



Revision of the Australian *Oenochroma vinaria* Guenée, 1858 species-complex (Lepidoptera: Geometridae, Oenochrominae): DNA barcoding reveals cryptic diversity and assesses status of type specimen without dissection

AXEL HAUSMANN¹, PAUL D.N. HEBERT², ANDREW MITCHELL³, RODOLPHE ROUGERIE²,
MANFRED SOMMERER⁴, TED EDWARDS⁵, & CATHERINE J. YOUNG⁶

¹Zoologische Staatssammlung München, Münchhausenstr. 21, D-81247 München, Germany; E-mail: Axel.Hausmann@zsm.mwn.de

²Biodiversity Institute of Ontario, University of Guelph, 579 Gordon Street, ON, N1G 2W1, Guelph, Canada.

E-mail: phebert@uoguelph.ca, rrougeri@uoguelph.ca

³NSW Department of Primary Industries, Wagga Wagga Agricultural Institute, Pine Gully Rd, Wagga Wagga NSW 2650, Australia.

E-mail: andrew.mitchell@dpi.nsw.gov.au

⁴Volpinistr. 72, 80638 München, Germany. E-mail: Sommerer.Manfred@t-online.de;

⁵Australian National Insect Collection, ANIC, GPO Box 1700, Canberra ACT 2601, Australia; e-mail: Ted.Edwards@csiro.au;

⁶Tasmanian Museum and Art Gallery, GPO Box 1164 Hobart, 7001, Tasmania. E-mail: Catherine.Young@tmag.tas.gov.au

Abstract

The assembly of a DNA barcode library for Australian Lepidoptera revealed that *Oenochroma vinaria* Guenée, 1858, as currently understood, is actually a mix of two different species. By analyzing DNA barcodes from recently collected specimens and the 150 year-old female lectotype of *O. vinaria*, we propose a reliable assignment of the name *vinaria* to one of these two species. A lectotype is designated for *Monoctenia decora*, a confirmed synonym of *O. vinaria*, and a new species, *Oenochroma barcodificata* **sp. nov.**, is described. This species is only known from Tasmania and New South Wales; its biology and immature stages are described in detail.

Key words: *Oenochroma barcodificata*, Tasmania, new species, type sequencing, lectotype, redescription

Introduction

Identification of specimens of closely related or externally indistinguishable species of Lepidoptera usually requires scrupulous comparison with the corresponding type specimens. Quite frequently, however, an unambiguous identification cannot be obtained, either because the type specimen is missing the body parts which contain the important diagnostic features (e.g., antennae, legs, abdomen, etc.) or because it is of the "wrong" sex, precluding comparative study. In fact, the type specimen needed is often not accessible at all. Taxonomists have frequently encountered such shortcomings and as a result there often remains a degree of uncertainty in their taxonomic decisions.

Analysis of DNA barcodes offers an effective additional tool for the identification and distinction of lepidopteran species e.g., in situations where a type specimen is available, but damaged or of the wrong sex. The Biodiversity Institute of Ontario and collaborators are currently carrying out a comprehensive DNA barcoding project named 'All Leps' (<http://www.lepbarcoding.org/>). This targets, as a long-term objective, the analysis of all Lepidoptera through a combination of regional and continental campaigns, and more focused global campaigns on certain taxa. As a result of both an Australian regional campaign and a recently initiated global campaign on Geometridae, specimens of the Australian species *Oenochroma vinaria* Guenée, 1858 were sampled and barcoded. Surprisingly, DNA barcode analysis revealed an unusually deep divergence (maximum pairwise K2P distance of 3.6%; minimum distance between the two inferred clusters of 3.1%)