kubáň and me allowed us to separate *M. impressithorax* and *M. alfieranus*. At present, I regard them as two distinct species.

Material examined: Israel: *Judean Desert:* 1♂ 1♀ 5 km E 'Arad, 2.vii.1971, H. Bytinski-Salz (SMNHTAU). *Central Negev:* 1♀ Nahal Zin, 5.vi.1963, Peneer & Blondheim (SMNHTAU); 1♂ 10 ex., Nahal Zin, Rt. 40 near 'Avedat, 30°43'N 34°47'E, 740 m, 29.v.2002, L. Friedman (SMNHTAU, 1♂ CNA); 1♀ 'Avedat, 19.v.2005, A. Freidberg (SMNHTAU); 1 ex., Har Ramon, 4.vi.1992, A. Freidberg & F. Kaplan (CMN); 1♀ Nahal Nizzana, 14 km WSW Mizpe Ramon, 6.vii.1996, V. Zaitzev (SMNHTAU); Nahal Nizzana, 14 km WSW Mizpe Ramon, Loc. No. 10, 6.vii.1996, M. Volkovitsh & M. Dolgovskaya (ZIN). **Egypt:** 1♀ (not genit.) Wadi Um Elek, 28.5.19 / Coll. Alfieri Egypte / *impressithorax* Pic Co-Type / *impressithorax* Pic Paratype / Museum Paris 1935 Coll A. Théry (MNHN); 1♂ (not genit.) Wadi Housein 31.5.1919 / Coll. Alfieri Egypte / *impressithorax* Pic Paratype / sp. dessiné / Museum Paris 1935 Coll. A. Théry (MNHN); L'Égypte Cairo *Meliboëus impressithorax* Pic. Comp. Type! Det. Dr. Obenberger (NMPC); Sinai, Djébel Kasr Abas, 5.viii.1971, Bytinski-Salz (CMN); Eastern Desert, Wadi Garawi, 29°50'05.7" N / 31°26'41.6" E, 21.v.1998 (CKB). **Iraq:** Irak occ., Western desert, Bir-Er-Rah, 70 km N of Rutba, 6.vi.1979, J. Macek (CKB).

Distribution: Egypt, Israel, Iraq.

Host plants: The type specimen was caught on *Artemisia judaica* L. (Asteraceae), presumed host plant. L. Friedman (pers. comm., 2020) remarked, that he caught the beetles in Nahal Zin, near 'Avedat, on *Verbascum sinaiticum* Benth. (Scrophulariaceae), perhaps while they were mating. However, *Artemisia sieberi* Besser is also present there.

Meliboeus monnerati Niehuis & Strauss, 2016

(Fig. 12)

That species was described in the nominal genus from Morocco. It belongs to a small group of species (*M. caucasicus* (Abeille de Perrin, 1896), *M. kubani* Niehuis, 1994, *M. reitteri* (Semenov, 1889)), which possess the unifying character of unsplit claws. The differences, compared with *M. reitteri*, are weak: seen from above, the vertex is broader, more arched; the fine sculpture (fine punctured lines) of the pronotum is nearly obscured in *M. reitteri*, but distinct in *M. monnerati*; the terminal part of the aedeagus in *M. reitteri* has a whitish margin, in *M. monnerati* that margin is the colour of the parameres, dark.

Material examined: **Israel:** *Central Negev:* 4♂ Borot Loz, Rt. 171, 30°31'N 34°38'E, 900 m, 26.vi.2012, L. Friedman (SMNHTAU); 1♂ Har Horesha, Rt. 171, 30°30'N 34°36'E, 935 m, 26.vi.2012, L. Friedman, on *Achillea fragrantissima*, *Artemisia herba-alba*, *Centaurea damascena* (SMNHTAU). **Egypt:** 1♂ Sinai, Gebel Katharina, 2500 m 24.vi.1998 A. Freidberg & F. Kaplan (SMNHTAU). **Jordan:** 1♂ S Madaba Wadi Wala 500 m 31.v.1957 J. Klapperich (CMN, CKB); 1♀ Dana Reserve, N30.66051 / E35.55822 / 535 m, 4.VI.2011, C. Monnerat (CCMN). **Syria:** Syria (NMPC).

Distribution: This is the first record of the species for Israel. In CAN, there are specimens of *M. reitteri* from Kazakhstan and Kyrgyzstan, according to Kubáň (2006) there are also records from Iran. Tozlu and Özbek (2000) reported *M. reitteri* in Artvin/Eastern Turkey; but they erroneously treated *M. caucasicus* as a synonym of *M. reitteri*. It is therefore not evident which of the two species they referred to; I have collected *M. caucasicus* (vid./det. V. Kubáň) in Eastern Turkey, but never saw *M. reitteri* from there. My opinion is that all specimens from Morocco across Egypt to Israel, Jordan and Syria belong to *M. monnerati*, which is a separate species.

Host plants: Four labels of the SMNHTAU specimens read “on *Verbascum sinaiticum*”. As Scrophulariaceae do not belong to the spectrum of host plants of this group of *Meliboeus*, the species might have used these plants perhaps as mating substrate. It is more probable that *M. monnerati* develops—like *M. caucasicus*—in *Artemisia* species or another genus of Asteraceae. The specimen from Har Horesha, collected on a variety of Asteraceae (*Achillea fragrantissima* (Forssk.), *Artemisia sieberi* Besser (as *A. herba-alba*) and *Centaurea damascena* Boiss.), proves this. *Artemisia sieberi* Besser is found in Borot Loz (L. Friedman, pers. comm., 2020).

Meliboeus oliveri Niehuis, 2015

(Fig. 13)

The name is available from Niehuis (2015) (description itself in 2014 was without the holotype designation and, thus, the name was unavailable). I described that species in the subgenus *Meliboeoides*. The holotype is in SMNHTAU (see Niehuis 2015).

Material examined: **Israel:** *Har Hermon:* 1 ex., Har Hermon, 1700 m, 17.v.2020, L. Friedman (SMNHTAU); 1♂ 7 ex., Har Hermon, 1600 m, 18.v.2009, L. Friedman (SMNHTAU); Mt. Hermon, 1515 m, 27.iv.2013, M. & O. Niehuis, 1♂ HT (SMNHTAU), 4♂ 2♀ PT (CNA); 1 ex., Har Hermon, 1500 m, 21.v.2002, L. Friedman (SMNHTAU); 4♂ Mt. Hermon, 1350 m, 10.v.1996, D. Gianasso (CGC);

8♀♀ PT, Mt. Hermon, 3 km NW Majdal al-Shams, 33°17'68"N 35°45'65"E, 1450 m, 29.v.2012, M. & O. Niehuis (CNA); 1♂ Har Dov, 33°16'N 35°41'E, 635 m, 6.vi.2013, L. Friedman (SMNHHTAU). *Golan Heights*: 1♂ PT, Nimrod Castle, 20.IV.1977, J. Halperin (SMNHHTAU); 1♀ PT, Tel Abu Hanzir, 18.iv.1982, H. Mühle (CMN). *Hula Valley*: 1♀ PT, Dan, 1.iv.1959, J. Halperin (SMNHHTAU); 2♂♂ Qiryat Shemona [Qiryat Schamona], 29.iii–26.iv.1987, A. Richter (CMN). *Upper Galilee*: 3♀♀ PT, Meron W Zefat, 21.iv.1992, M. & O. Niehuis (CNA); 1♂ 2♀♀ PT, Galilea Sha'al, 18.iv.1982, H. Mühle (CMN). *Carmel Ridge*: 1♂ PT, Haifa, Carmel, 22.iv.1973, A. Freidberg (SMNHHTAU); 1♂ PT, Mt. Karmel, Nahal Oren, 5.iv.1995, E. Colonelli (CMN). *Samaria*: 2♂♂ Gilboa Res., 29.iii–26.iv.1987, A. Richter (CMN). *Central Coastal Plain*: 2♀ PT, Dor, 8.iv.1995, E. Colonelli (CMN). *Jordan Valley*: 1♀ PT, Umm Zuqa Nature Reserve, Rt. 5788, 200 m, 18.iii.2008, L. Friedman (SMNHHTAU). *Judean Desert*: 1♀ PT, 89292 'En Perat [Wadi Qelt], 13.iii.2011, L. Friedman (SMNHHTAU).

Distribution: East Mediterranean. In addition to Israel, there are numerous records from Greece, Cyprus, Turkey, Lebanon, Jordan, Iraq and Iran Niehuis (2014b), which outline the total known distribution.

Host plants: The species develops in thistles, most likely in *Echinops* spp.

Meliboëus parvulus (Küster, 1852)

(Fig. 14)

Meliboëus violaceus (Kiesenwetter, 1857).

Théry (1929) classified *M. violaceus* as a variety of *M. amethystinus* (Olivier, 1790). Cobos (1986) regarded *Meliboëoides* as a genus and came, like Schaefer (1949: 218), to the conclusion, that *M. violaceus* is a morphologically valid species, separate from *M. amethystinus*. Today *Meliboëus parvulus* is considered a valid name. As there were several similar described species from the Middle East, records from Israel (most of them sub *M. violaceus*) cannot be used without examination of the beetles. In Israel mainly *M. adlbaueri* and *M. oliveri* may be mixed with *M. parvulus*, but *M. parvulus* occurs in Israel and adjacent states too.

Material examined: Israel: *Har Hermon*: 1♂ 1♀ Mt Hermon, 3 km NW Majdal al-Shams, 33°17.68"N 35°45.65"E, 1450 m, 29.v.2012, M. & O. Niehuis (SMNHHTAU). *Upper Galilee*: 1♂ 5♀ Meron, W Zefat, 21.iv.1992, M. & O. Niehuis (4♀ CNA, 1♂ 1♀ SMNHHTAU). **Jordan:** 1♂ NW, Ajlun env., 30 km W Jarash, 32°19'9" N / 35°43'1" E, 1.v.2006, F. et L. Kantner (CNA); 2♂ 2♀ Amman reg., 5 km N Madaba, Hisban vil. circ., 600 m, [.]1.iv.2003, I. G. Pljushch (CNA). **Lebanon:** 1♀ Nord Libano, Wadi Qadisha (Becharre dist.), 3.vi.1997, D. Gianasso (CNA). **Syria:** 1♀ Jabal an-Nusayryah, Slinfah env., 1200 m, 19.v.2002, Košťál & Voříšek (CNA).

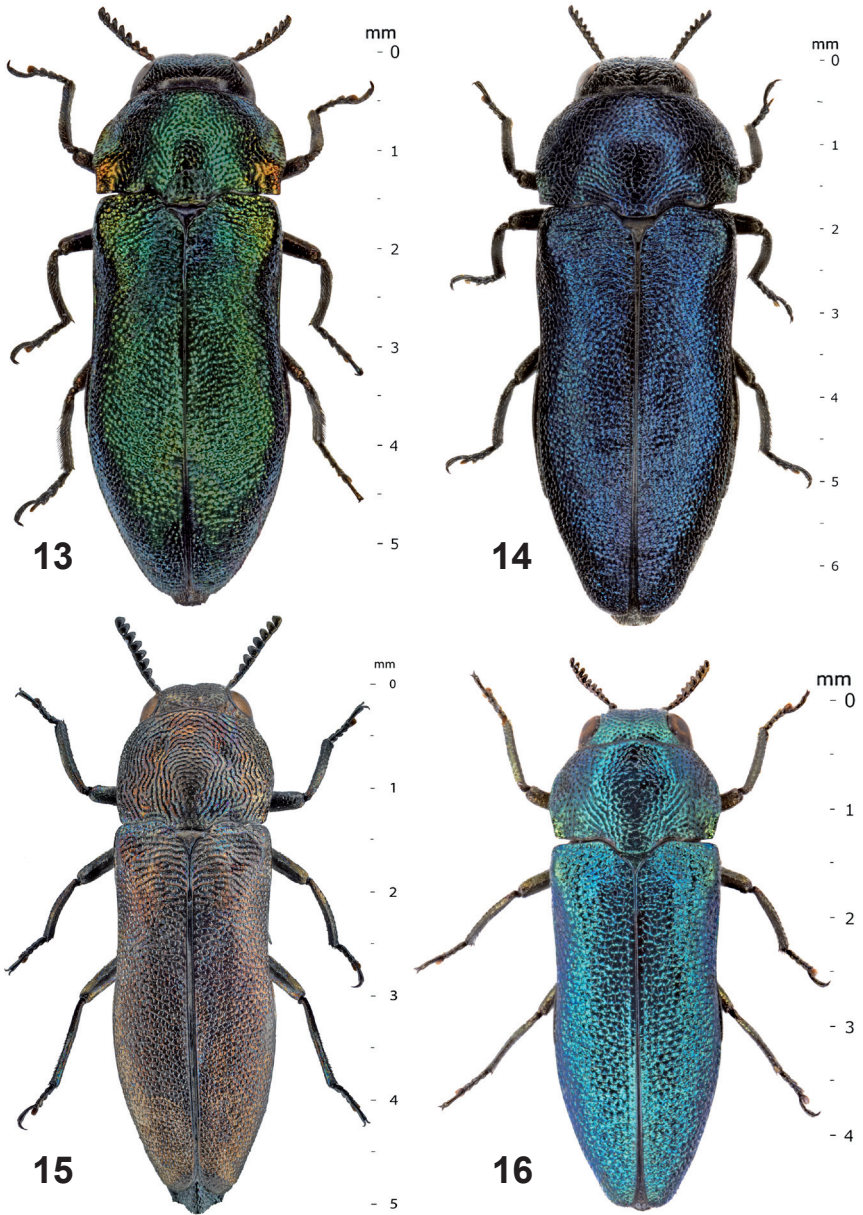
Distribution: East Mediterranean and Middle Asia. First record for Jordan.

Host plants: *Meliboëus parvulus* undoubtedly develops in thistles. According to Volkovitsh *et al.* (2000), its host plant in Israel is unknown but in other countries it breeds in *Cirsium* sp., *Onopordum* sp., and *Carduus* spp.; however, observations on *Echinops* might be referred to *M. oliveri* (s. o.). Halperin and Argaman (2000) reported *Cirsium polycephalum*.

Meliboëus sinaïticus Théry, 1935

(Fig. 15)

One of the species most likely to be found in Israel is *M. sinaïticus* Théry, 1935, although it has not been recorded outside of Egypt since its description (Théry



Figs 13–16: Dorsal view: (13) *Meliboeus oliveri*; (14) *Meliboeus parvulus*; (15) *Meliboeus sinaiticus*; (16) *Meliboeus granulatus*.

1935; Hassan 1990). The type locality is on the Egyptian coast of the Gulf of Aqaba south of Elat, very close to the Israel–Egypt border. I studied the male holotype in the Frey collection (NMB) and extracted its aedeagus. It is very characteristic and easy to distinguish from those of all other species in the region by features on its ventral side.

Material examined: Egypt: Abou Hemaida, Sud Sinai, 06.1926 (rapporté par A. Kaiser) (reçu de A. Andres) *Meliboëus aegyptiacus sinaïticus* Théry TYPE (NMB); 8 ex., Sinai, Wadi Ahmar, 2000–2300 m, 25.06.1998, L. Friedman (SMNHATAU, 1♂ CNA).

Host plants: Unknown.

DISCUSSION

Additional *Meliboëus* (subgenus *Meliboëoides*) species developing in thistles could occur in Israel or expand their distribution into Israel. These are, for example, the North African *Meliboëus amethystinus* (Olivier, 1790) and *M. granulatus* (Gory & Laporte, 1839) (Fig. 16), the latter species I have resurrected some years ago (Niehuis 2014a; Verdugo & Niehuis 2016); *M. maceki* (Niehuis & Strauss, 2015), described from Iraq; *M. robustus* (Küster, 1852) and *M. skalei* (Niehuis, 2011) from South-eastern Turkey and Iran; *M. makrisi* (Mühle & Brandl, 2009) from Cyprus; and the Arabian *Meliboëus dhaferi* (Niehuis & Strauss, 2018a), *M. margotana* (Novak, 2010), *M. saudiarabicus* (Niehuis & Strauss, 2018b).

Twelve species of *Meliboëus* are presently known from Israel. The diversity of landscapes, habitats, flora, as well as the geographic position of the country (these characteristics have been recently reviewed by Kravchenko *et al.* (2020) and Ustjuzhanin *et al.* (2020)) raise expectations for further species of *Meliboëus* to occur in the country.

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