LARVAE OF OWLET MOTHS

Larvae of Owlet Moths (Noctuidae)

Biology, Morphology, and Classification

O.I. Merzheevskaya

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Scientific Editor

E.J. BRILL
LEIDEN • NEW YORK • KØBENHAVN • KÖLN
1989

Translation of:
Gusenitsy Sovok (Noctuidae), ikh Biologiya i Morfologiya (Opredelitel')
Nauka i Tekhnika Publishers, Minsk, 1967

Translator: P.M. Rao
General Editor: Dr. V.S. Kothekar

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Distributed world-wide by:
E.J. Brill Publishing Company
P.O. Box 9000
NL-2300 PA Leiden
The Netherlands

U.S.A. & Canada
E.J. Brill (USA) Inc.
24, Hudson Street
Kinderhook, NY 12106
U.S.A.

ISBN 90 04 08804 0

Printed in India at Pauls Press, New Delhi

Foreword to the English-language Edition

The Smithsonian Institution Libraries, in cooperation with the National Science Foundation, has sponsored the translation into English of this and hundreds of other scientific and scholarly studies since 1960. The program, funded with Special Foreign Currency under the provisions of P.L. 480, represents an investment in the dissemination of knowledge to which the Smithsonian Institution is dedicated.

O.I. Merzheevskaya's publication on the immature stages of Belorussian noctuids is a definite complement and supplement to H. Beck's (1960) *Die Larvalsystematik der Eulen* which covered Central Europe. While Merzheevskaya certainly was influenced by Beck as evidenced by her acknowledged use of certain figures and indices from Beck's work, her species accounts provide a wealth of additional information on all the larval instars for the majority of the species that she discussed whereas Beck's larval descriptions targeted the ultimate larval instar. Her detailed observations on the changes in integumental structures, especially setal bases and granulation, of the body and the color patterns of the head and body during larval development, constitute the core of and may be the most significant, systematic aspect of her study. In addition to the larval descriptions, nearly every species account is accompanied by basic phenological information in Belorussia, the known host plants, and detailed information on egg morphology and egg color. Her notes on larval and egg color include changes attributable to development, and for the former, intra- as well as inter-instar shifts in basic coloration and patterns.

The identification keys are designed only to determine the mature larva, and they are written quite well and are amply illustrated with line drawings. However, I question the practicality of many of the keys to species because the dominant characters used by the author are coloration and maculation. Generally these disappear or become obscured in preserved material. The author discussed a preservation technique involving ethyl alcohol, salicylic acid, common salt, and distilled water which she published in 1965 that supposedly fixes the colors of green, pink, white, and yellow up to six months and the integumental melanic pattern for over five years. I never have tried this technique which apparently has

some advantages over others and am not criticising it, but the fact remains that the colors and related patterns on preserved larvae change over time. Thus, the keys may be useful only for larval specimens that are no more than six months old.

Discussion of feeding behavior and survival for certain polyphagous species, e.g., *Mamestra oleracea* (L.) and *M. suasa* (Schiff.), in relation to dietetic diversity in the section entitled "Biology of Larvae", should interest any person interested in rearing noctuids. The author's main point is that if a polyphagous species is fed only a single host species, even an acceptable one, it will experience greater mortality and decreased fertility over two to three generations than if it is allowed to feed on a variety of hosts. She cited previous studies that support her contention.

Readers please note that many of the listings in the Bibliography contain some inaccurate or incomplete titles, names of the publishers, and paginations. These are carry-overs from the original text.

Considering that Merzheevskaya's publication originally was released in 1967, congratulations are too late, but certainly the information that has been provided is much appreciated and very useful.

Drs. Yuri P. Nekrutenko (Institute of Zoology, Kiev, Ukraine, USSR) and Eleonora Khot'ko (Minsk) communicated the following biographical information about the author: Olga Ivanovna Merzheevskaya was born into a farmer's family in Rechitsa Region, Gomel District, Byelorussia on 12 November 1904 and died in Minsk, 13 May 1981. She received her schooling at Teachers College (Byelorussia) and advanced training through the Natural History Division, Pedagogical Faculty, Byelorussian State University in Minsk. From 1944–1960's she conducted research at the Division of Zoology and Parasitology, Academy of Sciences of Byelorussian SSR, first on nematode pests of principal field crops, later on the Noctuidae and Geometridae. She published over 50 papers, including three major monographs: "Nematoda of the Principal Field Crops in Byelorussian SSR" (1953), "Larvae of the Owlet Moths (Noctuidae) . . ." (1967), and "Owlet Moths of Byelorussia" (1971). Among her colleagues she had a good reputation for being well organized in her research, a good teacher, and a clear-minded researcher. She was chief of the Entomology Laboratory, Division of Zoology and Parasitology, Academy of Sciences of Byelorussian SSR; head of the Byelorussian Branch, All-Union Entomological Society; and was reputed to be the leading entomologist in Byelorussia.

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UDC 595.78

This book provides information on the biology and morphology of owlet moth larvae and keys to their subfamilies, genera, and species. Morphological characters, body coloration, and dermal patterns are detailed for each species. The larvae of 144 species of owlet moths are described and data on developmental changes in instars given for 91 of them.

This book should be helpful to entomologists, agricultural entomologists, plant-protection specialists, and teachers and students of biology, agriculture, and forestry.

Editor
Prof. A.S. Danilevskii
Doctor of Biological Sciences

Preface

Noctuidae, the extensive family of owlet moths, includes many species that damage agriculture. In Belorussia owlet moths severely damage crops, pastures, forest and park nurseries, berries, beneficial wild flora, and ornamental flowers. Agriculture and forestry are threatened most by the turnip moth, other cutworms, silver y-moth, cabbage moth, and pine beauty moth. Plant protection organizations have done extensive work in identifying harmful species, predicting population levels, and devising control measures.

It is essential to correctly identify species in the harmful phase—the larval stage. Such identification is very difficult since the larvae of various species of owlet moths are morphologically similar and often look alike. Handbooks for the identification of larvae are few. T.N. Ryazantseva (1937) and M.A. Ryabov (1960) have contributed keys in *Opredelitel' Nasekomykh po Povrezhdeniyam Kul'turnykh Rastenii* (Keys to Insects Based on Damage Caused to Cultivated Plants), but these cover only a small number of owlet moths. In 1964 a limited edition of *Opredelitel' Obitayushchikh v Pochve Lichinok Nasekomyk* (Keys to Larvae of Soil-Dwelling Insects) was published, which contains a rather sizable key to larvae of owlet moths compiled by E.V. Chadaeva from data available in literature up through 1963. Two monumental works on larvae of owlet moths have been published abroad, one by the American scientist, S.E. Crumb (1956), and the other by the German scientist, H. Beck (1960).

Appreciating the need of Belorussian entomologists for an identification key for the harmful phases [larvae] of owlet moths, I undertook a study of the larvae of species found in Belorussia. This book presents the results of these studies.

Keys to subfamilies, genera, and species are based on their most reliable structural features: characters of the general body structure, head, mandibles, spinneret, chaetotaxy, and color pattern on the body and head. The book is richly illustrated[1]; illustrations borrowed from literature are duly acknowledged.

Before consulting keys to larvae one should know the external morphology of the larva. Keys to subfamilies and genera and detailed descriptions of the species are based on the last instars. Changes in larval

[1]Figures 1 through 7 have been placed in the text and Figures 8 through 97 arranged at the end of the book.

instars also have been indicated for many species. The cycle of development of larvae, hibernation, and food plants also are indicated.

In my opinion, information on the structure of the eggs and the nature of oviposition is also quite useful. In the section "Biology of Larvae" I have presented information available in the literature and from my own observations on the effect of temperature and humidity on embryonal and postembryonal development in nature, as well as some information on food preferences.

I am greatly indebted to Prof. A.S. Danilevskii and the late M.A. Ryabov for invaluable advice. My colleagues R.V. Molchanova, S.V. Kundakova, and E.I. Khot'ko in the Department of Zoology, Belorussian Academy of Sciences, cooperated in the laborious process of specimen collection and participated in laboratory investigations. R.V. Molchanova and S.V. Kundakova contributed many illustrations. I extend my sincere gratitude to all who assisted in the preparation of the manuscript.

Table of Contents