

## On two species of *Opogona* Zeller, 1853 from St Helena Island (Tineoidea: Tineidae: Hieroxestinae)

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Timm Karisch  Email: [Timm.Karisch@naturkunde.dessau.de](mailto:Timm.Karisch@naturkunde.dessau.de)

Museum für Naturkunde und Vorgeschichte Dessau (MNVD), Askanische Straße 32, D-06842 Dessau, Germany.

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**Abstract:** A new species of *Opogona* is described, based on specimens collected at two sites with Gumwood trees (*Commidendrum robustum* (Roxb.) DC.) (Asteraceae) on St Helena Island. The species is very distinctive among all other known *Opogona* species on the island in its characteristic bronze-and-black speckled pattern of the forewings. Colour photographs of the moth and drawings of the male and female genitalia are given. Genetic and morphological examination of specimens treated as *O. apicalis* (E. Wollaston, 1879) and *O. compositarum* (E. Wollaston, 1879) revealed that they are conspecific, and these two names are therefore here synonymised, giving priority to *Tinea compositarum* E. Wollaston, 1879 over the equally old *Tinea apicalis* E. Wollaston, 1879 **syn. nov.**

**Key words:** Taxonomy, Tineidae, Hieroxestinae, *Opogona*, St Helena Island

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### INTRODUCTION

In 1879 Edith Wollaston (1849–1911) described a large number of *Opogona* and *Tinea* species that she had collected on St Helena Island. Since then, it has become known that isolation and remoteness of this nearly 15 million years old island in the Atlantic Ocean has led to a distinctive radiation in the genus *Opogona*, resulting in the recognition of 33 species on St Helena.

In the 20<sup>th</sup> century, little attention was paid to *Opogona*, but several hundreds of specimens were collected in 2017 and 2018. Among them, a comparatively large and very handsome new species was discovered, which is clearly distinct from all other *Opogona* species, as described in this paper.

On 7<sup>th</sup> March 2017, a copulation between a male individual identified as *O. compositarum* (E. Wollaston, 1879) and a female identified as *O. apicalis* (E. Wollaston, 1879) was observed at Flagstaff Hill by David Pryce. The subsequent genetic analysis of the specimens revealed that they are conspecific.

### METHODS AND MATERIALS

The type specimens of the majority of the *Opogona* species from St Helena are stored in the Natural History Museum (NHMUK) in London, all of which have been examined during the course of this study.

One specimen of the new species was collected in 2018 during field work for the Darwin Plus Project PLUS00040 “Securing the future for St Helena’s endemic

invertebrates”. The other was discovered among unidentified Tineidae from collections of P. & M. Ashmole, H. Mendel and E. Thorpe in 2005 in the NHMUK.

The specimens of the former different species *O. compositarum* und *O. apicalis* were collected in 2017 and 2018 by the author.

Twenty-two specimens of *O. compositarum*/*O. apicalis* and one of the new species were sequenced for the standard “barcoding” region of the mitochondrial COI gene by the Canadian Center for DNA Barcoding (CCDB) in Guelph, following the protocols described by Ivanova *et al.* (2006) and Dewaard *et al.* (2008). The data are held in the BOLD database system and available for analysis (Ratnasingham & Hebert 2007) under process ID LEPDE310-18 for the new species. The BIN is mentioned further below. For the new species, all 658 bp of the sequenced region were recovered.

For description and comparison, the specimens were studied under a Zeiss-Stemi stereo-microscope. The genitalia of all taxa were dissected according to the method of Robinson (1976), stained with Chlorazol Black and embedded in Euparal. The drawings were prepared by using a prism for a ROW Rathenow Optics monocular microscope. All photos were processed using Adobe Photoshop software.

### RESULTS

#### Description of new taxon

*Opogona aenea* sp. nov. (Figs 1, 4, 6)

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Holotype ♂: “St. HELENA: sample #2460. | Peak Dale, of twigs of | Gumwood *Commidendrum |robustum*. 21.xii.2005”, “St. Helena Peak’s project | N.P. & M.J.

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Ashmole | H. Mendel & E.A. Thorpe | BMNH(E) 2006-9.”, “NHMUK 010919261”, “Gen.-Präp. | 3745 | präp. Karisch, 2020”, “HOLOTYPE ♂ | *Opogona aenea* | Karisch, 2022 | des. Karisch, 2022” [red label]. In NHMUK.

Paratype ♀: ”ST. HELENA Island, 550 m.a.s.l. | Thompson’s Wood | *Comm[idendrum]. robustum* at *Acacia-Junip[erus]* [forest, 15°59’43.3” S, 5°44’46.6” W | 06.iv.2018 LF (250 W HQL) | T. Karisch & A.-J. Dutton legit”, “Gen.-Präp. | 3936 | präp. Karisch, 2021”, “Barcoding CCDB-11448 | Sample MNVD-11448-C01”, “PARATYPE ♀ | *Opogona aenea* | Karisch, 2022 | des. Karisch, 2022” [pink label]. In MNVD.

#### Description:

Head: coloured bronze- and pale yellow ochreous, frons with a brush of long blackish-brown hair-like scales; antennae fuscous, annulated bronze, 2<sup>nd</sup> segment flattened and broadened distally, blackish with a yellow crest of scales; labial palpi pale yellow ochre, 2<sup>nd</sup> segment long, with a few long, fuscous hairs.

Thorax: dorsally coloured bronze-with blackish suffusions, ventrally pale yellowish ochreous; femora dorsally greyish; tibiae greyish-ochreous; tarsi greyish with pale ochreous rings at distal end; metatibiae with very long inner spur proximally (more than a half as long as tibia).

Forewings: narrow with acute apex; ground colour pale yellowish ochreous, mixed with bronze; with numerous blackish transverse fasciae broken into black patches, some Y-shaped at costa in basal and middle part of the wing, broad and confluent along dorsum; fringes pale yellowish ochreous, some greyish, some with dark brown tip; underside greyish-yellow, darker in costal area.

Hindwings: pale yellowish, including fringes, underside pale greyish-yellow.

#### Male genitalia (Fig. 4):

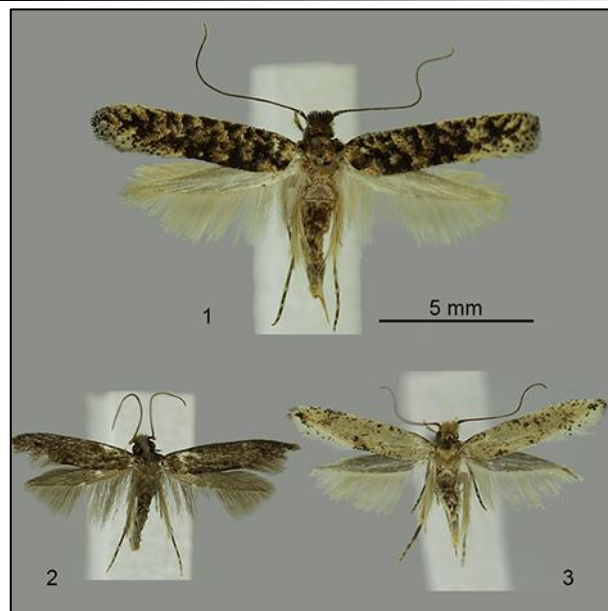
Tegumen very broad, socii broad, more or less trapezoidal in outline, distally broadened, with numerous strong spines in distal half, with small ventral area with bristles; saccus long, broad; cucullus of valva broadened medially; sacculus slightly curved outwards, with smooth, slender, blunt tipped processus below; anellus lobe distinct, triangular, broad based. Aedeagus slender, slightly curved in the middle, broadened towards base.

#### Female genitalia (Fig. 6):

Papillae analis small; oviscapt very long and slender; apophyses anteriores strong, long, apophyses posteriores extremely long and thin, slightly broadened at end; antrum with convex anterior margin, slightly impressed anterio-laterally; ductus bursae very narrow, broadened just before bursa copulatrix; corpus bursae ovoid; signum very large, similar to a mincing knife, with two strongly sclerotised lateral plates, curved anteriorly and connected with an arch, sclerotised to a lesser degree and extended to a small cone in the posterior half.

#### Diagnosis

The numerous transverse black fasciae on the yellowish and bronze-coloured forewings are unique amongst the *Opogona* species on St. Helena. However, *Opogona aenea* sp. n. has a slight similarity to *O. brunneomarmorata* (E. Wollaston, 1879), which is somewhat smaller, has the ground colour of the forewings greyish ochreous with a lot of brown suffusions. As opposed to *O. aenea* sp. nov.,



Figures 1–3 – Adult habitus of *Opogona* species: 1: *O. aenea* sp. nov., paratype, ♀; 2: *O. compositarum*, ♂; 3: *O. compositarum*, ♀.

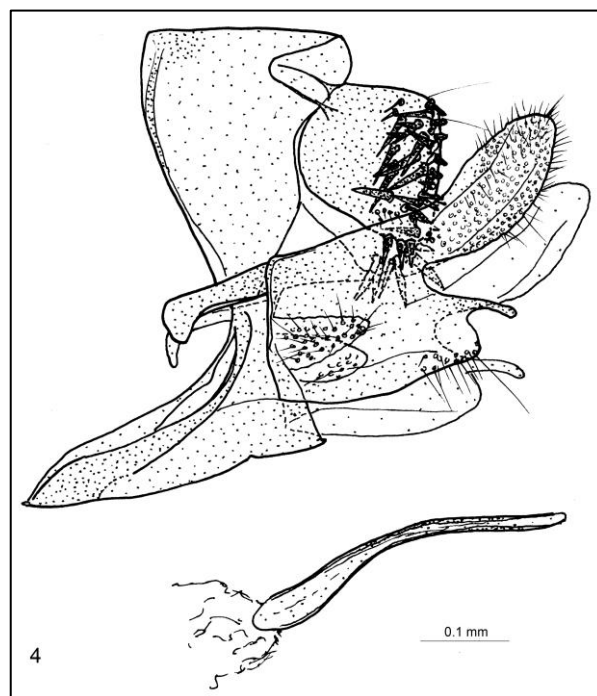
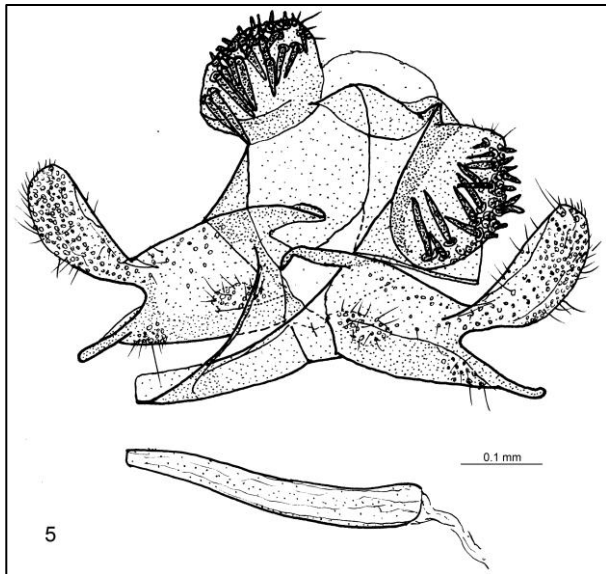


Figure 4 – Male genitalia of *Opogona aenea* sp. nov., lateral view.

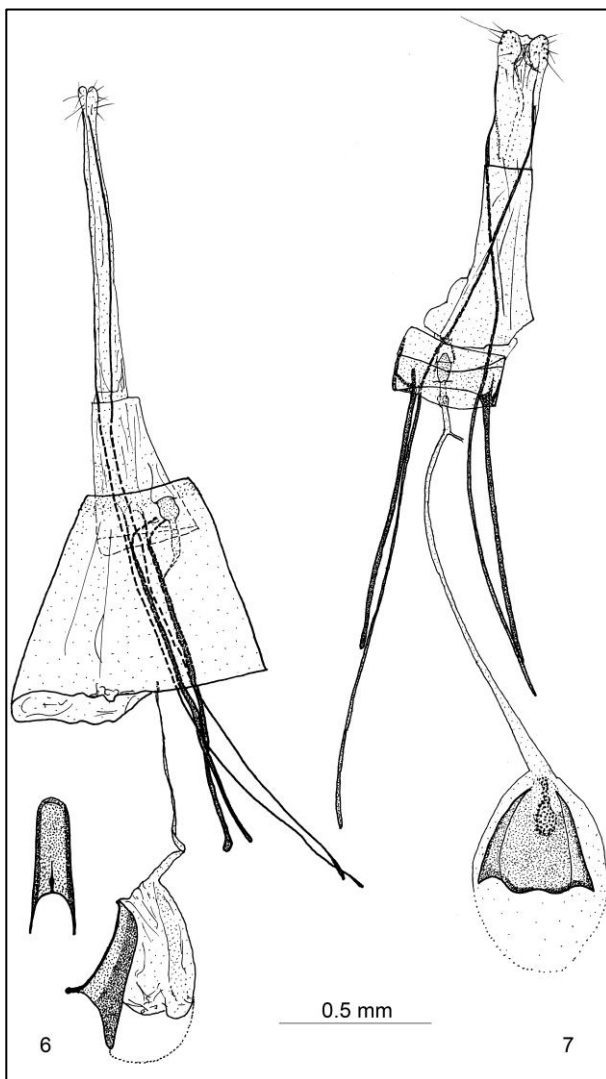
*O. brunneomarmorata* has only a few black patches on the forewings, mainly along the costa and two larger ones on the dorsum. The hindwing of *O. brunneomarmorata* is much darker grey than the pale yellowish grey one of *O. aenea* sp. nov.

The male genitalia of *O. aenea* sp. n. also resemble those of *O. brunneomarmorata*, but the spines on the socii are less numerous, the cucullus is broadened medially and not terminally, the saccular process is more delicate and the tip below blunt and rounded, not pointed and the aedeagus is much slender and slightly curved in the middle (that of *O. brunneomarmorata* stronger and straight). The signum in the bursa copulatrix of female *O. aenea* sp. nov. is narrow

and anteriorly with an erect cone in the centre, whereas the signum of *O. brunneomarmorata* consists of an erect ridge anteriorly in the central part.



**Figure 5** – Male genitalia of *Opogona compositarum*, caudal view.



**Figures 6 & 7** – Female genitalia of *Opogona* species:  
6. *O. aenea* sp. nov., with signum in dorsal view;  
7. *O. compositarum*.

**DNA**

The nearest neighbour distance in the BOLD-tree (Fig. 8) between *O. aenea* sp. n. and *O. brunneomarmorata* is 5.2 %, *O. piperata* differs 5.5 % (according to Boldsystems, Ratnasingham & Hebert, 2007). This shows that *O. aenea* sp. n. is quite different genetically from the other two species.

**Remarks**

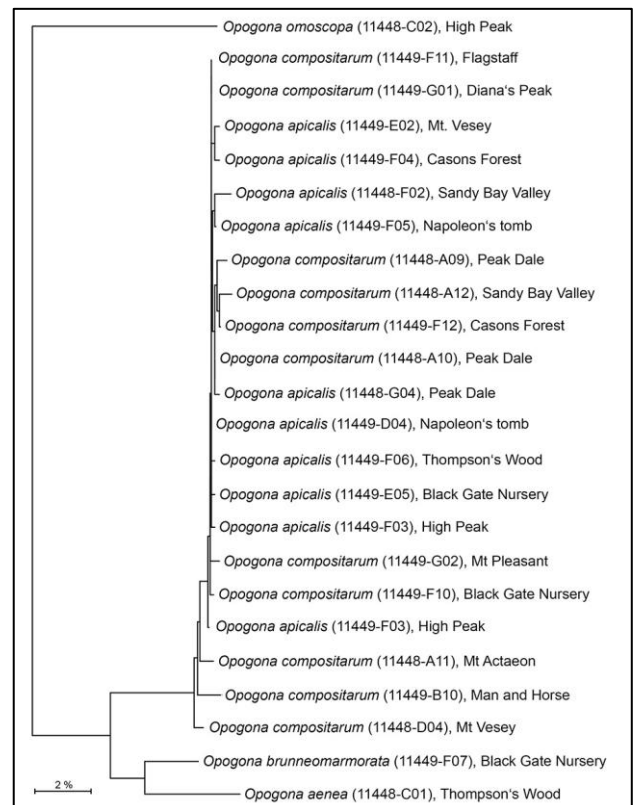
The male holotype was obtained “off twigs of *Commidendrum robustum*”. According to P. Ashmole (pers. comm., vi.2019) in regard to a similar wording on labels of *Opogona* specimens from Prosperous Bay Plain, this mean that the specimen was beaten off or collected between twigs of this plant and rather than obtained by rearing it from plant tissues.

The light source for trapping in Thompson’s Wood (Fig. 9) was placed next to an old Gumwood tree, and it is likely, that the female thus collected was attracted from this tree rather than from *Acacia* or *Juniperus* trees in the surroundings.

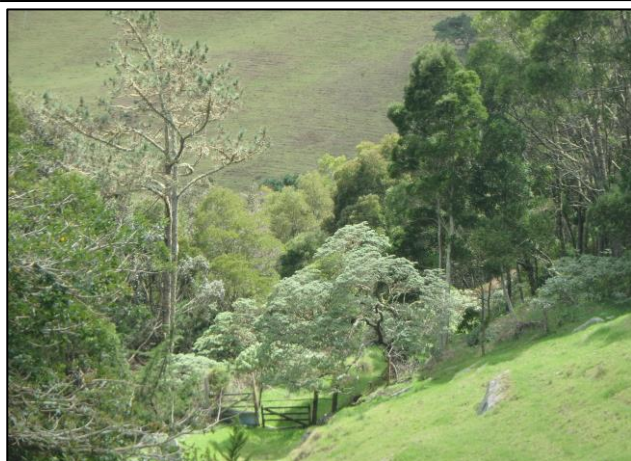
The two records from a historical and current Gumwood site suggest that there is a relationship between *O. aenea* sp. nov. and this plant species, but further investigation is required to verify this.

**Derivation of name**

The species name is the Latin word for bronze (aenëus, -a, -um) and is an adjective.



**Figure 8** – Neighbour-joining tree of COI sequences of *O. aenea* sp. nov., *O. brunneomarmorata*, *O. apicalis* syn. nov., *O. compositarum* and *O. omoscopa* (Meyrick, 1893) (Kimura-2-parameter, composed with BOLD, after Ratnasingham & Hebert (2007).



**Figure 9** – Habitat of *Opogona aenea* sp. nov. at the woodland edge of Thompson's Wood.

***Opogona compositarum* (E. Wollaston, 1879) and *O. apicalis* (E. Wollaston, 1879)**

**Material examined**

*Opogona compositarum*

ST HELENA, Lectotype ♂ (herewith designated): “St. Helena | Wollaston | 79-68”, “*Tinea compositarum*” [handwritten label], “Gen.-Präp. | 3938 | präp. Karisch, 2021”, “LECTOTYPE ♂ | *Tinea compositarum* | E. Wollaston, 1879 | des. Karisch, 2022”, “NHMUK 010919270”. In NHMUK.

*Opogona apicalis*

ST HELENA, Lectotype ♀ (herewith designated): “St. Helena | Wollaston | 79-68”, “*Tinea apicalis*” [handwritten label], “LECTOTYPE ♀ | *Tinea apicalis* | E. Wollaston, 1879 | des. Karisch, 2022”, “NHMUK 010919210”. In NHMUK.

4 ♀ (syntypes) “St. Helena | Wollaston | 79-68”, “*Tinea apicalis*” [handwritten label], 1 ♂ “B.M. Micr. | 34291”. In NHMUK.

Further material: ST HELENA, Flagstaff Hill, woodland beyond track near summit, 1 ♀ (in copula with ♂ of *O. compositarum*), 07.iii.2017 TF, D. Pryce (MNVD); Peak Dale, Gumwood woodland, 10 ♀♀ (1 ♀ gen. slide 3588, Karisch) 01.iii.2017 LF, T. Karisch (coll. Karisch Demitz-Thumitz [CKDT]); id., 13 ♀♀ 11.iii.2017 LF, T. Karisch (CKDT), id., 1 ♀ 12.iii.2017 LF, T. Karisch (MNVD), 1 ♀ 14.iii.2017 TF, T. Karisch (MNVD), id., 21 ♀♀ (1 ♀ gen. slide 3587, Karisch, 1 ♀ barcode MNVD-11448-E11) 17.iii.2017 LF, T. Karisch (MNVD); id., 11 ♀♀ 13.iv.2018 LF, T. Karisch, L. Fowler, N. Stevens (CKDT); Mt. Actaeon, slopes 0.1 km E, 2 ♀♀ 08.iii.2017 LF, T. Karisch (CKDT); Mt. Actaeon, path on W-slope, 1 ♀ 06.iii.2017 LF, T. Karisch (CKDT); High Peak, Ginger Patch, 15 ♀♀ (1 ♀ barcode MNVD-11449.F03) 17.iv.2018 LF, T. Karisch, S. Isaac, N. Stevens (CKDT); Black Gate Nursery, 0.15 km W, 3 ♀♀ (1 ♀ barcode MNVD-11449-E05) 02.iii.2017 LF, T. Karisch (CKDT); id., 5 ♀♀ 16.IV.2018 LF, T. Karisch (CKDT); Casons Forest nr. Hardings Spring, 8 ♀♀ (2 ♀♀ barcodes MNVD-11449-F04, -F12) 17.iv.2018 LF, T. Karisch, N. Stevens, S. Isaac (CKDT); Sandy Bay, near Baptist's Church, 1 ♀ (barcode MNVD-11448-F02) 19.iii.2017 LF, T. Karisch (MNVD); Burnt Rock, near The Saddle, 3 ♀ 15.iv.2018 LF, T.

Karisch, L. Fowler, N. Stevens, A.-J. Dutton (CKDT); Hooper's Rock, 2 ♀ 26.iii.2018 LF, T. Karisch (CKDT); Thompson's Wood, Gumwood Site, 8 ♀♀ (1 ♀ barcode MNVD-11449-F06) 06.iv.2018 LF, T. Karisch (CKDT); Napoleon's Tomb, 10 ♀♀ (1 ♀ barcode MNVD-11449-F05) 11.iv.2018 LF, T. Karisch, A.-J. Dutton (CKDT); Joan Hill, Man and Horse cliffs, 7 ♀♀ 27.ii.2017 LF, T. Karisch (CKDT); Mt. Vesey, 1 ♀ (barcode MNVD-11449-E02) 10.iii.2017, H. Mendel (MNVD).

Based on specimens with uniform brown forewings and hindwings, E. Wollaston described specimens with uniform brown forewings and hindwings as “*Tinea compositarum*” and specimens with pale whitish ochreous forewings with brown suffusions and a distinct black spot in the apex as “*Tinea apicalis*”. Fresh specimens of these both forms have been regarded as easy to identify and therefore no special effort was undertaken in the past to study them. However, Robinson (2009) found that there were only females of *O. apicalis* in the NHMUK collection, and wondered whether this species could be parthenogenetic.

In March 2017, David Pryce found a male of *O. compositarum* copulating with a female of *O. apicalis* in the wild, providing a first hint that these colour forms may be conspecific.

In 2017 and 2018, the author collected a larger number of specimens of both forms (see “material examined”) and subjected samples from several to DNA-sequencing, which revealed that all these specimens form a homogenous clade (Fig. 8). This confirmed that specimens regarded as *O. compositarum* and *O. apicalis* are genetically identical. Therefore one of the names has to be placed into synonymy. To achieve stability in nomenclature I first designate a lectotype from the syntype series to fix each name on a single specimen (see above). The names *Tinea compositarum* and *T. apicalis* were published in the same paper (Wollaston 1879). In accordance with Art. 24.2 ICZN (Kraus 2000) the name *Tinea compositarum* E. Wollaston, 1879 is chosen as the valid name for this species (principle of the first reviser), because “*compositarum*” indicates a possible connection of both forms to a plant species whereas “*apicalis*” describes the morphological character of only one of the mentioned forms. *Tinea apicalis* E. Wollaston, 1879 **syn. nov.** is therefore a synonym. At present the species is placed in the genus *Opogona* Zeller, 1853, as *Opogona compositarum* (E. Wollaston, 1879).

The original descriptions of the species by Wollaston (1879) (the males as *T. compositarum*, the females as *T. apicalis*) are comprehensive except for the genitalia and for any illustrations. Therefore both sexes are illustrated here (Figs 2, 3) and the male and female genitalia are described and also illustrated.

**Male genitalia** (Fig. 5):

Tegumen broad; socii large, ovoid, with some rows of large, stout cornuti at margin, the dorsal ones smaller; valvae broad, with cucullus narrow, long, broadest in the middle, sacculus broad, with a long, strong process, rounded at tip, ventral margin slightly convex; saccus broad, but rather short. Aedeagus slender, rather short,

slightly curved, with a few minute teeth laterally on tube near tip.

#### Female genitalia (Fig. 7):

Papillae anales small; apophyses anteriores long, strong, apophyses posteriores very long and narrow; ostium bursae narrow, antrum small, ovoid; ductus bursae slender, long; corpus bursae ovoid, with small spinose bag and broad, sclerotised signum with narrow wings on each side, broadened anteriorly, with a broad, gently curved central part.

#### Remarks

Robinson (2009) noted that he had studied females assignable to *O. compositarum*. However, the author has not found such females either in the collection of the NHMUK, or among the material collected in 2017 and 2018, only females assignable to *O. apicalis*. Because the females are quite variable, it is assumed that Robinson (2009) had a darker female of that form to hand.

Wollaston (1879) found specimens of *O. compositarum* mainly at medium altitudes on the trunks of old gumwoods. She also obtained the female form “*apicalis*” from the trunks of gumwoods and considered it to be one of the commonest Tineidae on St. Helena. A considerable number of *O. compositarum* specimens were also found in places with old gumwoods in 2017 and 2018, and thus it seems that the species may be associated with this tree species. However, the moth was also observed commonly in places with other endemic Asteraceae (e. g. Flagstaff Hill, High Peak, Peak Dale, Mt Actaeon, Diana’s Peak, Black Gate Nursery, Napoleon’s Tomb), as well as at sites without endemic Asteraceae (e. g. Burnt Rock, Casons Forest, Sandy Bay Valley nr. Church), implying that the species does not depend on those native trees and shrubs for its life history.

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