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Original article

Immature stages of *Oecia oecophila* (Staudinger, 1876) (Lepidoptera, Gelechioidea, Schistonoeidae), with notes on biology and phylogenetic relationships of the familyYoshitsugu Nasu^{a,*}, Yositaka Sakamaki^b, Yasuhiro Tomioka^c^a Nakado, Hashimoto, Wakayama, Japan^b Faculty of Agriculture, Kagoshima University, Korimoto, Kagoshima, Japan^c Technical Research Laboratory, IKARI Corporation, Chibadera, Chuo-ku, Chiba, Japan

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ABSTRACT

The immature stages of *Oecia oecophila* (Staudinger, 1876) (Schistonoeidae) are described and illustrated for the first time. The biological notes are provided, and the phylogenetic relationships of the family discussed.

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Introduction

The family Schistonoeidae is a small family of the superfamily Gelechioidea, containing two pantropical species (Hodges 1998). The two subfamilies, Oeciinae and Schistonoeinae, are recognized within the family with each consisting of a single monobasic genus (Hodges 1998). The immature stages of the family had hitherto been unknown.

In 2014 and 2015, many adults of *Oecia oecophila* (Staudinger 1876) of the subfamily Oeciinae occurred in a food factory in Tokyo, Japan (Tomioka et al 2016; Figure 1A). This species is possibly native to the Caribbean Islands and has been widely dispersed through commerce (Holloway et al 2001; Parenti 2000; Zimmerman 1978). The moths had previously occurred elsewhere in Japan; however, they have disappeared recently (Issiki 1950; Sakamaki 2013). The mass occurrence of the species was perhaps caused by the latest immigrants to Tokyo (Tomioka et al 2016). We collected some larvae of the species from the food factory, and obtained pupae and adults after rearing the larvae.

In the present paper, we describe the immature stages using illustrations and biological notes for the first time, and discuss the phylogenetic relationships of the family.

Materials and methods

Materials

Mature larva: 3 exs, fixed on July 16, 2015 (Y. Tomioka leg.). Pupa: 1 ex, fixed on July 16, 2015 (Y. Tomioka leg.). The larvae were identified from the trash in the roof-space of one floor underground in the food factory in Tokyo, Japan, on May 13, 2015. The trash contained house dust and feces of Muridae. The feces were considered to be of rats [*Rattus norvegicus* (Berkenhout, 1769)] because of the habitat and feces size. The larvae were reared in cases at room conditions, with the feces provided. The materials are preserved in the private collection of Y. Nasu.

Methods

Larvae were slit lengthwise laterally and macerated for approximately 10 hours in 10% KOH solution under room conditions, and after washing, stained with acetocarmine solution for examination of

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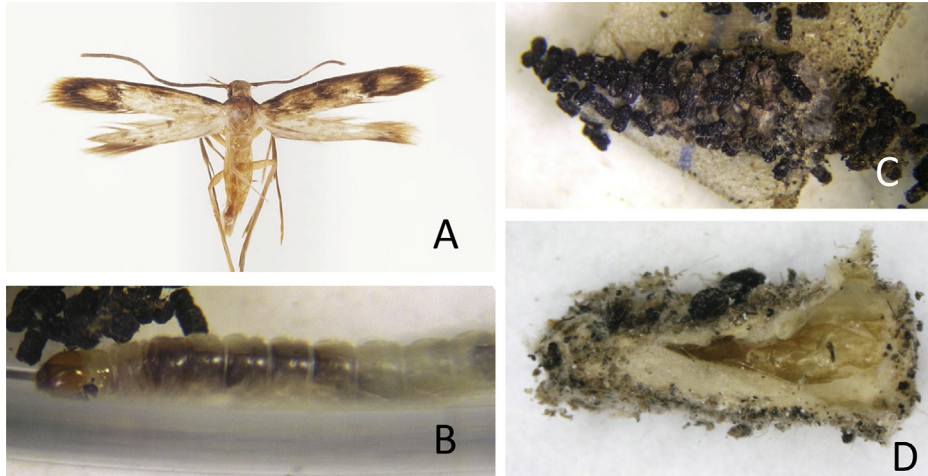


Figure 1. Adult, larva, and cocoon of *O. oecophila*. A, Male adult; B, Mature larva; C, Cocoon; D, Pupal skin in cocoon.

the larval morphology. Illustrations of the immature stages were drawn using a drawing apparatus attached to a binocular microscope, Leica MZ16 (Leica Microsystems, Germany), and images of the larval crochets were taken using a digital camera, Nikon Coolpix 8400, attached to a microscope, Nikon Eclips E200 (Nikon Corporation, Japan). Digital images of adults and larvae were enhanced using Adobe Photoshop software (Adobe Systems Incorporated, USA).

Results

Description of immature stages of Oecia oecophila (Staudinger, 1876) (Figures 1–3)

Mature larva (Figures 1B, 1C, and 2). Length 7–8 mm. Head somewhat shorter than broad, pale brown (Figure 1B), without a

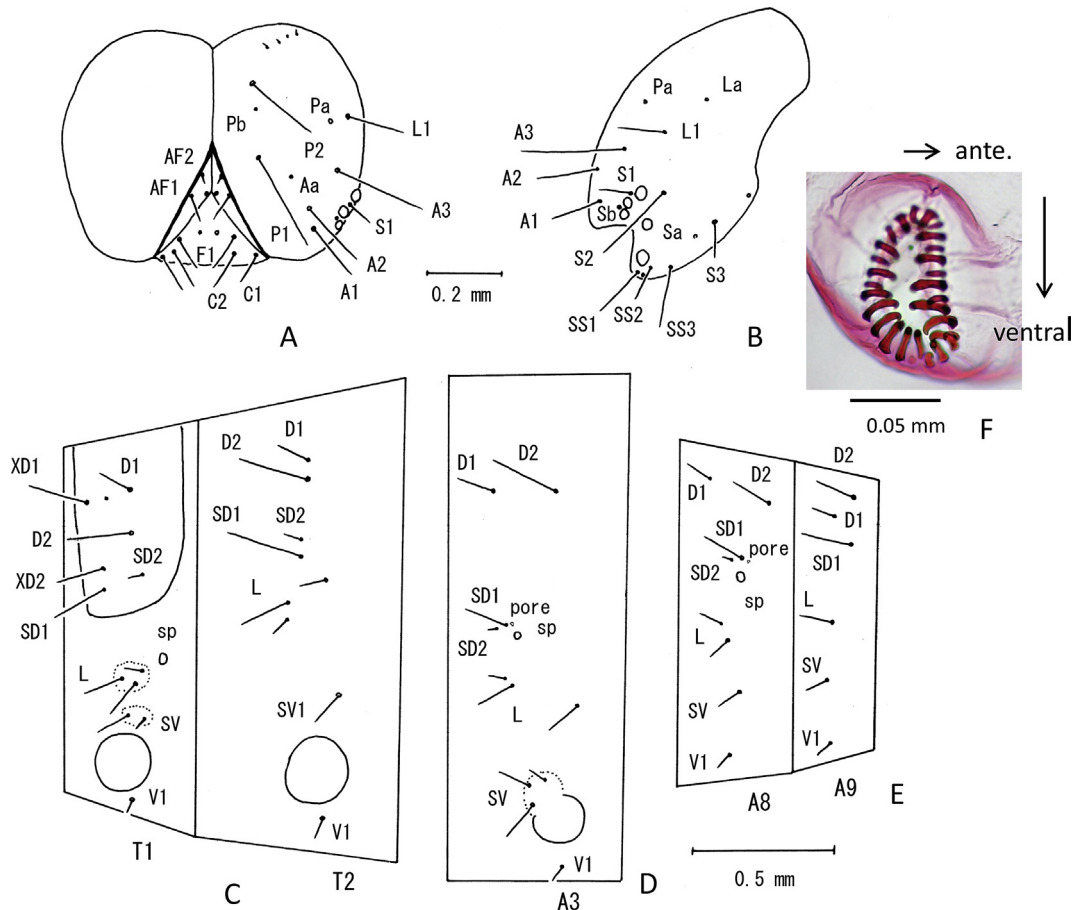


Figure 2. Larval chaetotaxy and crochets of *O. oecophila*. A, Head, frontal view; B, Head, lateral view; C, Pro- and mesothorax, lateral view; D, Third abdominal segment, lateral view; E, 8th and 9th abdominal segments, lateral view. F, Crochets of right ventral leg of 4th abdominal segment. sp = spiracle.

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