

A thriving colony of *Melitaea aurelia* recorded in the Greek part of the Rodhópi Mts., and an important note on female identification based on genitalic features (Lepidoptera: Nymphalidae, Melitaeinae)

Hrístos T. Anastassíu & John G. Coutsis

Abstract. A well-established colony of *Melitaea aurelia* is recorded here for the first time by the first author from the Greek part of the Rodhópi Mts. Identifications were carried out by the second author, those of males based on hitherto well-known genitalic characters and those of females by a set of new characters in combination with previous genitalic finds carried out by Urbahn (1952).

Samenvatting. Een goed gevestigde populatie van *Melitaea aurelia* wordt hier door de eerste auteur voor het eerst vermeld van het Griekse deel van Rodopegebergte. De tweede auteur voerde de determinaties uit, die van de mannetjes gebaseerd op tot nu toe bekende genitaaleigenschappen en die van de vrouwtjes door een aantal nieuwe eigenschappen gecombineerd met eerdere genitaalstudies uitgevoerd door Urbahn (1952).

Résumé. Une colonie bien établie de *Melitaea aurelia* est enregistrée ici pour la première fois de la partie grecque des Rhodopes par le premier auteur. Les identifications ont été effectuées par le deuxième auteur, celles des mâles sont basées sur des caractères génitaux connus jusqu'à présent et celles des femelles par un ensemble de caractères nouveaux en combinaison avec les études précédentes des génitales, effectuées par Urbahn (1952).

Key words: *Melitaea athalia* – Greece – Flórina – Female genital appendages – Species differentiation.

Anastassíu H. T.: International Hellenic University, Department of Informatics, Computer and Communications Engineering, end of Magnisías Str., GR–62124 Sérres, Greece. hristosa@teiser.gr

Coutsis J. G.: 4 Glykonos Street, GR–10675 Athens, Greece. kouts@otenet.gr

Introduction

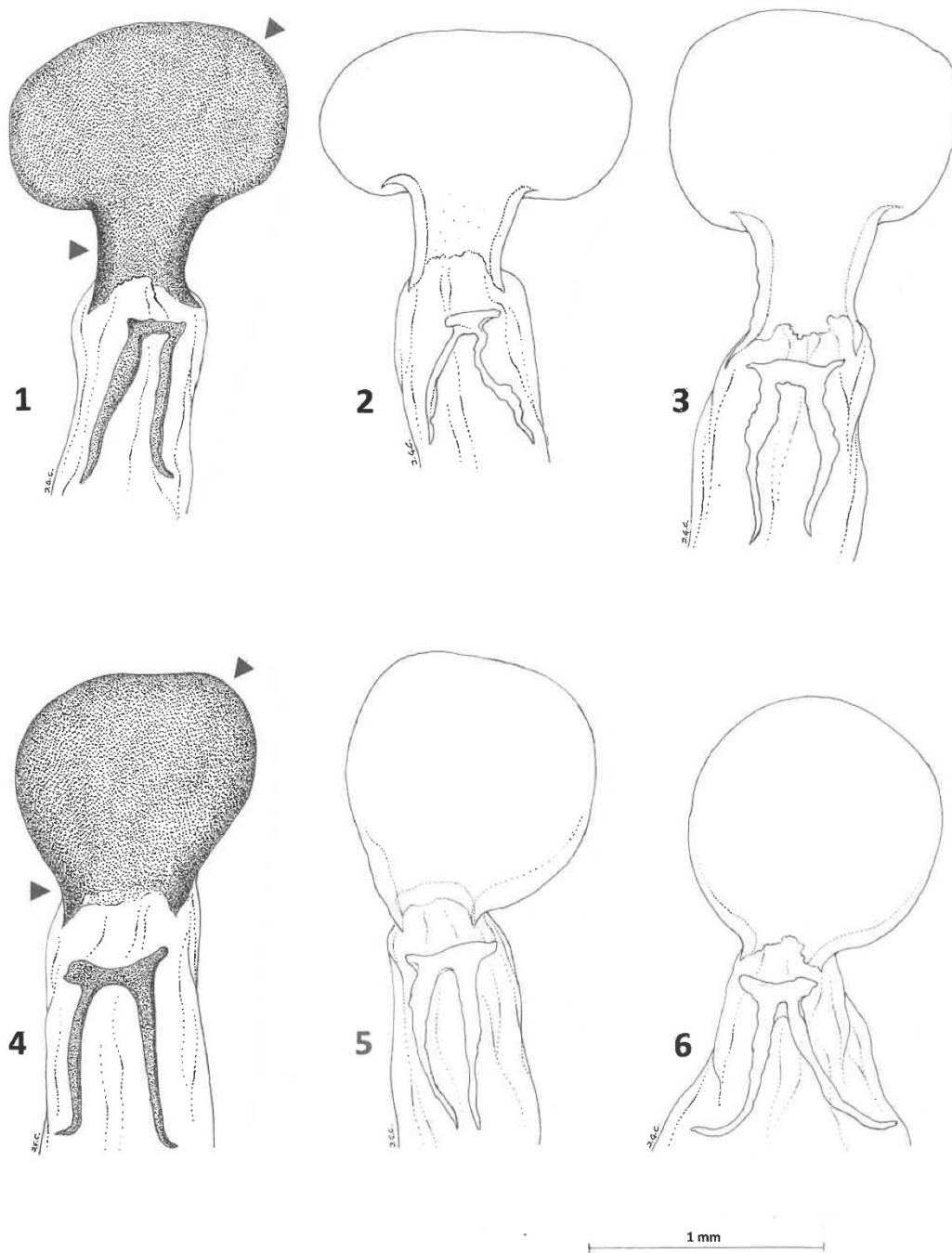
Melitaea aurelia Nickerl, 1850 has reliably been recorded so far on Greek soil in the Flórina Prefecture of N.W. Greece (van der Poorten & Cuvelier 1997), as well as in the Rodhópi Mts. of N.E. Greece (Ghavalás *et al.* 2015), all identifications having been based on the morphology of its male genitalia. In the Rodhópi Mts. a few males have been sporadically met along the Greco/Bulgarian border, suggesting occasional infiltration from Bulgarian soil. More recently, however, a rather extensive mixed population of both genders was discovered by the first author of the present paper in the Greek Rodhópi Mts., and several km away from the Greco-Bulgarian border (Map, Fig. 7), clearly pointing to the existence in Greece of well-established colonies. The newly discovered habitat is characteristically much drier than average in the Greek part of the Rodhópi range (Fig. 8). Females were reliably determined by the second author by newly discovered set of genitalic characters in combination with previously reported characters of female genitalia carried out by Urbahn (1952). Older records of *M. aurelia* from the Rodhópi Mts. by Tolman & Lewington (1997), repeated in Coutsis & Ghavalás (2001), were all based on wing characters which are not always reliable for identification, and perhaps on larval characters as well, as Tolman was a known early-stage breeder.

Differentiation of the females of *M. aurelia* from those of other members of the species-group

The first attempt at making this differentiation was carried out by Urbahn (1952) who, studying the female genitalia, discovered character differences between the antevaginal plates of *M. aurelia*, *M. athalia* (Rottemburg, 1775) and *M. britomartis* Assmann, 1847 – three often mutually confused with each-other species – albeit admitting at the same time that these differences may not always be 100% reliable. Koren & Juković (2012) also doubt the reliability of these features. Higgins (1955) on the other hand figured the complete female genitalia of these three species, but his figures are rather too sketchily drawn to enable one to draw conclusions from them, and the pertinent script does not refer to any differentiating female genitalic characters between them. Even though he was well-aware of Urbahn's article, as attested by its inclusion in the reference list of his relevant paper, he makes no mention of it anywhere else in the script. A study of a large number of females of Greek *M. aurelia* and *M. athalia* carried out by the second author confirmed much of Urbahn's finds and in addition revealed the following:

***M. aurelia*:** antevaginal plate always roughly **elliptical**, followed proximally by a **long** ductus bursae (Figs 1–3).

***M. athalia*:** antevaginal plate always roughly **circular**, followed proximally by a **very short** to **imperceptible** ductus bursae (Figs 4–6).



Figs. 1–6. Ventral aspect of antevaginal plate together with ductus bursae and distal end of corpus bursae of female *Melitaea* specimens from Greece, Makedhonía. **1–3.** *M. aurelia*, Rodhópi Mts., Stámna, 1300 m, 18.vii.2019. **1.** Prep. no. 5883. **2.** Prep. no. 5880. **3.** Prep. no. 5882. **4–6.** *M. athalia*. **4.** Rodhópi Mts., 1300 m, 8.vii.1990, prep. no. 5885. **5.** Rodhópi Mts., Vathírema, 1500 m, 19.vii.2018, prep. no. 5886. **6.** Mt. Vóras (= Kaimáktsalan), 1000 m, 9.vii.2004, prep. no. 5884.

Note: The only elements shown here are the antevaginal plate, the ductus bursae and the distal end of the corpus bursae, all other genital components, either attached or not to these elements, have been omitted.

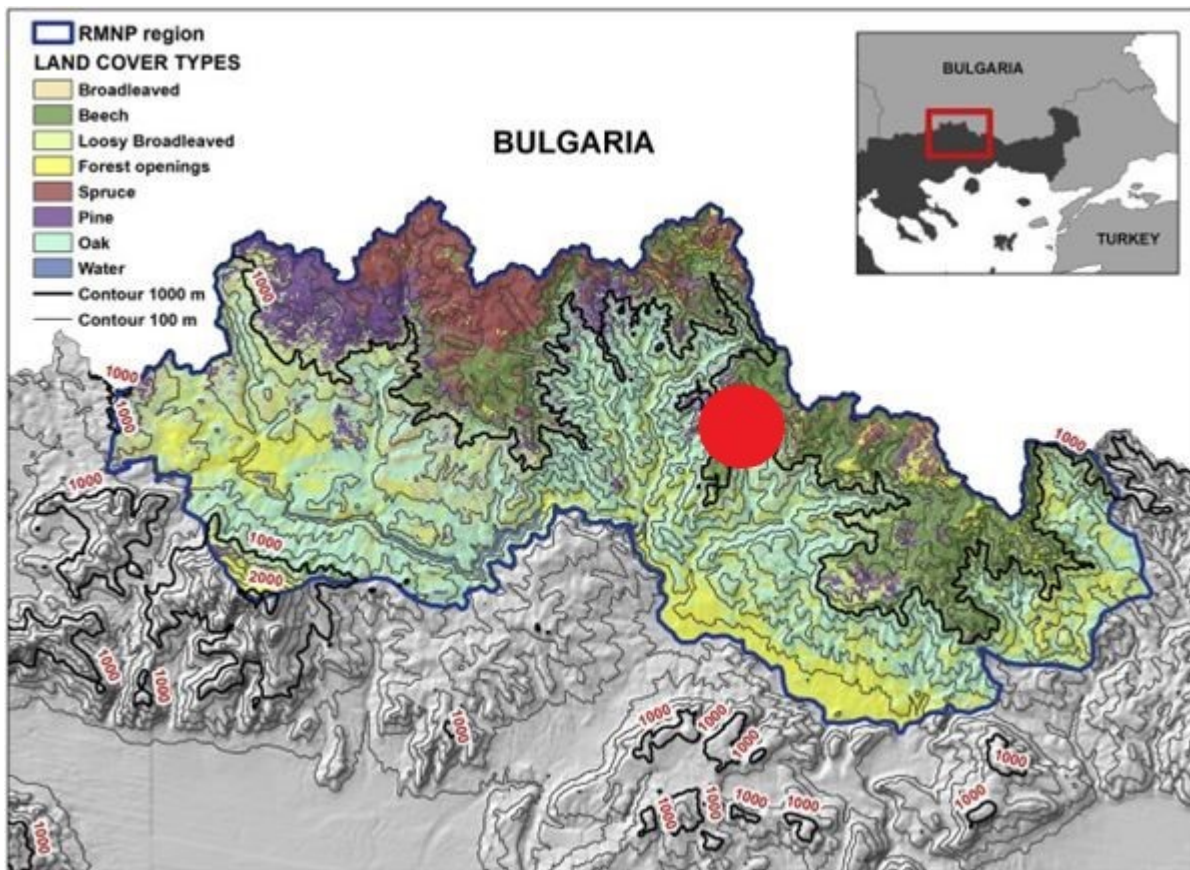


Fig. 7. Map showing exact location (red-filled circle) of *M. aurelia* colony in the Rodhópi Mts., in Greece. Source: <https://www.sciencedirect.com/science/article/pii/S2351989418304268#bib37> accessed on 10.x.2019.

Discussion

With the available now genitalic information at hand it will become feasible to trace in the future and in more detail the distribution of *M. aurelia* in N. Greece, and to check also the possibility of the parallel existence in Greece of *M. britomartis*, a species not included in our study for lack of any hitherto reliable records from this country.



Fig. 8. Habitat of *Melitaea aurelia* in Greece, Rodhópi Mts., Stámna. © H. T. Anastassiú.

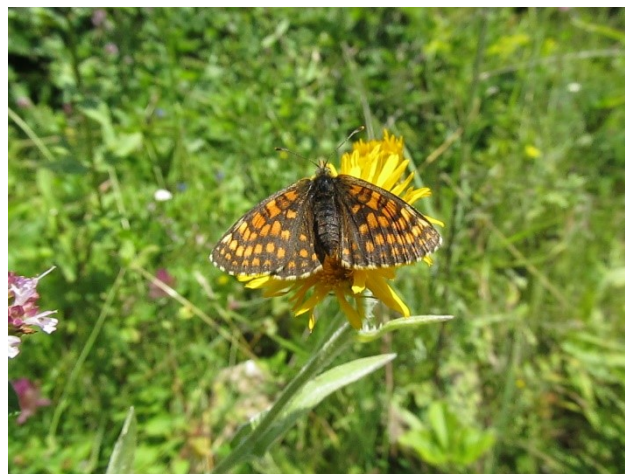


Fig. 9. Female *Melitaea aurelia* in Greece, Rodhópi Mts., Stámna. © H. T. Anastassiú.

A recent survey of the distribution of all three of these species in the N.W. Balkans is given by Koren & Juković (2012), identifications of both genders having been carried out on the basis of genitalic character differences as defined in previous works. The apparent syntopism shown for *M. aurelia* and *M. britomartis* near the southern limit of their distribution in this geographic area suggests, however, that the latter might eventually also be found further south, probably even penetrating into Greek territory.

Acknowledgments

We would like to thank Zdravko Kolev for his invaluable criticism and comments, as well as for kindly bringing to our attention two important articles that we

were unaware of, namely that of Urbahn (1952) and of Koren & Juković (2012), both dealing in part with the same subject as ours.

References

- Coutsis J. G. & Ghalalás N. 2001. The Skippers and Butterflies of the Greek part of the Rodópi massif (Lepidoptera: Hesperioidea & Papilionoidea). — *Phegea* **29**: 143–158.
- Ghalalás N., Anastassíu H. T., Coutsis J. G., & Mastorákis A. 2015. New reports regarding the distribution of several Nymphalid butterflies in Greece. — *Phegea* **43**: 31–33.
- Higgins L. G. 1955. A descriptive catalogue of the genus *Mellicta* Billberg (Lepidoptera: Nymphalidae) and its species, with supplementary notes on the genera *Melitaea* and *Euphydryas*. — *Transactions of the Royal Entomological Society of London* **106**: 1–131.
- Higgins L. G. 1975. *The Classification of European Butterflies*. — Collins, London, 320 pp.
- Koren T. & Jugović J. 2012. New data on the presence of three similar species of the genus *Melitaea*: *M. athalia*, *M. aurelia* and *M. britomartis* (Lepidoptera: Nymphalidae) in the north-western Balkans. — *Annales, Series Historia Naturalis* **22**: 25–34.
- Tolman T. & Lewington R. 1997. *Collins Field Guide. Butterflies of Britain and Europe*. — Harper Collins Publishers, London. 320 pp.
- Urbahn E. 1952. Die Unterschiede der Jugendstände und Falter von *Melitaea athalia* Rott., *britomartis* Assm. und *parthenie* Bkh. = *aurelia* Nick. in Deutschland (Lep.). — *Zeitschrift der Wiener Entomologischen Gesellschaft* **37**: 105–121, 4 black and white pls., 1 colour pl.
- van der Poorten D. & Cuvelier S. 1997. *Melitaea aurelia* new for Greece (Lepidoptera: Nymphalidae). — *Phegea* **25**: 89–90.
-