

**New localities for *Polyommatus sagratrox* (AISTLEITNER, 1986) and
Pseudochazara hippolyte (ESPER, 1783) in Granada province
(S. Spain), with observations on the taxonomic status of the first taxon**

(Lepidoptera: Lycaenidae; Satyrinae)

by

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Abstract: New colonies of the endemic taxon *Polyommatus (Plebicula) sagratrox* (AISTLEITNER, 1986), one colony in a single UTM 10 x 10 km grid, and of *Pseudochazara hippolyte* (ESPER, 1783), one colony in two UTM 10 x 10 km grids, are recorded in the north-east of Granada province (SE. Andalusia Region, NE. Spain). This new and small colony of *P. sagratrox* (AISTLEITNER) is the third for the taxon, which has a very limited distribution only in Granada province. *Polyommatus sagratrox* (AISTLEITNER) is regarded by some authors, those that follow TOLMAN & LEWINGTON (1997), as a subspecies of *Polyommatus golgus* (HÜBNER, 1813) - an endemic species of Sierra Nevada, S. Spain - an assessment with which we do not agree. In the present work we describe the main ethological (distinct flight and sexual behaviour), ecological, as well as characteristic morphological differences, between the two aforementioned taxa.

Resumen: Nuevas colonias del taxón endémico *Polyommatus (Plebicula) sagratrox* (AISTLEITNER, 1986), 1 colonia en 1 cuadrícula UTM 10 x 10 km, y de *Pseudochazara hippolyte* (ESPER, 1783), 1 colonia entre 2 cuadrículas UTM 10 x 10 km, son registradas en el noreste de la provincia de Granada (NE. Andalucía, España). Esta nueva y reducida colonia de *P. sagratrox* (AISTLEITNER) es la tercera para este taxón, de distribución muy limitada sólo en la provincia mencionada. *Polyommatus sagratrox* (AISTLEITNER) es considerado por algunos autores, que siguen a TOLMAN & LEWINGTON (1997), como una subespecie of *Polyommatus golgus* (HÜBNER, 1813), especie endémica de Sierra Nevada, una opinion con la que no estamos de acuerdo. En el trabajo actual mencionamos las diferencias principales entre la etología (forma de vuelo y comportamiento sexual, muy diferentes), ecología y característica morfología de los dos taxones anteriores.

Zusammenfassung: Eine neue Kolonien der endemischen *Polyommatus (Plebicula) sagratrox* (AISTLEITNER, 1986), in einem 10 x 10 km UTM-Raster, und von *Pseudochazara hippolyte* (ESPER, 1783), je eine Kolonie in zwei 10 x 10 km UTM-Rastern, werden aus dem Nordosten der Provinz Granada gemeldet. Diese neue und kleine Kolonie von *P. sagratrox* (AISTLEITNER) ist die dritte dieses Taxons, das eine sehr begrenzte Verbreitung nur in der Provinz Granada besitzt. *Polyommatus sagratrox* (AISTLEITNER) wird von den Autoren, die TOLMAN & LEWINGTON (1997) folgen, als Unterart der in der Sierra Nevada/ Südspanien endemischen *Polyommatus golgus* (HÜBNER, 1813) anngesehen, einer Auffassung, die wir nicht vertreten. In dieser Arbeit beschreiben wir die hauptsächlichen ethologischen Unterschiede (Flugbild und Sexualverhalten), Ökologie, wie auch charakteristische morphologische Unterschieoede zwischen beiden Arten.

Introduction: The endemic taxon *Polyommatus sagratrox* (AISTLEITNER, 1986) (col. pl. 4: 4) is only located in the north-eastern extremity of Granada province, its habitat being one of the smallest and most isolated of the associated Spanish lepidopterological fauna. A new locality (one colony) is here-with reported. At the moment only three isolated colonies are known, including this new one.

Polyommatus sagratrox (AISTLEITNER) has been considered as a subspecies of *P. golgus* (HBN.) (col. pl. 4: 1) in TOLMAN (1994), this being based on dubious criteria: 1).- The hostplant is incorrectly considered to be the same for both species: This information is corrected in GIL-T. (2007), as they feed on two different subspecies of *Anthyllis vulneraria*. TOLMAN (1994) incomprehensibly states: When the same host plant is used, this is an argument “strongly against specificity for *sagratrox*“ (sic!); 2).- When considering the morphology of the very similar fully grown larva of both taxa, the fact that this same feature occurs among other taxonomically closely related species is ignored; and 3).- It is considered that the genitalia are similar, in TOLMAN & LEWINGTON (1997). These contentions are discussed later. Also, TOLMAN appears to ignore, amongst other features (ecological and morphological differentiations), that there are relevant distinguishing features in sexual and flight behaviour (extensively accepted in taxonomy) between these taxa, as well as other differences revealed in GIL-T. (2003), some of which are referred to in this work. A molecular study -DNA- of both taxa would be very useful, and indeed necessary, in order to definitively determine the taxonomic status of *P. sagratrox* (AISTLEITNER).

Pseudochazara hippolyte (ESPER, 1783) (col. pl. 4: 3) has its type locality situated in the Ural Mountains: The accepted range of this species is somewhat eccentric: Kazakhstan, Kyrgyzstan, S. Siberia, Mongolia... and the Iberian Peninsula (!?). It would be a very valuable and useful phylogenetic study, sequencing and comparing their DNA, in order to clarify if the taxon does exist in Spain, or if it is a different species – a theory which cannot be dismissed.

The range of this taxon within the Iberian Peninsula is limited to several southern and south-easterly mountain chains (Andalusia Region: Granada and Almeria provinces; and Murcia). The populations of this butterfly in these mountains remains stable except for those colonies located in the following areas: 1.-Sierra de los Filabres (W. Almeria province), where it has apparently disappeared, as well as the abundant colonies of *Parnassius apollo* (LINNAEUS, 1759) (!), on account of pine reforestation and the massive use of insecticides; 2.- Sierra Espuña (Murcia), where it is very scarce; and Sierra Guillimona (N. Sierra de la Sagra, NE Granada province), where losses are most probably due to excessive collecting and the impact of livestock on vegetation.

We hereby report the discovery of a new colony of this butterfly in an extensive area of approximately 6 x 2 km, located between two UTM 10 x 10 km grids.

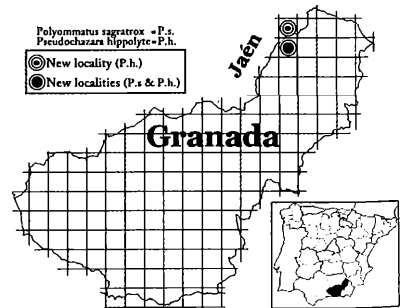


Fig. 1.- New localities for *Polyommatus sagratrox* (AISTLEITNER, 1986) and *Pseudochazara hippolyte* (ESPER, 1783).

New localities: In fig. 1 the UTM 10 x 10 km grid is illustrated, where the new colony of *P. sagratrox* (AISTLEITNER, 1986) (in a very small area) has been discovered; and the new colony of *Pseudochazara hippolyte* (ESPER, 1783), shared between two UTM 10 x 10 km grids (amazingly, in an area around 6 x 2 km). Both grids are located in Sierra Seca, within the Natural Park Sierra de Castril, NE. Granada province. It is very probable that these two taxa also exist in the near Sierra de Segura (Jaen province), to the west of Sierra Seca.

Concerning the ethology, ecology, morphology and taxonomic status of *Polyommatus sagratrox* (AISTLEITNER, 1986)

Geologic-geographic features and environment altitude: The habitat of *P. golgus* (HBN.) is situated at altitudes ranging between 2500 and 3200 m, and is limited to the oromediterranean (above of the sub-alpine zone) and crioromediterranean bioclimatic belts of the Sierra Nevada. The species is found in open land with clearings (mountain slopes, plains, and along the margins of footpaths and tracks), with climatic and creeping vegetation, and at higher altitudes where it is found in acidic meadows with a predominance of sand, tending to prefer siliceous substrates (siliceous and quartzite materials) of a brownish-grey colour. Its distribution is limited to 10 UTM 10 x 10 km grids, which include the two new grids of this species mentioned in IBÁÑEZ & GIL-T. (2009).

The presence of *P. sagratrox* (AISTLEITNER), in NE. Granada province, is restricted to altitudes of between 1900 and 2300 m and solely within the oromediterranean bioclimatic belt (above the sub-alpine zone). Only two colonies were formerly known to exist before this work was published, both of them of small (less than 10 hectares in total between both locations), each of them in a single UTM 10 x 10 km grid. This taxon shows a particular preference for rocky areas (cliff and rocky slopes). Geologically speaking the Sierra de la Sagra is composed of dolomite and a limestone substrate with a characteristic whitish colour. These taxa therefore have significant differences as far as their general distribution, altitude and environmental factors are concerned.

Sexual and flight behaviour: The male adults of *P. sagratrox* (AISTLEITNER) are continuously on the wing, flying throughout their biotope. They fly a few centimetres above the ground, with a rapid flight in zigzags, searching for ♀♀ on the higher sites on the rocky landscape. Their contact with sharp stones and the scarce vegetation rapidly causes severe wing damage soon after emergence. They seldom rest, this being very brief and generally for feeding purposes. Contrarily, the ♂♂ of *P. golgus* (HBN.) spend much more time resting on plants and flowers. The sexual behaviour of *P. sagratrox* (AISTLEITNER) could be defined as “explorer or patroller”, flying across their reduced territory many times a day. On the other hand, the behaviour of male *P. golgus* (HBN.) is quite different: they have a short flight and prefer to settle or roost, waiting for ♀♀ to come passing by. Unlike *P. sagratrox* (AISTLEITNER), the ♂♂ adults of *P. golgus* (HBN.) normally fly about 30–40 cm above the ground, in a lazy and slower manner, preferring open areas, frequently landing for feeding on flowers. Another feature worth pointing out is the noticeable tendency of the ♂♂ to dart out in pursuit of other butterflies (territorial, stalking) when flying nearby, especially and much more vigorously when it comes to ♂♂ of the same species or other blue coloured Lycaenids. Males of *P. sagratrox* (AISTLEITNER) therefore react differently than the other butterflies existing in the same biotope.

It is accepted that even separated populations of the same species always show the same sexual behaviour. Sexual behaviour is considered to give a specific taxonomic differential diagnosis: this feature

is particularly dissimilar between *P. golphus* (HBN.) and *P. sagratrox* (AISTLEITNER). Flight conduct is also different, this being similarly comparable to the different conduct between *Euchloe charlonia* (DONZEL, 1842) and *Euchloe penia* (FREYER, 1852), which for a long time were considered as the same species and finally separated on the basis of differences in their preimaginal stages, wing morphology and ecological-ethological differences. With respect to the latter, in LEESTMANS & BACK (1992) differences in habitat and flight conduct are pointed out, indicating that *E. penia* (FREYER) has a “slow and lazy” flight and *E. charlonia* (DONZEL) a “fast and irregular” flight.

Genitalia: As shown in HIGGINS (1975), the genitalia of various *Plebicula* species: *P. golphus* (HBN.), *P. dorylas* (D. & S., 1775) and *P. nivescens* (KEFERSTEIN, 1851), are very similar. We have been unable to find any significant differences between the genitalia of *P. sagratrox* (AISTLEITNER) we have examined, when compared to those of *P. golphus* (HBN.), or even *P. dorylas* (D. & S.). Note: by this previous reason, *P. golphus* (HBN.) and *P. dorylas* (D. & S.) (similar genitalia) were for a long time considered to be the same species. In TOLMAN & LEWINGTON (1997) *P. sagratrox* (AISTLEITNER) is considered a subspecies of *P. golphus* (HBN.) on the basis of the ♂ genitalia, which are very similar, not only among these two taxa, but also among other *Plebicula* species.

Hostplants: Larvae of both *P. golphus* (HBN.) and *P. sagratrox* (AISTLEITNER) feed on *Anthyllis vulneraria*, with the difference being that they feed on different subspecies of this plant (GIL-T., 2007), and not the same subspecies (*Anthyllis vulneraria arundana* -sic) as stated in TOLMAN & LEWINGTON (1997). *P. dorylas* (D. & S.) and *P. nivescens* (KEFERSTEIN) can use either subspecies of *Anthyllis vulneraria* in Spain. In Teruel province (NE. Spain), where the two species exist in the same area, they use the same subspecies of *A. vulneraria*. The statement in TOLMAN (1994), that the use of the same subspecies of *A. vulneraria* by *P. sagratrox* (AISTLEITNER) and *P. golphus* (HBN.) argues “strongly against specificity for *sagratrox*“, is wrong. It must be also highlighted that, *P. sagratrox* (AISTLEITNER), as well as *P. golphus* (HBN.), does not descend from a certain altitude limited to the oromediterranean bioclimatic floor, as 1900 m is the minimum height for *P. sagratrox* (AISTLEITNER) and 2500 m for *P. golphus* (HBN.), in spite of the abundant presence of other *Anthyllis vulneraria* subspecies found immediately below the oromediterranean zone.

Morphological comparison between the larvae of these taxa: The L1 larvae of *P. golphus* (HBN.) and *P. sagratrox* (AISTLEITNER) are creamy-yellow when hatched. A little later they turn to a light green colour. The following differences may be observed between the two taxa as from the second day of life (GIL-T., 2003): in *P. sagratrox* (AISTLEITNER) the head is light brown coloured; in *P. golphus* (HBN.) the colour is dark green. After several days, in both species the colour changes to black. The different colouration of the larval heads in L1 is considered by some authors to be of taxonomic value. The similarities between *Erebia styx* (FREYER, 1834) and *Erebia stirijs* (GODART, 1824) led to them being originally considered a single species, but subsequently LORKOVIĆ (1952) demonstrated they were different, confirmed by means of a morphological and biological study of their preimaginal stages (also with different colouration of the head in L1 larvae). The fully grown larvae (L5) of *P. golphus* (HBN.) and *P. sagratrox* (AISTLEITNER) are much alike in colouration and patterning, although the green background tone is not identical. There can be important variations in the colour tone of the larvae of *P. golphus* (HBN.) (GIL-T., 2003): *P. sagratrox* (AISTLEITNER) larvae are evenly coloured. The dorsal (olive-green), subdorsal (greenish-yellow) and lateral stripes (yellowish-green) are very much similar in tone and contrast on both taxa. These similarities in L5 also occur in other closely related species.

About the morphological differences in the adults: TOLMAN & LEWINGTON (1997) omitted the main morphological differences between the adults of *P. golgus* (HBN.) and *P. sagratrox* (AISTLEITNER) (see fig. 3), considering just the colour tone to be the main differential feature. The colour was thought to be the result of an adaptation to different soil colours in their environment, this being a whitish lime substrate in *P. sagratrox* (AISTLEITNER) habitats.

The most significant differences are outlined below, all of which are located on the upperside of the wings. The spots and submarginal lunules of the underside are very much alike on both species, except for the ground colour which is very different:

The wingspan of *P. golgus* (HBN.) ♂♂ is smaller; however, ♀♀ of both *P. golgus* (HBN.) and *P. sagratrox* (AISTLEITNER) are similar in size.

We highlight the proportional difference in size between the *P. sagratrox* (AISTLEITNER) sexes, ♂♂ being generally larger than the ♀♀. We have obtained approximate wingspan measurements (between the apex tips) of 29,8 mm for the ♂♂ and 26,3 mm for the ♀♀. In *P. golgus* (HBN.) the size between both sexes is similar.

The apex is constantly very acutely shaped in *P. sagratrox* (AISTLEITNER), but is less so in *P. golgus* (HBN.).

- The black marginal borders on the wings of *P. sagratrox* (AISTLEITNER) are narrower than in *P. golgus*. In *P. golgus* these borders radiate along the wing nervules, towards the interior of the wing, more in *P. golgus* and much less (very small, vestigial or absent) in *P. sagratrox* (AISTLEITNER).

The hind wings of *P. golgus* (HBN.) ♂♂ show black submarginal lunules, these being absent on *P. sagratrox* (AISTLEITNER).

- The orange submarginal lunules on the females are larger and thicker in size in *P. sagratrox* (AISTLEITNER) (the lunules are always present on both fore and hind wings) than in *P. golgus* (HBN.) (generally, the lunules are absent on the fore wings and incomplete or vestigial on the hind wings). In all the ♀♀ specimens of *P. sagratrox* (AISTLEITNER) examined there were six orange lunules on the hind wing and a minimum of four on the fore wing (occasionally an extra vestigial lunule is present). This is a constant distinguishing feature with respect to *P. golgus* (HBN.).

- The ♀♀ of *P. sagratrox* (AISTLEITNER) normally show abundant and visible blue scaling in the base of the wings, occasionally extended to the discal zone and the wing nervules. In *P. golgus* (HBN.) the blue scaling is rare and only present in the basal area.

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