

# Stem-mining behaviour of young *Paradoxus osyridellus* larvae (Lepidoptera: Yponomeutidae)

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**Abstract.** Larvae of *Paradoxus osyridellus* Stainton, 1869 are known to feed on *Osyris alba* L. within a silken web around the twigs. Recent observations reveal that newly hatched larvae mine the bark of stems of the host plant. In this article, the bionomics of *P. osyridellus* are described and illustrated, partially based on a breeding experiment.

**Samenvatting.** De rupsen van *Paradoxus osyridellus* Stainton, 1869 voeden zich vanuit een zijden web op *Osyris alba* L. Recente waarnemingen brachten aan het licht dat pas uitgeslopen rupsen mijnen maken in de schors van twijgen van de voedselplant. In dit artikel wordt de bionomie van *P. osyridellus* besproken en geïllustreerd, deels gebaseerd op een kweekexperiment.

**Résumé.** Les chenilles de *Paradoxus osyridellus* Stainton, 1869 se nourrissent d'*Osyris alba* L., au sein d'une toile de soie autour des brindilles. Des observations récentes ont révélé que les chenilles fraîchement émergées minent dans un premier temps l'écorce des brindilles de la plante hôte. Cet article aborde et illustre la bionomie de *P. osyridellus*, basée en partie sur un élevage.

**Key words:** Bionomics — France — *Osyris alba* — *Paradoxus osyridellus* — Yponomeutidae.

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## Introduction

*Paradoxus osyridellus* Stainton, 1869 (according to some sources Millière, 1869) (Lepiforum 2021) is an Yponomeutidae moth with limited distribution in southern and eastern Europe: Portugal, Spain, France, Italy (Sardinia), Croatia, parts of former Yugoslavia, Greece and Turkey. Recently it was discovered in Ukraine (Gershenson 2016).

The host plant *Osyris alba* L. is a small shrub (30–150 cm) of the Santalaceae family, that on first sight looks a bit like Broom (*Cytisus* spp.) (Fig. 10). In Europe it is quite common in the Mediterranean region, preferring dry areas up to 700 m altitude (Tela Botanica 2021, Le Driant 2021). Millière used the observation of several larvae on *O. alba* L. in France (Dép. Alpes-Maritimes) to complete the first description of *P. osyridellus* (Millière, 1869). So from the beginning a lot was known about this strictly monophagous species, which understandably only occurs in regions where the host plant is present.

On 21 and 22 May 2021, several larvae of *P. osyridellus* were found by the author on *O. alba* L. shrubs in Southern France, specifically in Revens (Dép. Gard) and Fabrègues (Dép. Hérault). Ten specimens were collected and kept in breeding conditions. From 6 June onwards, the adult moths emerged (Fig. 1, 2). In early morning on 7 June the end of a *copula* was observed and the fertilised female was kept in a Petri dish, supplied with a fresh twig of *O. alba* L., after which different stages of development were observed indoors (22 °C–26 °C).

## Observations

Eggs are laid on the surface of a previous year's twig (Fig. 3). No eggs were found on the young, thinner side branches nor on the leaves. Within a week the young, yellow larvae with black head become clearly visible through the egg shells (Fig. 4). After hatching, apparently

from the underside of the egg, the larva immediately bores into the bark of the twig, and makes a narrow, yellowish gallery just beneath the surface (Fig. 5). While boring into the bark, the larva fills the empty egg with blackish frass (Fig. 4). In breeding conditions undoubtedly more eggs were laid on a single twig than in the wild, resulting in a high density of mines (Fig. 5). Maximum length of the mines in captivity was about 6–7 mm.

After a few days, the larvae leave their mine through a small hole (Fig. 6) and spin a web in the upper parts of the host plant, often in the forks between twigs and fresh shoots but also amongst leaves. At this point most webs contain fine-grained, brown frass and several yellowish brown larvae with a body length of approximately 2 mm (Fig. 7). They feed on the leaves and bark.

## Bionomics

After having observed the larval behaviour in captivity, some *Osyris alba* plants in natural conditions were checked on 15 July 2021 in Oreison (Dép. Alpes-de-Haute-Provence). Five larvae of *P. osyridellus* were located, each living in its own web at the top of young shoots. In every case a vacated larval mine was found on the previous year's twig from which the new growth was sprouting (Fig. 9). In nature it seems that eggs are laid singly (in breeding conditions rather in small batches) on the branches of the host plant, larval mines tend to be longer (longest mine was 17 mm) and abandoned mines often burst open (Fig. 9).

Both the larvae collected in July and those bred in captivity produced another generation in early August, showing that this species is at least bivoltine.

The bionomics of *P. osyridellus* seem very similar to those of the related *Zelleria oleastrella* (Millière, 1864) on *Olea europaea*: young larvae mine a leaf or fresh shoot for a few days after hatching and then live in a web amongst the shoot tips (Meert 2018).

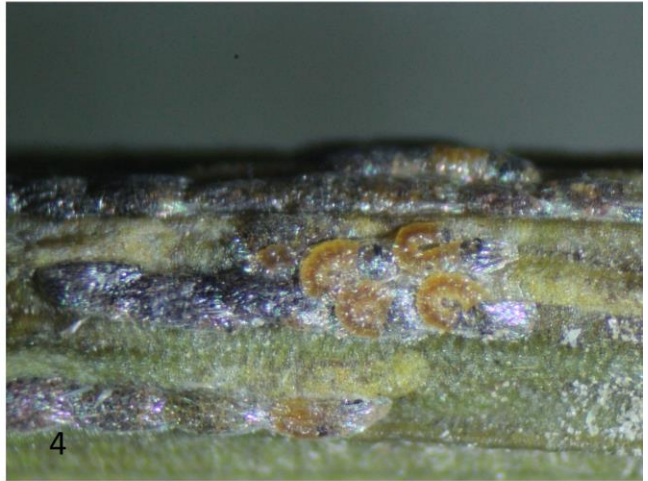




Fig. 1. *Paradoxus osyridellus* ♀, imago e.l. 06.vi.2021, bred from a larva on *Osyris alba*, Revens, France, 21.v.2021. © Ruben Meert.

Fig. 1. *Paradoxus osyridellus* ♀, imago e.l. 06.vi.2021, gekweekt van rups op *Osyris alba*, Revens, Frankrijk, 21.v.2021. © Ruben Meert.

Fig. 2. *Paradoxus osyridellus* ♂, imago e.l. 06.vi.2021, bred from a larva on *Osyris alba*, Revens, France, 21.v.2021. © Ruben Meert.

Fig. 2. *Paradoxus osyridellus* ♂, imago e.l. 06.vi.2021, gekweekt van rups op *Osyris alba*, Revens, Frankrijk, 21.v.2021. © Ruben Meert.

Fig. 3. *Paradoxus osyridellus*, batch of eggs in breeding conditions on twig of *Osyris alba*, 18.vi.2021. © Ruben Meert.

Fig. 3. *Paradoxus osyridellus*, eipakket in kweekomstandigheden op twijg van *Osyris alba*, 18.vi.2021. © Ruben Meert.

Fig. 4. *Paradoxus osyridellus*, hatched eggs filled with frass (left) and nearly hatched eggs (right) in breeding conditions on twig of *Osyris alba*, 18.vi.2021. © Ruben Meert.

Fig. 4. *Paradoxus osyridellus*, uitgekomen, met frass gevulde eitjes (links) en bijna uitgekomen eitjes (rechts) in kweekomstandigheden op twijg van *Osyris alba*, 18.vi.2021. © Ruben Meert.

Fig. 5. *Paradoxus osyridellus*, wandering larva (left) that has left its mine, eggs filled with frass and galleries in bark of *Osyris alba* (breeding conditions), 18.vi.2021. © Ruben Meert.

Fig. 5. *Paradoxus osyridellus*, dolend rupsje (links) dat de mijn heeft verlaten, met frass gevulde eitjes en gangmijnen in schors van *Osyris alba* (kweekomstandigheden), 18.vi.2021. © Ruben Meert.

Fig. 6. *Paradoxus osyridellus*, abandoned galleries on twig of *Osyris alba* (breeding conditions), 21.vi.2021. © Ruben Meert.

Fig. 6. *Paradoxus osyridellus*, verlaten mijnen op twijg van *Osyris alba* (kweekomstandigheden), 21.vi.2021. © Ruben Meert.



Fig. 7. *Paradoxus osyridellus*, web with several young larvae in fork between twigs on *Osyris alba* (breeding conditions), 21.vi.2021. © Ruben Meert.  
Fig. 7. *Paradoxus osyridellus*, web met verschillende jonge rupsen in takvork op *Osyris alba* (kweekomstandigheden), 21.vi.2021. © Ruben Meert.  
Fig. 8. *Paradoxus osyridellus*, empty larval mine on *Osyris alba* (in nature), Oreison, France, 15.vii.2021. © Ruben Meert.  
Fig. 8. *Paradoxus osyridellus*, verlaten mijn op *Osyris alba* (in natuur), Oreison, Frankrijk, 15.vii.2021. © Ruben Meert.  
Fig. 9. *Paradoxus osyridellus*, web with full grown larvae on *Osyris alba* (in nature), Revens, France, 21.v.2021. © Ruben Meert.  
Fig. 9. *Paradoxus osyridellus*, spinsel met volgroeide rups op *Osyris alba* (in natuur), Revens, Frankrijk, 21.v.2021. © Ruben Meert.  
Fig. 10. *Paradoxus osyridellus*, habitat and host plant (*Osyris alba*), Revens, France, 21.v.2021. © Ruben Meert.  
Fig. 10. *Paradoxus osyridellus*, habitat en voedselplant (*Osyris alba*), Revens, Frankrijk, 21.v.2021. © Ruben Meert.

## Conclusions

Before living and feeding amongst the fresh shoots, *Paradoxus osyridellus* larvae feed within the bark of *Osyris alba* during the first days after hatching, creating a distinct yellowish gallery up to nearly 2 cm long. The species is at least bivoltine.

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