

A new taxon in the genus *Pyrgus* (Lepidoptera: Hesperiiidae) from the Carpathian Mountains in Romania

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Abstract. A new subspecies of *Pyrgus* (Lepidoptera: Hesperiiidae) is described: *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.** *Pyrgus cacaliae* (Rambur, 1839) is a rare and local butterfly endemic to Europe with known populations in the Pyrenees, the Alps, Rila Mountains in Bulgaria and the Carpathian Mountains in Romania. However, the populations in the Carpathian Mountains have turned out to be both morphologically and genetically different from all other populations in Europe and are now considered to refer to the taxon *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.**

Samenvatting. Een nieuwe ondersoort van *Pyrgus* (Lepidoptera: Hesperiiidae) wordt beschreven: *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.** *Pyrgus cacaliae* (Rambur, 1839) is een zeldzame en lokale vlinder die endemisch is voor Europa met bekende populaties in de Pyreneeën, de Alpen, het Rilagebergte in Bulgarije en de Karpaten in Roemenië. De populaties in de Karpaten zijn echter zowel morfologisch als genetisch verschillend gebleken van alle andere populaties in Europa en worden nu beschouwd als te verwijzen naar het taxon *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.**

Résumé. Une nouvelle espèce de *Pyrgus* (Lepidoptera: Hesperiiidae) est décrite: *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.** *Pyrgus cacaliae* (Rambur, 1839) est un papillon local et rare endémique d'Europe avec des populations connues dans les Pyrénées, les Alpes, les montagnes de Rila en Bulgarie et les Carpates en Roumanie. Cependant, les populations des Carpates se sont avérées être à la fois morphologiquement et génétiquement différentes de toutes les autres populations d'Europe et sont maintenant considérées comme faisant référence au taxon *Pyrgus cacaliae hebsgaardi* Bjerregård & Mølgaard, **ssp. nov.**

Key words: Lepidoptera — Hesperiiidae — *Pyrgus* — New subspecies — Romania — Distribution.

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Introduction

Pyrgus cacaliae (Rambur, 1839) (Lepidoptera: Hesperiiidae) is an alpine species, distributed in mountains in central and southern Europe: Pyrenees (France, Spain), Alps (France, Italy, Switzerland, Germany, and Austria), Dinarid Mountains (Bosnia & Herzegovina), Rila, Pirin and Stara Planina Mountains (Bulgaria) and southern Carpathian Mountains (Romania) (Higgins & Riley 1970; Tolman & Lewington 1997; Kolev 2010; Lafranchis 2010; Haahtela *et al.* 2011; Tshikolovets 2011; Kudrna 2015; Leraut 2016).

In the autumn of 2021, the first author discovered a variation across European populations in the collection of ZMUC (Zoological Museum, Natural History Museum of Denmark, Copenhagen, Denmark). Most populations in Europe seemed to be morphologically similar; however, isolated populations in southern Romania seemed to be morphologically different from the rest of the European populations. After examination of public genetic material in GenBank, it was clear that the Romanian population was also genetically different from the rest of the European populations, which was later confirmed by Dapporto *et al.* (2022). It is described here as *Pyrgus cacaliae hebsgaardi* **ssp. nov.**

Material and methods

After discovering specific morphological differences in specimens from the southern Carpathians in Romania, the first author photographed these (Fig. 3) together with material from the Alps for comparison.

During field trips to the southern Carpathian Mountains in recent years, the second author visited the type locality of *Pyrgus cacaliae hebsgaardi* **ssp. nov.** on 14.vii.2016 and both authors visited it again on 1.viii.2021 and 10.viii.2021. Several Lepidoptera species were observed, among them *Boloria pales carpathomeridionalis* Crosson du Cormier & Popescu-Gorj, 1963, and *Erebia epiphron transsylvanica* Rebel, 1908. We would have liked to enlarge the material of *Pyrgus cacaliae hebsgaardi* **ssp. nov.** with freshly collected specimens to further support the differences in external characters from the other European populations but this was not possible. Weather conditions were optimal and the habitat type was similar to the habitat descriptions mentioned in Tolman & Lewington (1997), Székely (2008), and Tshikolovets (2011): slopes, plateaux, and hollows/gullies with short alpine vegetation, partly near streams or small rivers and sometimes near low bushes and scrub.

Pyrgus cacaliae hebsgaardi **ssp. nov.**

urn:lsid:zoobank.org:pub:A6918977-4965-4FDC-BB28-AE1A38BEAC57

Material examined

Holotype: ♂, Romania, Masivul Bucegi, above Sinaia, jud. Prahova, 2100–2200 m, 08.vi.1965, leg. J. Szabo, coll. ZMUC (Fig. 3a–b).

Paratypes:

5 ex., Romania, Masivul Bucegi, above Sinaia, jud. Prahova, 2100–2200 m, 08.vi.1965, leg. J. Szabo, coll. ZMUC (one of these is illustrated in Fig. 3c–d).



Fig. 1. Male genitalia of *Pyrgus cacaliae hebsgaardii* **spp. nov.**, prep. O. Karsholt.

1 ex., Romania, Muntenia, Arges, Făgăraș Mts., Balea Lac, 2050 m, 22.vii.2004, leg. V. Dincă, GenBank (accession number HQ005122.1) (Fig. 4a).

1 ex., Romania, Muntenia, Prahova, Bucegi Mts., Babele, 2200 m, 14.vii.2008, leg. J. Hernández-Roldán (accession number HQ005124.1) (Fig. 4b).

1 ex., Romania, Muntenia, Prahova, Bucegi Mts., Babele, 2200 m, 23.vii.2004, leg. V. Dincă, GenBank (accession number HQ005123.1) (Fig. 4c).

1 ex., Romania, Muntenia, Prahova, Bucegi Mts., Cota, 2000 m, 23.vi.2011, leg. L. Szekely, GenBank (accession number KP870484.1)

Diagnosis

The new subspecies is morphologically quite similar to nominotypical *Pyrgus cacaliae* (Rambur, 1839) but can be distinguished from it by the white spots on the upper- and underside which show the same pattern but are generally considerably larger. On the upperside, the ground colour is darker brown and the underside is darker and with a more greenish tinge.

The male genitalia (Fig. 1) were compared to the genitalia of the nominotypical *P. cacaliae* of the Alps. There are no significant differences.



Fig. 2. Masivul Bucegi (2100–2200 m) above Sinaia, jud. Prahova 01.viii.2021: Habitat of the new endemic taxon *Pyrgus cacaliae hebsgaardii* Bjerregård & Mølgaard, **spp. nov.** in the southern Carpathian Mountains in Romania. © Emil B. Bjerregård.

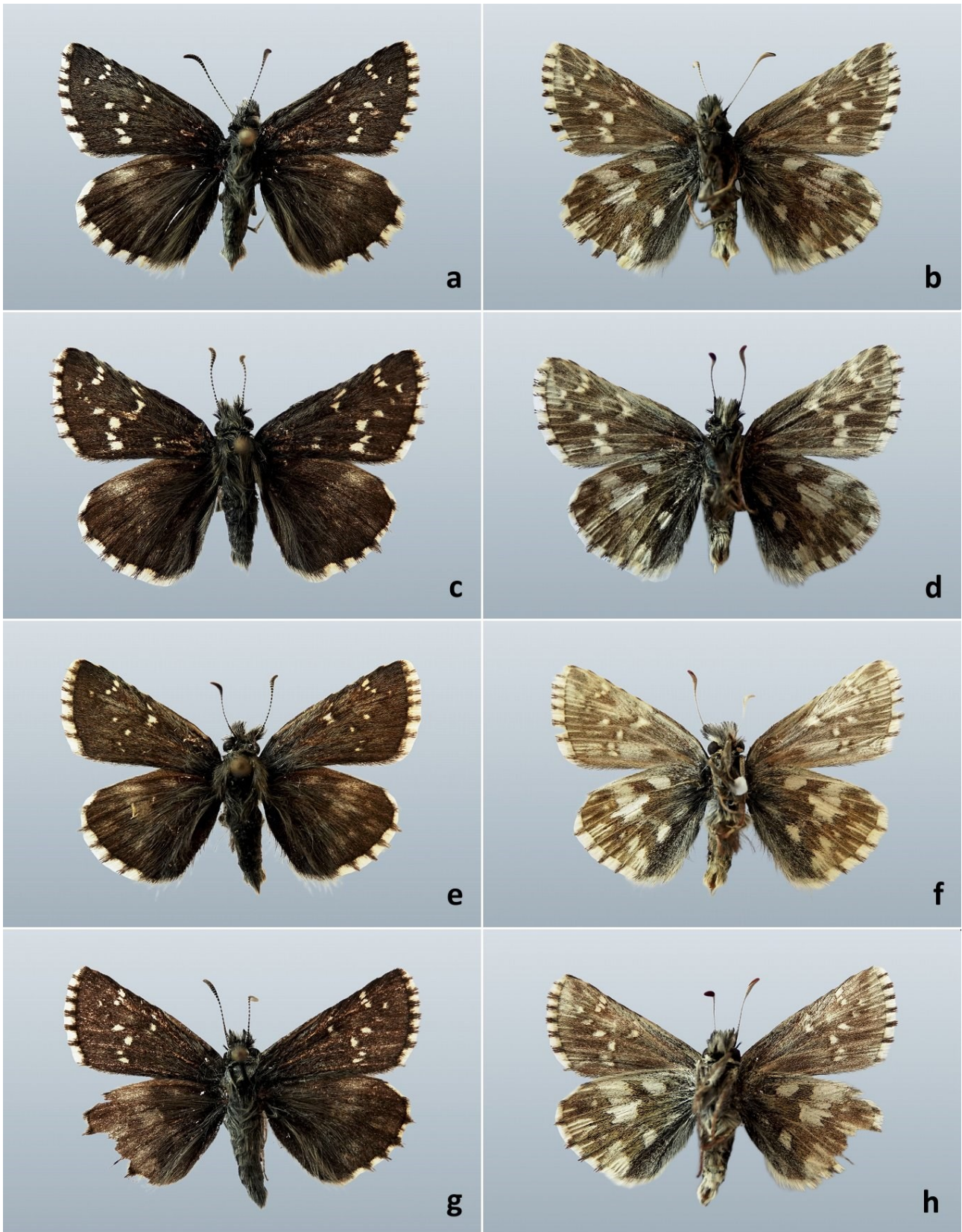


Fig. 3. Upperside and underside of habitus of *Pyrgus* spp.

a, b, c, d, *Pyrgus cacaliae hebsgaardii* **ssp. nov.**, Masivul Bucegi, jud. Prahova, Romania, 08.vi.1965, leg. J. Szabo, coll. ZMUC.

e, f, *Pyrgus cacaliae cacaliae*, Ducan, 2600 m, Graubünden, Switzerland, 29.vii.1963, leg. Unknown, coll. ZMUC; g, h, idem, Obertauern, 2000 m, Austria, 3.viii.1975, leg. W. Schacht, coll. ZMUC.

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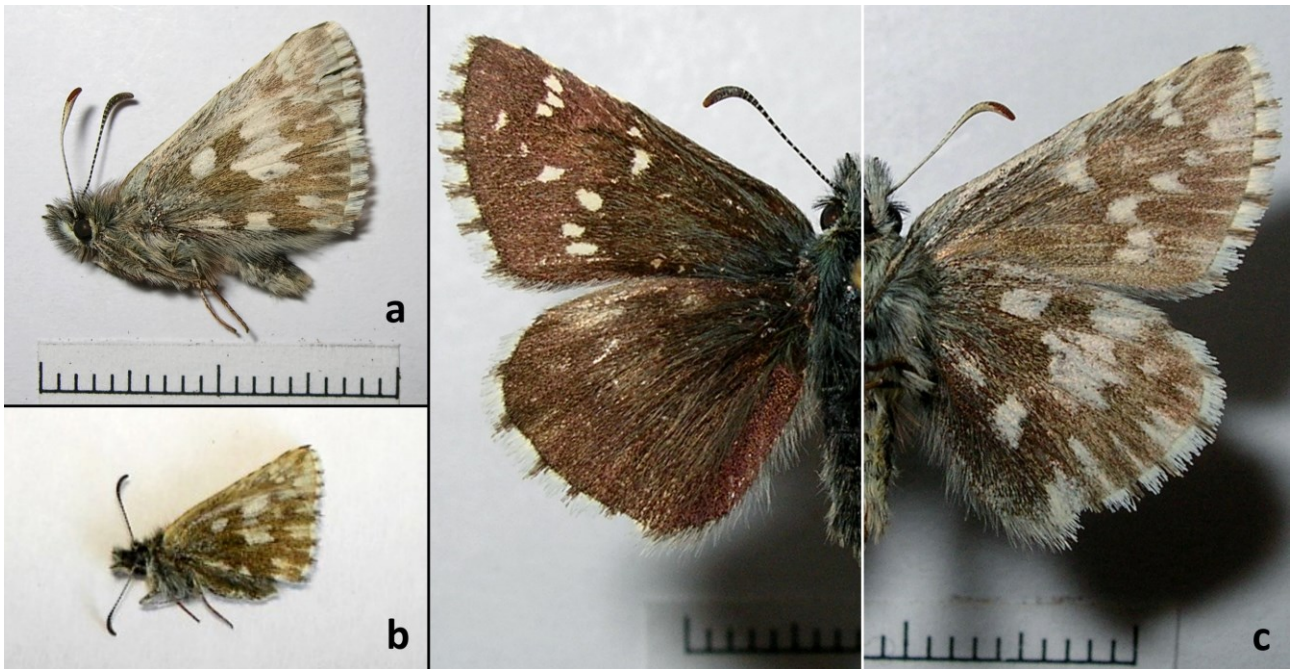


Fig. 4. Habitus of genetically studied specimens.

a, *Pyrgus cacaliae hebsgaardi* **ssp. nov.**, GenBank accession number HQ005122.1 (specimen voucher RV-08-A014); b, *Pyrgus cacaliae hebsgaardi* **ssp. nov.**, GenBank accession number HQ005124.1 (specimen voucher RVcoll.08-M576); c, *Pyrgus cacaliae hebsgaardi* **ssp. nov.**, GenBank accession number HQ005123.1 (specimen voucher RV-07-E668). © Butterfly Study Group at Institut de Biologia Evolutiva, Universitat de Barcelona.

Description

Male (Fig. 3a–d). Wingspan 25–30 mm. Upper side ground colour is very dark brown, with white spots on the forewing quite prominent. Hindwing lacks ornamentation. Fringes with alternate light/dark pattern. Head and entire body covered with long ash-grey hairs. Male has a costal fold. Underside forewing greenish-brown, white spots diffuse, hindwing greenish-brown, and white spots diffuse.

Genetics

The delineation of *Pyrgus cacaliae hebsgaardi* **ssp. nov.** is also confirmed by genetic data since the difference between this subspecies and the nominotypical species in cytochrome oxidase subunit 1 (COI) gene is 0,61-0.76 %. In GenBank, COI data from four sequenced specimens (Fig. 4) are present with accession numbers: HQ005124.1, HQ005123.1, HQ005122.1, and KP870484.1. The examined specimens were collected from three different sites in the Bucegi Mts and Făgăraș Mts. These four obtained strains are closely associated, either they are identical or have at most a difference of 0,15% which indicates a high similarity compared with sequences from nominotypical specimens from Italy, Bulgaria, Switzerland and Spain (accession numbers: MW503174.1, MW503088.1, MW502499.1, and KP870283.1). These results support that all Romanian *cacaliae* belong to the taxon *hebsgaardi*. Furthermore, the delineation of this subspecies is supported by recent work on the mitochondrial genetic diversity for Western butterflies (Dapporto *et al.* 2022), which suggested clearly different clusters between the Romanian populations and the remaining European populations (Dapporto *et al.* 2022).

Biology

Not known except for the collecting dates and localities.

Both authors visited the type locality in the Bucegi Mts. (Fig. 2) and in the Făgăraș Mts. In both localities, the habitat type consists of slopes, plateaux, and hollows/gullies with short alpine vegetation, partly near streams or small rivers and sometimes near low bushes and scrub.

The collecting dates of the specimens suggest that the flight period is rather long, with the earliest record 08.vi.1965 and the latest 23.vii.2004. According to the literature the flight period of *P. cacaliae* is mentioned from (mid) June until August (Higgins & Riley 1970; Tolman & Lewington 1997; Lafranchis 2010; Tshikolovets 2011; Leraut 2016), and in July–August (Szekely 2008; Hahtela *et al.* 2011). What is really the optimal flight period of this taxon is still rather unclear, based on the limited material available.

The host plants of the larvae of these populations are assumed to be alpine *Potentilla* spp. (Tshikolovets 2011).

Further field investigations are necessary to shed more light on the flight period, host plants, and early stages.

Distribution

It is to be assumed that *Pyrgus cacaliae hebsgaardi* **ssp. nov.** is limited to the Bucegi and Făgăraș Mts., southern Carpathian Mountains, Romania (Fig. 5), but further field investigations in the rest of the southern Carpathian Mountains are needed.



Fig. 5. Distribution of *Pyrgus cacaliae hebsgaardii* **ssp. nov.**: Făgăraș and Bucegi Mts. in the southern Carpathian Mountains in Romania (marked with red circles 1 and 2, respectively).

Etymology

The new taxon is named after Magnus Vest Hebsgaard, a close friend and talented young Danish lepidopterist. Despite his young age, Magnus was one of the fieldwork leaders in the recent Danish atlas of butterflies and has written articles for the Danish entomological journal *Lepidoptera*. We thank him for his contribution to the knowledge of Danish entomology.

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