

The systematic position of *Palaeocrocota ostrogovichi* (CARADJA, 1930) (Lepidoptera: Geometridae, Ennominae)

László RÁKOSY, Dieter STÜNING, Mihai STĂNESCU & Manfred SOMMERER

Summary: *Cleogene ostrogovichi* CARADJA, 1930 was described after a single male specimen collected at Galişer Hill (Dealul Galişer), Cluj-Napoca, Romania, in August of 1923. A new examination of this specimen and its genitalia (STĂNESCU 2002) revealed that *ostrogovichi* does not belong to the genus *Crocota* HÜBNER, 1823 (= *Cleogene* DUPONCHEL, 1829). Instead, the new genus *Palaeocrocota* STĂNESCU, 2002 was proposed to hold *ostrogovichi*. By a thorough analysis of the structure of male genitalia, wing shape, venation and characters of antennae, labial palps and legs, STÜNING recently concluded, however, that the holotype of *ostrogovichi* belongs to the tribe Macariini. Although barcoding of the holotype was unsuccessful, the authors, taking all available facts into account, found that the type specimen of *ostrogovichi* is a fully melanic specimen within the species complex *Isturgia limbaria* (FABRICIUS, 1775) – *I. roraria* (FABRICIUS, 1776). Considering the relevant distinguishing characters and also the known distribution of the two species involved, *Palaeocrocota ostrogovichi* (CARADJA, 1930) is considered to be a junior synonym (syn. n.) of *Isturgia roraria* (FABRICIUS, 1776), both, on genus- and on species-level. It is proposed to uphold the name *ostrogovichi* as infrasubspecific denomination of the so far unique, completely melanic form: *Isturgia roraria* ab. *ostrogovichi* (Caradja, 1930).

Key words: *Isturgia limbaria*, *I. roraria*, Macariini, melanism, genitalia, DNA-barcoding, new synonyms, environment, Romania.

Introduction

Cleogene ostrogovichi CARADJA, 1930 was described after a single male specimen collected by Prof. ADRIANO OSTROGOVICH in the outskirts of Cluj, at Galişer Hill (Dealul Galişer), on the 5th of August, 1923 (Fig. 1). The specimen intrigued the collector who therefore sent it for closer analysis to ARISTIDE CARADJA, at that time a renowned expert

on Lepidoptera in Romania. CARADJA was equally surprised by the appearance of this specimen and, believing that it might belong to a hitherto unknown species, decided to submit it to the authority of HANS REBEL in Wien. In the meantime, he had hoped to receive more such specimens as a basis for a comprehensive and detailed description of the new species. With the aim of securing his priority, he started, however, to publish at once a brief description



Fig. 1. *Cleogene ostrogovichi* Caradja, 1930 – holotype: ♂, coll. Ostrogovich, MGAB (a – upperside; b – underside).

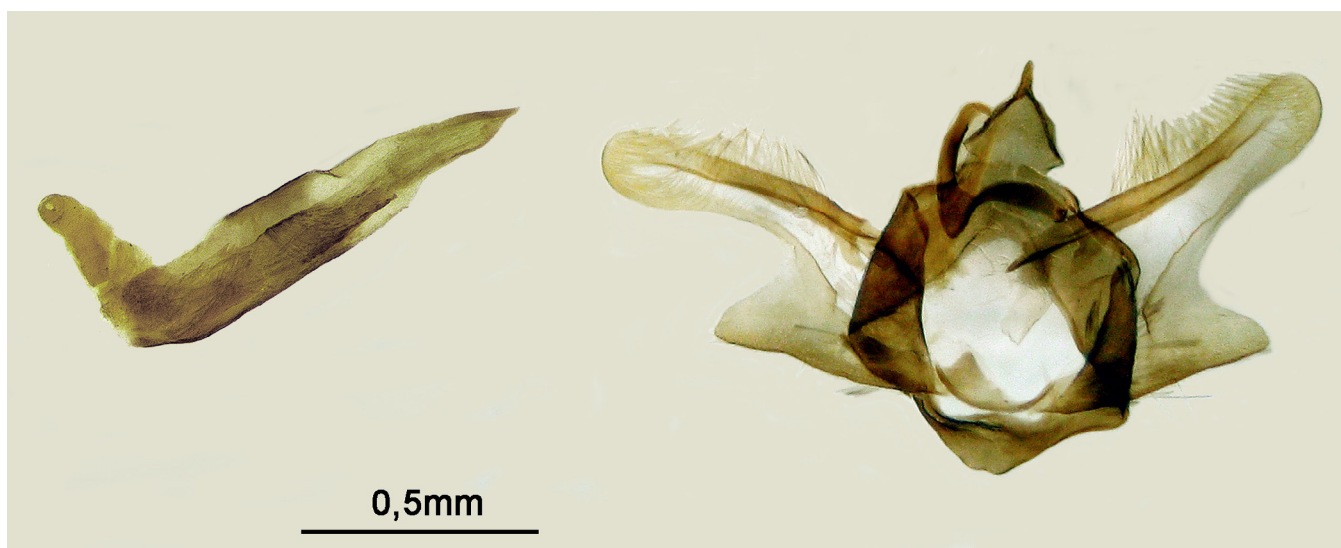


Fig. 2. *Cleogene ostrogovichi* Caradja, 1930 – holotype genitalia (prep. gen. no. 615, MGAB).

of the unique specimen as is stated in the introduction of his paper on the new taxon (CARADJA 1930). Misled mainly by the homogeneous dark brown colour of both wings and body CARADJA assumed a close relationship with the genus *Cleogene* DUPONCHEL, 1829 (currently a junior synonym of *Crocota* HÜBNER, 1823), mainly with the blackish males of *Cleogene peletieraria* DUPONCHEL, 1830. The original description of the new species *Cleogene ostrogovichi*, thus dedicated to the collector, neither offers an image of the unique type specimen nor does it deal with the structure of the genitalia. *Crocota ostrogovichi* (CARADJA, 1930) was recorded in the catalogue of the „Prof. A. Ostrogovich” collection (POPESCU-GORJ 1964), in a series of systematic lists and catalogues (POPESCU-GORJ 1987, MÜLLER 1996, STĂNESCU 1997, SCOBLE 1999, SCOBLE and HAUSMANN 1999, HAUSMANN *et al.* 2007), and in the list of the endemic Lepidoptera of the Romanian fauna (RÁKOSY 1997). During the period of nearly a century up to now, no other specimens exactly coincident with the holotype of *ostrogovichi* were reported.

During the revision of the specimens in the “Prof. A. Ostrogovich” collection at the “Grigore Antipa” National Museum of Natural History in Bucharest (MGAB), STĂNESCU (2002) re-evaluated the systematic status of *C. ostrogovichi* and found that the genitalia (Fig. 2) definitely exclude any relationship with the genus *Crocota* HÜBNER, 1823 (see LERAUT 1998, 2009: 128-129, fig. 57). Due to the structural differences compared with *Crocota*, STĂNESCU (2002) proposed for *ostrogovichi* the new genus *Palaeocrocota* and published for the first time images of the holotype, its genitalia and other morphological structures (such as the structure of the antenna – Fig. 3). The new combination *Palaeocrocota ostrogovichi* (CARADJA, 1930) is recorded in the Catalogue of the Romanian Lepidoptera (RÁKOSY *et al.* 2003), but with the conservation status “DD” (data deficient) stressing the fact that the new genus holds only one single known specimen.

New taxonomical evaluation

Confronted with that long-lasting taxonomical mystery on the basis of STĂNESCU’s paper (2002), the second author identified the genitalia structure as one of a member of the tribe Macariini: the shape of the valva, separated into strong, rather straight dorsal arms with a wider, setose apex and roughly triangular ventral lobes is a characteristic Macariini feature. Further morphological characters were studied in addition (antennae bipectinate, with rather short, dorsally scaled, distally wider rami; chaetosemata elongate, but leaving a wide gap centrally – Fig. 4 and 5; forewings of male with fovea; hind tibia with two pairs of spurs, but not enlarged, without evertible brush of scales; sternite 3 of abdomen without setal comb, tergite and sternite 8 undifferentiated) and led to the genus *Isturgia* Hübner. Comparing the specific structures of a number of European *Isturgia*-species, the second author concluded that *ostrogovichi* must be a rare, almost completely melanic member of the *Isturgia limbaria-roraria* species complex, most likely *Isturgia roraria*, considering the so far known distribution of both species (compare also Skou and Sihvonen 2015, pp. 95-100, 513, text-figs 37-40, genitalia figs 18, 19). Intermediate melanic forms are rather common in *limbaria*, but obviously not so in *roraria*. Among more than 70 specimens of *roraria* (from East and Southeast Germany, Austria, Hungary, Ukraine, all from lowland localities) in the ZFMK collection there is not a single even partly melanic specimen. Almost completely black specimens of *roraria* are known from breedings: BERGMANN (1955) figures (fig. 1147a, p. 953) such specimens (as ab. *stehliki* BRETSCHNEIDER) which BRETSCHNEIDER (1954) had received from a F2 generation, bred from normal-coloured *roraria* parents (Fig. 6). He described them as “mel. mut.” (= melanic mutation) *stehliki* BRETSCHNEIDER, named after the collector



Fig. 3. *Cleogene ostrogovichi* Caradja, 1930 – holotype: head with antennae, dorsal view.



Fig. 4. *Cleogene ostrogovichi* Caradja, 1930 – holotype: head, antennae, palps, dorsal view (arrows indicating position of chaetosemata).



Fig. 5. *Cleogene ostrogovichi* Caradja, 1930 – holotype: head, anterior part of thorax, lateral view.

of the breeding-material. BRETSCHNEIDER (l. c., p. 43) suspected the occurrence of such mutations also in isolated biotopes in the wild.

Isturgia roraria is locally found in Romania. Males and females, collected at Cluj in April, May and July of 1924, 1925, 1927 and 1935, are recorded in the Catalogue of the “PROF. A. OSTROGOVICH” collection (POPESCU-GORJ 1964, p. 145). Most public and private Romanian moth collections hold specimens of *roraria* from Romania. The 12 Romanian specimens of *roraria* in LÁSZLÓ RÁKOSY’s collection show, at least those originating from the higher Carpathian Mountains, a tendency toward melanism, normal-coloured specimens being nevertheless not uncommon (Fig. 7). The melanic specimens in the RÁKOSY collection are from altitudes between 1800 and 2000 m, whereas the intermediate forms were collected at lower altitudes (1200 m). It is true that no such forms were collected as low as about 600 m, the altitude of the Galişer Hill, where ADRIANO OSTROGOVICH took his legendary specimen.

Whether that unique specimen originated at Galişer Hill by a rare case of inbreeding in the wild, as described above, or was transported there once by air-current from higher mountain regions, cannot be told.

The changed environment

Efforts to find other specimens congruent with the holotype of this peculiar species have, indeed, never yielded any result. During the XVIIIth SEL Congress held in Cluj-Napoca in May 2009, several participants operated – alas, in vain – light traps on the type locality Galişer Hill. But it is also a fact that the habitat of the type locality Galişer Hill has changed much since the 1920s and, in its actual state, is certainly far from the original steppe biotope.

The Galişer Hill is located in the southern part of Cluj-Napoca, in the vicinity of the Mănăştur district, which now has a population of 120,000. This hill is characterized by clay soils placed on sandstones and tuffs (the *Dej tuff*, an important stratigraphic geological landmark throughout the Transylvanian Basin). Before 1970, the southern slope of the hill had xerothermic vegetation (e.g. *Stipa* sp., *Adonis vernalis* L., *Iris pumila* L., *Daphne cneorum* L. etc.) that offered habitats to many thermophilic insects (e.g. *Mantis religiosa* (LINNAEUS, 1758), *Saga pedo* (PALLAS, 1771), *Chazara briseis* (LINNAEUS, 1764) etc.). Between 1970 and 1973, a large area on the southern slope was planted with scots pine (*Pinus sylvestris* L.), completely altering the original vegetation and its animal diversity. After 1990, multi-story buildings of the Mănăştur village even extended to the slopes of the Galişer Hill. That human interference caused a tremendous change of the natural habitats there. The remaining clearings and meadows are heavily grazed by sheep, and weekend-tourism



Fig. 6. *Isturgia roraria* ab. *stehliki* Bretschneider, 1954 – ♂, Dessau, E. Germany, reared specimen, coll. Phyletisches Museum Jena, Germany (a – upperside; b – underside; wingspan 22 mm).



Fig. 7. *Isturgia roraria* (Fabricius, 1776) – male specimens collected in the Romanian Carpathians (László Rákósy collection): a – partly melanic specimen, Bucegi Mountains, Caraiman, 2.100 m altitude, 4.VII.2003, László Rákósy leg.; b – normal-coloured specimen, Apuseni Mountains, Scărița-Belioara Rezerve, 1.100 m altitude, 29.V.1983, László Rákósy leg. (same scale as fig. 6).

has added to the damages. Nevertheless, only 4-5 km east of the Galișer Hill, RÁKÓSY managed to collect two specimens of *Isturgia roraria* on the meadows of Făgetul Clujului (Peana peak, Casele Micești) in 1985. The larval host-plants of *Isturgia roraria*, the Dyer's Greenweed *Genista tinctoria* L. and its closely related *G. sagittalis* L., are still relatively frequent on the hills east of the Galișer Hill. They have, however, now disappeared from the Galișer Hill itself.

Conclusion

In the light of the analysed features shared by the holotype of *Palaeocrocota ostrogovichi* and *Isturgia roraria*, the authors formally synonymize, on genus- and on species-level, both taxa here: *Isturgia roraria* (FABRICIUS, 1776) = *Palaeocrocota ostrogovichi* (CARADJA, 1930) syn. nov. The name *ostrogovichi* may be retained as infrasubspecific (aberrational) name: *Isturgia roraria* (FABRICIUS, 1776) ab.

ostrogovichi (CARADJA, 1930), in order to denote this (so far unique), completely melanic form.

The preliminary information on the revised status of *ostrogovichi* was already communicated in a talk presented by RÁKÓSY at the SYMPOSIUM INTERNATIONALE ENTOMOFAUNISTICUM EUROPAE CENTRALIS (SIEEC) 23 (Bozen/Bolzano, Italy, Sept. 2013; not published) and implemented in the text of the fifth volume of the monograph “The Geometrid Moths of Europe” (SKOU and SIHVONEN 2015, p. 100). The – eastern – *Isturgia roraria* and the – western – *Isturgia limbaria* form a species complex that still needs a thorough and detailed analysis, the more so as it is also genetically split up (SKOU and SIHVONEN, l. c.). The attempt to confirm the association of the holotype of *ostrogovichi* with *roraria* by barcoding was unfortunately not successful (cf. BOLD: specimen page BC MGAB LepTyp 0001; sequence page GWOTY091-10; sequence 0 bp). Other three specimens of *roraria*

from Romania were successfully barcoded in BOLD and obtained the BIN BOLD: AAF3597, separated at 1,1% from other populations of *roraria*. The reasons for this difference are unclear, but may be explained by the low number of barcoded specimens, with partly insufficient quality. This will be investigated with more and freshly collected specimens in a future study.

Acknowledgements

The authors are deeply indebted to Axel Hausmann, Bavarian State Collection of Zoology (Zoologische Staatssammlung München, ZSM), for the attempt to confirm the association of the holotype of *ostrogovichi* with *Isturgia roraria* (Fabricius, 1776) by DNA barcoding. We also thank Gunnar Brehm, Phyletisches Museum Jena, for the loan of a pair of "type"-specimens of *I. roraria* ab. *stehliki* and Mrs. Ulla Kreutz, (Meckenheim, Germany) who edited the original images of the male genitalia and that of ab. *stehliki* presented here.

References

- BERGMANN A. (1955) Die Grossschmetterlinge Mitteldeutschlands. Band 5/2 Spanner. Urania Verlag Leipzig/ Jena, pp. 561-1267.
- BRETSCHNEIDER R. (1954) Auslösung einer Mutation faktoriellen Melanismus durch Inzucht bei *Isturgia* Hbn. (= *Fidonia* Tr.) *roraria* F. *Entomologische Zeitschrift* 4 (64 Jahrgang): 41-43.
- CARADJA A. (1930) Eine neue Geometridae aus Siebenbürgen. *Buletinul Secțiunii Științifice a Academiei Române* 13 (2): 52.
- HAUSMANN A., MIRONOV V. and VIIDALEPP J. (2007) Geometridae. In: KARSHOLT O., VAN NIEUKERKEN E. J. – Fauna Europaea: Lepidoptera, Moths. Fauna Europaea version 2.6. <http://www.fauna-eur.org>, accessed on 22.02.2017.
- LERAUT P. (1998) Contribution à l'étude des espèces du genre *Crocota* Hübner (Lepidoptera Geometridae). *Alexanor* 20 (7-8): 467-481.
- LERAUT P. (2009) Moths of Europe, volume 2, Geometrid Moths. N. A. P. Editions, pp. 1-804.
- MÜLLER B. (1996) Family Geometridae. In: KARSHOLT O., RAZOWSKI J. (ed.) – The Lepidoptera of Europe. A distributional checklist. Apollo Books, Stenstrup: pp. 218-248.
- POPESCU-GORJ A. (1964) Catalogue de la collection de lépidoptères „Prof. A. Ostrogovich” du Muséum d'Histoire Naturelle „Grigore Antipa”, Bucarest. Musée d'Histoire Naturelle „Grigore Antipa”: 293 pp., XVIII plates.
- POPESCU-GORJ A. (1987) La liste systématique révisée des espèces de macrolépidoptères mentionnées dans la faune de Roumanie. Mise à jour de leur classification et nomenclature. *Travaux du Muséum d'Histoire Naturelle "Grigore Antipa"* 29: 69-123.
- RÁKOSY L. (1997) Die endemischen Lepidopteren Rumäniens. *Entomologica Romanica* 2: 59-81.
- RÁKOSY L., GOIA M. and KOVÁCS Z. (1997) Catalogul Lepidopterelor României/Verzeichnis der Schmetterlinge Rumäniens. *Societatea Lepidopterologică Română*, 446 pp.
- SCOBLE M.J. (ed.) (1999) Geometrid Moths of the World: a catalogue (Lepidoptera, Geometridae). *CSIRO Publishing*, Collingwood, Vols 1-2, 1016 pp.
- SCOBLE M.J. and HAUSMANN A. (2007) Online list of valid and available names of the Geometridae of the World. <http://www.herbulot.de/globalspecieslist.htm>, accessed on 22.02.2017.
- SKOU P. and SIHVONEN P. (2015) Ennominae I. In: HAUSMANN A. (ed.): The Geometrid Moths of Europe. 5, Brill, Leiden, 657 pp.
- STĂNESCU M. (1997) The updated systematic and synonymic list of the Geometridae (Insecta: Lepidoptera) of Romania. *Travaux du Muséum Nationale d'Histoire Naturelle "Grigore Antipa"* 39: 109-160.
- STĂNESCU M. (2002) The systematic position of *Crocota ostrogovichi* (Caradja, 1930) (Lepidoptera: Geometridae: Ennominae). *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"* 44: 253-260.

László RÁKOSY
Department of Taxonomy and Ecology
Babeş-Bolyai University, Clinicilor 5-7
Cluj-Napoca, RO-400006, Romania
E-mail: laszlo.rakosy@ubbcluj.ro

Dieter STÜNING
Zoologisches Forschungsmuseum
Alexander Koenig, Adenauerallee 160,
Bonn, D-53113, Germany
E-mail: d.stuening@zfmk.de

Mihai STĂNESCU
The "Grigore Antipa" National Museum
of Natural History, Șos. Kiseleff 1,
Bucharest 1, RO-011341, Romania
E-mail: mihai.st@antipa.ro

Manfred SOMMERER
Volpinistr. 72,
München, D-80638, Germany
E-mail: sommerer.manfred@t-online.de

Received: 26.12.2016
Accepted: 26.03.2017
Published online: 26.03.2017
Published:
Online article number: ER20201603