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Has *Colias hyale* (Linnaeus, 1758) ever existed in Madeira (Insecta: Lepidoptera: Pieridae)?

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With 1 plate

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ABSTRACT: The reports of the presence of *Colias hyale* from Madeira are examined and commented upon. The frequency of large populations of *Colias crocea* on the island reported by various researchers is documented. It is suggested that the museum specimens, which were observed by Burr in the collections of the *Museu de História Natural do Seminário do Funchal*, if they were of Madeiran origin, were most probably *Colias crocea* f. *cremonae*. The resemblance of *C. hyale* to this form has been reported previously and it has been recorded from Madeira more recently, when the population of *C. crocea* was abundant. Most recently, Payne considered that *C. hyale* had been recorded on Madeira. It is concluded that *C. hyale* should be removed permanently from the list of Madeiran butterflies.

Keywords: *Colias hyale*, *Colias crocea*, Madeira, Museums, Funchal.

RESUMO: Os relatos da presença de *Colias hyale* na Madeira são examinados e comentados. A frequência de grandes populações de *Colias crocea* na ilha relatada por vários investigadores é documentada. Sugere-se que os espécimes de museu, observados por Burr nas coleções do Museu de História Natural do Seminário do Funchal, se fossem de origem madeirense, seriam muito provavelmente *Colias crocea* f. *cremonae*. A semelhança de *C. hyale* com esta forma foi relatada anteriormente e foi registada na Madeira recentemente, quando a população de *C. crocea* era abundante. Mais recentemente, Payne considerou que *C. hyale* havia sido encontrada na Madeira. Conclui-se que *C. hyale* deve ser removida permanentemente da lista de borboletas madeirenses.

Palavras-chave: *Colias hyale*, *Colias crocea*, Madeira, Museus, Funchal.

INTRODUCTION

The first published suggestion that *Colias hyale* (Linnaeus, 1758) was seen on the island of Madeira was by COCKERELL (1923: 244), who reported that Dr. Malcolm Burr (no references were attached to Cockerell's article) had seen specimen(s) of *C. hyale* in the *Museu de História Natural do Seminário do Funchal*, Madeira, with the comment, 'presumably collected in Madeira'. There is no appropriate article listed by *Wikipedia* under Dr. M. Burr (accessed 16.03.2020); however, it should be noted that Burr was a specialist in Dermaptera and Orthoptera, rather than Lepidoptera. When the collection in the *Seminário* was moved to the Natural History Museum in the Funchal Botanical Gardens, AGUIAR & CARVALHO (2016) catalogued all the surviving insect material. No specimen of *C. hyale* was present; however, there was a pair of *C. crocea* (Geoffroy, 1875) without data (note: none of the specimens present in the *Seminário* had any data [FRANQUINHO AGUIAR, *pers. comm.*]). PAYNE (2020: 237-8 & plate 38, p. 306), solely on the basis of Cockerell's report, included *C. hyale* as a Madeiran butterfly, including a map of its 'known distribution'.

Historical references to *C. hyale* and *C. crocea* in Madeira

BARON DE WORMS (1964: 253) reported on his visit to Madeira in April 1964 and noted as follows: "...an area of

about four acres was alive with *Colias crocea* Fourc. and I have seldom seen it more abundant in a confined space...". SWASH & ASKEW (1982) also made a comment that *C. crocea* was the most common butterfly when they visited the island; the significance of such comments will become apparent later. LACE & JONES (1984: 163) simply recorded that *C. hyale* is a vagrant, without further comment; however, they recorded a large number of *C. crocea* along a transect at Ponta de São Lourenço between 10 and 40 m altitude. OWEN *et al.* (1987: 29) merely mentioned that *C. hyale* had been reported from Madeira, without any further reference; they noted (p. 30) that in April 1985: 'at Ponta de São Lourenço dozens of *C. crocea* females were laying on clovers and vetches'. KARSHOLT (1988) referred to the report of *C. hyale* by COCKERELL (1923), considering it doubtful; he suggested that this could have been confused with *C. crocea* f. *helice* (Hübner, 1879). PAYNE (2020: 237) commented upon this possibility as follows: "...it seems to this author that confusing *C. hyale* with *C. crocea* var. *helice* (sic) is too easy an explanation to try to presume – *helice* is creamy white in colour and *hyale* is bright yellow...". From this comment it is obvious that Payne was unaware that the females of *C. hyale* are always of the *alba* form, which of course are off-white in colour and thus rather similar to *C. crocea* f. *helice* (see Plate I: 1 & 3). The similarity in flight would have been notable.



Plate I – 1) *Colias hyale* ♀, Frenois, Cote d'Or, France, 350 m, ex ovum. 2) *Colias hyale* ♂, Frenois, Cote d'Or, France, 350 m, ex ovum. 3) *Colias crocea* ♀ f. *helice*, Rogi, Peloponnese, Greece, 900 m. 4) *Colias crocea* f. *cremonae* ♀, Porto do Salão, Azores, Portugal, 25 m.

OWEN & SMITH (1993) make no mention of *C. hyale* being part of the North Atlantic Islands butterfly fauna. MEYER (1993: 125, 129) did not include *C. hyale* in his 'checklist' of Madeiran butterflies but later, placing it in parentheses, referred to COCKERELL (1923) reporting that there was specimen in the *Seminário*. ZHANG (1994: 150) listed Madeira under geographical records for *C. hyale*, without further comment. SALMON & WAKEHAM-DAWSON (1999) listed *C. hyale* as 'uncertain status', commenting later on the article of COCKERELL (1923). However, they included a section on *C. crocea*, saying that it was the second most abundant butterfly in July and August 1998; they figured (plate 1, p. 79) several examples of *C. crocea*, including a male *C. crocea* f. *cremonae* Bang-Haas, 1912, to which, unfortunately, they gave the authority as Verity (see RUSSELL *et al.*, 2003) and stated that it was synonymous with 'abs *pallida* Manon, 1926, *tergestina* Stauder, 1913 and *helicinoides* Braun 1930', which are merely very pale aberrations, but still have vestiges of the red pigment present, unlike the form *cremonae*, in which it is entirely absent. This is probably the only positive record of this form from Madeira; hardly surprising since *C. crocea* populations are rarely large enough to encounter many examples of this double recessive mutant (RUSSELL *et al.*, 2003).

WAKEHAM-DAWSON *et al.* (2001) mentioned the supposed sighting by Burr (COCKERELL, 1923) and placed *C. hyale* under the heading of 'doubtful records'. MEYER (2003: 327) placed *C. hyale* in his 'Registos erróneos' list of Macaronesian species, without further comment. WAKEHAM-DAWSON & AGUIAR (2003) mentioned that *C. crocea* was common in the Funchal Ecological Park. WAKEHAM-DAWSON, McCULLOUGH & AGUIAR (2004: 113) made no comment on the record of *C. hyale*. AGUIAR & KARSHOLT (2006: 32) placed *C. hyale* in their list of butterflies from Madeira with the following note (p. 91): "...recorded from Madeira by COCKERELL (1923: 244) based on a probably unlabelled specimen that once existed in the collection of the Museu do Seminário in Funchal..." "All subsequent records of *hyale* from Madeira are based on this record." KRATOCHWIL *et al.* (2018) did not mention *C. hyale*, but summarised the works of other researchers on *C. crocea* in Madeira, mentioning the abundance of this species in some years.

DISCUSSION AND CONCLUSION

The reference to the fact that Burr had seen *C. hyale* in the *Seminário* in Funchal by COCKERELL (1923) is intriguing. It is fairly obvious that the specimen(s) that Burr

saw was(were) not extant when AGUIAR & CARVALHO (2016) catalogued the insects on their removal to the museum in the Funchal Botanical Gardens, since there was just one pair of *C. crocea* (no mention of f. *helice*). It seems very doubtful that Burr, even as a 'non-lepidopterist' would have mistaken these for *C. hyale*; surely it would have been a lemon yellow coloured butterfly that would have initiated his suggestion of *C. hyale*. It would seem likely therefore that between the times that Burr saw what he considered was *C. hyale* (certainly prior to 1923) and the cataloguing in 2016, around a century later, the reported specimens had disappeared. Maybe this was the result of infestation; butterflies are very prone to becoming a pile of dust in just a few years if left unattended.

Assuming that Burr did see something that he considered was *C. hyale*, then what are the options? It does seem very unlikely that *C. hyale* reached Madeira; the nearest populations are in northwest Spain just south of the Pyrenees, some 2000 Km away and the winds at this latitude are generally westerlies, tending to prohibit migration to the west. The present author has already refuted the wholly unscientific 'record' by PAYNE (2019: 153) of this species reaching the Azores Archipelago (Russell, 2020). It must be remembered that the butterflies in the *Seminário* collection originated from all over the world, there were both tropical and European specimens present (AGUIAR & CARVALHO, 2016), for example: *Morpho menelaus* (Linnaeus, 1758), *Aglais urticae* (Linnaeus, 1758) and *Aglais io* (Linnaeus, 1758).

Another and more probable explanation for this quandary is that, if what Burr saw did actually originate from Madeira, it was a female of *C. crocea* f. *cremonae* (see Plate I: 2 & 4). As has been shown in the Azores (RUSSELL, TENNENT & HALL, 2003), when populations of *C. crocea* flourish, this double recessive mutant form can be found in some numbers. It has been noted above, that populations of *C. crocea* on Madeira have been seen to become very extensive, often being the most abundant butterfly on the island (SWASH & ASKEW, 1982; OWEN *et al.*, 1987; SALMON & WAKEHAM-DAWSON, 1999). Thus, it would seem possible that what Burr saw was *C. crocea* f. *cremonae*, a form already recorded in Madeira and figured by SALMON & WAKEHAM-DAWSON (1999). Payne's curious assertion (2020: 237) that the claim by WAKEHAM-DAWSON, SALMON & AGUIAR '(2000)? (2001) that the record was doubtful 'on no evidence whatever' is nonsense. In fact, it is only PAYNE (2020: 237), who has accepted the 'record' of *C. hyale*, which of course it is not – it is merely a 'report' of a specimen with no data, without any positive evidence. Even in the unlikely event that the

specimen(s) observed by Burr was (were) actually *C. hyale*, the fact that it had no location data precludes it (them) from being a 'record' of this species from Madeira. All of the inclusions of *C. hyale* in lists of Madeiran butterflies are based on COCKERELL (1923: 244), it has never been observed since. Finally, it is concluded that the so called 'record' of *C. hyale* from Madeira is not only dubious, but entirely false and this species should be removed entirely from the list of Madeiran butterfly fauna.

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