

# Sympatric and partially synchronic populations of *Melitaea phoebe* ([Denis & Schiffermüller], 1775) and *M. ornata* Christoph, 1893 are well known; how common are hybrids? (Lepidoptera: Nymphalidae)

Peter J. C. Russell

## Abstract

Locations where *Melitaea phoebe* ([Denis & Schiffermüller], 1775) and *M. ornata* Christoph, 1893 are sympatric and at least partially synchronic, across 10 countries, are listed. Comments are made on specimens that are known hybrids and others which have a hybrid appearance, having some characters associated with both species. Albania (nine) and Spain (six) currently record the most locations where both species occur together. Difficulties in species identification of some individual specimens are believed to be the result of hybridisation between these two species.

**Keyword:** Lepidoptera, Nymphalidae, *Melitaea phoebe*, *Melitaea ornata*, sympatric, synchronic, hybrids, Europe.

**Las poblaciones simpátricas y parcialmente sincrónicas de *Melitaea phoebe* ([Denis & Schiffermüller], 1775) y *M. ornata* Christoph, 1893 son bien conocidas ¿hasta qué punto son comunes los híbridos?  
(Lepidoptera: Nymphalidae)**

## Resumen

Se enumeran las localidades donde *Melitaea phoebe* ([Denis & Schiffermüller], 1775) y *M. ornata* Christoph, 1893 son simpátricas y al menos parcialmente sincrónicas, en 10 países. Se comentan los especímenes que son híbridos conocidos y otros que tienen apariencia híbrida, al presentar algunos caracteres asociados a ambas especies. Albania (nueve) y España (seis) registran actualmente el mayor número de localidades en las que ambas especies aparecen juntas. Se cree que las dificultades en la identificación de las especies de algunos especímenes individuales son el resultado de la hibridación entre estas dos especies.

**Palabra clave:** Lepidoptera, Nymphalidae, *Melitaea phoebe*, *Melitaea ornata*, simpátricas, sincrónicas, híbridos, Europa.

## Introduction

As far as the author is aware, there are only two published incidents of hybridisation between *Melitaea phoebe* ([Denis & Schiffermüller], 1775) and *M. ornata* Christoph, 1893, in Hungary (Bálint & Ilonczai,

2001) and in Slovenia (Russell et al. 2014). There are, however, multiple instances of the two species flying in close proximity, within the parameters of the species' known flight range. There have been many occasions when the author has experienced difficulty in determining the specific identity of a particular specimen, particularly in the case of historical museum material. Known locations where the two species occur in close proximity are listed here, together with comments on known or supposed hybridisation between them.

**Locations where *M. phoebe* and *M. ornata* are sympatric and often partly synchronic, listed under country in alphabetical order**

**ALBANIA:**

1) Gjirokaštër, Tepelenë, Bëncë, at the old bridge S. of the village (220 m). Rocky and bushy/shrubby slopes, meadows. 17-V-2014 (Micevsky et al. 2015).

2) Korçë, Drenovë, three sites very near the village and each other: two with *M. phoebe* and one with *M. ornata*, 21-VII-2013 (Šašić et al. 2015). The presence of *M. ornata* in July is unusual but not unknown and this is very probably a second-generation specimen. These are often the result of larvae being exposed to humid conditions when, instead of entering diapause, they continue to feed, pupate and adults emerge (cf. Russell et al. 2007, p. 145; Russell & Pateman, 2019, pp. 88-89).

3) South of Dejë-Macukull [41.6581N; 20.1354E], 3-VII-2023, by barcode readings.

4) Northeast of Hotolisht [41.1842N; 20.4406E] *M. ornata* and [41.1852N; 20.4433E] *M. phoebe*, 21-VI-2023, by barcode.

5) Hasi district [42.3464N; 20.1660E] 28-VI-2023, by barcode.

6) West of Zhulat (40.12N 19.98 E) at 360 m.

7) Ujesjellesi i Ali Pashait (40.264N 20.006E) at 210 m.

8) South of Cerujë (41.23N 20.08E and 41.27N 20.089) at 1040 m.

9) North of Vishaj (41.27N 19.82E) at 120 m.

**ARMENIA:**

1) Populations of both species are located in close proximity around the southern tip of Armenia (Tshikolovets & Nekrutenko, 2013). There are also records of both species from the Khosrov Nature Reserve, but this occupies an area of nearly 7000 hectares and populations could be beyond the usual flight of the two species (Tshikolovets & Nekrutenko, 2013).

**FRANCE:**

1). Var, Near Fayence, (Saint Paul en Forêt) at different times. A female taken in 2008 deposited an egg batch which produced adult *M. ornata* in 2009 (Figures 1A-1B). All females from this area taken since have produced *M. phoebe* offspring (Gascoigne-Pees, pers. comm.).

2). Var, Massif de la Sainte Baume, Nans-les-Pins, the type locality of *M. phoebe* race *subtusca* Verity, 1952; the syntypic series of 7 specimens (4 ♂, 3 ♀) are housed in the Museo Zoologico de "La Specola" dell'Università, Firenze, Italy and were taken between 24-V-1926 and 24-V-1936. High resolution photographs of the seven specimens were examined by Russell et al. (2020), who concluded that both *M. phoebe* and *M. ornata* were present; in fact, a specimen of each species was taken at Nans-les-Pins on the same day, 24-V-1926 by two different collectors, verified by the different handwriting on the data labels (see Figures 2 A-C and 3 A-C). From figures 2B (*M. phoebe*) and 3B (*M. ornata*) the distinguishing characters of the two species are clearly visible: submarginal black markings arcuate, touching the intervening veins and club shaped antennae (*M. phoebe*) and the submarginal black markings more triangular, not touching the intervening veins and spatulate antenna (*M. ornata*). It is considered highly likely that hybrids emerged in this area of La St. Baume between 1926 and 1936; for example, compare the figures of a known hybrid reared from a Slovenian *M. ornata* female (Figure 4) and a female from La Ste Baume (Figure 5). If both species remain present, it may be possible to rear hybrids.

## GREECE:

- 1). Males of both species have been observed at Thráki, East Rodópi Mts., near Essími, 900 m, evidenced from a list of species provided by John Coutsis (Athens, Gr., in litt.).
- 2). Mt. Órvilos, Macedonia, GR., 800 m, 13-VI-1992 and 700 m, 15-VII-1992, Pamperis (2009).

## HUNGARY:

See Bálint & Ilonczai 2001 (in Hungarian).

## ITALY:

Both species have been recorded from Calabria, Cosenza, San Fili, Monte Martinelli but at different times: *M. phoebe* at 880 m on 10-VI-2007 and *M. ornata* at 600 m on 3-VI-1913 (Russell et al. 2020).

## KAZAKHSTAN:

*M. phoebe* var. *alatauica* Wagner, 1913 [TL: Kazakhstan, Taldi Kurgan and mountains near Issyk-Kul Lake and Ili River], was described from Kazakhstan by Wagner but this name was preoccupied by *M. parthenie alatauica* Staudinger, 1881. It was replaced by *M. phoebe wagneri* by Wnukowsky (1929). In his original article Wagner illustrated the upper and undersides of males of what he considered to be typical *M. phoebe* and the variety *alatauica* (Wagner, 1913, p. 89, figs 5-6), exemplifying the heavy post discal black spotting, differentiating the latter from typical *M. phoebe*.

Russell & Tennent (2016), in their article on the identities of the names of various taxa associated with *M. phoebe*, considered that the name *wagneri* (= *alatauica*) should continue to be associated with *M. phoebe* rather than *M. ornata*. However, on close examination of the Wagner's figures (see Figures 6A-B), it is noted that the uppersides and undersides figured are of different specimens (the positions of the antennae do not match); also, the specimen of "*M. phoebe*" figured underside (Figure 6B) shares a remarkable resemblance to the figure of *M. ornata* in Tshikolovets et al. (2016, plate LIII, fig. 2), a specimen from Kazakhstan, Province Aqtöbe, Alimbet, 22-V-2001 (see Figures 7A-B). Unfortunately, the precise locality where Wagner's illustrated specimens were collected is unknown. Thus, although it remains possible that the illustrated specimen of var. *alatauica* is *M. phoebe*, the present author considers that Wagner's 'typical *M. phoebe*' specimen underside, is almost certainly *M. ornata*.

In south-eastern Kazakhstan, populations of *M. ornata* are concentrated along the border with Kyrgyzstan, adjacent to the type locality of *M. ornata adversaria* Korb, Stradomsky & Kuznetsov, 2015, on the northern slopes of the western end of the Tian Shan Mountains. However, there are additional populations to the north, near Zharkent in the Almaty Region, where there is a small concentration of populations of *M. phoebe* (assuming the identifications of the two species were correct [see Tshikolovets et al. 2016, plate LIII]). In the northeast, Tshikolovets et al. (2016, p. 329, map) marked the locality of a specimen of 'uncertain status', which could be a hybrid.

## RUSSIAN FEDERATION:

Freshly emerged male *M. phoebe* (Figures 8A-B) and two worn females of *M. ornata* were observed on the calcareous hills south of the village of Krasnoznamenska, Orenburgskaya, on 2-VI-2012; thus, indicating the earlier emergence of the latter species (Russell & Tennent, 2022) and the possibility of hybridisation. A male *M. ornata* from the same region is figured for comparison (Figures 9A-B).

## SERBIA:

*M. ornata* has been recorded from two localities:

- 1). Trgovište, Šaprance, near the border of North Macedonia on 31-V-2016 (Popović & Verovnik, 2018, p. 514).

2). Izvor, Mt. Rudina Planina, southeast of Piroton on 12-V-2020 (Vujić et al. 2020).

A group of final instar larvae of *M. phoebe* were observed by the author feeding on *Centaurea grisebachii* (Nyman) Heldr. just to the east of Piroton on 6-VI-2013; further nests of larvae were observed feeding on *C. scabiosa* L. on a sloping meadow to the northeast of Piroton. Thus, *M. phoebe* appears to be common in this area and it would be unsurprising if the two species came into contact with one another.

#### SLOVENIA:

A batch of ova obtained from a captured female *M. ornata* from a colony two km northwest of Rakitovec, Koper, 525 m, produced what were, from larval morphological features, adults and biochemical analysis *M. phoebe* adults but they were clearly hybrids (see Figure 5). A female *M. ornata* taken the following year from the same location produced offspring typical of *M. ornata*. Males taken from the colony all appeared to be *M. ornata*. However, within two km of that colony, male *M. phoebe* was captured at the same time as the *M. ornata* female was taken (see Russell et al. 2014).

#### SPAIN:

1). Granada, Monachil, 1600 m, and this location *M. phoebe* larvae were observed feeding on *Centaurea ornata* Willd. & *C. boissieri* DC. and *M. ornata* larvae were found on *Onopordium acanthium* L. and *Carduus nutans platypus* (Lange) Greuter (Sánchez Mesa & Muñoz Sarios, 2017).

2). Granada, Beas, 1200 m, *M. phoebe* larvae observed on *Centaurea ornata* Willd. and *M. ornata* larvae feeding on both *Cirsium arvense* (L.) Scop. and *Carduus nutans platypus* (Sánchez Mesa & Muñoz Sarios, 2017).

3). Granada, Güéjar Sierra, circa 1100 m, in north-western Sierra Nevada was a locality provided for *M. phoebe* captured on 24-IV and *M. ornata* taken on 11-V, 3-VI (no years given) (Hinojosa et al. 2022, supplementary material pages 2-3).

4). Granada / Almería, Puerto de la Ragua, both *M. phoebe* (Hinojosa et al. 2022 supplementary material, page 3 et Russell & Vives Moreno, 2023) and *M. ornata* (Russell et al. 2020) have been reported from this location.

5). Albacete, Riopar, *M. phoebe* larvae at 1170 m, feeding on *Centaurea ornata* and *M. ornata* larvae at 1300 m feeding on *Cirsium pyrenaicum* (Jacq.) All., *Carduus nutans platypus* and *Onopordium illyricum* L. (Muñoz Sarios & Sánchez Mesa, 2019a).

6). La Sagra was listed as a locality for both *M. phoebe* captured on 21-V and *M. ornata* on 19-23-V (no years given); however, this is a wide area covering 1322 km<sup>2</sup> (Wikipedia, accessed 4-VII-2023), and no definitive locations were mentioned (Hinojosa et al. 2022, supplementary material, pages 2-3).

## Discussion

Sánchez Mesa & Muñoz Sarios (2017, p. 317) reported a larva with a black head carapace that proved to be *pseudornata* (= *M. ornata*). It is suggested that this was probably a hybrid between *M. phoebe* and *M. ornata*. Recently *M. ornata* was found to occur in previously unrecorded Spanish Provinces, including Cuenca, Guadalajara, Palencia, Toledo and Zaragoza; *M. ornata* and has now been confirmed from 25 of the 47 Provinces of mainland Spain (Russell & Vives Moreno, 2023). Thus, it is anticipated that further hybrid specimens will be identified in the future from Spain and Albania. It is suspected that the larger numbers of locations with sympatry of these two species reported in Albania and Spain results from intensified fieldwork in the last few years, since *M. ornata* was recognised as a separate species from *M. phoebe*.

## Acknowledgements

The author is greatly indebted to Sylvain Cuvelier (Ieper, Belgium) for passing on the information gained from his fieldwork in Albania and the results of barcoding Albanian specimens of both species. Thanks, are also due to Vadim Tshikolovets (Czech Republic) for providing photographs of specimens of *M. ornata* from Alimbet, Kazakhstan. Luca Bartolozzi (Florence, Italy) is thanked for providing photographs of

both species from the La Sainte Baume, Var, France taken by S. Bambi. Martin Gascoigne-Pees is thanked for providing photographs of *M. ornata* reared from an egg batch produced by a female captured near Fayence, Var, France in 2008. John Tennent is thanked for his valuable comments on the manuscript, from which it was greatly improved.

### Conflict of Interest

The author declares that he has no financial interest or personal relationship that could influence the work presented in this article.

### References

- Bálint, Z., & Ilonczai, Z. (2001). Újabb adatok a Magyarországon védett nappali lepkék ismeretéhez (Lepidoptera: Lycaenidae, Nymphalidae). *Természetvédelmi közlemények*, 9, 209-218.
- Hinojosa, J. C., Tóth, J. P., Monasterio, Y., Sánchez Mesa, L., Muñoz Sariot, M. G., Escobés, R., & Vila, R. (2022). Integrative taxonomy reveals a new *Melitaea* (Lepidoptera: Nymphalidae) species widely distributed in the Iberian Peninsula. *Insect Systematics and Diversity*, 6(2), 1-9. <https://doi.org/10.1093/isd/ixac004>
- Micevsky, N., Franeta, F., Gascoigne-Pees, G., & Micevsky, B. (2015). Butterfly surveys in Albania during 2014 including the discovery of two new species for the country. *Ecologica Montenegrina*, 3, 1-12. <https://doi.org/10.37828/em.2015.3.1>
- Muñoz Sariot, M. G., & Sánchez Mesa, L. (2019). Nueva subespecie de *Melitaea ornata* Christoph, 1893, con la descripción de sus estadios preimaginales (Lepidoptera: Nymphalidae). *Archivos Entomológicos*, 21, 5-20.
- Pamperis, L. N. (2009). *The Butterflies of Greece*. Koan Editions.
- Popović, M., & Verovnik, R. (2018). Revised checklist of the butterflies of Serbia (Lepidoptera: Papilionoidea). *Zootaxa*, 4438(3), 501-527. <https://doi.org/10.11646/zootaxa.4438.3.5> PMID:30313133
- Russell, P. J. C., Bartolozzi, L., Hawkins, R. L., Tennent, W. J., & Léger, T. (2020). Designation of lectotypes for some Spanish and other western European *Melitaea* taxa, some with mixed syntypic series of *M. phoebe* ([Denis & Schiffermüller], 1775) and *M. ornata* Christoph, 1893 (Lepidoptera: Nymphalidae). *SHILAP Revista de lepidopterología*, 48(191), 449-472. <https://doi.org/10.57065/shilap.369>
- Russell, P. J. C., & Pateman, J. E. (2019). Confirmation of the presence of *Melitaea ornata* Christoph, 1893 (Lepidoptera: Nymphalidae) in Croatia and Bosnia and Herzegovina with its host-plants. *Entomologists' Gazette*, 70, 79-92.
- Russell, P. J. C., Pateman, J. E., & Verovnik, R. (2014). First record of *Melitaea ornata* Christoph, 1893, from Slovenia, with notes on its confirmed distribution and hybridisation with *M. phoebe* ([Denis & Schiffermüller], 1775). *Entomologist's Gazette*, 65, 135-153.
- Russell, P. & Tennent, W. J. (2016). A synonymic list of names associated with western Palaearctic *Melitaea phoebe* (Denis & Schiffermüller, 1775) species group taxa *M. phoebe*; *M. punica* Oberthür, 1876; *M. ornata* Christoph, 1893) (Lepidoptera, Nymphalidae). *Nota Lepidopterologica* 39(1): 27-56.
- Russell, P. J. C., & Tennent, W. J. (2022). Butterflies observed on the western (European) slopes of the southern Ural Mountains during three spring visits in 2011, 2012 and 2014. *Neue Entomologische Nachrichten*, 80, 199-212.
- Russell, P. J. C., Tennent, W. J., Pateman, J., Varga, Z. S., Benyamini, D., Peer, G., Bálint, Z., & Gascoigne-Pees, M. (2007). Further investigations into *Melitaea telona* Fruhstorfer, 1908; (= *ogygia* Fruhstorfer, 1908; = *emipunica* Verity, 1919) (Lepidoptera: Nymphalidae), with observations on biology and distribution. *Entomologists' Gazette*, 58, 137-166.
- Russell, P. J. C., & Vives Moreno, A. (2023). The identities of some subspecies. Forms and individual specimens in museum previously classified as *Melitaea phoebe* ([Denis & Schiffermüller], 1775) (Lepidoptera: Nymphalidae). *SHILAP Revista de lepidopterología*, 51(202), 213-227. <https://doi.org/10.57065/shilap.453>
- Sánchez Mesa, L., & Muñoz Sariot, M. G. (2017). *Melitaea ornata* Christoph 1893, nueva especie para la Península Ibérica datos de su morfología, biología y ecología comparada con los de *Melitaea phoebe* ([Denis & Schiffermüller], 1775). (Lepidoptera: Nymphalidae). *Archivos Entomológicos*, 18, 313-324.
- Šašić, M., Popović, M., Cuvelier, S., Đuric, M., Franeta, F., Gascoigne-Pees, M., Koren, T., Maes, D., Micevski, B., Micevsky, N., Mølgaard, M. S., van Swaay, C., Wynhoff, I., & Verovnik, R. (2015). Contribution to the

- knowledge of the butterfly fauna of Albania. *Nota lepidopterologica*, 38(1), 29-45. <https://doi.org/10.3897/nl.38.8814>
- Tshikolovets, V. V., & Nekrutenko, Y. (2013). *The Butterflies of Palaearctic Asia, 9: The Butterflies of Caucasus and Transcaucasia*, Tshikolovets Publications, Pardubice, Czech Republic.
- Tshikolovets, V. V., Kosterin, O., Gorbunov, P. & Yakolev, R. (2016). *The Butterflies of Kazakhstan*. Tshikolovets Publications, Pardubice, Czech Republic.
- Vujić, M., Djurić, M., & Tot, I. (2020). New Localities for rare butterflies *Muschampia cribrellum* and *Melitaea ornata* (Lepidoptera: HesperIIDae, Nymphalidae) in Serbia. *Acta Entomologica Slovenica*, 28(2), 159-164.
- Wagner, F. (1913). Beitrag zur Lepidopterenfauna des Iligebietes sowie des Sary-Dschas (Asia centr.) *Entomologische Mitteilungen Berlin*, 2(1), 22-30, (2), 50-62, (3), 88-95, (4), 112-126, (5), 153-158, (6), 185-190, (7/8), 244-254, (9), 285-288.
- Wnukowsky, W. (1929) Einige faunistische Angaben uber die Insekten Sibiriens und des Ussuri-Gebietes. *Zoologischer Anzeiger*, 83(9/10), 221-224.

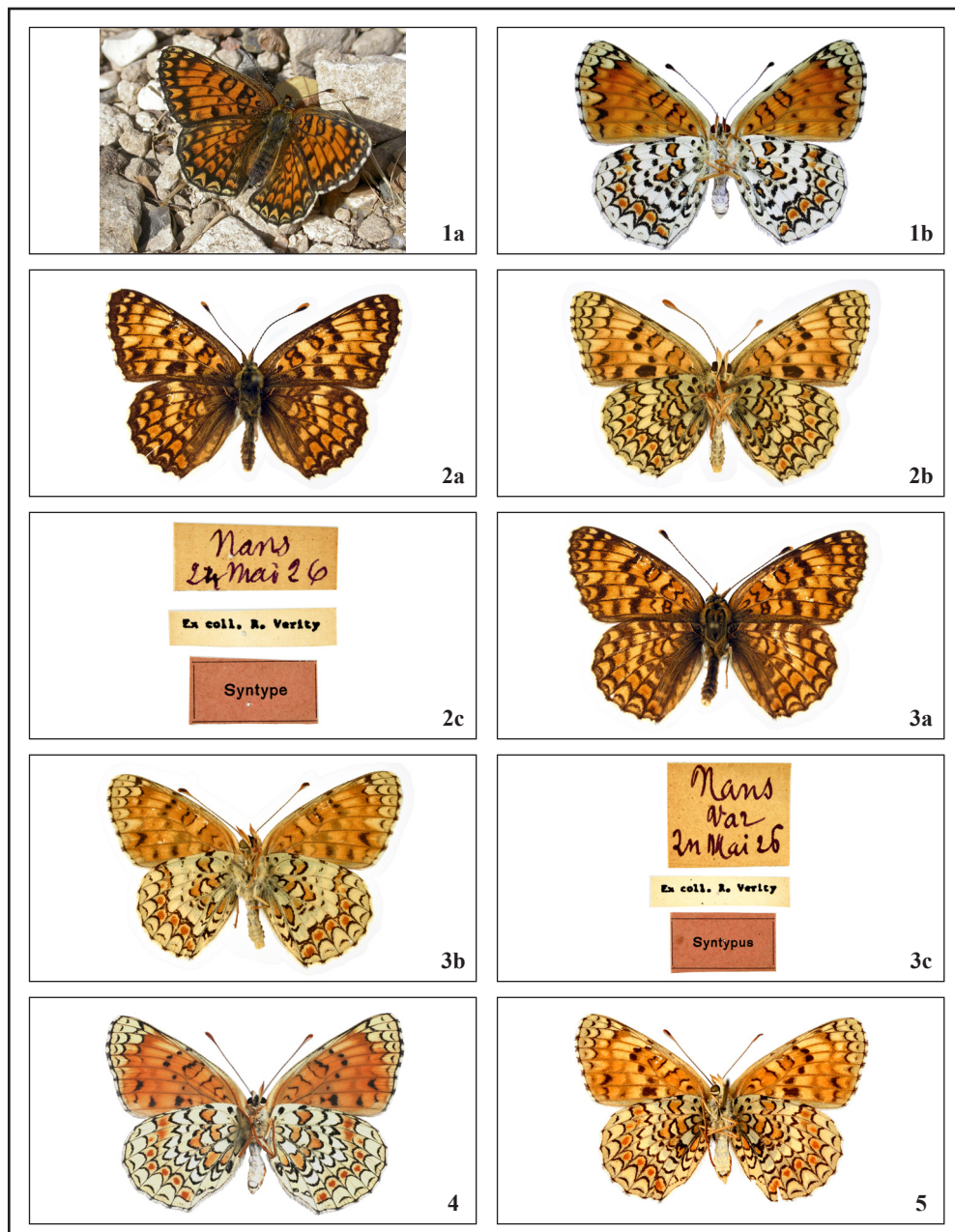
Peter J. C. Russell  
Oakmeadow  
Wessex Avenue, East Wittering  
GB-West Sussex PO20 8NP  
REINO UNIDO / UNITED KINGDOM  
E-mail: peterjcrussell82@yahoo.com  
<https://orcid.org/0000-0001-6211-4706>

(Recibido para publicación / *Received for publication* 26-V-2024)  
(Revisado y aceptado / *Revised and accepted*)  
(Publicado / *Published* 30-VI-2025)

**Derechos de autor:** El autor(es). Este es un artículo de acceso abierto distribuido bajo los términos de la Licencia de Reconocimiento 4.0 Internacional de Creative Commons (CC BY 4.0) que permite el uso, distribución y reproducción sin restricciones en cualquier medio, siempre que se cite al autor original y la fuente. / **Copyright:** The author(s). This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.



**Figures 1-5.** 1. *Melitaea ornata* female upperside (A) and underside (B) reared from an egg batch produced by a captive female originating from Fayence, Var, France, emerged IV-2009. © Gascoigne-Pees. 2. *M. phoebe* male upperside (A), underside (B) and labels on pin (C), Nans, Var, France, 24-V-1926. © S. Bambi. 3. *M. ornata* male upperside (A), underside (B) and labels on pin (C), Nans, Var, France, 24-V-1926. © S. Bambi. 4. *M. phoebe* / *M. ornata* hybrid female underside, reared from egg batch produced by captive *M. ornata* female, Rakitovec, Slovenia, emerged 17-V-2012. © Russell. 5. Possible *M. phoebe* / *M. ornata* hybrid female underside, Nans, Var, France, 24-V-1936. © S. Bambi.



**Figures 6-9.** 6. Screen shot of figures 5 and 6 in Wagner, 1913 (A); detail of the underside of one of the two 'typical *M. phoebe*' specimens in figure 5 from Wagner, 1913 (B). © expired. 7. *M. ornata* female upperside (A), underside (B), Alimbet, Kazakhstan, 22-V-2001. © Gorbunov. 8. *M. phoebe* male upperside (A), underside (B), Krasnoznamenska, Orenburgskaya, Russian Federation, 02-VI-2012. © Russell. 9. *M. ornata* male upperside (A), underside (B), Guberlya, Orenburgskaya, Russian Federation, 18-V-2014. © Russell.

