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Two new species of *Anthrenus* Geoffroy (s. str.)
(Coleoptera: Dermestidae: Megatominae)
from Egypt and Eritrea

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Two new species of *Anthrenus* Geoffroy (s. str.) (Coleoptera: Dermestidae: Megatominae) from Egypt and Eritrea


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Abstract. Two new species, *Anthrenus kushangaza* Holloway and Herrmann and *Anthrenus kittenbergeri* Holloway and Herrmann (Coleoptera: Dermestidae: Megatominae) from northeast Africa are described. Images of internal and external features are presented and compared with *A. crustaceus* Reitter and *A. rauterbergi* Reitter, both of which are found in the same geographical region as the new species.

Key words. *Anthrenus aegyptiacus*, aedeagus, sternites, bursa copulatrix, taxonomy, identification.

ZooBank registration. urn:lsid:zoobank.org:pub:1C1FA786-3C4E-42F6-AC22-E6FFF07026D2

Introduction

The family Dermestidae contains over 1900 species (Háva 2024). One of the largest genera within the family is *Anthrenus* Geoffroy, 1762 with nearly 300 named species (Háva 2024). *Anthrenus* is structured into 10 subgenera based largely on number of antennal segments: *Anthrenodes* Chobaut, 1898 (33 species), *Anthrenops* Reitter, 1881 (30 species), *Anthrenus* (75 species), *Florilinus* Mulsant and Rey, 1868 (38 species), *Helocerus* Mulsant and Rey, 1868 (four species), *Nathrenus* Casey, 1900 (80 species), *Peacockia* Menier and Villemant, 1993 (one species), *Ranthenus* Mroczkowski, 1962 (four species), *Setapeacockia* Háva, 2008 (two species), and *Solskinus* Mroczkowski, 1962 (17 species) (Háva 2024). There are many species of *Anthrenus* found across northern Africa and into the Middle East, particularly *Anthrenodes* and *Anthrenus*, but our current knowledge of how many there are and where they are found is superficial. Here we describe two new species from northeastern Africa, *Anthrenus kushangaza* and *Anthrenus kittenbergeri*.

Materials and Methods

The two new species were examined using different techniques.

***Anthrenus kushangaza* Holloway and Herrmann.** A series of 33 specimens labelled *Anthrenus aegyptiacus* Pic, 1899 was borrowed from the Natural History Museum, London (NHMUK) for study. All specimens were examined and measured. Nine specimens were macerated in a solution of 2% acetic acid for five days to allow removal from staging prior to dissection. Dissection was carried out under a Brunel BMSL zoom stereo LED microscope and involved detaching the abdomen from the rest of the insect using two entomological pins. The soft tergites were then peeled away from the harder ventrites to expose the genitalia. For males, the aedeagus was detached from the ring sclerite, and then sternite IX was detached from the ring sclerite and the aedeagus. Females were similarly dissected to inspect the bursa copulatrix and to dissect tergite VIII and sternite VIII. Habitus images, both dorsal and ventral sides, were captured at $\times 20$ magnification using a Canon EOS 2000D camera mounted on

the BMSL microscope. Images of aedeagi, male sternite IX, female tergite VIII and sternite VIII were captured at $\times 200$ magnification for measurement using a Canon EOS 1300D camera mounted on a Brunel monocular SP28 microscope. After dissection, all body parts were mounted on a card. The antennae were teased out and images were taken at $\times 200$ magnification through the SP28 microscope. All images were focus-stacked using Helicon Focus Pro version 8.2.2 focus-stacking software. Holotype measurements were made using DsCap.Ink software version 3.90, all other measurements were made using a micrometereyepiece.

***Anthrenus kittenbergeri* Holloway and Herrmann.** Three specimens of *A. kittenbergeri* were discovered in Andreas Herrmann's collection (AHEC). The specimens were macerated for 7 days in a solution of 1% pepsin in hydrochloric acid to free them roughly of protein tissues and to make the extremities of the body moveable. The abdomen was disconnected from the body and the soft tergites peeled away from the harder ventrites to expose the genitalia. The aedeagus was detached from the ring sclerite. The genitalia were cleaned using a fine needle in a drop of 99% glycerol. All body parts were glued on a mounting board, firmly embedded in a drop of a solution consisting of polyvinylpyrrolidone, distilled water and diglycerin. Photos of the body and the abdomen were taken with a digital SLR camera Sony alpha 35, connected to an objective Nikon CF N Plan Achromat 4x 160/- and extension rings. For images of the genitalia and antenna a Bresser Junior USB-Handmikroskop at 200x magnification was used. Layered images were combined using the stacking program CombineZP.

Measurements for both species were made with the following abbreviations used in the descriptions:

Measurements taken:

Body length (BL): distance from anterior margin of pronotum to the apex of the elytra.

Body width (BW): maximum distance across the elytra.

Antennal club length (AL): length of the last three antennomeres.

Antennal club width (AW): maximum width across the terminal antennomere.

Paramere length (PL): distance from the anterior end of the parameres to the apex of the parameres.

Median lobe length (ML): from posterior tip to tip of one anterior stirrup.

Sternite IX length (SL): distance from the tip of one anterior horn to the tip of the posterior lobe.

Data for the distribution map (SimpleMappr, Shorthouse 2010) were derived from the data labels on the specimens. Scale bars were attached using ImageJ 1.53m.

Results

***Anthrenus (Anthrenus) kushangaza* Holloway and Herrmann, new species**

(Fig. 1–3)

Holotype male. Fayoum, Lake Karun, Egypt (29.458, 30.676), 2-23.ix.1945, R.L. Coe leg. Deposited in NHMUK.

Paratypes. 32 specimens deposited in NHMUK, same data as holotype.

Description, external characteristics. Holotype (Fig. 1A). BL = 1.7 mm, BW = 1.17 mm. Overall appearance very pale. Head with single dark amber coloured ocellus centrally below level of top of eyes. Eyes with lower inner margins notched. Integument of head, thorax, and base of elytra dark reddish brown, becoming much paler red towards elytral apices. Head and thorax entirely coated in pale scales, mostly white some tinted yellow, especially anterior to the scutellum, with a few pale brown scales on the disc of the thorax. Elytra similarly covered in pale scales with smaller numbers of pale brown scales; pale brown scales forming a sub-basal spot and two loose trans-elytral bands, one median and the other sub-median. There is colour variation with many individuals displaying more brown scales than the holotype (paratype male, Fig. 1B).

Ventrites (Fig. 1C) dark brown, covered in white scales. Ventrite 1 with two angled postcoxal lines crossing ventrite either side of midline.

Antenna with 11 antennomeres, AL = 128 μm , AW = 81 μm , entirely red (Fig. 2A). Antennal club formed from last three antennomeres, densely hirsute. Legs red. Femur with outer surface densely coated in white scales.

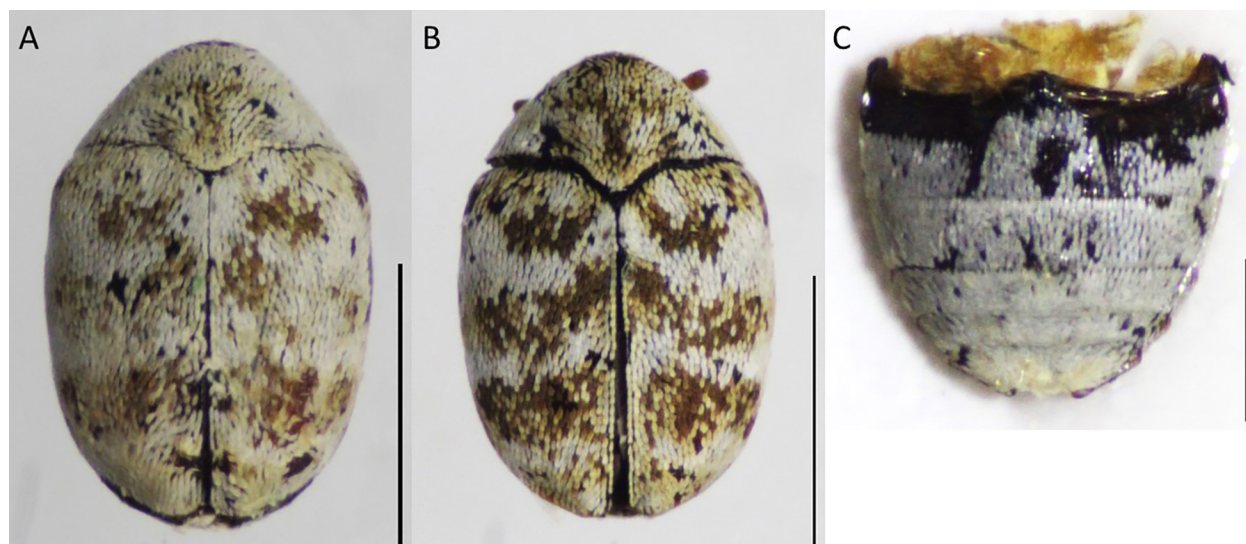


Figure 1. *Anthrenus (Anthrenus) kushangaza*. A) Habitus, paler specimen (holotype) (scale bar = 1 mm). B) Habitus, darker specimen (paratype) (scale bar = 1mm). C) Ventrites (scale bar = 500 μ m).

Description, internal characteristics. Aedeagus (Fig. 2B) long and narrow. Parameres (PL = 322 μ m) rod-shaped, nearly equal width for their entire lengths. Parameres diverge from the base, curve round towards posterior, before progressing to the posterior tips as two parallel rods. Rounded tips of parameres flat (like a rod of putty pinched flat at the tip) and curved in towards each other but do not meet. Flattened tips paler than the rest of the aedeagus which is a uniform pale yellowish brown. Parameres are almost completely glabrous apart from a few very small setae on the flattened tips. Parameres with inner margins parallel to the margins of the median lobe.

Median lobe (ML = 361 μ m) broad with margins diverging slightly from base to maximum width about midway, before smoothly converging to a blunt, rounded tip. Posterior tip of median lobe not extending as far as tips of parameres. Median lobe with two long, curved stirrups at anterior end.

Sternite IX, (Fig. 2C) SL = 342 μ m. Two long, curved, narrow horns at anterior end. Bases of horns converge to form a neck at the base of short, yellow-ochre posterior lobe that terminates in a white, rounded tip. Tip of posterior lobe with ~25–30 short recumbent setae emerging from margin; few setae (<10) emerging from disc.

Female. Bursa copulatrix devoid of sclerites. The only features of note from the female terminalia are sternite VIII (Fig. 3A) and tergite VIII (Fig. 3B).

Morphometrics. Mean BL = 1.84 ± 0.14 (standard deviation) mm, mean BW/BL = 0.68 ± 0.01 , n = 30 in both cases. The data indicate that 95% BLs of *A. kushangaza* would lie within 1.54–2.13 mm. The smallest individual found in the sample studied was 1.60 mm, the largest 2.20 mm. 95% BW/BL expected to lie between 0.65–0.71 (actual range 0.65–0.71).

Distribution. *Anthrenus kushangaza* was collected in northeastern Egypt (Fig. 5).

Etymology. *Anthrenus kushangaza* is named after the Swahili word “kushangaza”, meaning surprising or marvelous, reflecting our surprise on inspecting the specimens labelled *A. aegyptiacus* in NHMUK and discovering an undescribed species.

Anthrenus (Anthrenus) kittenbergeri Holloway and Herrmann, new species

(Fig. 4)

Holotype male. Assab, Eritrea (13.022, 42.738), 1907, K. Kittenberger leg. Deposited in AHEC.

Paratypes. Two males, same data as holotype, deposited in AHEC.

Description, external characteristics. Holotype (Fig. 4A.), BL = 2.0 mm, BW = 1.43 mm. Head with single dark brown or black ocellus centrally, below level of top of eyes. Eyes notched at lower inner margins. Integument



Figure 2. *Anthrenus (Anthrenus) kushangaza*. A) Antenna. B) Aedeagus ventral aspect. C) Sternite IX. Scale bar = 100 μ m in all cases.

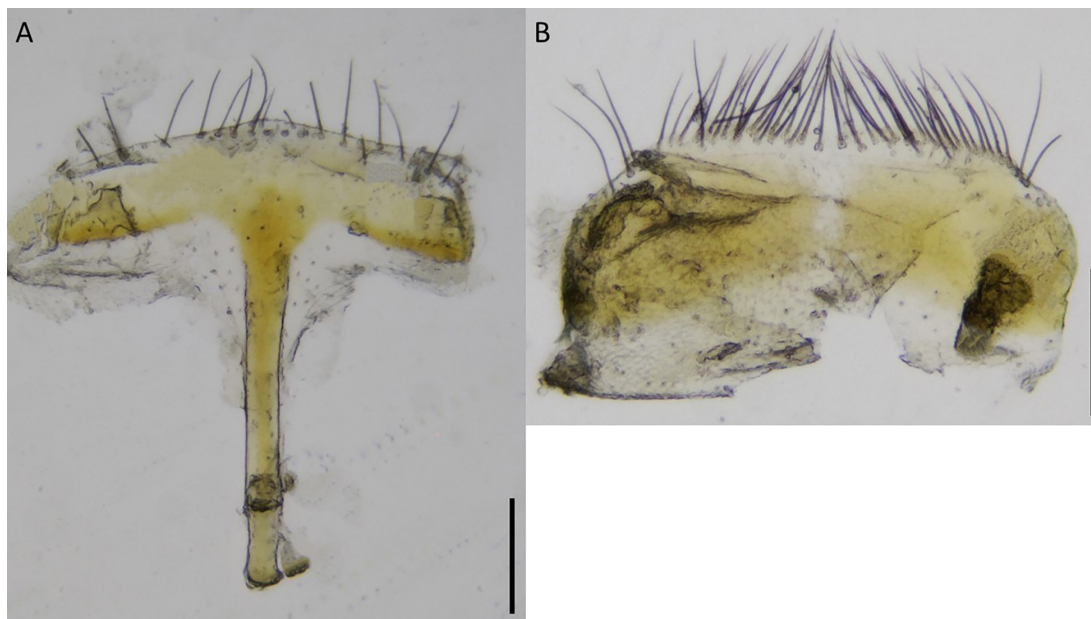


Figure 3. *Anthrenus (Anthrenus) kushangaza*. A) Sternite VIII. B) Tergite VIII. Scale bar = 100 μ m in both cases.



Figure 4. *Anthrenus (Anthrenus) kittenbergeri*. **A)** Habitus (scale bar = 1 mm). **B)** Ventrites (scale bar = 1 mm). **C)** Antenna (scale bar = 100 µm). **D)** Aedeagus (scale bar = 100 µm).

of head, thorax, and base of elytra dark brown, becoming red towards elytral apices. Head and thorax entirely coated in pale orange scales with white scales concentrated at posterior pronotal angles. Elytra similarly covered in orange and white scales; white scales concentrated in pre- and postmedian fasciae, with basal and sub-apical spots.

Ventrites (Fig. 4B) with dark brown integument, covered in white scales. Ventrites 2 to 5 with scales tinted brown, growing darker towards the margins. Ventrite 1 with two vertical, almost parallel (slightly diverging) postcoxal lines crossing ventrite 1 either side of midline and turning inwards slightly at the tip.

Antenna with 11 antennomeres (Fig. 4C), AL = 146 µm, AW = 97 µm, entirely red. Antennal club formed by last three antennomeres. Legs red; outer surface of femur densely coated in white scales.

Description, internal characteristics. Aedeagus (Fig. 4D) broad and short (relative to *A. kushangaza*). Parameres (PL = 309 µm) rod-shaped, broader in the posterior half than the anterior half. Parameres diverge from the base, curve round towards posterior, before progressing to the posterior tips as two slightly diverging rods (outer margins are concave). Parameres with broad, flat rounded tips that point in towards each other, but do not meet at the midline. Aedeagus uniform pale brown, tips of parameres paler. Parameres with inner margins that parallel margins of median lobe and wrap around tip of median lobe.

Median lobe (ML = 312 µm) very broad (broader than *A. kushangaza*); apex blunt, rounded. Posterior tip of median lobe not extending as far as tips of parameres. Median lobe with two long, curved stirrups (one broken) at anterior end.

Morphometrics. Holotype BW/BL = 0.72, indicating that *A. kittenbergeri* has a broader profile than *A. kushangaza*.

Distribution. *Anthrenus kittenbergeri* was collected in southern Eritrea (Fig. 5).

Etymology. *Anthrenus kittenbergeri* is named after the collector of the holotype, Kálmán Kittenberger.

Differential diagnosis

Both species described here came from north-eastern Africa. Only one other species comes from this region belonging to the subgenus *Anthrenus* and has rod-shaped parameres as described here: *A. crustaceus* Reitter, 1881. Háva (2014) produced clear illustrations of *A. crustaceus* antenna (Fig. 6A) and aedeagus (Fig. 6B) to differentiate between *A. crustaceus* and another species with rod-shaped parameres, *A. kubistai* Háva and Votruba, 2005 (no image of the habitus was provided). The illustrations produced by Háva (2014) differ from *A. kushangaza* and *A. kittenbergeri* in several ways. *Anthrenus crustaceus* antenna (Fig. 6A) has a large, rounded terminal antennomere producing an obvious step between the 10th and the 11th antennomere, and a small 1st antennomere,

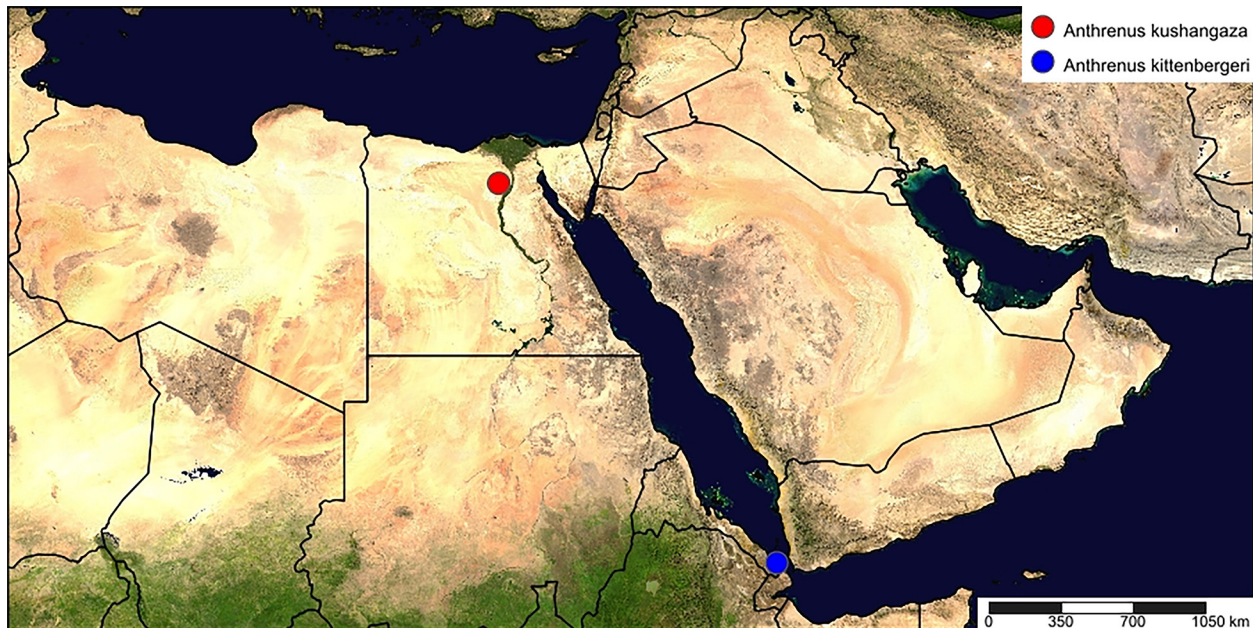


Figure 5. Locations of collection of the holotypes of *Anthrenus kushangaza* and *Anthrenus kittenbergeri*.

much smaller than the 2nd antennomere. The antennae shown in Figures 2A and 4C do not have rounded 11th antennomeres that produce a step between the 11th and the 10th antennomere, and the 1st antennomere is the same size as the 2nd antennomere.

The aedeagus of *A. crustaceus* (Fig. 6B) is long, narrow, with parallel sides, immediately differing from the aedeagus of *A. kittenbergeri* (Fig. 4D), which is broader and shorter with slightly concave outer margins. The median lobe of *A. crustaceus* (Fig. 6B) does not extend as far to the paramere tips as that of *A. kushangaza* (Fig. 2B). The flattened paramere tips of *A. crustaceus* (Fig. 6B) are larger and curve in to the extent that they overlap, differing from *A. kushangaza* paramere tips which are smaller and do not overlap (Fig. 2B).

Another potential confusing species is *A. rauterbergi* Reitter, 1908. Only a single paratype female was available for comparison (AHEC, Fig. 7). *Anthrenus rauterbergi* has a broader, shallower pronotum (length/width = 0.427) than *A. kushangaza* and *A. kittenbergeri* (length/width = 0.475, and 0.512, respectively). The postcoxal lines in *A. rauterbergi* diverge all the way to the tips (Fig. 7B) but are almost parallel in *A. kittenbergeri* and curve inwards at their tips (Fig. 5B). The antennal club of *A. rauterbergi* is broader than *A. kushangaza* (AW/AL = 0.77, and 0.63, respectively).

Discussion

It quickly became apparent that all specimens identified as *A. aegyptiacus* borrowed from NHMUK had been misidentified. *Anthrenus aegyptiacus* belongs to the subgenus *Anthrenodes* which has antennae with 10 antennomeres. All individuals of *A. kushangaza* have 11 antennomeres and have a notch on the inner margin of each eye which places them within *Anthrenus* (s. str.). It is likely that many African and Middle Eastern species of *Anthrenus* (s. str.) remain to be discovered. The known species with rod-shaped parameres all have similar color patterns dominated by white and orange scales, with varying amounts of brown scales. Some species have variable color patterns (e.g., *A. kushangaza*) and all species have aedeagi that vary from the same basic design (Háva 2014, 2022; Herrmann et al. 2015). For these reasons, it is essential that identification is based only on dissection and inspection of the genitalia, and that as much accurate and clear information as possible is provided on external and internal features. Sclerites in the bursa copulatrix are found in some species of *Anthrenus* (Adams 1988; Holloway and Pinniger 2024), but nothing of any significance could be found in the bursa copulatrix of *A. kushangaza*.

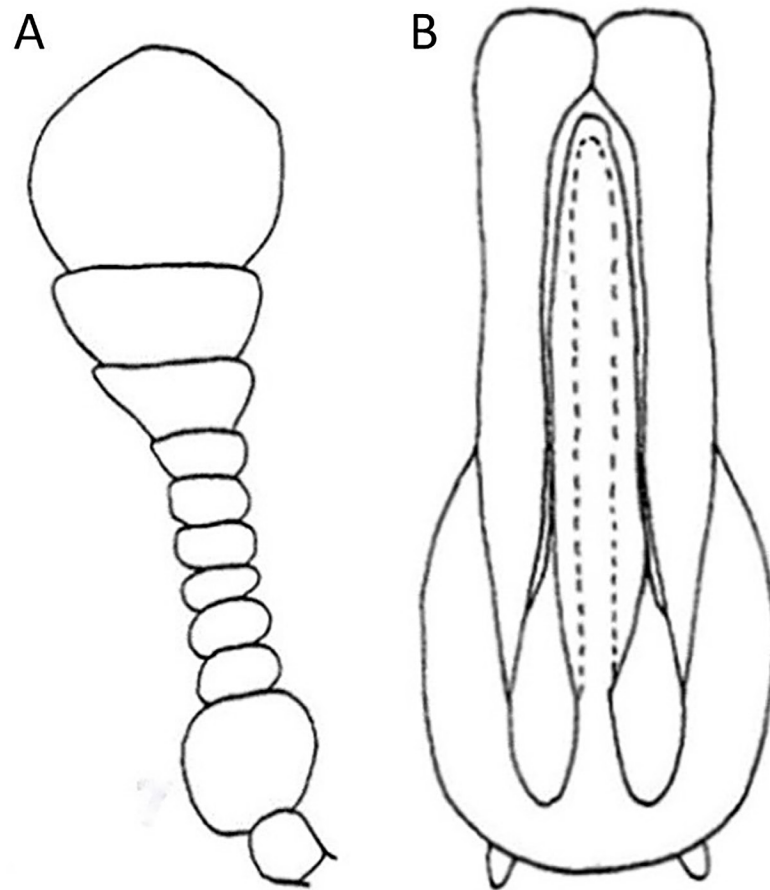


Figure 6. Illustrations of *Anthrenus crustaceus*. A) Antenna. B) Aedeagus. Reproduced from Háva (2014).

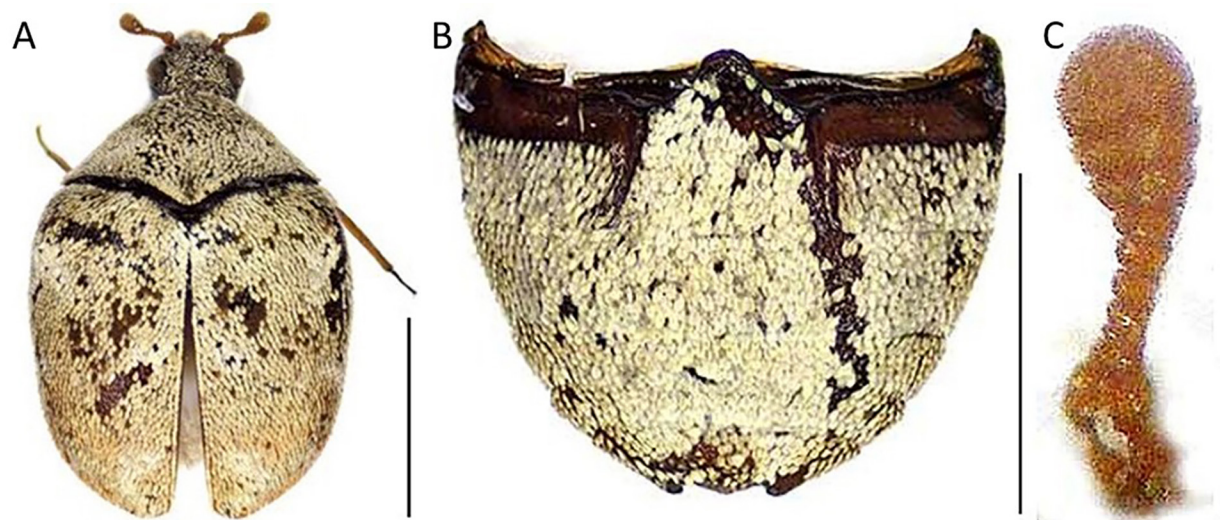


Figure 7. *Anthrenus (Anthrenus) rauterbergi* paratype female. A) Habitus (scale bar = 1 mm). B) Ventrites (scale bar = 1 mm). C) Antenna (scale bar = 100 µm).

Images of female tergite VIII and sternite VIII are provided for *A. kushangaza*. Images of these abdominal plates are very rarely shown for *Anthrenus*, and in the absence of any structures within the bursa copulatrix, abdominal plate structure might offer one of the few routes to identification of female specimens.

Knowledge of the African *Anthrenus* species is limited and consequently mistakes are being made. *Anthrenus kittenbergeri* has been presented elsewhere but misidentified as *A. crustaceus*, see illustrations in Herrmann et al. (2015, Fig. 6). Only with more work on African (and Middle Eastern) *Anthrenus* species with better and more extensive examination will we be able to iron out errors and develop a more comprehensive understanding of African *Anthrenus*.

After the current study, nine *Anthrenus* (s. str.) species are known from Egypt:

Anthrenus crustaceus Reitter, 1881
Anthrenus delicatus Kiesenwetter, 1851
Anthrenus goliath Saulcy in Mulsant and Rey, 1867
Anthrenus kushangaza Holloway and Herrmann, 2024
Anthrenus oceanicus Fauvel, 1903
Anthrenus rauterbergi Reitter, 1908
Anthrenus rotundulus Reitter, 1889
Anthrenus simonis Reitter, 1881
Anthrenus x-signum Reitter, 1881

Only three species of *Anthrenus* (s. str.) are known from Eritrea:

Anthrenus crustaceus Reitter, 1881
Anthrenus kittenbergeri Holloway and Herrmann, 2024
Anthrenus x-signum Reitter, 1881

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