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ISSN: 1989-6581

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Holloway & Herrmann (2024)
ARQUIVOS ENTOMOLÓXICOS, **30**: 269-276

ARTIGO / ARTÍCULO / ARTICLE

Redescription of *Anthrenus (Anthrenodes) minor* Wollaston, 1865 (Coleoptera, Dermestidae, Megatominae)

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Abstract: The description of the species *Anthrenus minor* Wollaston, 1865 (Coleoptera, Dermestidae) is very brief and inadequate given the number of species within the genus *Anthrenus* Geoffroy, 1762 currently known. An extended description is provided along with images of the habitus, antenna, aedeagus, male sternite IX, female sternite VIII and female tergite VIII. The global distribution of *A. minor* is illustrated.
Key words: Coleoptera, Dermestidae, Megatominae, Anthrenini, *Anthrenus minor*, redescription, identification, distribution, aedeagus, sternite.

Resumen: Redescripción de *Anthrenus (Anthrenodes) minor* Wollaston, 1865 (Coleoptera, Dermestidae, Megatominae). La descripción de la especie *Anthrenus minor* Wollaston, 1865 (Coleoptera, Dermestidae) es muy breve e inadecuada dado el número de especies dentro del género *Anthrenus* Geoffroy, 1762 actualmente conocidas. Se proporciona una descripción ampliada junto con imágenes del habitus, la antena, el edeago, el esternito IX del macho, el esternito VIII de la hembra y el tergito VIII de la hembra.
Palabras clave: Coleoptera, Dermestidae, Megatominae, Anthrenini, *Anthrenus minor*, redescripción, identificación, distribución, edeago, esternito.

Recibido: *13 de noviembre de 2024*
Aceptado: *22 de noviembre de 2024*
Publicado on-line: *3 de diciembre de 2024*

Introduction

Describing and cataloging global biodiversity relies on good species descriptions to facilitate comparison with candidate new species. For some Coleopteran families, brief or poor descriptions of many species are commonplace, including Dermestidae. Descriptions from the 18th and 19th centuries are often inadequate and fail to differentiate among several similar species. During this period, not many species of Dermestidae had been discovered and described, so brief descriptions probably sufficed to differentiate among the few believed to exist. Now we know of many more Dermestidae and the number of species in the family is approaching 2000 (Háva, 2024). *Anthrenus minor* Wollaston, 1865 fits into the category of briefly described Dermestidae making it appropriate to revisit the original text and to extend the description taking onboard new information.

Wollaston's (1865) original description is as follows:

> *A. oblongo-ovalis (nec rotundatus), angustulus, niger, supra parce lurido-irroratus; prothorace basi utrinque albido-maculato; elytris fasciis tribus dentatis albidis (plus minus conspicuis) ornatis; infra albidus; antennis (11-articulatis) pedibusque ferrugineis, illarum clava (2-articulata) picescentiore. — Long. corp. lin. ¾ - 1⅓.*
> *Anthrenus claviger*, Woll. [*nec* Erich.], Cat. Can. Col. 161 (1864).

> *Habitat in* Gomera, Palma *et* Hierro, *ad flores varios (praesertim Euphorbiarum) hinc inde parum vulgaris.*

Wollaston's (1865) description translates (loosely) into the following:

> A. Oblong-oval (not rounded), narrow, black, sparingly above with bright spots; the base of the prothorax is white-spotted on the outside; elytra adorned with bands of three serrated whites (more or less visible); below white; antennae (11-jointed) and rusty feet, the club (2-jointed) darker. — Body length ¾ - 1⅓.
> *Anthrenus claviger*, Woll. [*nec* Erich.], Cat. Can. Col. 161 (1864).
> It lives in Gomera, Palma and Hierro, visiting the various flowers (especially *Euphorbiarum*) scattered here and there.

As can be seen, the description is brief. Initially, Wollaston (1865) mistook *A. minor* for *A. fuscus* Olivier, 1789 (*A. claviger* Erichson, 1846). He also presents *A. minor* as having an 11-segmented antenna (see original description), later changing to a 10-segmented antenna and states that it belongs to the same group as *A. museorum* Linnaeus, 1761 which has an 8-segmented antenna. Wollaston (1865) does admit that he had not examined the antenna with sufficient care (given the number of specimens from the Canary Islands and Madeira that he was dealing with) but concludes that the new species (*A. minor*) is very likely to be conspecific with *A. minutus* Erichson, 1846 (which has a 5-segmented antenna). Clearly, there was a great deal of confusion here (as also noted by Plata & Prendes, 1982) and perhaps Wollaston did not have the time to devote to the description of *A. minor* that was required.

The purpose of the current study is to produce a more complete description of *A. minor* and to consider intra-specific variation.

Materials and methods

All 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 confirm sex, to facilitate inspection of the bursa copulatrix, and to extract sternite VIII and tergite VIII. Images of male and female habiti, both upper and lower sides, were captured at ×20 magnification using a Canon EOS 2000D camera mounted on the BMSL microscope. Images of aedeagi, sternites and tergites were captured at ×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 card. The antennae were teased out (where possible) 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.
- 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.
- Sternite VIII length (SL8): distance from posterior margin to tip of anterior stem.
- Sternite VIII width (SW8): distance across posterior lobe.
- Tergite VIII length (TL): distance from posterior margin to centre of anterior margin.
- Tergite VIII width (TW): distance across tergite.

The data for the distribution maps (Shorthouse 2010) were derived from the data labels on the studied specimens and Háva (2024). Statistical analysis (Mann-Whitney) was carried out using jamovi version 2.3.28, retrieved here. Scale bars were added using ImageJ 1.53M (Schneider *et al*., 2012).

Acronyms used:

- BNHM: Natural History Museum, London, UK.
- HNHM: Hungarian Natural History Museum, Budapest, Hungary.
- AHEC: Andreas Herrmann Entomological Collection, Stade, Germany.
- JHAC: Jiri Háva, Private Entomological Collection and Laboratory, Prague, Czech Republic.

Results

***Anthrenus (Anthrenodes) minor* Wollaston, 1865 (BNHM)**

Anthrenus claviger Wollaston, 1861[BNHM]
Anthrenus albidoflavus Reitter, 1881 [HNHM]
Anthrenops minutus J. Sahlberg, 1903
Anthrenus (Nathrenus) canariensis Háva, 2022 (JHAC, Háva & Herrmann, 2022)

External features

BNHM: 1 male, 8 females; AHEC: 2 males, 7 females. No difference in BL between BNHM and AHEC specimens (H=38.5, df=16, p=ns [not significant]). Mean male BL = 1.89 mm, mean female BL = 2.12 mm (H=7.5, df=16, p=ns), sample range 1.7 mm – 2.7 mm.

Habitus (showing variation), Fig. 1. Integument dark brown (appearing chestnut brown in dissected individuals). Single brown ocellus in centre of head just below level of top of eyes. Vertex and face covered in dark brown scales admixed with yellow and white scales. Eyes not emarginated along inner margin. Deep excavations (fossae) along anterior part of pronotal lateral margins to accommodate antennae reaching at least halfway along pronotum in females, much further in males. From above, lateral margins of pronotum with projecting flanges reflecting the presence of the deep antennal fossae. Pronotum covered in dark brown scales admixed with varying amounts of white and yellow scales. Elytral coloration varies, although a consistent feature is the presence of three bands of white scales: sub-basal, sub-medial, and sub-apical. Most examples also show white scales along the basal margin, along the elytral suture, and apically. Mixed in with the white scales of the bands are varying amounts of pale brown to orange scales (Fig. 1a). One specimen studied sported many large, rounded pale cream scales (Fig. 1b), again with some admixed pale brown scales, but the overall effect was to produce a pale looking individual. Between the white bands, scales are either dark brown or orange (Fig. 1c). Ventrites (Fig. 2a) brown loosely covered in white scales that become slightly yellowy towards the lateral margins and especially towards the tip of ventrite 5.

Antenna (Figs. 2b–2d) 10-segmented, segments 1–8 honey-coloured to brown. Two segmented club densely hirsute and darker, dark brown in males (Figs. 2b, 2c), brown in females (Fig. 2d). Male antennal club longer than female and terminal segment longer than penultimate segment, but the ratio of lengths of segments 9 and 10 the same (1:1.7) in both sexes. One specimen (a male, Figs. 1b, 2c) found with curved antennal club) but there was no evidence to suggest that this was anything other than *A. minor*. All legs components pale brown to honey-coloured.

Internal features (male)

Aedeagus (Fig. 3a) and sternite IX (Fig. 3b) of male shown in Fig. 1a, and the same in Figs. 3c and 3d for male shown in Fig. 1b. Average PL = 268 μm (PL/BL = 0.14). Parameres pale brown, slightly paler at posterior tips. From base parameres bow out and round before continuing to posterior tips as straight, parallel rods with barely any expansion at tips. There is no suggestion that Figs. 3a and 3c are different, rather the apparent differences are most likely caused by slight twisting of the parameres. Sternite IX (Figs. 3b, 3d, SL = 298 μm) has a broad, short posterior lobe, heavily hirsute

along lateral margins for posterior half of lobe and around the posterior margin with a few setae on the lobe disc. Below the posterior lobe, the margins sweep evenly out and back inwards to form two long, thin, curved anterior horns.

Internal features (female)

Sternite VIII (Fig. 4a, SL8 = 420 μm) is a parasol shaped structure with a long, slender anterior stem and a broad posterior lobe (SW8/SL8 = 0.76). The anterior stem is sclerotinized (brown) but the sclerotinization does not extend into the posterior lobe. The anterior margins and outer corners of the posterior lobe are sclerotinized and the rest of the lobe is white. Long, stiff setae line the white posterior margin of the lobe. Tergite VIII (Fig. 4b, TW = 340 μm [approx., TL/TW = 0.46) has a flat posterior margin lined with stiff, inward pointing setae. The setal distribution on the two halves of the tergite mirror each other closely. In addition to the marginal setae, there is one sub-marginal seta on each side below the angle of the posterior margin, and another, longer seta on each lateral margin. The lateral margins are straight before rounded hind angles. The anterior margin is strongly bilobed. There are no setae on the reticulated tergite disc.

Distribution

Anthrenus minor appears to be distributed in countries along a tight band between about 25° and 35°N running across north Africa and into Asia (Fig. 5), although it is not clear where the records beyond the Canary Islands come from. Mroczkowski (1968) states that *A. minor* can be found in several north African Countries and Greece, but identification of *A. minor* appears to be quite muddled. The north African records could well be correct, but the authors have not seen any specimens from this region and are unaware of anybody else who has.

Discussion

Anthrenus minor is not well represented in the literature and images of the species have not been published before indicating the level of colour variation that might be encountered, although Herrmann (2024) and Machado (2024) do show habitus images. It was not usual to dissect and describe genitalia at the time Wollaston (1865) described *A. minor* so genital structure is also published for the first time (but again, see Herrmann, 2024), although Plata & Prendes (1982) produced a schematic illustration. The male genitalia are distinctive and other species are unlikely to be confused with *A. minor* providing dissection is carried out. Wollaston's (1865) confusion with antennal segment number is evident claiming at first that *A. minor* had an 11-segmented antenna (presumably an assumption) before actually counting 10 segments. He then proceeded to suggest that *A. museorum* had 10 segments to the antenna (rather than eight) and suggested that *A. minor* might well be the same species as *A. minutus*, which has just five antennal segments. It is possible that Wollaston's equipment was not very good and seeing antennal segments of small beetles was difficult, or he was just too busy processing all the specimens (he estimated 20,000) he had from the Canary Islands and Madeira to devote much time to any individual specimen. A lack of available time might also account for why his description of *A. minor* was so brief, although its length was quite similar to many descriptions of the day. Another intriguing observation was made by Háva & Herrmann (2022) in synonymizing *A. canariensis*. This species was originally ascribed to the subgenus *Nathrenus* Casey, 1900 since the specimen from Gran Canaria appeared to have an 11-segmented antenna. It was later concluded that one antennal segment was split; perhaps a similar specimen with a split antennal segment caused Wollaston to originally describe the species with 11 antennal segments.

In addition to male internal features, female internal elements were dissected and imaged as well. No sclerites could be found in the bursa copulatrix as is sometimes the case in *Anthrenus* spp. (e.g. Adams, 1988; Holloway & Herrman, 2024; Holloway & Pinniger, 2024). Females are rarely dissected and imaged as it is considered female structures are too difficult to handle and offer little useful

information. It is certainly true that they are more difficult to manage than male features (with the exception of male sternite XI) and the female sternite VIII and tergite VIII were particularly small and delicate. However, it's difficult to say whether female features are of little value since they are hardly every published. Until more images appear in the literature, it will be impossible to carry out comparative work and only then will we be able to assess their value.

Wollaston (1865) records the length of *A. minor* as ¾ - 1⅓. It is not clear which units of measurement Wollaston (1865) is using here. In the current study, BL varied from 1.7 mm to 2.7 mm which does not equate with Wollaston's measurements. Female mean BL (2.12 mm) was greater than mean male BL (1.89 mm) in the current study, but the difference was not statistically significant. It is likely that the lack of significance was due to the small number of males available for study and with a slightly larger sample size a significant difference in size between the sexes could show through.

Anthrenus minor is claimed to be distributed in a relatively tight band across north Africa from the Canary Islands in the west into Saudi Arabia in the east. Its distribution does not extend far enough north to appear in mainland Spain. All the specimens studied here were from the Canary Islands, and Háva & Herrmann (2022) examined the antennae of 50 specimens of *A. minor* also all from the Canary Islands. A revision of the distribution might be appropriate for at least two reasons: being a volcanic island group, the Canary Islands have never been part of mainland Africa, so endemism is a possibility, and also Saudi Arabia is such a long way from the Canary Islands it is highly likely that a different species occurs in Asia. Island endemism is a common phenomenon in the natural world, including Dermestidae. Four species within the Attageninae Laporte de Castelnau, 1840 and fifteen *Thorictus* Germar, 1834 species are endemic to the Canary Islands (Háva, 2024). Greece appears as an outlier in Fig. 5. A reconsideration of records from Greece might also be appropriate. As it stands, five *Anthrenus* species are known from the Canary Islands: *A. coloratus* Reitter, 1881, *A. fuscus*, *A. minor*, *A. verbasci* (Linnaeus, 1767) (Machado, 2024), and *A. museorum* (Biodiversity Data Bank of the Canary Islands, 2024). Only *A. minor* and *A. verbasci* are recorded across all Canary Islands, *A. coloratus* and *A. fuscus* are recorded from Tenerife, and *A. museorum* only from La Palma (BDBCI, 2024).

Acknowledgements

The authors are very grateful to Max Barclay and the Coleoptera curatorial team at BNHM for maintaining and making available specimens for study. We are also very grateful to the many collectors over the years for providing us with the specimens held in AHEC.

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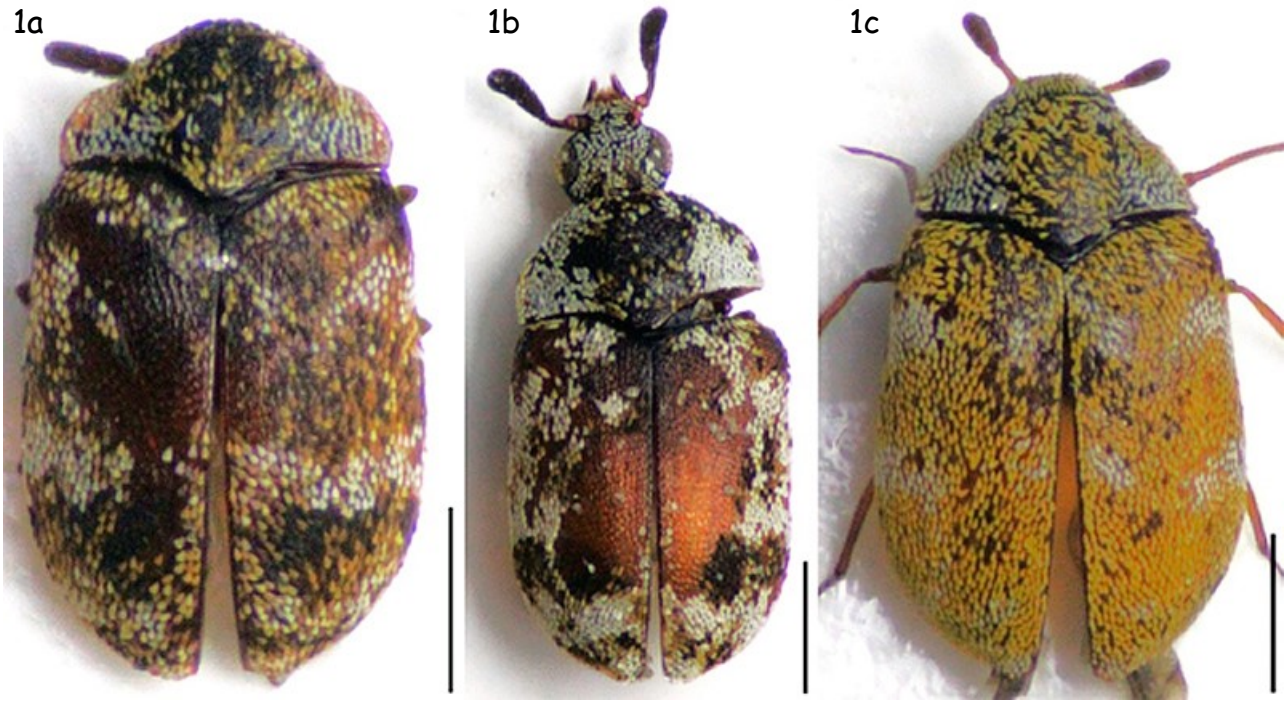

Fig. 1.– *Anthrenus minor*, habiti, dorsal aspect. **1a.–** Male, La Palma. **1b.–** Male, Tenerife. **1c.–** Female, La Gomera. Scale bars = 0.5 mm.

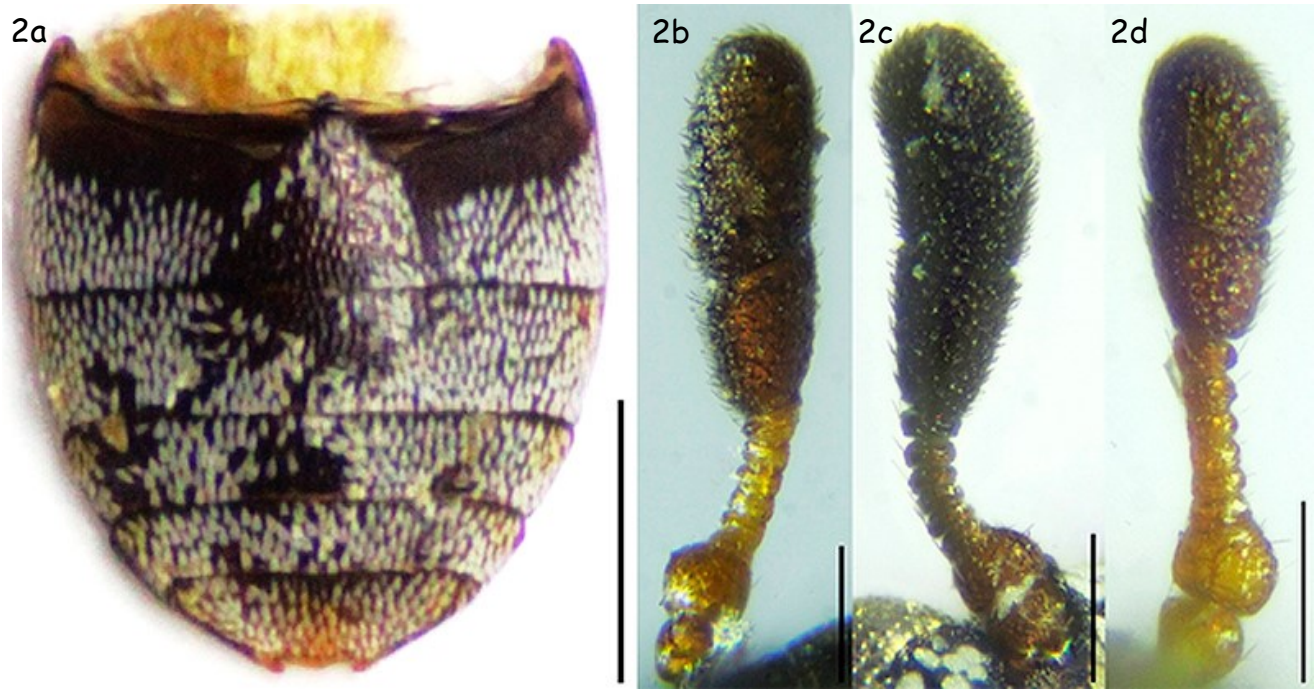

Fig. 2.– *Anthrenus minor*. **2a.-** Ventrites, female, La Gomera (scale bar = 0.5 mm). **2b**.– Antenna, male, La Palma (scale bar = 100 μm). **2c**.– Antenna, male, Tenerife (scale bar = 100 μm). **2d**.– Antenna, female, La Gomera (scale bar = 100 μm).

Fig. 3.– *Anthrenus minor*. **3a-b**.– Male, La Palma, aedeagus and sternite IX, respectively. **3c-d**.– Male, Tenerife, aedeagus and sternite IX, respectively. All scale bars = 100 μm.

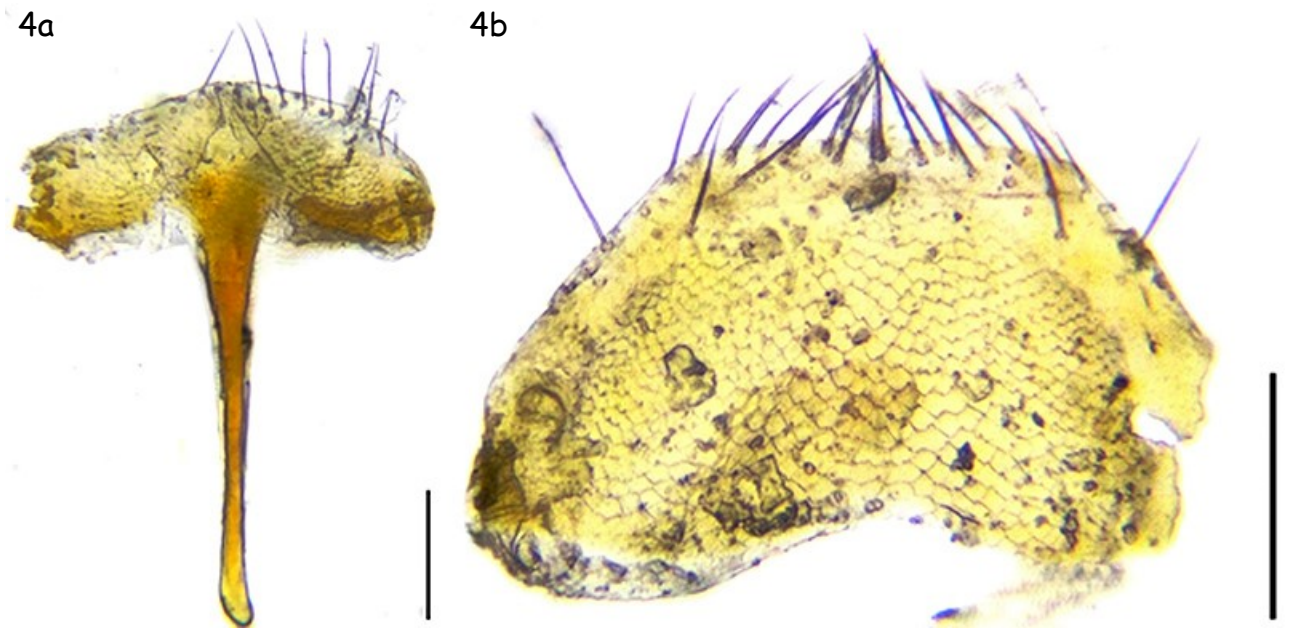

Fig. 4.– *Anthrenus minor*, female, La Palma. **4a**.– Sternite VIII. **4b**.– Tergite VIII. All scale bars = 100 µm.

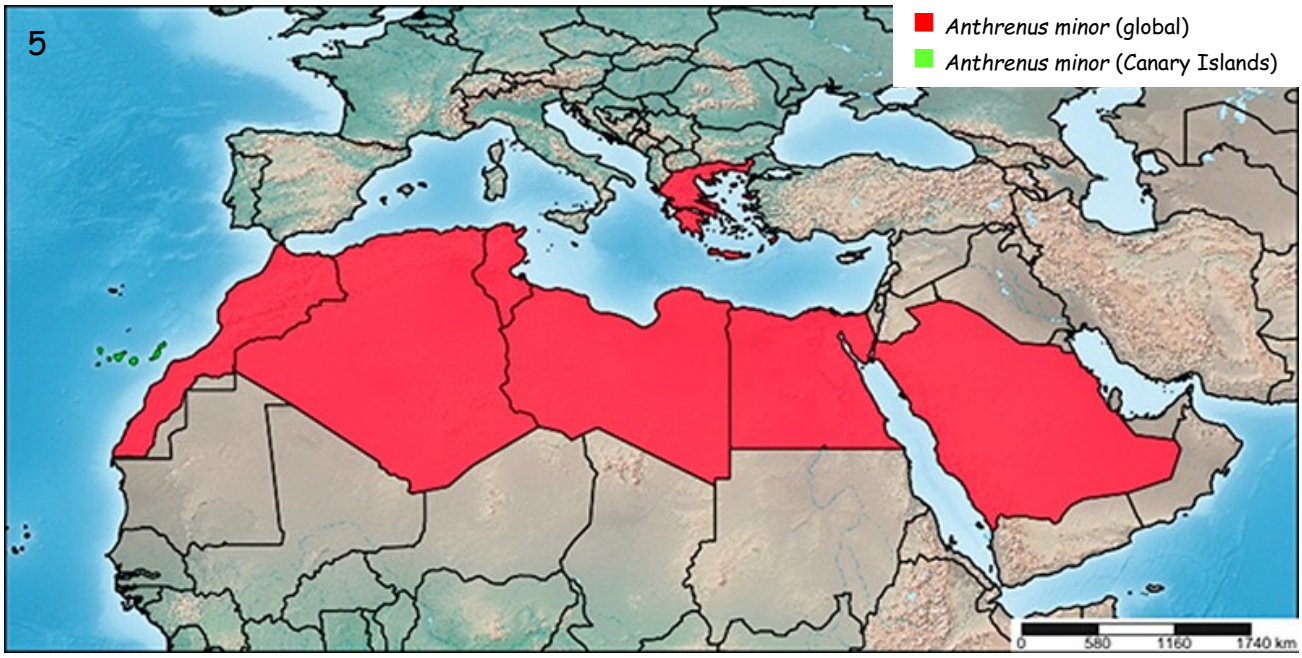

Fig. 5.– Distribution of *Anthrenus minor* according to Háva (2024).