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## DISTRIBUTION AND BIONOMICS OF *UDEA ALPINALIS* (LEPIDOPTERA, PYRALIDAE) IN WESTERN CARPATHIANS (SLOVAKIA)

Lubomír Panigaj<sup>1</sup>, Miroslav Kulfan<sup>2</sup>

<sup>1</sup> Department of Zoology, Institut of Biology and Ecology, Faculty of Science  
University of P. J. Šafárik, Moyzes str. 11, 041 67 Košice, Slovak Republic,  
E-mail: lubomir.panigaj@upjs.sk

<sup>2</sup> Comenius University, Department of Ecology, Faculty of Science, Mlynská dolina B-1,  
84215 Bratislava, Slovak Republic,  
E-mail: kulfan@fns.uniba.sk

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**Distribution and Bionomics of *Udea alpinalis* (Lepidoptera, Pyralidae) in Western Carpathians (Slovakia).** Panigaj L., Kulfan M. — Here we summarize all known and new localities with occurrence of *Udea alpinalis* (Denis et Schiffermüller, 1775) in Slovakia. Furthermore, based on our data we discuss distribution, hypsometric claims and variability of forewings design.

**Key words:** Alpine pearl, *Udea alpinalis*, Lepidoptera, distribution, variability.

**Распространение и бионика *Udea alpinalis* (Lepidoptera, Pyralidae) в Западных Карпатах (Словакия).** Пангай Л., Кулфан М. — В работе суммированы все известные и новые места находок *Udea alpinalis* (Denis et Schiffermüller, 1775) в Словакии. Кроме того, на основании наших данных обсуждается распространение, гипсометрические требования и изменчивость дизайна передних крыльев.

**Ключевые слова:** *Udea alpinalis*, Lepidoptera, распространение, изменчивость.

### Introduction

In Western Carpathians, the members of the genus *Udea* Guenée, 1845 inhabit mainly higher mountain altitudes. Apart from *Udea alpinalis* (Denis et Schiffermüller, 1775) the following *Udea* species occur in Western Carpathians: *Udea uliginosalis* (Stephens, 1834), *U. decrepitalis* (Herrich-Schäffer, 1848), *U. inquinatalis* (Lienig et Zeller, 1846) and *U. nebulalis* (Hübner, 1796). Likewise, *U. cyanalis* (La Harpe, 1855), *U. hamalis* (Thunberg, 1788), *U. rhododendronalis* (Duponchel, 1831) and *U. austriacalis* (Herrich-Schäffer, 1851) live within the area of other Central European mountains. According to several authors, these species belong to alpine, boreo-alpine and boreo-montane element of lepidopterofauna. They occur in subalpine, eventually up to alpine zone of high mountains, therefore their distribution coincides with high mountain ranges. Several other species of the family Pyralidae with similar distribution are known, for example *Oreana alpestralis* (Fabricius, 1787) and *Eudonia vallesialis* (Duponchel, 1832). *U. alpinalis* is habitually similar to *U. uliginosalis*, which is exclusively alpine element. Based on the morphological and molecular analysis Mally and Nuss (2011) showed that these two species from the *Udea* genus are phylogenetically the closest. Here we summarize all available information according to our best knowledge and present new data on distribution and biology of *U. alpinalis* in Western Carpathians. Field research showed that, besides the area of Slovak mountains, *U. alpinalis* populated territories outside the high mountains as well. Therefore, goal of our research was to determine the range and reasons for such extended occurrence.

### Material and methods

Data were collected between the years 2005–2010 in the area of High Tatras and high mountains in its proximity. We used sampling by entomologic net or visual recognition. Overall, we captured 84 males and 23 females. All samples are deposited in the Zoology department of PF UPJŠ in Košice. Collection was used for determination of wingspan and variability of drawing and colour. Field observations were supplemented with already published data.

## Results and Discussion

### Distribution

*Udea alpinalis* is distributed in the mountains of temperate and submeridional Europe — Carpathians, Alps, Pyrenees, Balkans (fig. 1.). As for Carpathian arch, except Western Carpathians its occurrence was also confirmed in Western Ukraine — Eastern Carpathians: Beskydy and Gorgany Mts. (Ivano-Frankovska and Zakarpatska oblasti) (Kosakevitsch 1974; Bizdilya et al. 2006), in the Polish Carpathians — Tatras (Buszko, Mikkola and Nowacki 2000), and Bieszczady: Zatwarnica (leg. M. Mleczak). According to Kosakevitsch (1974), distribution of *U. alpinalis* across Russia is unknown. However in Catalogue of the lepidopterans (Lepidoptera) of Russia (2008) isolated population in western Caucasus is observed.

According to published data *U. alpinalis* was formerly found in the following Slovak localities: Lesser and Greater Fatra (Malá Fatra and Veľká Fatra) and High and Low Tatras (Hrubý 1964; Reiprich and Okáli 1989). The new localities and last findings point out to another character of distribution in Slovakia (fig. 2.).

New records: Zvolen — Javorie Mt. (leg. J. Patočka), **Lesser Fatra**: Medziholie; **Low Tatras**: Vajskovská dolina walley, Jasná, Trangoška, chata M. R. Štefánika chalet, Ohnište, Lajstroch; **Western Tatras**: Červenec, Babky, Sivý vrch Mt., Žiarska chata chalet, Žiarske sedlo saddleback; **High Tatras**: Turkova dolina walley, Popradské pleso lake, Velická poľana, Velické pleso lake; **Belianske Tatras**: Rakúska poľana, chata Plesnivec chalet, Zadné Meďodoly, Biele pleso lake, Kopské sedlo saddleback; **Slovak Paradise**: Kopanecké lúky meadows; **Spišská Magura Mts.**: Jezersko (leg. L. Panigaj);

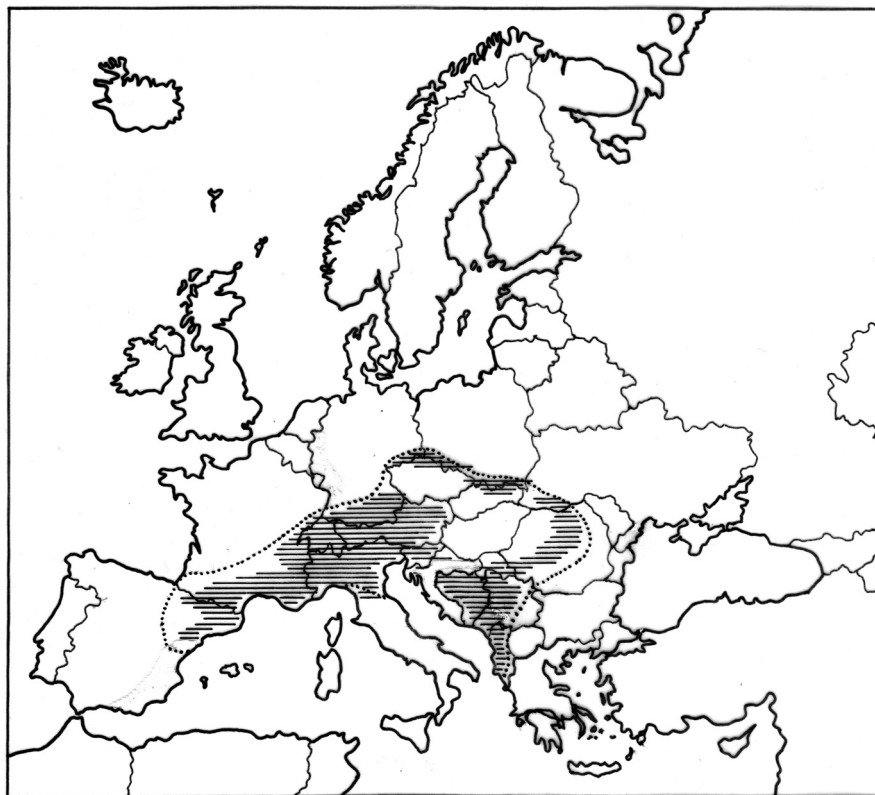


Fig. 1. Distribution of *Udea alpinalis* in Europe.

Рис. 1. Распространение *Udea alpinalis* в Европе.

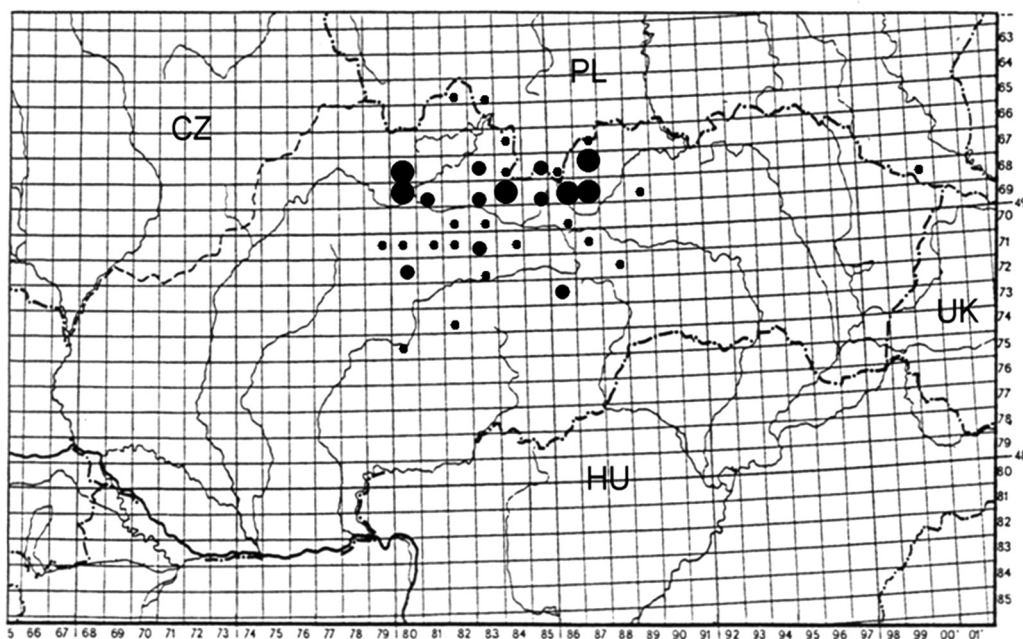


Fig. 2. Records of *Udea alpinalis* in Slovakia: ● — 1 locality in map square; ● — 2–4 localities in map square; ● — more than 4 localities in map square.

Рис. 2. Находки *Udea alpinalis* в Словакии: ● — 1 местонахождение в квадрате карты; ● — 2–4 местонахождений в квадрате карты; ● — более 4 местонахождений в квадрате карты.

**Western Tatras:** Oravice (leg. I. Richter); **Spíšská Magura Mts.:** Bachledova dolina wally, Ždiar — Strednica; **Belianske Tatras:** Muráň, Predné Međodoly, Zadné Međodoly; **High Tatras:** Bielovodská dolina wally; **Lesser Fatra:** Chleb — Chlebský kotol basin, Suchý (leg. M. Kulfan). In Slovakia alpine pearl is also known from the Eastern Carpathians — **Bukovské vrchy** hills: Ruské sedlo saddleback (leg. L. Panigaj). Expected occurrence of *U. alpinalis* was not confirmed in some of the mountains in area of Slovenské rudohorie with altitude 1200–1400 m above sea level.

### Bionomics

Vertical distribution of *U. alpinalis* in Western Carpathians is between altitudes of 600–800 to 1600–1800 m, optimally at 1350 (fig. 3). It has not been confirmed that geological bedrock shapes the vertical distribution. In Eastern Carpathians in Ukraine *U. alpinalis* occurs from altitude of 800–900 m to dwarf pine level (Kosakevitsch 1974). Laštůvka (1994) presents atypical occurrence of the alpine pearl from Pálava Landscape Protected Area in Czech Republic (Stolová hill, altitude 458 m). According to different authors, wingspan of *U. alpinalis* is varying between following values: 25 mm, 24–28 mm or 24–26 mm (Hanneman, 1964). Collected specimens from Western Carpathians had wingspan 24.3–27.6 mm. Shape and size of white spot on forewing of *U. alpinalis* is greatly varying (fig. 4). *U. alpinalis* is the only species from the genus *Udea* with such variability. Occurrence of aberrative forms collected in different localities of Western Carpathians was accidental; influence of different abiotic or biotic factors was not observed. *U. alpinalis* and *U. uliginosalis* occur together in the same locality sporadically. An interesting phenomenon was observed in High Tatras where *U. uliginosalis* only seldom descends close to valleys below glacier's shelves located at altitude of about 1700–1800 m — e. g. in Velická dolina valley, below Batizovské plesá moun-

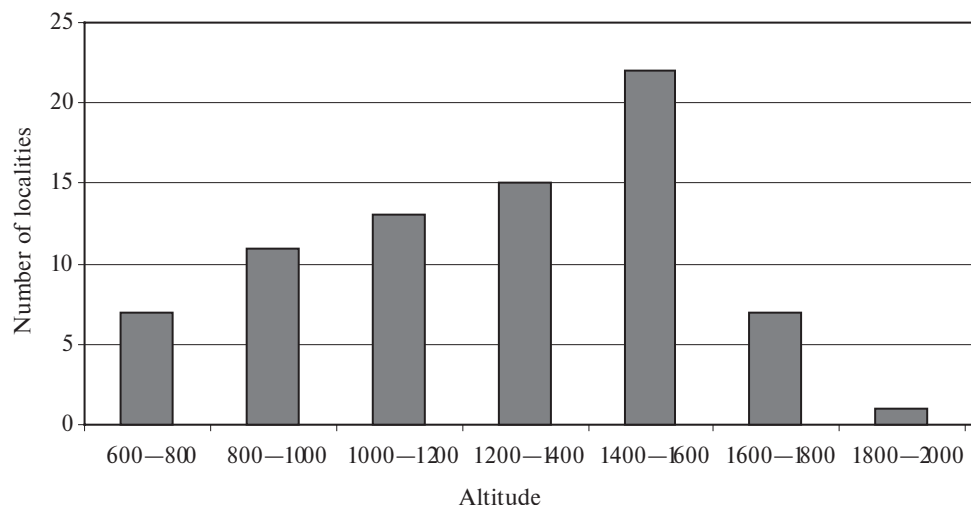


Fig. 3. Altitude of records of *Udea alpinalis* in Slovakia.

Рис. 3. Высота находки *Udea alpinalis* в Словакии.

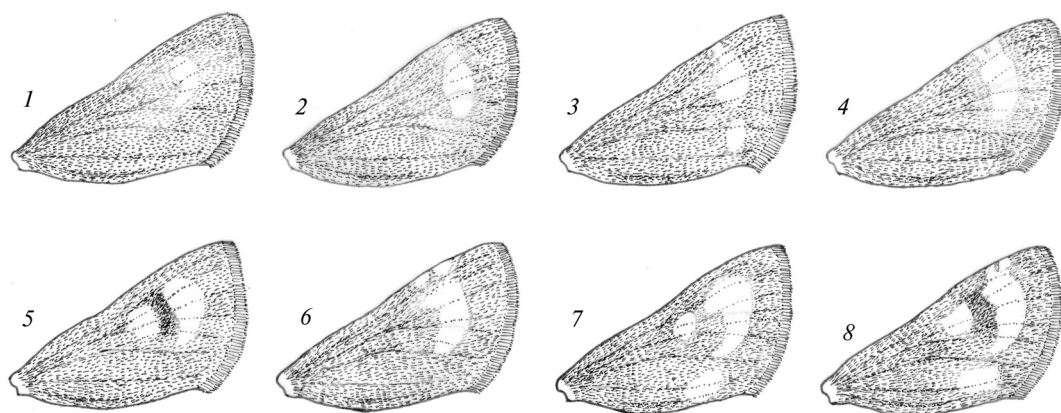


Fig. 4. Variability of forewing of *Udea alpinalis* from Western Carpathians. Eight different aberrative forms of forewing design were found: 1 — High Tatras: Turková dolina valley, 6.07.1996, male — typical form; 2 — Western Tatras: Žiarska dolina valley, 11.07.2004, male; 3 — Belianske Tatras: Biele pleso lake, 12.07.2003, male; 4 — Belianske Tatras: Kopské sedlo saddleback, 20.08.2006, female; 5–7 — Belianske Tatras: Rakúska poľana, 10.07.2003 males; 8 — Lesser Fatra: Rozsutec Mt., 9.07.2007, male — all leg., det. and col. E. Panigaj.

Рис. 4. Варибельность передних крыльев *Udea alpinalis* из Западных Карпат. Найдено восемь аббераций формы передних крыльев.

tain lakes, in Veľká studenovodská dolina valley, etc. On the other hand, *U. alpinalis* passes upwards across this barrier only seldom — e. g. in Temnosmrečinská or Veľická dolina valleys.

## Conclusion

Based on our research we can conclude that:

— *Udea alpinalis* is European (central-western European) boreoalpine species, living probably on whole continent.

— Occurrence in Western Carpathians is limited to the highest mountains — High and Low Tatras Mts., Greater and Lesser Fatra Mts., Babia hora Mts., Levočské mountains and Bukovské hills (already in Eastern Carpathians).

- It seems that *U. uliginosalis* is the closest species to *U. alpinalis*.
- Except the high mountainous areas (largely subalpine or alpine zone) *U. alpinalis* live also at lower altitudes in the zone of coniferous vegetation, its habitable range is between 700 to 1800 m above the sea level with optimum in Western Carpathians 1350 m.
- Drawings of forewings in *Udea* spp. show significant variability without known reason.

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