



Anthrenus (s. str.) *corona* (Coleoptera, Dermestidae, Anthrenini): a new species in the *A. pimpinellae* Fabricius, 1775 complex from Turkey

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Abstract

A new species from Turkey, *Anthrenus* (s. str.) *corona*, belonging to the *Anthrenus pimpinellae* complex is presented. The species is described from a single specimen discovered in the collection held by the Natural History Museum, London. The species was uncovered during the dissection of many specimens for the purpose of curation. The species is compared in detail to *A. goliath*, the most likely confusion species. An obvious external feature of the specimen is its large size, putting it apart from nearly all other species within the complex. The parameres and median lobe are slim, differing in many ways from *A. goliath*.

Key words: *goliath*, complex, dissection, genitalia, aedeagus, taxonomy

Introduction

The family Dermestidae Latreille 1804 contains over 1,700 described species worldwide (Háva 2020). One of the larger genera within the family is *Anthrenus* Geoffroy 1762, with about 260 species. The genus is split into 10 subgenera (Háva 2020), but the taxonomy is not yet well established. Kadej (2018) using juvenile characters showed that only the subgenus *Anthrenus* is monophyletic, concluding that the remaining subgenera form a polyphyletic unit. Holloway *et al.* (2020a) carried out a limited genetic analysis of the relationship between a few *Anthrenus* species and found evidence supporting Kadej (2018). Both studies suggest that the taxonomy of the genus *Anthrenus* has not yet been resolved.

The monophyletic taxon, *Anthrenus* (*Anthrenus*), contains around 70 species, including the large *Anthrenus pimpinellae* Fabricius 1775 complex. It has been known for a long time that the complex contains many species of similar appearance and this has made identification difficult (Beal 1998). Complexity within the group has resulted in a lack of knowledge of the number of species and, for each species, a lack of understanding of the distribution (Beal 1998; Holloway *et al.* 2019; Holloway & Bakaloudis 2019; Holloway *et al.* 2020a, b). Beal (1998), Kadej *et al.* (2007) and Kadej & Háva (2011) emphasized the importance of dissection for genital inspection to establish identification, arguing that it was required to circumnavigate the problem of colour pattern variation across the group. In taking this approach, Kadej *et al.* (2007) and Kadej & Háva (2011) described six new species within the *A. pimpinellae* complex bringing the total number of species within the complex to 20. Holloway (2019, 2020) followed the advice provided by Beal (1998), and Kadej and colleagues that dissection is important and, in doing so, discovered two more species within the complex bringing the number of species known within the *A. pimpinellae* complex to 22.

The work of Holloway (2019, 2020) and Holloway *et al.* (2020a) has indicated that perhaps there remain more species to be discovered in the *A. pimpinellae* complex and that this, most likely, can only be achieved via dissection. The requirement to dissect species belonging to the complex is also a problem for museum curation. During curation there is a need to sort specimens accurately according to species. Work is currently being carried out to dissect all specimens in the *A. pimpinellae* complex held by the Natural History Museum (NHM), London. This effort has demonstrated considerable confusion among species and resulted in the discovery of two new species, *A. chikatunovi* (Holloway 2020), and *A. corona* described here.

Materials and methods

The nomenclature and zoogeography follow Háva (2015, 2020), and the conventional nomenclature, including of the taxa under study, is used. All specimens belonging to the Palaearctic *A. pimpinellae* complex were borrowed from the NHM (over 100 specimens). Each specimen was removed from its staging pin and dropped into 2% acetic acid for at least 3 days to make the insects fall away from the card on which they were set or to be removed from the pins piercing their bodies (as in the current case). The abdomen was detached from the thorax and the soft tergites peeled away from the harder ventrites to reveal the genitalia. The genitalia were placed into a drop of 70% ethanol to facilitate the removal of dried abdominal material from the genitalia under a stereo microscope using fine entomological pins. Sternite IX was removed from the aedeagus. The habitus, ventrites, tergites, aedeagus and sternite IX were arranged and fixed to new mounting card. The antennae were hooked out of the antennal cavities to facilitate inspection. Dissection was carried out under a Brunel BMSL zoom stereo LED microscope. Images were taken using a Canon EOS 1300D and fed through Helicon Focus 6-Pro focus stacking software. For the specimen described here, habitus and ventrite images were captured at x15 (BMSL), images of antennae were captured at x63 (BMSL), and images of the genitalia were captured at x100 using a Brunel monocular SP28 microscope. Morphometrics were taken using DsCap.Ink software.

The following morphometrics were taken:

Body length (BL)	linear distance from the anterior margin of the pronotum to the tip of the elytra
Body width (BW)	linear transverse distance across the widest point to the outer margins of the elytra (values were obtained for each elytron separately and summed)
Paramere length (PL)	linear length of one paramere from the apical tip of paramere to the base where the two parameres curve in on each other and meet.
Antennal club length (AL)	maximum length of antennal club
Antennal club width (AW)	maximum width of antennal club

Results

Anthrenus corona sp. nov.

Specimen examined. New record (holotype) for *Anthrenus (Anthrenus) corona* sp. nov. Turkey, Keçiören, 16 May 1939, F.S. Bodenheimer leg., one ♂, NHM, London, UK.

Description. *External characteristics.* Large (BL = 4.434 mm) and broadly oval (BW = 3.297 mm) (Fig. 1A), BW/BL = 0.744. Head with one median ocellus on vertex. Cuticle reddish brown on elytra, dark brown on pronotum. Dorsal surface covered in flat, oval scales, which are approximately twice as long as broad. Scales either black, orange, or creamy-white. Creamy-white scales concentrated in sub-basal, trans-elytral band, broadest at the lateral margin, narrowing towards the elytral suture. The scutellum is triangular and black. One sub-apical creamy-white spot on each elytron and two more diffuse creamy-white patches on the hind angles of the pronotum. Orange scales more scattered as small patches across the pronotum, around the elytral apices, along the apical half of the elytral suture and scattered as loose patches across the disk of each elytron posterior to the white band. Eyes emarginated on inner edge and mostly glabrous apart from a few scattered micro setae in top half of eye. Abdominal ventrites covered in closely packed white scales (Fig. 1B). Anterior 1/3 of ventrite I devoid of scales. Anterior halves of lateral margins of ventrites II–V carry spots of black scales and there is a spot of black scales at the apex of ventrite V. Ventrite I also carries spots of black scales towards each lateral margin, but these spots are small, sub-lateral and surrounded by white scales. The femora, tibiae, and tarsi unicolorous mid-brown. Femora carry scales on the outer surface, especially basally. Antennae with 11 antennomeres, antennomeres 1–8 reddish brown (Fig. 1C). Antennomeres 9–11 form an asymmetric club (AL = 0.247 mm; AW = 0.180 mm; AL/AW = 1.372) that is marginally darker than antennomeres 1–8.

Internal characteristics. PL = 0.572 mm. PL/BL = 0.129, aedeagus (Fig. 2A) short relative to BL compared with equivalent measures in some other species (Holloway & Bakaloudis 2020; Holloway *et al.* 2020a). Parameres carry hairs on the apical third. The spikey hairs on the outer surface of each paramere are noticeable and unusual. Also,

some sparsely distributed hairs on inner surface of each paramere starting marginally further away from the apical tip than hairs on outer surface. Inner surfaces of each paramere at the apical tip carry several short, spikey hairs emerging at right angles from each paramere pointing inwards. Parameres very narrow, evenly curved from base to apex. Parameres expand slightly at apex forming blunt, rounded, and white tips that tilt in towards each other. The white patches extend further down the inner margins of the parameres than the outer margins. Median lobe has a wide base and narrows rapidly towards the apex until about halfway along its length from which point it barely narrows any further, forming an almost parallel-sided finger to the apex. Apical tip of median lobe evenly rounded, without expansion, falling short of tips of parameres. Apical (posterior) end of sternite IX (Fig. 2B) spatulate. Margins of expanded apex of sternite IX carry sharp hairs, including around the evenly rounded tip. From the apex towards the anterior end, posterior stem narrows forming a neck before expanding rapidly towards two slim horns pointing into abdomen. Fig. 2C illustrates structure of the evident, but narrow, sclerotized margins, just posterior to the neck that expand evenly to terminate at the base of each horn. Horns similarly sclerotized with contrast between colour at base of each horn and the broad ends of the sclerotized margins described above. Between the horns, the membrane is translucent. From apex to base, sternite IX = 0.626 mm.

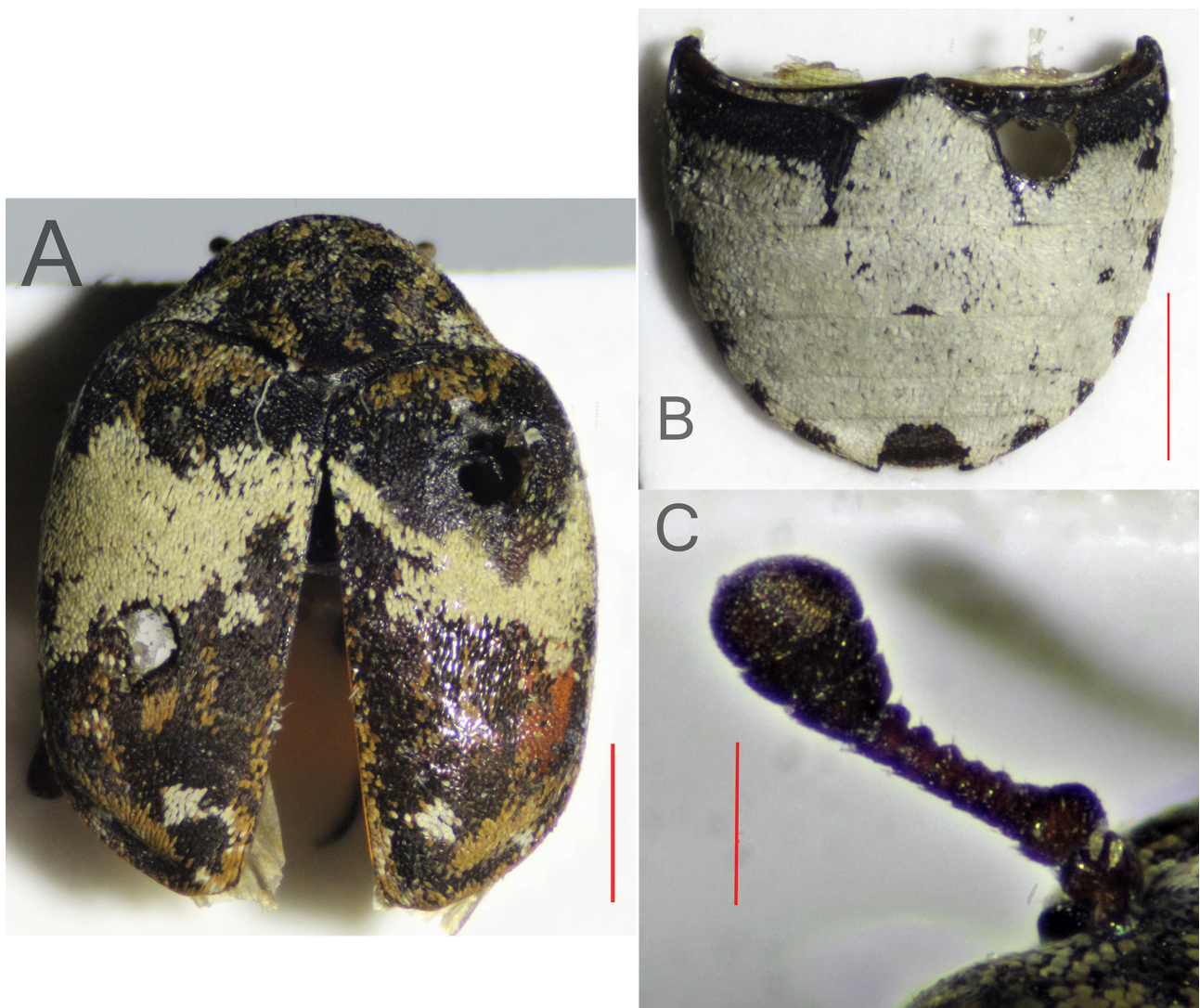


FIGURE 1. External features of ♂ *Anthrenus corona*: **A**, habitus dorsal aspect (scale bar: 1 mm); **B**, ventrites (scale bar: 1 mm); **C**, antennal club (scale bar: 0.2 mm).

Differential diagnosis. *External characteristics.* The most striking feature of the specimen shown in Fig. 1A is its size. The only other species in the complex that approaches this size and has a colour pattern resembling *A. corona* is *A. goliath* Mulsant & Rey 1868 (Fig. 3A). NHM holds just one *A. goliath*: BL = 3.962 mm, BW = 3.171 mm, BW/BL = 0.700. The NHM *A. goliath* specimen has a narrower habitus profile than *A. corona*. Fig. 3B shows

an image of an antenna from *A. goliath*. *Anthrenus goliath* has a slim, asymmetric antennal club (AL = 0.250 mm, AW = 0.165 mm, AL/AW = 1.515). *Anthrenus corona* also has an asymmetric antennal club (Fig. 1C) that is not as narrow as *A. goliath*.

Internal characteristics. *Anthrenus corona* has very narrow aedeagal parameres (Fig. 2A). The parameres of *A. goliath* (Fig. 3C) are considerably broader than *A. corona*. The setae on *A. goliath* parameres are short, sparse and cover the surface of the parameres, in contrast to the spikey setae along the paramere margins in *A. corona*. *Anthrenus goliath* PL = 540 μ m, PL/BL = 0.136, so the aedeagus in *A. goliath* is longer relative to BL than *A. corona*. The median lobe of *A. goliath* is broader for much of its length than the median lobe of *A. corona*.



FIGURE 2. Genitalia of ♂ *Anthrenus corona*: **A**, aedeagus dorsal aspect, low intensity transmitted light to highlight setae; **B**, sternite IX, low transmitted light intensity to highlight setae; **C**, sternite IX, high transmitted light intensity to highlight sclerotized features. Scale bars: 0.2 mm.

Discussion. The specimen of *A. corona* described here is large at 4.434 mm. Kadej *et al.* (2007) examined 60 specimens of *A. goliath* and found body length to vary between 3.0 mm and 4.25 mm. The only *A. goliath* held by the NHM measures 3.962 mm. However, the *A. corona* specimen has a much rounder profile (BW/BL = 0.744) than *A. goliath* (BW/BL = 0.700). Holloway & Bakaloudis (2020) and Armstrong *et al.* (submitted) found BW/BL to be highly conserved, so it is likely that *A. goliath* is a consistently slimmer species than *A. corona*. According to Háva (2020), *Anthrenus goliath* also occurs in Turkey. It would be interesting to get more body measurements for *A. corona* to establish whether body size and shape could be an initial guide to identification. Genital structure remains the principal way of differentiating among species within the *A. pimpinellae* complex. Even when habitus characteristics are very similar, genital structure varies consistently among species (Kadej *et al.* 2007) but varies very little within species (Holloway & Bakaloudis 2020; Holloway *et al.* 2020a).

The discovery of *A. corona* brings the number of known species within the *Anthrenus pimpinellae* complex to 23. One further species within the *A. pimpinellae* complex is claimed: *A. almatyensis* Háva 2018 (Háva 2018). Unfortunately, the quality of the images provided in Háva (2018) does not offer readers the opportunity to explore the calibre of the claim, in particular differentiation from the similar *A. mesopotamicus* Háva 2001 (Kadej *et al.* 2007).

Etymology. *Anthrenus corona* is named after the COVID-19 pandemic that has been causing so much suffering globally at the time this species was discovered.

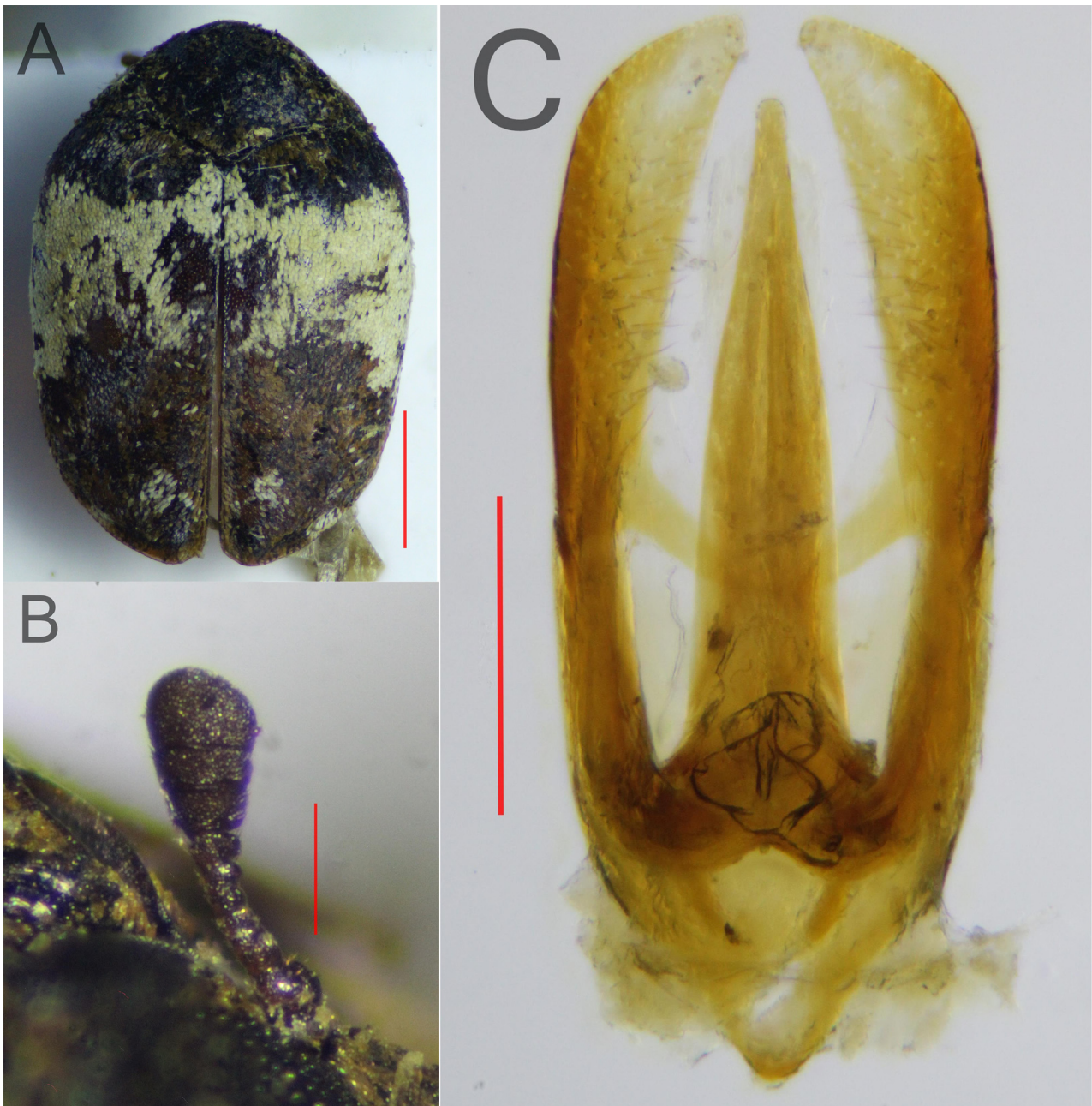


FIGURE 3. ♂ *Anthrenus goliath*: **A**, habitus dorsal aspect (scale bar: 1 mm); **B**, antennal club (scale bar: 0.2 mm); **C**, aedeagus dorsal aspect (scale bar: 0.2 mm).

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