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Taxonomic revision and zoogeographical patterns of the species of *Gnopharmia* Staudinger, 1892 (Geometridae, Ennominae)

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Abstract

The genus *Gnopharmia* Staudinger, 1892 is revised, based on more than 2000 specimens from the entire area of distribution and study of type material of all described taxa, as far asmap available. Seven species and three subspecies are confirmed as valid for the genus. All important morphological characters have been studied and compared, including male and female genitalia. In addition, preliminary results of DNA-Barcoding were used to reassess our taxonomic decisions, based on morphological studies. Type specimens and their labels are illustrated and additional specimens, demonstrating the variability of certain species, are also figured. Male genitalia of all valid species are figured and SEM photos of the aedeagus are illustrated. Further important structures, the so-called 'octavals' on the male pre-genital abdomen, are also figured. Female genitalia revealed a high similarity between species, combined with a considerable variability, and were unsuitable for characterisation of species. Female genitalia of three species are figured to exemplify this situation. As a result of the morphological and genetic studies, 12 out of the 21 described species and subspecies are synonymised or transferred to the closely related genus *Neognopharmia* Wehrli, 1953. In addition, *G. colchidaria cocandaria* (Erschoff, 1874) is revived as a valid species, *G. sinesefida* Wehrli, 1941 is downgraded to a subspecies of *G. colchidaria* Lederer, 1870. Five new records for the fauna of the following countries are presented: *G. colchidaria objectaria*: new for Pakistan; *G. irakensis:* new for Turkey and Pakistan; *G. kasrunensis*: new for Oman and *G. sarobiana*: new for Pakistan. Distribution maps and an identification key are given for all species.

Key words: Macariini, *Gnopharmia*, *Neognopharmia*, new synonyms, new records, lectotype designations, distribution, Iran

Introduction

The Palaearctic Geometrid genus *Gnopharmia* Staudinger, 1892—despite its name having been composed of '*Gnophos*' and '*Boarmia*' by Staudinger—is a member of the tribe Macariini (Ennominae). Wehrli (1953: 365) previously stated this, based on the characters of the male genitalia. Scoble and Krüger (2002) revised the Macariini at the generic level and also included *Gnopharmia* therein. Parsons et al. (1999) listed 13 species, but two of them (*cataleucaria* Staudinger, *horhammeri* Brandt) are members of the closely related genus *Neognopharmia* Wehrli, 1951. The most recent state of knowledge at the species level was presented by Scoble & Hausmann, 2007, who listed 11 species (19 taxa including all subspecies in total).

All species of *Gnopharmia* are difficult to identify, and previous authors often misinterpreted or overestimated external differences which resulted in unnecessary descriptions of mere variations as new species or subspecies. After description of the first species of this genus by Lederer (1870; as "*Gnophos colchidaria*") from Georgia, Erschoff (1874) described the second species belonging to the genus as *Boarmia cocandaria* from Kokand (near Soch, East Uzbekistan). A further six new taxa were described by Staudinger (1892): *G. colchidaria* var. *objectaria* and *G. c.* var. *degeneraria* (from Ashkhabad in Turkmenistan), *G. maculifera* from Samarkand in Uzbekistan, *G. rubraria rubraria* from Jerusalem and two localities in Southeast Turkey (Aintab, Marasch [Maraš]), and *G. rubraria subrubraria* from Margelan, also in East Uzbekistan. Wehrli (1938) described *G. colchidaria melanotaenia* from Meghri [as Migri] in Armenia and *G. irakensis* from Rawanduz in Iraq. Later he introduced a further three new species: *G. erema* Wehrli, 1939 from Kerbela, Iraq, and, based on material of the famous collections of Fred Brandt from Iran, *G. kasrunensis* Wehrli, 1939 (Kunar Takhteh, Kazerun) and *G. sinesefida*

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