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Anthrenus (Anthrenus) algeriensis (Coleoptera, Dermestidae, Megatominae), a new species from Algeria

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All specimens labelled *Anthrenus pimpinellae* were borrowed from the Natural History Museum, London. Many of the specimens were incorrectly identified with only a minority *A. pimpinellae*. Included in the sample were three specimens collected from Algeria. The specimens are compared with potential confusion species; the Algerian specimens differed from all of them. *Anthrenus algeriensis* sp. nov. is described. Images of habitus, antenna, and male genitalia are provided.

Key words: Carpet beetle, aedeagus, median lobe, sternite IX, taxonomy, distribution, Anthrenini

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INTRODUCTION

The Dermestidae Latreille, 1804 is a moderately speciose family containing just over 1800 species (Háva 2023). The Dermestidae are not well studied and there remains a lot to be discovered judging by the rate at which new species are being described (Háva 2023). *Anthrenus* Geoffroy, 1762 is one of the larger genera in the family numbering over 280 species. It is split into 10 subgenera (Peacock, 1993; Háva 2023), the largest two being *Anthrenus* (s. str.) with over 75 species and *Nathrenus* Casey, 1900 with 80 species. A group of species within *Anthrenus* s. str. that has received a lot of attention recently is the Palaearctic *A. pimpinellae* (Fabricius, 1775) complex. Kadej *et al*. (2007) dissected many specimens and found three species new to science. Kadej and Háva (2011) extended this work by describing a further three new species, Holloway (2019, 2020, 2021) added a further three new species, two of which were held in the Natural History Museum, London (BNHM), and Holloway *et al*. (2023b), bringing the number of species in the complex to 24. The new species from the BNHM collection were discovered by dissecting all specimens labelled '*A. pimpinellae*'. About 30% of them were correct, but a greater proportion were *A. isabellinus* Küster, 1848 plus a mixture of species such as *A. angustefasciatus* Ganglbauer, 1904, *A. chikatunovi* Holloway, 2020, *A. corona* Holloway, 2021, *A. delicatus* Kiesenwetter, 1851, *A. goliath,* Saulcy in Mulsant & Rey, 1868, and *A. oceanicus* Fauvel, 1903. All specimens were dissected and identified using genitalia which illustrated two things: how important it is to dissect to be sure of species identification, and how difficult workers find it to differentiate among species using

external characteristics such as colour pattern. Amongst the insects borrowed from BNHM were three *A. pimpinellae* complex specimens collected from Algeria. In the current study, *Anthrenus* (*Anthrenus*) *algeriensis* sp. nov. from Algeria is described.

MATERIALS AND METHODS

The dry, carded specimens were borrowed from BNHM for study. All specimens were macerated in a solution of 2% acetic acid for five days to soften and 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 the male, 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 confirm sex, but no further examination of female genitalia was carried out. Images of male and female habiti, both upper and under sides, were captured at ×20 magnification using a Canon EOS 2000D camera mounted on the BMSL microscope. Images of aedeagus and (male) sternite IX were captured at ×200 magnification using a Canon EOS 1300D camera mounted on a Brunel monocular SP28 microscope. After dissection, all body parts were mounted on card. The antennae were teased out and images were taken at ×200 magnification through the SP28 microscope. All images were fed through Helicon Focus Pro version 8.2.2 focus-stacking software. All measurements were made using DsCap.Ink software version 3.90. 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
- Sternite IX length (SL): distance from the tip of one anterior horn to the tip of the posterior lobe

The data for the distribution maps (Shorthouse 2010) were derived from Holloway et al. (2023a) for *A. pimpinellae*, Holloway (2020) and a verified (by GJH) record from iNaturalist (2023) for *A. chikatunovi*, Holloway (2019) for *A. amandae*, and the data label on the holotype for *A. algeriensis*.

RESULTS

Anthrenus (*Anthrenus*) *algeriensis* sp. nov. (Figs 1, 2)

Specimens examined. **Holotype** (female) BNHM, Algeria, early 20th century, J.J. Walker leg (Sharp coll.).
Paratypes. One male (Sharp coll., BNHM) and one female (BNHM), Algeria, no collector or date on data labels. J.J. Walker collected during his travels as a naval officer during early 20th century. Given his naval links, it is likely that the *A. algeriensis* specimens were collected from a coastal region in Algeria.

Holotype habitus (Fig 1A) (BL = 2.53 mm, BW = 1.80 mm), paratype ventrites (Figure 1B), antenna (Figure 1C) (AL = 163 µm, AW = 121 µm).

Description holotype, external characteristics. *Anthrenus* (s. str.) *algeriensis*

holotype (Fig 1A) has a single dark amber ocellus on vertex, typical of Dermestidae, except for Dermestinae, and a notch on the lower inner margin of the eye typical of the subgenus *Anthrenus*. The dorsal integument is very dark brown to black and covered in very dark brown, pure white, creamy white, and orange/light brown scales. The main colour pattern feature is the sub-basal fascia consisting of creamy white scales. The fascia is widest at the lateral margin. At about ¾ of the way across the elytra, the fascia goes up to the dark triangular scutellum (60% wider than it is long). At the point where the fascia turns up towards the scutellum, it splits with some scales reaching downwards and then up the elytral suture encircling a black spot in the white fascia on each elytron just in from the elytral suture. Just in from the outer margins of each elytron, the white scales of the fascia reach down to join a sub-marginal spot of pure white scales. There are also two sub-apical spots of pure white scales, one on each elytron and a second white spot very close to the outer margin just below the level of the sub-apical spot. The orangey brown scales start admixed with the white fascia scales and form a narrow line two or three scales thick against the elytral suture widening down to the apices of the elytra. The orange scales then arch up away from the apices to join the white spots at the outer margins. On the disc of each elytron between the white fascia and the sub-apical white spot there are some orange/brown scales arranged in three loose vertical stripes.

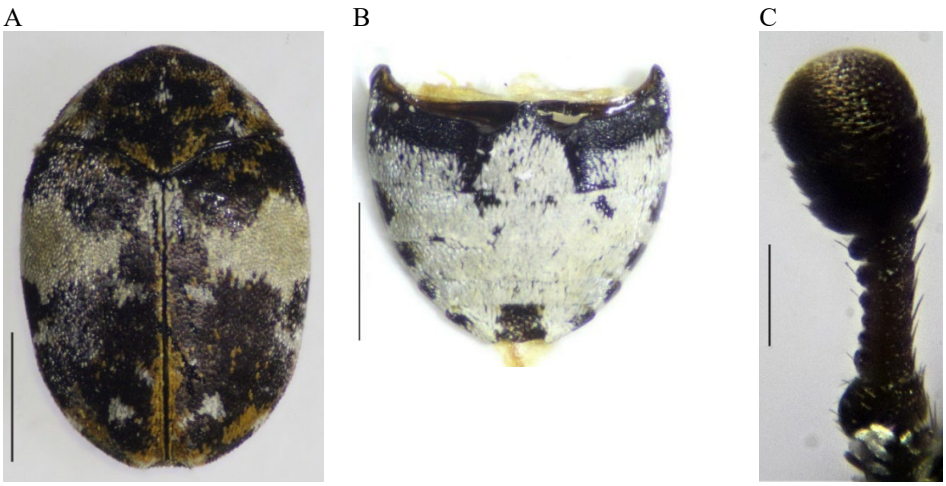


Fig. 1. *Anthrenus* (*Anthrenus*) *algeriensis* **sp. nov.** Holloway, 2024 holotype A: habitus dorsal aspect (scale bar = 1mm), B: ventral aspect ventrites (scale bar = 1mm), C: antenna (scale bar = 100µm).

The ventrites (Fig 1B) are covered mostly in bright white scales. The anterior 2/3 of the outer margins of ventrites 2-5 carry elongated spots of black scales. The tip of ventrites 5 bears a square spot of black scales. Sternite 1 carries a small, sub-marginal spot of black scales.

The 11-segmented antenna (Fig 1C) is entirely dark red. Antennomeres 1, 2, 9, 10, and 11 are a shade darker than the remaining antennomeres. The antennal club consisting of antennomeres 9, 10, and 11 is strongly cubic. All components of the legs are similarly dark red. The anterior faces of the femora are covered in scales, the tibiae and

tarsi are unscaled. The scales on the anterio-dorsal component of the femora are very dark brown, particularly on the front leg, more narrowly coated with dark scales on the anterio-dorsal component of the middle leg, and even less so on the rear leg. The scales on the rest of the anterior face of the femora are a mixture of orange/pale brown and creamy coloured.

Paratype male, internal characteristics. Fig 2A shows ventral surface of the paratype male aedeagus. The parameres (PL = 393 µm) are broad, flattened and hooked inwards at the blunt posterior tips. The outer margins for most of the length are gently convex until the point where they turn evenly inwards to the tips. The inner margin of each paramere is sinuate. The surface of each paramere is covered in spikey setae. The outer half of each paramere is more heavily sclerotinized than the inner half (which is paler). The tips of the parameres are particularly white suggesting that they are very thin. The median lobe (ML = 392 µm) is extremely narrow. It is broadest (although not particularly broad) at the base and the margins gradually converge to produce a long, thin terminal tip that falls short of the paramere tips.

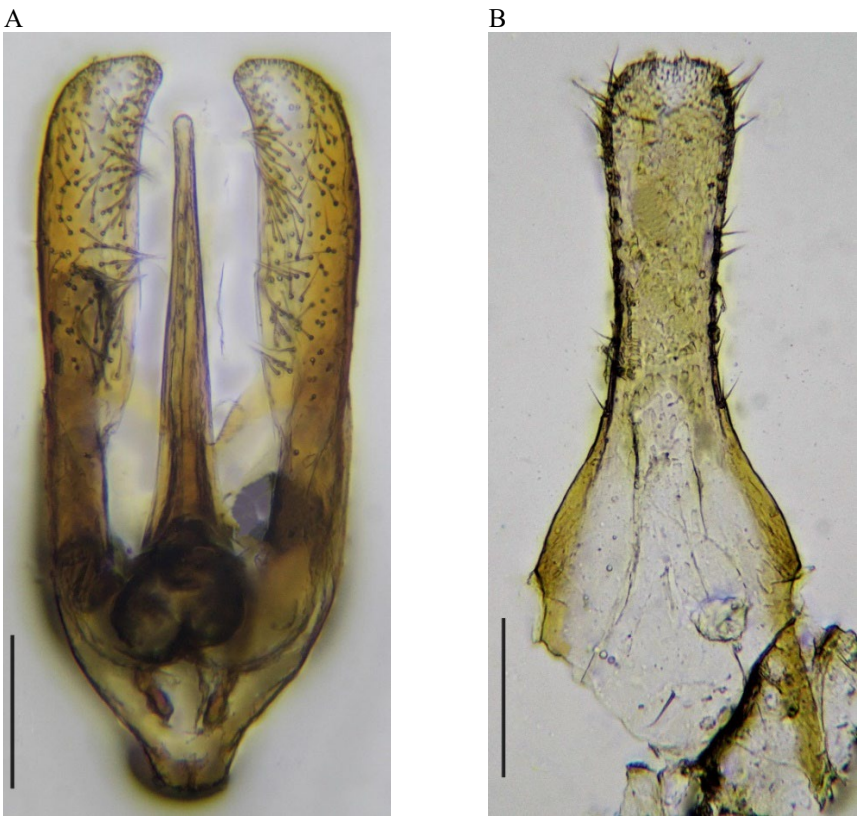


Fig. 2. *Anthrenus* (*Anthrenus*) *algeriensis* **sp. nov.** Holloway, 2024 paratype A: aedeagus ventral aspect, B: sternite IX. Scale bars = 100µm in both cases.

One of the anterior horns of sternite IX (Fig 2B, SL = 475 µm) is damaged and some of the marginal setae are rubbed off. The tip of the posterior lobe is evenly rounded with a

small notch in the middle. From the tip of the lobe, the margins converge slightly to form a well-defined neck that is not much narrower than the distance across the tip of the posterior lobe. There are spikey setae down both sides of the posterior lobe from the tip to beyond the narrowest part of the neck. The setae are longest and concentrated at the corners of the tip of the posterior lobe. The distance of the neck to the tip of the posterior lobe is only 40% the length of the entire sternite IX from the tip of the posterior lobe to the tips of the anterior horns.

Differential diagnosis (Fig 3). Three other species belonging to the *A. pimpinellae* complex are known to occur in Algeria: *A. angustefasciatus*, *A. isabellinus* and *A. munroi*. All these species can be comfortably distinguished from *A. algeriensis* using habitus colour pattern (Holloway and Cañada Luna 2022), antennal structure, or aedeagal structure (Holloway et al 2020; Holloway and Cañada Luna 2022; Holloway and Herrmann in press).

Three other species around the western Mediterranean have cubic antennal clubs and are small (BL < 3mm) like *A. algeriensis*: *A. amandae* Holloway, 2019, *A. chikatunovi*, and *A. pimpinellae*. Habiti of these three potential confusion species are shown in Figs 3A, B, and C, respectively, antennae are shown in Figs 3D, E, and F, respectively, aedeagi are shown in Figs 3G, H, and I, respectively, and sternite IX's are shown in Figs 3J, K, and L, respectively.

The scales on the dorsal surface of *A. amandae* tend to be brown, rather than the orange of *A. algeriensis*. *Anthrenus pimpinellae* has very few orange scales on the elytral disc below the white fascia, *A. algeriensis* does have orange scales in this region (NB the paratypes have more orange scales below the white fascia than the holotype). Furthermore, *A. pimpinellae* ventrites are often covered in 'dirty' white scales (Holloway and Bakaloudis 2020) and the black scales at the lateral margins of ventrites I are large extending right up to the margin. This contrasts with the ventrites pattern of *A. algeriensis* (Fig. 1B) providing comfortable differentiation from *A. pimpinellae*. *Anthrenus algeriensis* is not easy to differentiate from *A. chikatunovi* from habitus pattern alone. The aedeagi of *A. chikatunovi* and *A. pimpinellae* have heavily bowed, hairy parameres and broad-based median lobes which contrast with the shallow bowing of *A. algeriensis* parameres and the slim median lobe. *Anthrenus amandae* parameres have straight outer margins to the broad parameres and the outer margins turn in more sharply to the tips, and the median lobe is relatively broad, compared with *A. algeriensis*. *Anthrenus amandae* and *A. chikatunovi* are broader across the tips of the posterior lobes of sternite IX and have more accentuated 'necks'. The sternite IX posterior lobe of *A. pimpinellae* is broader throughout than *A. algeriensis*.

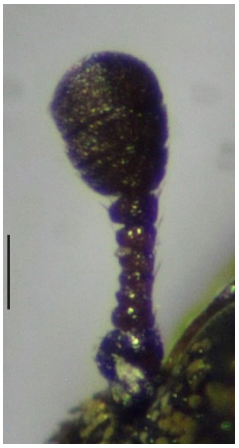
A

B

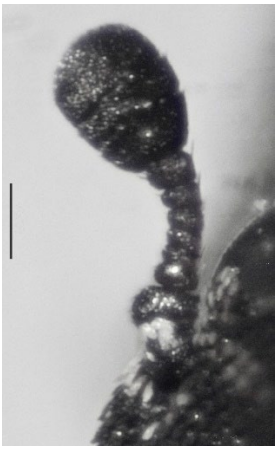
C

D

E



F



G

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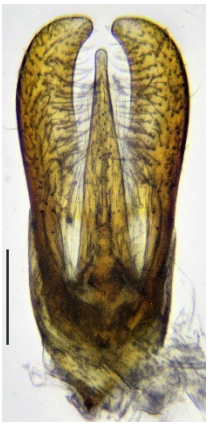

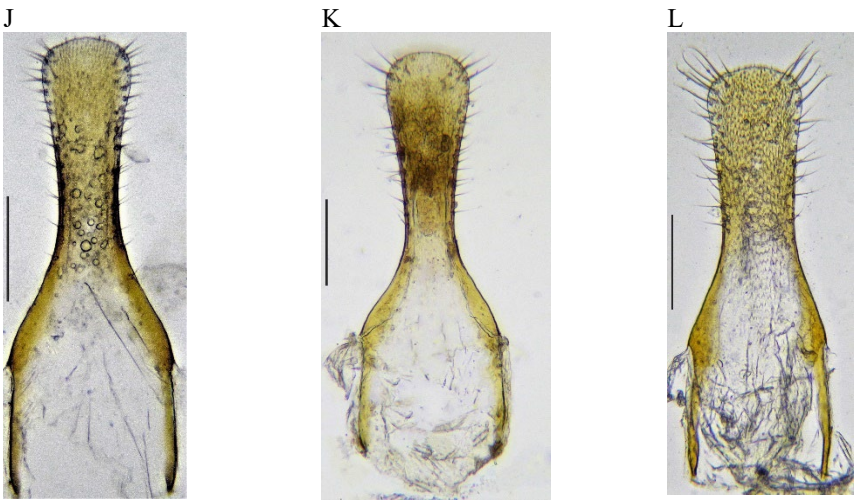

Fig. 3. *Anthrenus amandae*, *A. chikatunovi*, *A. pimpinellae* habiti (Figs A, B, C, respectively) (scales bars = 1mm in all cases), antenna (Figs D, E, F, respectively) (scale bars = 100µm in all cases), aedeagi (Figs G, H, I, respectively) (scale bars = 100µm in all cases), sternite IX (Figs J, K, L, respectively) (scale bars = 100µm in all cases).

***Distributions*.** Fig 4 shows the distributions of the smaller *A. pimpinellae* complex species with cubic antennal clubs described above. All four species are geographically separated from each other (according to data currently available). In western Europe, *A. pimpinellae* does not reach into southern France although there is evidence that its distribution extends into southern Italy (Holloway *et al*. 2023). *Anthrenus chikatunovi* has only been found around the Pyrenees (Holloway 2020) and *A. amandae* has only been recorded from Mallorca (Holloway 2019).

Etymology. *Anthrenus algeriensis* is named after the country of collection (Algeria).

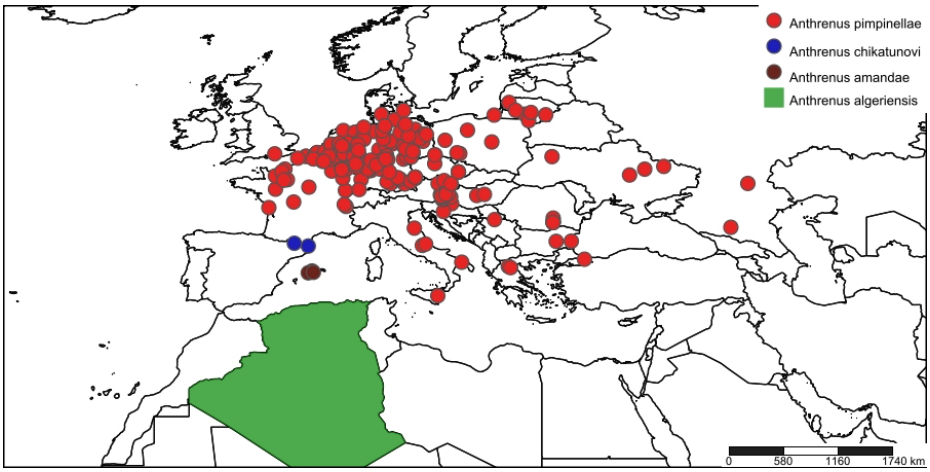

Fig. 4. Known distributions of *Anthrenus amandae*, *A. chikatunovi*, *A. pimpinellae*, and *A. algeriensis*

Discussion

Anthrenus algeriensis was found during an examination of the species labelled '*Anthrenus pimpinellae*' in BNHM. The '*A. pimpinellae*' sample of insects contained a variety of species, including *A. pimpinellae*, *A. angustefasciatus*, *A. chikatunovi*, *A. corona*, *A. isabellinus*, and *A. goliath*. It was clear that, in the past at least, workers have confused species within the *A. pimpinellae* complex. The approach that has been taken more recently is to dissect specimens to confirm species identification and then convert that information to find habitus characteristics that can facilitate identification without dissection when used with care (Holloway and Cañada Luna 2022). Dissection remains the technique of choice for identification in taxonomic work. Following this approach has yielded at least 11 species new to science within the Palaearctic *A. pimpinellae* complex 2007. It is likely that more remain to be discovered.
Confusion of *A. algeriensis* with other species within the *A. pimpinellae* complex is unlikely. All other species known to occur in Algeria can be easily distinguished from habitus colour pattern and antennal structure. There are three other species from western Europe with cubic antennal clubs, like *A. algeriensis*: *A. amandae, A. pimpinellae*, and *A. chikatunovi*. *Anthrenus amandae* and *A. pimpinellae* can be differentiated from *A. algeriensis* on the basis of external characters. *Anthrenus chikatunovi* externally resembles *A. algeriensis* so requires dissection to separate definitively. However, Fig. 4 shows that all four species have non-overlapping distributions based on current information offering instant identification from location of collection.

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