

**A new subspecies of *Euchloe charlonia* DONZEL (1842)
from southern Spain : *bazae* ssp. nov.
(*Lepidoptera* : *Pieridae*)**

by Filippo FABIANO (*)

Abstract

The author communicates the discovery of the Pierid : *Euchloe charlonia* DONZEL (1842) in a dry steppe near Baza, Granada, Spain. The collected specimens, compared to the north African ones, show some differences concerning the size, the wing shape and the wing pattern and are described as *Euchloe charlonia bazae* ssp. nov.

Résumé

L'auteur communique la découverte d'*Euchloe charlonia* DONZEL (1842) (*Pieridae*) qu'il a trouvé dans une steppe sèche près de Baza, Grenade, Espagne. Les exemplaires capturés sont comparés à des spécimens provenant de l'Afrique du Nord. Ainsi il constate des différences dans la taille, la forme et les dessins alaires. Cette population est nommée : *Euchloe charlonia bazae* ssp. nov.

Samenvatting

De auteur deelt de ontdekking mede van *Euchloe charlonia* DONZEL (1842) (*Pieridae*) in een droge steppe nabij Baza, Granada, Spanje. De gevangen exemplaren worden vergeleken met diertjes uit N. Afrika waarbij verschillen in grootte, vleugelvorm en tekening worden vastgesteld. Deze populatie wordt beschreven als *Euchloe charlonia bazae* ssp. nov.

Zusammenfassung

Der Autor gibt Auskunft über die Entdeckung der Pieride : *Euchloe charlonia* DONZEL (1842) in einem trockenen Steppe in der Nähe von Baza, Granada, Spanien. Die gesammelten Exemplare, verglichen mit nordafrikanischen

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Exemplaren, weisen Unterschiede in der Grösse, in der Zeichnung und in der Flügelform auf, und werden wie *Euchloe charlonia bazae* ssp. nov. beschrieben.

Riassunto

L'autore dà notizia del ritrovamento, in una steppa arida presso Baza, Granada, Andalusia, della Pieride: *Euchloe charlonia* DONZEL (1842). Gli esemplari raccolti, confrontati con esemplari nordafricani, presentano differenze nella taglia, nel disegno e nella forma alare, e vengono descritti come *Euchloe charlonia bazae* ssp. nov.

Key words: *Pieridae*; *Euchloe*; *charlonia*; *Euchloe charlonia bazae* ssp. nov.; southern Spain.

Introduction

In May 1982, while driving back to Italy after a two month trip in North Africa, I stopped briefly in a dry steppe along the N.342 road, about 10 km. north-east of Baza (Granada province, Andalusia). I had the good fortune to collect a few butterflies here, among which was a male specimen of *Euchloe charlonia* DONZEL (1842).

At the time I didn't realize the importance of the discovery and only later, when the set specimen stood out from among the other *charlonia* specimens collected in Morocco, I started a bibliographic research which led me to the conclusion that my specimen was the first known record of this species in Europe (*).

All the same, since a single male was involved, I decided to wait for the opportunity to collect some more specimens before communicating the discovery and in order to confirm my opinion concerning its real status. It was not until May 1993 that I could at last go back to the site, where I collected five more, two males and three females, showing the same characters of the first one, and confirming my assumption about its validity as a new subspecies.

In April 1992, a new population of *E. charlonia* had been recorded near Fraga, Huesca, Aragon (J. J. PEREZ DE-GREGORIO *et al.*, 1992); it was considered to belong to the nominal subspecies. Some affinities with the Andalusian specimens seem to emerge from the illustration of the Aragonese ones: wing shape and wing pattern are similar, but more material is needed to conclude on their exact status.

(*) I agree with BACK (1991) who regards *Euchloe penia* FREYER as a distinct species.

Andalusia is a much more southernly region than Aragon (see fig. 1) and one month lapse separates the captures in the two localities : the Andalusian specimens were caught between May 21st and May 26th, flying with *Euchloe belemia*, *Euchloe crameri*, *Melanargia occitanica* and *Lysandra bellargus* ; the Aragonese ones between April 19th and April 27th together with *Euchloe tagis* (PEREZ DE-GREGORIO *et al.*, 1992). Maybe the Andalusian specimens belong to the 2nd generation and the Aragonese ones to the 1st generation, but the length of the flying period is not known and the captures were effectuated in different years, so that any conjecture based upon our present knowledge is hazardous.

The *charlonia* of Andalusia, compared with others from various localities of Morocco, Algeria, Libya and Jordan, show differences in size, colour and wing pattern as well as in the shape of the forewings. These differences justify, in my opinion, their separation as a distinct subspecies which I name : *bazae* *ssp. nov.*

Description of *Euchloe charlonia bazae* *ssp. nov.* (figs 1 and 2 of plate)

Derivatio nominis : from the town of Baza.

Locus typicus : Baza, Granada, Spain.

Description of male : Length of forewing (measured from the wing base to apex) : 22 mm. Tornus angle nearly right, outer margin lightly convex.

Upperside : Ground colour of forewing light sulphur yellow with a very light greenish tone. Black apical patch suffused with yellow scales in the outer portion and with a series of yellow marginal patches in the spaces from s 4 to s 9 (*), inner margin of black apical patch lightly convex, forming an angle between v 6 and v 7 and reaching the outer wing margin near v 4 ; two little marginal spots on v 2 and v 3 ; discoidal spot is deep black not reaching the costa, with straight proximal margin and wavy distal margin. Hindwing uniformly yellow with a weak basal suffusion of black scales.

Underside : forewing ground colour a little clearer than the upperside, apical patch greyish green with marginal whitish spots. Costa with a slight suffusion of reddish scales from base to distal margin of the cell,

(*) Numeration of spaces and veins according to HIGGINS (1975).

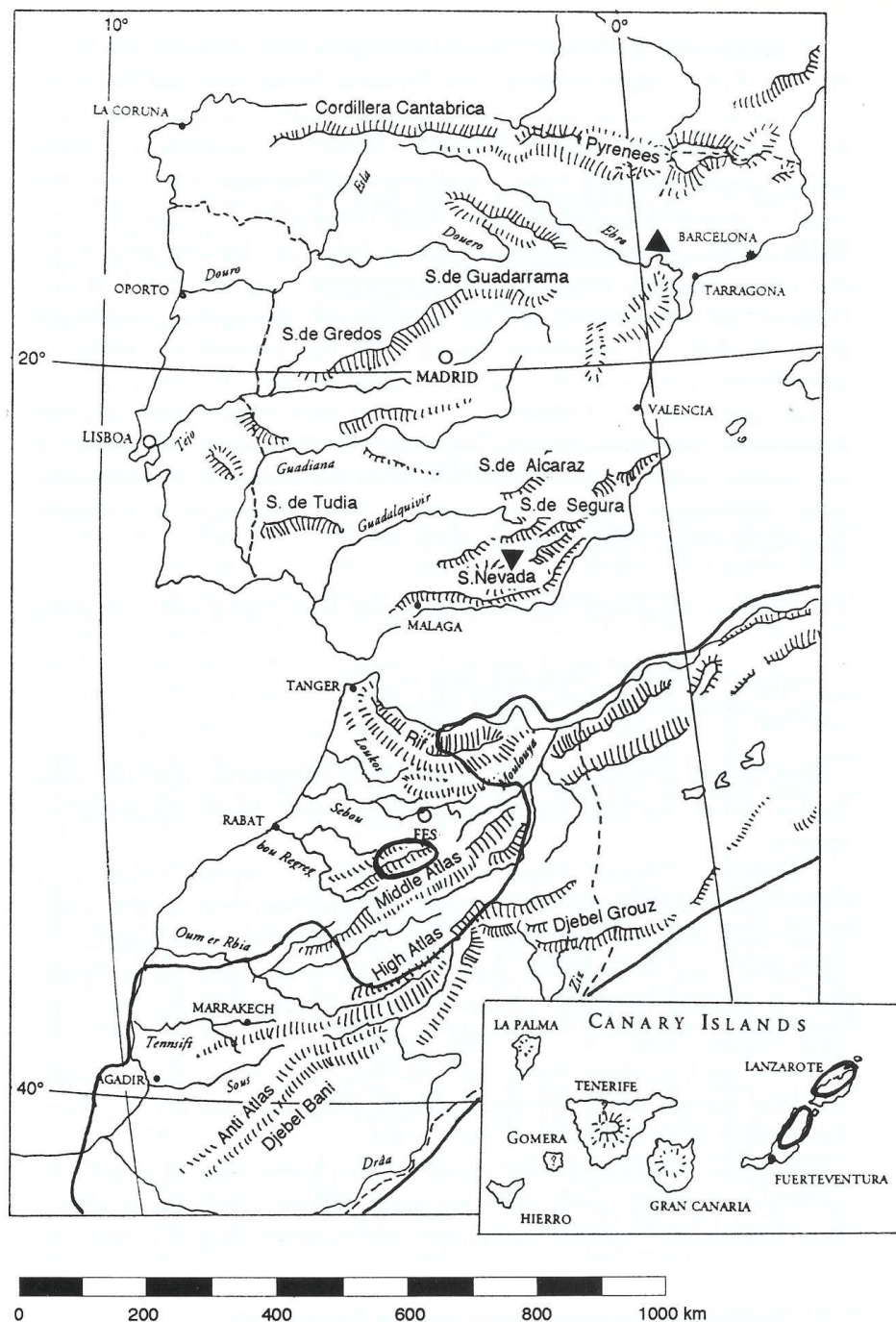


FIG. 1. — Tentative distribution of *Euchloe charlonia* in Spain and NW. Africa :
 ▼ : *E. charlonia bazae* : Baza, Granada, Andalusia ;
 ▲ : *E. charlonia* ssp. ? : Fraga, Huesca, Aragon ;
 ○ : *E. charlonia* : more or less closed areas in NW. Africa.

reddish fringes from v 4 to v 2 ; discoidal spot black containing a weak white line shaped as a circumflex accent.

Hindwing greyish green with whitish spots.

Description of female : Length of forewing 22 mm. Tornus angle nearly right but the outer margin, unlike the male, lightly convex.

Upperside : forewing light sulphur yellow very weakly shaded with white, apical patch darker than the male and reaching v 3, discal patch wide and well marked. Hindwing yellow with patterns of the underside almost invisible.

Underside : similar to the male, except for a whitish shade on forewings.

Material :

Holotype : male, Baza, 800 m, Granada, Spain : 22.V.1993 ; Allotype : female, Baza, 800 m, Granada, Spain : 22.V.1993. Paratypes : 1 male : 21.V.1993 ; 1 female : 22.V.1993 ; 1 female : 24.V.1993 ; 1 male : 26.V.1982, same locality.

The holotype is deposited in the Zoological Museum "La Specola" of Florence (MZSF), allotype and paratypes are deposited in the author's collection.

Differential characters of *E. charlonia charlonia* and *E. charlonia bazae*

E. c. charlonia shows some little differences between the two generations : the butterflies of the first one are smaller (total wingspan : average 27 mm the male, 29 mm the female), the black apical patch is well marked and the yellow marginal patches are more distinct, the colour of the underside of the hindwings is darker and on the upperside of these wings the basal suffusion of black scales is stronger (figs 3 and 4 of plate).

Since I presume that my specimens of *bazae* belong to the 2nd generation, I shall compare their characters with those of the 2nd generation of *charlonia*.

The most striking character is the bigger size of *bazae* compared with *charlonia* : the total wingspan average is 36.5 mm against 31.1 mm in the male, 37 mm against 33.2 mm in the female.

In *charlonia* the tornus angle of forewing is more obtuse and the wing appears more slender, exceeding the width of the hindwing, while

in *bazae* the forewing and hindwing have approximately the same width. The ground colour of *charlonia* is deeper, rarely tending towards green. Another striking character is the reduction of the forewing apical patch in *bazae*, while in *charlonia* it is darker and wider, reaching v 3 and sometimes v 2. The green colour of the hindwing underside is yellowish in *charlonia* and greyish in *bazae*; the red fringes are more developed in *charlonia*.

As regards to the male genitalia *bazae* shows a bigger harpe which is expanded with roundish shape, unlike in *charlonia*, where it is V-shaped (see fig. 2).



FIG. 2. — Valvae of *Euchloe charlonia* :
A : *E. charlonia charlonia* : Biskra, Algeria ;
B : *E. charlonia bazae* ssp. nov., holotype : Baza, Granada, Spain, 22.V.1993.

The habitat of *Euchloe charlonia bazae*

The locality where the new subspecies was collected is situated, as I stated before, about 10 km north-east of Baza, roughly 800 m above sea level, in the upper basin of the Rio Guadiana Menor, a zone known as Hoya de Baza (fig. 5 of plate).

It is a site with low argillaceous hills separated by an intricate system of small valleys. The nature of the vegetation is that of a sparse steppe, similar to the pre-desert steppe typical of the Maghrebine area south of the Atlas chain.

The most common plant is the Graminea *Lygeum spartum*; other plants noted in the site are: *Anthyllis* sp., *Helianthemum* (s.l.) sp., *Iris* sp., *Euphorbia* sp. and *Genista* sp.

Special care has been given to the search for *Cruciferae* which could be the foodplant of *bazae*, and three species have been recorded: *Moricandia moricandioides*, *Biscutella auriculata*, and *Brassica* sp..

I was unable to observe oviposition, however I noticed that all the females seemed to be flying within the boundaries of a little valley where *Biscutella auriculata* was abundant, while the other *Cruciferae* were

absent. It is possible therefore that *Biscutella* is a foodplant, as suspected in the case of the Aragonese population (PEREZ DE-GREGORIO *et al.*, 1992).

I captured the males while they were "hilltopping" with fast and straight flight on the ridges of the hills.

Conversely the females were caught in the above-mentioned valley, probably because of the strong wind which blew during the days following the beginning of my stay at the site. Not only *bazae*, but also the other hilltopping species observed, *Euchloe crameri* and *Iphiclides podalirius feisthamelii*, were absent from the top of the ridges.

Despite the apparent uniformity of the site, the flying *Rhopalocera* species were very much localized.

Notwithstanding the low height of the hills immediately above the valley levels (approx. 15-20 m), different species are typical of the different slopes: the north-facing slopes have a dense grassy covering, so that they are less subject to erosion and the declivity is gentle. *Melanargia occitanica*, *Callophrys rubi*, *Anthocharis belia euphenoides*, *Lysandra bellargus* live here. The south facing slopes are much steeper, more eroded because of the scarce vegetation covering, and are populated by *Euchloe charlonia bazae*, *Papilio machaon*, *Iphiclides podalirius feisthamelii*, *Colias alfacariensis*, *Euchloe belemia*, *Euchloe crameri*, *Colias croceus*, *Pyronia bathseba*, *Melitaea phoebe*.

Other species collected or observed in the site are: *Pieris rapae*, *Pontia daplidice*, *Polyommatus icarus*, *Cynthia cardui*, *Aricia agestis cramera*, *Pyrgus onopordi*, *Thymelicus lineola*, *Pseudophilotes baton panoptes*, *Carcharodus alceae* and the Geometrid *Bichroma famula*.

It is worthy to note that the association: *Euchloe charlonia*, *Euchloe belemia*, *Euchloe crameri* is common in North Africa, as remarked by OBERTHÜR (1914), as well as observed by myself in Morocco at Sidi R'bat on the Atlantic coast south of Agadir and in the N'fiss Valley, in the High Atlas south of Marrakech. The last site is quite an unusual one for *E. charlonia* (ordinarily an eremic species, LEESTMANS & BACK 1992), being a north facing valley (about 1100 m high) which is very fresh and humid. At the time of capture, on May 11th, the surrounding mountains were still abundantly covered with snow.

In its habitat, *E. charlonia bazae* was confined to an area about 200-300 m wide, and furthermore extremely scarce (6 specimens caught out of 9 observed). The surrounding area yields a reduced cultivation of cereals in the valleys, and it is also used, here and there, for the

disposal of various discarded materials. A further and much more serious threat is represented by the projected construction of the new A 92 road, which would cut through the very hills populated by the new subspecies, with foreseeable consequences.

I did not have enough time to explore other suitable sites in the surrounding area, but I suspect that other populations of *bazae* are likely to be found in the vicinity, since the entire region including the Hoya de Baza and the Hoya de Guadix, and extending northwards as far as Cullar Baza and Galera, shows similar geomorphological and botanical characteristics. I was able to make a short survey in the area known as Desierto de Tabernas, between Tabernas and Gergal in the Almeria province. A dry steppe covers this area as well, but there I found only *Euchloe belemia*, and I was unable to observe any *Euchloe charlonia*.

Geographical distribution of *Euchloe charlonia*

I do not wish to dwell upon the distribution of the taxon, a subject which has been widely covered by many authors.

It's remarkable to note how this species, widely distributed as it is from the Middle East across North Africa, westwards as far as the Canary Islands and southwards to the mountains of Tibesti and

PLATE

Fig. 1. *Euchloe charlonia bazae* :

- a : holotype, male : Baza, Granada, Spain : 22.V.1993 (leg. F. FABIANO) ;
- b : allotype, female : idem ;
- c : paratype, male : Baza : 26.V.1982 (leg. F. FABIANO) ;
- d : paratype, female : Baza : 24.V.1993 (leg. F. FABIANO).

Fig. 2. Same as fig. 1, but ventral side (reduced with 22%).

Fig. 3. *E. charlonia charlonia* :

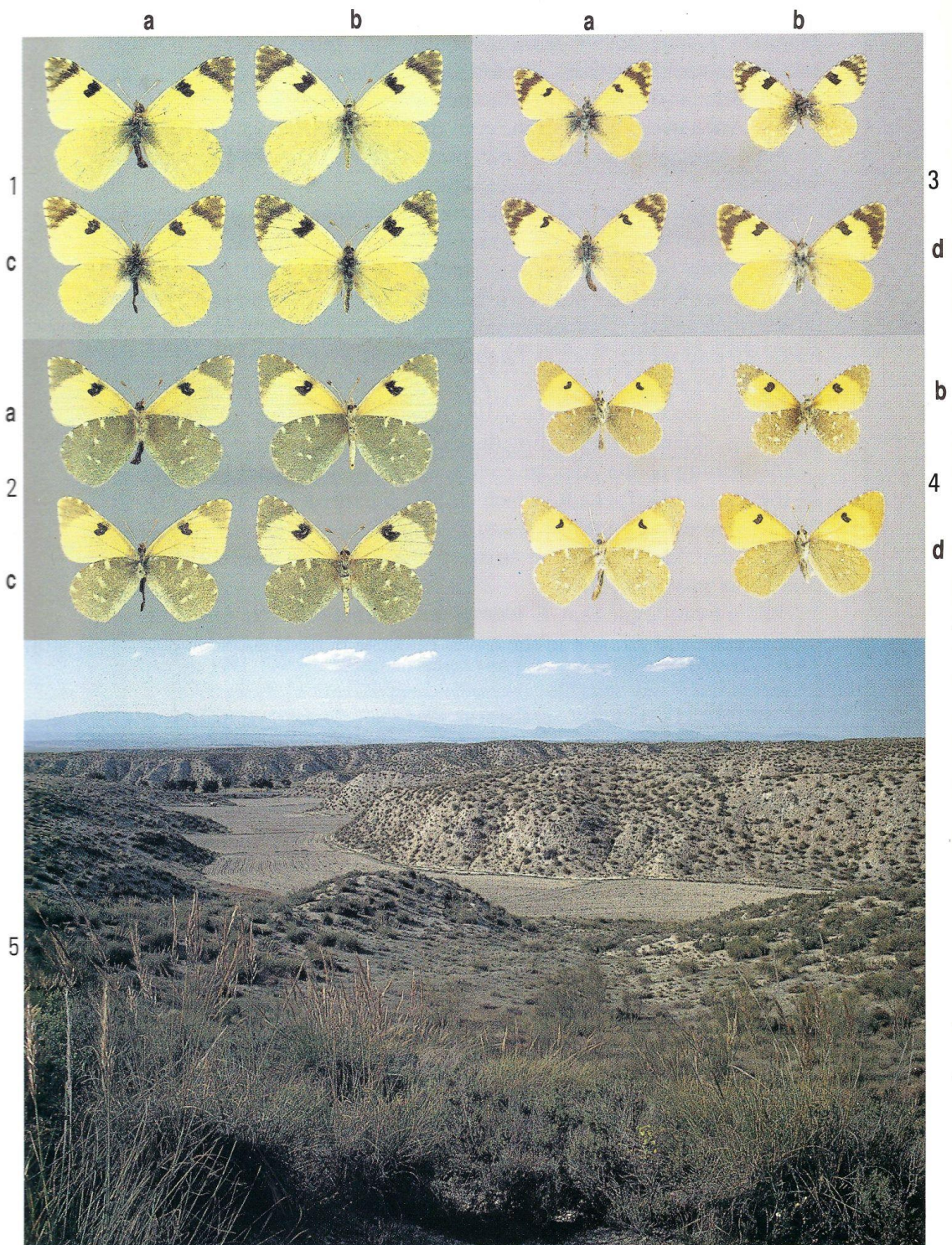
- a : male : Oued Rherhis (900 m), Tafilalt, Morocco : 9.XII.1979 (leg. F. FABIANO) ;
- b : female : Mt Assekrem (2985 m), Hoggar, Algeria : 18.III.1976 (leg. F. FABIANO) ;
- c : male : Sidi R'bat, Massa, Agadir, Morocco : 5.V.1982 (leg. F. FABIANO) ;
- d : female : El Aiun (500 m), Oujda, Morocco : 22.V.1982 (leg. F. FABIANO).

Fig. 4. Same as fig. 3, but ventral side (reduced with 40%).

Fig. 5. Baza, Granada, May 1993 : habitat of *E. charlonia bazae*, showing the differences between north- and south-facing slopes.

a = upper row left ; b = upper row right ; c = lower row left ; d = lower row right.

(*) Photographic documentation by the author.



Hoggar (*), and despite a certain individual variability, nevertheless retains some substantially constant traits. Also the population of the Canary Islands doesn't vary, although geographically isolated.

The Andalusian population, conversely, differs distinctly from the nominal subspecies, so that we can presume a very ancient geographical separation.

In the Miocene period, Andalusia would have been connected to Africa by the "betic-rifan" orographic system, but separated from the rest of Spain by the north betic channel (VERITY, 1940). Afterwards, in the lower Pliocene period, a continuous extension of land joined Africa to Europe. This fact could explain the presence in Spain of north African species such as *Euchloe belemia*, *Zegris eupheme*, *Colotis evagore*, *Tarucus theophrastus*, *Zizeeria knysna*, *Melitaea aetherie* as well as the occurrence in the Atlas chain of many typical European butterflies, often represented by distinct subspecies.

The drifting of the African continent eastwards caused the bending of the "betic-rifan" chain, which finally fractured (ELTER, 1985). In this way, about 5.3 million years ago, the Strait of Gibraltar opened and the definitive separation between the European and the African continents was established.

Thus we can argue that *E. charlonia* was able to reach Andalusia in the Miocene and Aragon in the lower Pliocene periods successively.

Conclusions

The presence of *E. charlonia* in Spain is certainly not surprising. It is however remarkable that it seemed unnoticed until now.

Further research is required to verify the flying periods as well as the identity of the foodplants and the development of the early stages.

The taxonomic status of the Aragonese population should also be verified since, in my opinion, it is doubtful that it could be satisfactorily collocated with the nominal subspecies. More material should be studied.

(*) SPEIDEL & HASSLER (1989), concerning the presence of *E. charlonia* in the Hoggar mountains, cite a record of 1931 and hypothesize the possibility that the species could be at the present time extinct in the area. Thanks to a specimen I collected on May 18th, 1976, on Mount Assekrem (2985 m), I can confirm that *E. charlonia* still flies in the Hoggar.

As both the populations recorded seem to be threatened, measures should be taken in order to protect them. Their effective consistence, as well as the possible presence of other populations, should be investigated in the future.

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Bibliography

- BACK, W., 1991. Die Präimaginalstadien von *Euchloe charlonia* (DONZEL, 1842) im Vergleich zu *Euchloe penia* (FREYER, 1852) und *Euchloe transcaspica* ssp. *amseli* (GROSS & EBERT, 1975). *Atalanta*, Würzburg 22 (2/4) : 357-363.
- BACK, W. & EITSCHBERGER, U., 1976. Die Unterarten von *Euchloe charlonia* (DONZEL, 1842). *Atalanta*, Würzburg 7 (3) : 142-160.
- ELTER, P., 1985. Introduzione allo studio dell'Appennino settentrionale nel quadro del sistema Alpino. *Quad. Mus. Stor. Nat. Livorno* Suppl. 1 (6) : 1-21.
- HIGGINS, L. G., 1975. The classification of European Butterflies. W. Collins Sons & Co Ltd, Glasgow (U.K.) : 320 pp.
- HIGGINS, L. G. & RILEY, N. D., 1983. (1st Italian edition, translation by M. CHIAVETTA), *Farfalle d'Italia e d'Europa*. Rizzoli Editore, Milano (Italy) : 395 pp.
- LARSEN, T. B., 1983. Insects of Saudi Arabia — *Lepidoptera* ; *Rhopalocera* (A monograph of the Butterflies of the Arabian Peninsula). *Fauna of Saudi Arabia* 5 : 333-478.
- LARSEN, T. B., 1990. The Butterflies of Egypt. Svendborg : 112 pp.
- LARSEN, T. B. & NAKAMURA, I., 1983. The Butterflies of East Jordan. *Ent. Gaz.* 34 (3) : 135-208.

- LEESTMANS, R. & BACK, W., 1992. Nouvelles captures d'*Euchloe penia* (FREYER, 1852) dans le Péloponnèse. Considérations taxinomiques, écologiques et biogéographiques sur le taxons du sous-genre *Elphinstonia* KLOTS (1930), *Linneana Belgica* XIII (8) : 351-388.
- OBERTHÜR, C., 1914. Faune des Lépidoptères de la Barbarie. *Et. Lép. Comp.* 10 : 42-45.
- PEREZ DE-GREGORIO, J.J., REDONDO, V.M. & RONDOS I CASES, M., 1992. *Elphinstonia charlonia* (DONZEL, 1842), género y especie nuevos para la fauna ibérica. *Zapateri Revta. aragon. ent.* 1 (2) : 13-16.
- SPEIDEL, W. & HASSLER, M., 1989. Die Schmetterlingsfauna der südlichen algerischen Sahara und ihrer Hochgebirge Hoggar und Tassili n'Ajjer (*Lepidoptera*). *Nachr. entomol. Ver. Apollo. Frankf. a. M.* N.F. 8, Suppl. 8 : 1-156.
- VERITY, R., 1905-1911. *Rhopalocera Palaearctica. Papilionidae et Pieridae*. Florence.
- VERITY, R., 1940. Le farfalle diurne d'Italia. Marzocco, Firenze 1 : VIII-XIV.