

## A melanistic form in the Genus *Cyclophora* spec. (Lepidoptera, Geometridae, Sterrhinae)

With 1 figure

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### Summary

A melanistic form of *Cyclophora* HÜBNER, 1822 (Lepidoptera, Geometridae, Sterrhinae) was recorded on Apennines in Central Italy.

### Key words

*Cyclophora*, melanistic form, *punctaria*

### Zusammenfassung

Eine melanistische Form von *Cyclophora* HÜBNER, 1822 (Lepidoptera, Geometridae, Sterrhinae) wurde am Apennin in Mittelitalien entdeckt.

### Riassunto

Viene descritta una forma melanica di *Cyclophora* HÜBNER, 1822 (Lepidoptera, Geometridae, Sterrhinae) del gruppo di specie *punctaria* trovata sull'Appennino nel Centro d'Italia.

### Introduction

Melanin is a complex of dark (black, brown, yellowish or dull red) animal pigments, and melanism is the occurrence in a species of some individuals that are predominantly black, dusky or noticeably darker than the typical form, due to a heritable increase in the proportions of melanins in the epidermis (KETTLEWELL, 1973).

Studies on melanism suggested that it may be related to environmental factors (rural melanism) including pollution caused by human activity (industrial melanism). According to FORD (1975) melanism could be explained by natural selection acting on rare mutations. Mutants are usually quickly eliminated by natural selection, but in polluted areas melanism proved adaptive, gained a selective advantage and rapidly spread through the population.

Since the mid-1800's in Europe and North America many moths, including Geometrids, have exhibited a dramatic increase in the occurrence of melanic forms. This spread of melanism provided an opportunity for studying evolution in action (MAJERUS, 1998).

In Geometrids, OWEN (1962) used six North American species to study the evolution of melanism; KETTLEWELL (1973) and his colleagues in *Biston betularia* (L.) and SARGENT (1971) in *Phigalia titea* CRAMER extensively studied the industrial melanism. Recently, Watson and Dallwitz (<http://delta-intkey.com/britin/lep/meloec.htm>) illustrated conspicuous examples of melanic forms in geometrids (i.e. *Biston* spec., *Apocheima* spec., *Alcis* spec., *Peribatodes* spec., *Ectropis* spec., *Odontopera* spec., *Agriopis* spec., *Angerona* spec.) collected in the decade 1948-1958 in Britain and Ireland.

Although the melanism is a phenomenon known, although rare, in Geometrids, in the genus *Cyclophora*, few are the observed cases. A melanistic form of *C. albipunctata* (HUFNAGEL, 1767) was described by HAUSMANN (2004, plate 22 fig. 179b). These forms are not rare in rearings and occasionally also occur in the wild with transitions to 'normal' forms (HAUSMANN, 2004). HAUSMANN (2004) refers citing some authors (MERRIFIELD 1893; PROUT 1913; BERGMANN 1955) that the variability in wing pattern could be induced by high temperatures.

Recently, we collected a melanistic form of *Cyclophora* spec. in a locality of a fairly restricted mountainous area in Central Italy where a survey on the Lepidoptera fauna have begun in 1967 and was continued during the following years until today (PINZARI et al., 2010; 2013). Here, among the 1606 species (butterflies and moths) iden-

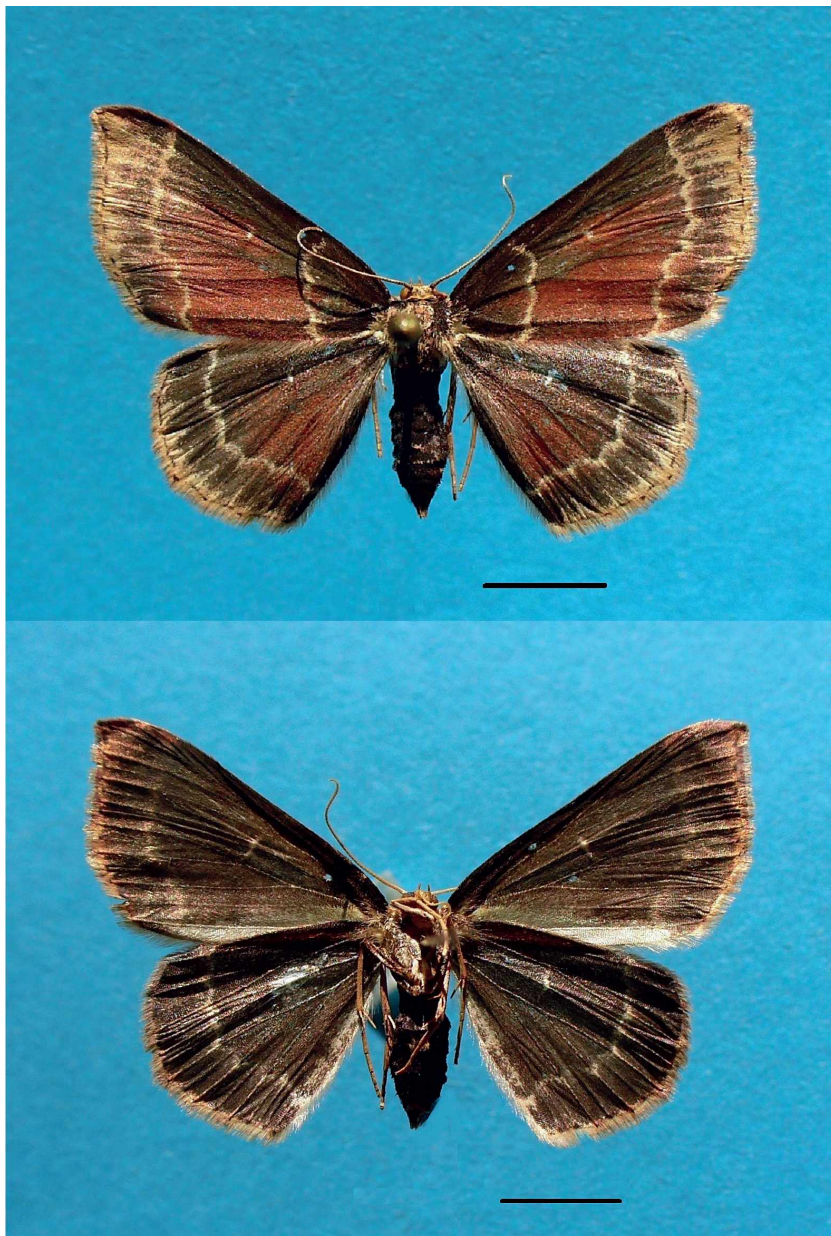


Fig. 1: *Cyclophora* spec. *punctaria* species group, a melanistic form, top: upperside, bottom: underside.

tified, also seven geometrids of the genus *Cyclophora* were collected: *suppunctaria* (ZELLER, 1847), *punctaria* (LINNAEUS, 1758) and *linearia* (HÜBNER, 1799) of the *punctaria* species group; *albiocellaria* (HÜBNER, 1789), *pupillaria* (HÜBNER, 1799), *ruficiliaria* (HERRICH-SCHÄFFER, 1855) and *porata* (LINNAEUS, 1767) of the *pendularia* species-group.

The *punctaria* species-group is widely present in Italy (KARSHOLT & RAZOWSKI, 1996; 2010; HAUSMANN, 2004; PROLA & RACHELI, 1979; RAINERI & ZANGHERI, 1995; PARENZAN et al., 1998; PINZARI et al. 2010; 2013), as opposed to the *pendularia* species group in which there are also species known only for the North (see *albipunctata* (HUFNAGEL 1767)) and absent in Italian Peninsula (KARSHOLT & RAZOWSKI 1996; 2010; PARENZAN et al., 1998; HAUSMANN, 2004).

In this short note, we report this new record for a melanistic form in the genus *Cyclophora*, describe its habitus and discuss on species identification.

## Materials and Methods

The individual was light-trapped by Mixed Light 160 W lamp on white cloth. When the moth arrived, as a habit of *Cyclophora*, it shifted rapidly away and alighted in a gray area of white cloth. The specimen, a female, was exclusively identified by the external habitus as a species of the *punctaria* species-group.

The work of HAUSMANN (2004) was used for the taxonomic identifications. We did not carried out any genitalia dissection of the specimen because no support for solving the identification of the species we would have found in female genital characters. In fact several authors studied the female genitalia in the genus *Cyclophora* to provide a key for species identification (URBHAN, 1970; HAUSMANN, 2004); though, they showed that positive species identification from the female genitalia is difficult and in some cases is not possible as the differences are slight with intra-specific variation, difficult to interpret and overlap between species (TOWNSEND et al. 2010).

## Descriptions

A melanistic form of *Cyclophora* spec. HÜBNER, 1822 (Geometridae, Sterrhinae, Cosymbiini) was collected in a locality of a mountainous area in Central Italy. Records: ♀, Vallemare (Rieti, Italy), Colle Marcone, 1121 m, 26.IV.2013, Mario Pinzari leg. The specimen was preserved in the private collection of Mario Pinzari (Roma, Italy) (Fig. 1). The description of the specimen is as follows: Wingspan 28 mm. Forewing termen concave below apex. Hindwing termen angled at M3. Wings are overall dark gray colored; this is more evident on the

underside wings. Upperside is dark grey: forewings, the area between the costa and the R5, the cell and basal area; hindwings, the area between the M3 and the costa and the anal margin. The remaining parts of the cell and the medial area are purple in both wings. The purple suffusion can cover locally more areas in the dark gray areas stated before. The specimen shows a sandy coloration in some parts of the wings. In particular there are some light yellowish brown areas in the terminal area; the postbasal and subterminal lines are sandy color bordered. Even the discal spots are sandy colored. Medial line is convex but it is barely visible due to the low contrast of wing colors. The postbasal and subterminal lines are reduced to small dots on all wings. The veins are covered by sandy-colored scales in the terminal area while they are mostly dark grey or purple in the remaining parts of the wings. The terminal dots are distinct, longish and dark grey. Underside is mainly dark grey; the sandy color is limited to the fringes of wings. The subterminal line is visible but toned down by some sandy-colored areas. Purple scales are substantially absent. The discal spots appear elongated due to the sand scales covering along the whole discocellular vein. From A vein to dorsum is whitish. Frons and labial palpi are sandy-colored. The vertex and the upper half of the antennae are whitish while the bottom is sandy-colored. The upper half of eyes is sandy while the lower is black. Even the legs are sand-colored with many dark gray scales only on femurs. The prothorax is sandy but covered with dark grey scales. The tegulae are covered with dark grey scales but the outer margin is sandy. The abdomen is completely dark grey.

## Conclusions

In lepidopterans individual forms are usually stated as occurring as a result of ecological or climatic circumstances, and they do not show continuity. In the genus *Cyclophora*, HAUSMANN (2004) described a melanistic form of *C. albipunctata*. In this species these forms are not rare in rearings and occasionally occur in the wild with transitions to ‘normal’ forms (HAUSMANN, 2004).

The habitus of our specimen is a melanistic form of *Cyclophora* spec. and we can attribute with certainty our specimen to *punctaria* species-group. In the study area three taxa of *punctaria* species-group, *C. punctaria*, *C. suppunctaria* and *C. linearia* are present (PINZARI et al. 2010; 2013).

Although *C. punctaria* could be the most parsimonious explanation given that melanistic forms are more frequent and known in this species (HAUSMANN 2004), we cannot attribute with certainty our melanistic specimen to this species neither any other species recorded in the study area. In fact, ‘normal’ forms of *C. punctaria*, *C. suppunctaria* and *C. linearia* could be easily misidentified, if exclusively on habitus determined. The examination

of the male genitalia leads to a clear result while one of female genitalia does not allow identifying correctly the species due to the small interspecific differences.

Finally, even the DNA Barcoding may not be helpful because the species of the genus *Cyclophora* are known to hybridize readily in nature and in captivity (HAUSMANN 2001). This may generate cases of barcode-sharing, thus making the DNA Barcoding a not efficient tool for species identification. This might be the case of *C. punctaria* and *C. supunctaria* that show little barcode divergence (0.15 %) (HAUSMANN et al. 2011) and may share their barcodes but at least *C. linearia* could be excluded that way (HAUSMANN, personal communication, December 17, 2015).

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