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A new species of the genus *Colias* (Lepidoptera, Pieridae) from Yakutia

by

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Abstract: A new species of yellow butterflies, *Colias jacuticola* **spec. nov.**, is described and figured in colour from a xerothermic locality in the Oymyakon Valley, Yakutian Autonomous Republic, USSR. It differs from the related species *C. cocandica*, *C. mongola*, *C. tyche* and *C. nastes* by several morphological characters, especially ornamentation in the submarginal part of the upper side of forewing and underside of hindwing. Also important are differences in behaviour, zoogeography and ecology.

Eine neue Art der Gattung *Colias* (Lepidoptera, Pieridae) aus Jakutien (UdSSR)

Zusammenfassung: Eine neue Art der Gattung *Colias*, *C. jacuticola* **spec. nov.**, wird von einem xerothermen Fundort im Oymyakon-Tal, Jakutische Autonome Republik, UdSSR, beschrieben und farbig abgebildet. Die neue Art unterscheidet sich habituell von den verwandten Arten *C. cocandica*, *C. mongola*, *C. tyche* und *C. nastes*, besonders in der Submarginalzeichnung der Vorderflügeloberseite und Hinterflügelunterseite. Weitere wichtige Unterschiede sind zu finden in Verhalten, Zoogeografie und Ökologie.

Introduction

In the summer of 1988, during an entomological expedition to the southeastern part of the Yakutian Autonomous Republic, USSR, we found a relatively large population of butterflies of the genus *Colias* FABRICIUS, 1807, subgenus *Eucolias* BERGER (1986). This group includes species of similar facies, e. g., *Colias mongola* ALPHÉRAKI, *C. nastes* BOISDUVAL, *C. tyche* BÖBER, and *C. cocandica* ERSCHOFF which also occur in the Asian part of the Soviet Union.

Biotope

We found the butterflies in the Oymyakon Valley in the altitude of 500–600 m, about 50 km east of the village Tomtor. The biotope of this species is part of an extensive ecosystem in the basin of the Indigirka river, characterized by wet to marshy meadows interspersed by low hills (100–200 m above the valley bottom). The northern and western slopes of these hills are larch taiga, while forest-steppe-like to steppe-like xerothermic biotopes overgrown by lush herbage are on the southern and eastern slopes.

Most butterflies of the new species occured at the border between the above biotopes, in a transitional zone between a xerothermic southern slope and a wetter flowering meadow. Predominant herbs in flower were milk vetch (*Astragalus* spec.), flax (*Linum* spec.) and crown vetch (*Coronilla* spec.). However, the butterflies also flew in a flooded meadow rather densely overgrown by dwarf birches and *Astragalus* spec. The milk vetch probably is the host plant of the new lepidopteran species, as females visited it often, apparently to lay eggs.

In addition to this species there was a diversity of butterflies at the locality, for instance *Parnassius phoebus interposita* HERZ, *Colias hyperborea* GRUM-GRSHIMAILO, *C. viluiensis* MÉNÉTRIÉS, *C. palaeno orientalis* STAUDINGER, *Melitea latonigena polaris* GRUM-GRSHIMAILO, *Coenonympha tullia viluiensis* MÉNÉTRIÉS, *Lycaeides argyrognomon jakutica* KURENTZOV, occasionally *Erebia pawlowskyi* MÉNÉTRIÉS and an *Oeneis* spec.

The *Colias* species is here described as new:

Colias jacuticola spec. nov.

Holotype ♂: USSR, Siberia or., Yakutia mer. or., Oymyakon Valley, 50 km east of the village Tomtor, 500–600 m a.s.l., 3–6 July 1988, leg. Zdeněk MRÁČEK. In coll. National Museum, Prague.

"Allotype" ♀: same data as holotype.

Paratypes: 89 ♂♂, 34 ♀♀ leg., same data. Zdeněk MRÁČEK and Josef VOLÁK. In coll. National Museum, Prague, Zdeněk MRÁČEK, Josef VOLÁK and Dalibor WEISS.

Description

Specimens of the new species from the Oymyakon Valley vary in their wing patterns and coloration, especially in dark pigmentation. The ground colour of the upperside of male wings is usually pale yellow with a greenish tinge and a subdued silvery lustre that is particularly distinct on the surface of forewings. They are rather thickly dusted with black scales, especially along veins and at the wing base. The dark pigmentation is markedly thinner on the hindwings, more uniform and concentrated at the bases of the wings. The discal field is pale, with a small, not very distinct discal spot. A black discal spot on the forewing is of medium size, with a slight indication of a pale centre. Its shape is irregular, often oval; it is markedly larger in a few specimens. The marginal area is blackish-brown and runs along the entire length of both wings. The forewing also has a submarginal area which

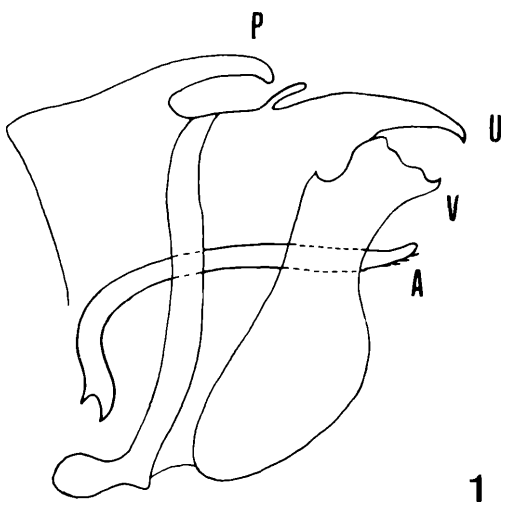

Fig. 1: The male genitalia of *Colias jacuticola* spec. nov. Lateral view, A aedeagus, P pseudouncus, U uncus, V valva.

Next page, colour plate 1:

Fig. 2: The variability of patterns and coloration of *Colias jacuticola* spec. nov. 1st row: male (holotypus), female (allotypus); 2nd row: male (paratypus), female (paratypus) underside; 3rd row: male (paratypus), male (paratypus) underside; 4th row: male (paratypus), male (paratypus) underside.

Plate 1

is its darkest zone, with a line of contrasting spots of pale ground colour without silvery lustre. In few specimens (8–10 %) these spots cut capillarily through the marginal area to the pink fringe in a way typical of *C. mongola*.

The underside of the forewing is light grey, bluish with thin grey dusting. In the apical part the ground colour changes into an inconspicuous greenish yellow. The discal spot is black, elliptic, with a pale centre. A line of dark spots runs along the submarginal area. They often peter out towards the apex, remaining only in M_3, Cu_1 and Cu_2. The underside of the hindwings is pale green to greenish/yellow, dusted grey especially in the anal part and at the base. The discal field is paler, the discal spot smaller, silvery, mostly elliptic with a rusty red border. This border is asymmetrical, extending arrow-wise towards the outer margin in some individuals. The discal spot is sometimes doubled by a small round spot adjacent to the distal margin of the larger one. The submarginal area on the underside of the hindwing is characterized by a row of almost connected pale spots corresponding to more contrasting submarginal spots on the upperside. Moreover, in the submarginal area of the underside runs a row of not very distinct dark spots that are often reduced or missing.

The variability of the male genitalia (Fig. 1) appears in the length of the dorsal projection of the uncus and shape of teeth on the top of the valva, particularly its hooked tip. The beak-shaped uncus and its length are relatively constant characters.

Sexual dimorphism is not much pronounced. Females differ from males by a somewhat paler ground colour and a considerable reduction of dark pigmentation, especially on the upperside of the forewing whose underside is creamy white in contrast to the males, and slightly dusted grey. The apical and subapical zones and the underside of the hindwing are conspicuously yellow and differentiated. The submarginal zone is also clarified and the row of the dark spots is almost indistinct.

The forewings of the males are relatively narrow and short (20–23 mm long), but with elongate apices. The wings of a mounted male are almost square owing to their shortness. The ratio of wing span to the distance between the apex of forewing and the most posterior point of hindwing is 1.14–1.26:1. The forewings of females are somewhat broader, rounded at the apex, 22–24 mm long.

Differential diagnosis

The close relationship between *C. jacuticola* from the Oymyakon Valley and the Euro-Siberian species *C. nastes, C. mongola* and *C. tyche* and their subspecies, and the Central Asian *C. cocandica* is evident in the yellowish-green ground colour and especially in the pale pattern of the submarginal area on the upperside of the wings. These species cannot be distinguished by the morphology of the male genitalia. The genitalia are very similar, and, moreover, another complication is their well-known uniformity and considerable morphological variability in almost all representatives of the genus *Colias*.

In addition to some characters of the general facies, the new species differs from *C. cocandica* and *C. tyche* by its bionomy and geographic distribution. *C. cocandica* lives exclusively in the alpine zones of the Tian-shan and Pamir-Alai. *C. tyche* is an eurybiont in Siberia, but these butterflies fly in early spring (May—June) while *C. jacuticola* never appears before early July. *C. tyche* flies at the type locality of *C. jacuticola* approximately one month earlier, and there is not the slightest overlapping of the periods of flight of the adults.

By its morphological characters *C. jacuticola* resembles most *C. mongola sidonia* that has been described from northernmost part of Central Mongolia, the steppe region of Rinchinlchumbe (WEISS 1968), moreover *C. nastes moina* from Manitoba, Canada, and *C. nastes aliaska* from Yukon, Alaska (HOWE 1975).

C. jacuticola can be distinguished from *C. mongola* by the pale submarginal spots on the upperside of the forewing, which only exceptionally reach to the fringe (in 8—10% of individuals), while in *C. mongola* this is quite common. Also by a considerable reduction to absence of dark spots in the submarginal area on the underside of the hindwing, which are present and distinct in most *C. mongola*. Another important distinguishing character is the ratio of wing span to the longest distance between the apices of the fore- and hindwings of males (measured along the body axis) (see above). This ratio is 1.37:1—1.48:1 in *C. mongola sidonia* and 1.31:1—1.40:1 in *C. mongola mongola*. In mounted individuals this is apparent in an almost square arrangement of the wings in *C. jacuticola*, whereas in *C. mongola* it is oblong.

C. jacuticola markedly differs from the circumpolar subspecies of *C. nastes, C. nastes werdandi* from Europe and western Siberia (SCHULTE 1953) and *C. nastes streckeri* from Alaska, by wing ornamentation.

From the Canadian *C. nastes moina* and Alaskan *C. nastes aliaska* it differs by a smaller size, more monotonous dark dusting (pigmentation) of the upperside of the forewing, and by ground colour which is more yellowish in these subspecies (HOWE 1975).

KURENTSOV (1970) described *C. nastes jacutica* from uplands near the town Verkhoyansk at the confluence of the rivers Yana and Adych (600 m a.s.l.). This place lies 700 km north-northwest of the type locality of *C. jacuticola*, 200 km above the polar circle. The taxonomic validity of this subspecies is not clear, being questionable owing to an insufficient description and only a few (6) specimens examined. Nevertheless, there are some characters differentiating the two taxa. *C. nastes jacutica* is larger (wing span 45 mm), its wings are wider and more rounded. Overall coloration is more uniform, with a more yellowish tinge. Ornamentation is less contrasting and lacks pigmentation of the upperside of forewings.

C. jacuticola also resembles *C. phicomone* ESPER by the ornamentation and shape of the wings, above all by the arrangement and size of pale submarginal spots and reduction of dark submarginal spots on the underside of the hindwing. However, the difference is quite clear because *C. phicomone*'s ground colour is a conspicuous yellow green, but the colour of the underside of hindwings is brightly yellow. Moreover, its distribution area is confined to alpine zones of the Alps, Pyrenees and Carpathians (ZELNÝ, personal communication).

Some behavioural traits and preference for certain biotopes are also of diagnostic significance. *C. jacuticola* flies at a medium speed, often interrupting the flight by stopping on flowers. In this respect it resem-

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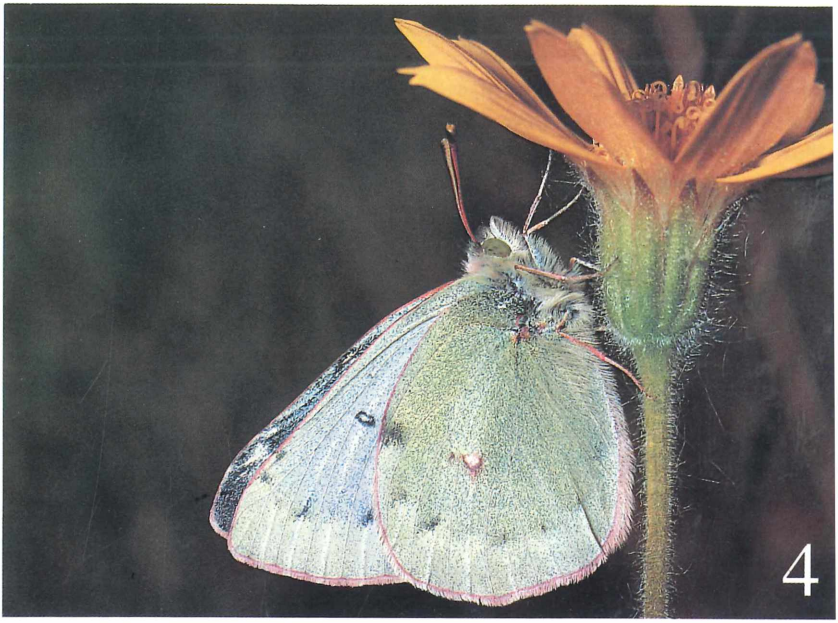
Next pages, colour plates 2 and 3:

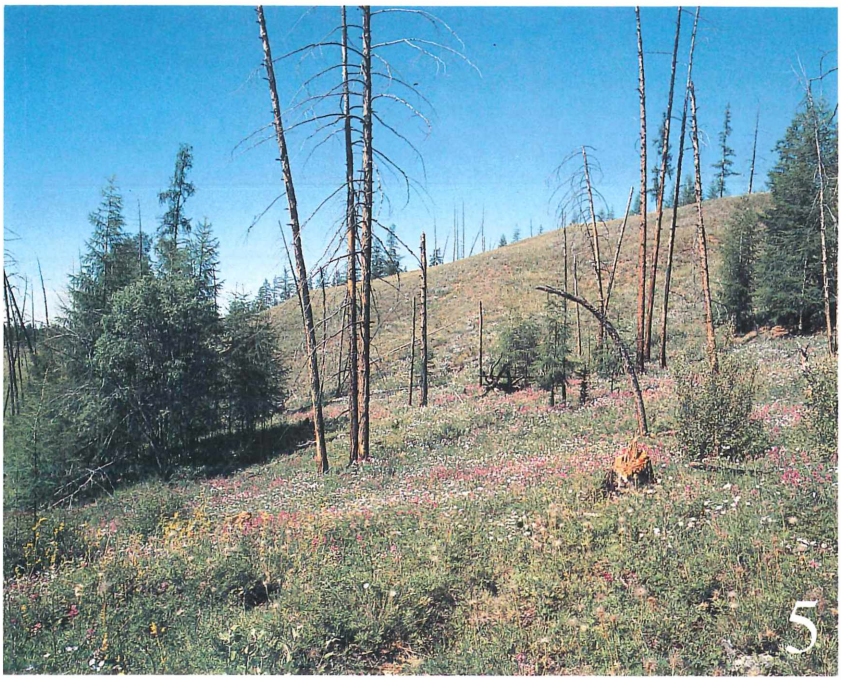
Fig. 3 (Colour plate 2): Differences in coloration and ornamentation between some species (all specimens are males) of the genus *Colias* FABRICIUS. 1st row: *C. jacuticola* spec. nov., *C. tyche herzi* STAUDINGER; 2nd row: *C. nastes werdandi* ZETTERSTEDT (locality Taymir, Siberia), *C. nastes werdandi* ZETTERSTEDT; 3rd row: *C. mongola sidonia* WEISS, *C. mongola mongola* ALPHERAKI; 4th row: *C. concandica maja* GRUM-GRSHIMAILO, *C. phicomone phicomone* ESPER.

Fig. 4–5 (Colour plate 3): Fig. 4: *Colias jacuticola* spec. nov. Male. **Fig. 5:** The biotope of *Colias jacuticola* spec. nov.

Plate 2

Plate 3





bles *C. alfacariensis* RIBBE (syn. = *australis* VERITY) rather than the related species *C. mongola* and *C. nastes*, whose flight is fast and whose behaviour is "nervous" with less frequent visits to plants. Moreover, *C. nastes* flies in waste areas of the montane and arctic tundra with sparse vegetation which are very different from the biotopes described for *C. jacuticola*.

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