

# FIRST RECORD OF *MALACOMYIA SCIOMYZINA* (HALIDAY, 1833) (DIPTERA, COELOPIDAE) IN CONTINENTAL PORTUGAL, WITH NOTES ON ITS LIFE CYCLE

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## ABSTRACT

This paper reports the first record of an established population of the seaweed fly *Malacomyia sciomyzina* (Haliday, 1833) (Diptera, Coelopidae) on Barra beach, Aveiro, Portugal. A total of 17 specimens were collected with sweep-nets from sea wrack dominated by *Fucus* sp. and the invasive water hyacinth *Eichhornia crassipes* (Mart) Solms. The individuals of this species were observed during autumn, overflying the sea wrack in this coastal area. Adult individuals were collected and reared under control conditions in a rearing facility, using the brown algae *Fucus* sp. as substrate. The complete life cycle was completed in about 5 weeks at 15°C. A great variation in size was observed among both male and female emerged individuals.

**Keywords:** Diptera, Coelopidae, kelp flies, sea wrack, beach flies, insect rearing.

## RESUMEN

### Primer registro de *Malacomyia sciomyzina* (Haliday, 1833) (Diptera, Coelopidae) en Portugal continental, con notas sobre su ciclo de vida

Este artículo reporta el primer registro de una población establecida de la mosca de las algas *Malacomyia sciomyzina* (Haliday, 1833) (Diptera, Coelopidae) en la playa de Barra, Aveiro, Portugal. Un total de 17 especímenes fueron capturados con redes de barrido sobre las algas marinas de la zona intermareal dominadas por *Fucus* sp. y con la presencia del jacinto de agua invasivo *Eichhornia crassipes* (Mart) Solms. Los individuos de esta especie fueron observados durante el otoño, sobrevolando las algas marinas en esta zona costera. Los individuos adultos fueron colectados y criados bajo condiciones controladas en un insectario, utilizando el alga parda *Fucus* sp. como sustrato. El ciclo de vida se completó en aproximadamente 5 semanas a 15°C. Entre los especímenes emergidos se observaron grandes variaciones de longitud, tanto en machos como en hembras.

**Palabras clave:** Diptera, Coelopidae, mosca de las algas, mosca de las playas, montones de algas, cría de insectos.

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## Introduction

The seaweed fly *Malacomyia sciomyzina* (Haliday, 1833) is the only species included in the genus

*Malacomyia* Westwood, 1840, and a member of the Coelopidae family. This family includes most known species of kelp flies. Coelopids occur mainly on maritime beaches, being associated with wrack, where

the larvae exploit stranded and rotting seaweed. They are among the most significant organisms recycling stranded kelp biomass (McAlpine 1991). Despite being occasionally considered a nuisance for beach users, they constitute a group with low economic importance (Marshall 2012).

All of the described 30 species of Coelopidae are kelp flies (Mathis & McAlpine 2011). They are present on most temperate shorelines, but absent in South America, where the family Helcomyzidae seems to replace them (Marshall 2012). This family occurs almost exclusively in temperate zones, and are distributed disproportionately, with 80% of the genera and 60% of the species occurring in the Australasian region alone (Mathis & McAlpine 2011). Moreover, adults of this family have considerable intraspecific variation, which led to multiple descriptions and names for the same species (Mathis & McAlpine 2011). The family is subdivided in two subfamilies, Lopinae, which contains only one Australian species, and Coelopinae, to which *M. sciomyzina* belongs (Marshall 2012).

The biology of *M. sciomyzina* is not well known, but the species is found throughout most of the European and North African shorelines. In Europe it is recorded from Azores, Canary Islands, Denmark, Great Britain, Ireland, Italy, Lithuania, Madeira, Netherlands, Poland, Russia (European Part), Spain, Sweden (Mathis & McAlpine 2011). The species is also reported for France, Norwegian mainland, Slovenia, Croatia, Estonia and Germany (Meier 2013).

Albeit recorded from Azores and Madeira Portuguese islands, there was no previous record of this species in continental Portugal. This is the first record of a population of *Malacomyia sciomyzina* in continental Portugal, with notes regarding its ecology.

## Material and methods

Between October 2020 and December 2020 on Barra Beach, Aveiro, Portugal (N 40°37'54", W 8°45'01") (Fig. 1), kelp flies were captured once every month (three months) using a sweep-net. Most flies were kept alive for rearing experiments, and some were stored in 70% alcohol solution and kept in the Department of Biology of the Aveiro University, for further identification. Seventeen adult flies were identified using McAlpine's (1998) key.

## Results and discussion

A total of 8 males and 9 females were identified as *Malacomyia sciomyzina*.

MATERIAL EXAMINED. PORTUGAL: Praia da Barra, Gafanha da Nazaré, Ílhavo, Aveiro (N 40°37'54", W 8°45'01". UTM WGS 84 32N EPSG:32632): 15.XI.2020, 9 ♀♀, 8 ♂♂, leg. F.S.Lourenço, det. C.Prado e Castro.



Fig. 1.— Barra beach location and sampling site (N 40°37'54", W 8°45'01") where *Malacomyia sciomyzina* was collected.

Fig. 1.— Ubicación de la playa Barra y lugar de muestreo (N 40°37'54", W 8°45'01") donde se recolectó *Malacomyia sciomyzina*.

REMARKS. These specimens were captured alongside *Fucellia maritima* (Haliday, 1838) (Diptera, Anthomyiidae), which was captured all year round in the same sampling site (Lourenço *et al.* 2020). However, *Malacomyia sciomyzina* was only found during the autumn season. This species is widely distributed, though uncommon, in most of the European countries and islands with coastlines facing the Atlantic and Mediterranean (Munari 2020).

There are no descriptions available on the biology of this species, only short mentions on its rarity. Coelopidae adults show much intraspecific variation, particularly in size and setal vestiture. Misunderstanding of this variation has produced several synonyms among this family (McAlpine 1998). Due to the intraspecific variation in *M. sciomyzina*, there are several references in the literature to a subspecies named *Malacomyia sciomyzina meridionalis* (Rondani, 1868) (Hennig 1937; Gorodkov 1984; Carles-Tolrà 2002). The distinction of the two phenotypes was based on the coloration of the thorax. While in *M. sciomyzina*, the thorax is predominantly grey (including dorsal parts and pleuron), in *M. sciomyzina meridionalis*, the humeral callus (postpronotal lobe), scutellum and anterior part of pleuron are reddish yellow. According to these descriptions, all our specimens fit with *M. sciomyzina meridionalis*. Currently, the subspecies is considered a junior synonym of *M. sciomyzina* in *Fauna Europaea* (Meier, 2013).

Coelopidae breed in wrack on marine beaches, being apparently restricted to seashores (Mathis & McAlpine 2011). *Malacomyia sciomyzina* undoubtedly breeds in rooting seaweed, however the biology of its immature stages is unknown (Smith 1989), as it occurs with most species of the family (Mathis & McAlpine 2011).

FLY REARING: *Malacomyia sciomyzina* successfully completed its life cycle in an insectarium, alongside with *Fucellia maritima*. They were reared using only *Fucus* sp. algae as substrate, however in the wild, these flies were found overflying both these brown algae and the invasive freshwater hyacinth *Eichhornia crassipes* (Mart) Solms, which arrives to the beach shore through Ria de Aveiro coastal lagoon channels coming from freshwater upstream rivers that flow into the lagoon.

The flies were kept at a mean temperature of  $15 \pm 3$  °C, relative humidity of  $70\% \pm 10$  and a photoperiod of 14L:10D. After the flies laid eggs for a period of 48 hours, the plastic tray with the substrate was removed from the rearing cage and moved to a 40 L plastic container, in which the larvae emerged from the eggs and fed on the available algae. The larvae (Fig. 2) took approximately three weeks until they started to migrate from the substrate and bury in the sand where they reached the pupal stage (Figure 3). The pupae

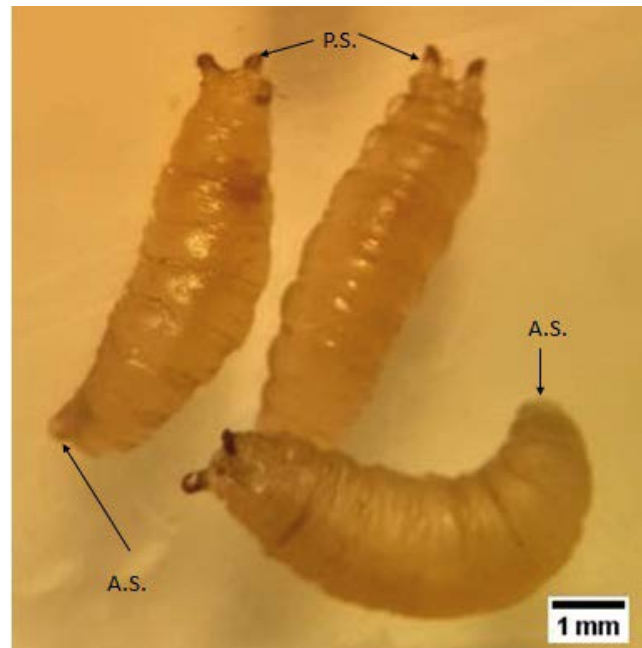


Fig. 2.– *Malacomyia sciomyzina* larvae. Abbreviations: P.S. = posterior spiracle; A.S. = anterior spiracle.

Fig. 2.– Larvas de *Malacomyia sciomyzina*. Abreviaturas: P.S. = espiráculo posterior; A.S. = espiráculo anterior.

were collected from the sand and placed back in the rearing cage until their emergence after two weeks under the same conditions.

THIRD LARVAL INSTAR. Cylindrical shaped, tapering on the anterior end and blunt on the posterior. Colour mustard yellow, the first segment is distinguished as the slimmest part of the body. The last segment is distinguished by the presence of the posterior spiracles which appear as backwardly directed projections from the dorsal part of the segment (Fig. 2).

PUPARIUM. Length, 4.71 mm-10.82 mm (mean 7.06 mm). Colour light to dark brown and oval shape, tapering both posteriorly and anteriorly. The posterior end segment with the presence of the elongated larval spiracles (Fig. 3). To allow emergence of adult, the puparium splits halfway along the middle segment, with the anterior part being pushed apart by the fly.

Some adult flies showed a great variation in their length, with a size range from 4.2mm to 8.36mm, similarly to what was observed in the pupae. This difference in length occurred in flies from the same generation and were kept under the same feeding substrate. These were the only observed intraspecific variations observed in the second generation, but as mentioned before, the adults of the family Coelopidae show multiple intraspecific variations (Mathis & McAlpine 2011). These variations in size for both females and males are also observed for larvae and pupae of other species of this family (Egglisshaw 1960).



Fig. 3.— *Malacomyia sciomyzina* pupae. Abbreviations: P.S. = posterior spiracle; A.S. = anterior spiracle.

Fig. 3.— Pupas de *Malacomyia sciomyzina*. Abreviaturas: P.S. = espiráculo posterior; A.S. = espiráculo anterior).

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**Conflict of interest.** The authors declare no conflict of interest

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