Entomol. Croat. 2005, Vol. 9. Num. 1-2: 77 - 83
ISSN 1330-6200
UDC 595.789(497.5)

NEW FINDING OF THE BUTTERFLY *BRENTHIS INO* (ROTTEMBURG, 1775) (LEPIDOPTERA: NYMPHALIDAE) IN CROATIA

Iva MIHOCI & Martina ŠAŠIĆ

Department of Zoology, Croatian Natural History Museum, Demetrova 1, 10000 Zagreb,
ivamihoci@gmail.com

Accepted: December 19, 2005

During summer 2005 in Velebit Nature Park we came upon the butterfly *Brenthis ino* (Rottemburg, 1775), which is considered rare in Croatia according to previous finds. In this paper we discuss the distribution, habitat characteristics and possible threat status of the mentioned species in the Croatian butterfly fauna.

***Brenthis ino*, distribution, habitat, Croatia**

I. MIHOCI, M. ŠAŠIĆ, Novi nalaz vrste *Brenthis ino* (Rottemburg, 1775) (Lepidoptera, Nymphalidae) u Hrvatskoj, Zoološki odjel Hrvatskog prirodoslovnog muzeja, Demetrova 1, 10000 Zagreb, ivamihoci@gmail.com, - Entomol. Croat. 2005, Vol. 9. Num.1-2: 77-83

Tijekom terenskih istraživanja faune danjih leptira na prostoru Parka prirode „Velebit“ u ljeto 2005. zabilježili smo vrstu *Brenthis ino* (Rottemburg, 1775) koja je prema dosadašnjim nalazima rijetka u Hrvatskoj. U radu se govori o rasprostranjenosti navedene vrste u Hrvatskoj, karakteristikama i stanju staništa na kojem je zabilježena, kao i omogućem stupnju ugroženosti u fauni danjih leptira Hrvatske.

***Brenthis ino,* rasprostranjenost, stanište, Hrvatska**

Introduction

In the European butterfly fauna there are three species representing the *Brenthis* genus: *Brenthis daphne* (Denis & Schiffermüller, 1775), *Brenthis hecate* (Denis & Schiffermüller, 1775) and *Brenthis ino* (Rottemburg, 1775). *B. daphne* Den. & Sch. and *B. ino* Rott. are morphologically very similar and according to Tolman & Lewington (1997) the main distinguishing feature of these two species is in the hind-wing underside base of the cell s4 (adjacent to the cell-end), which

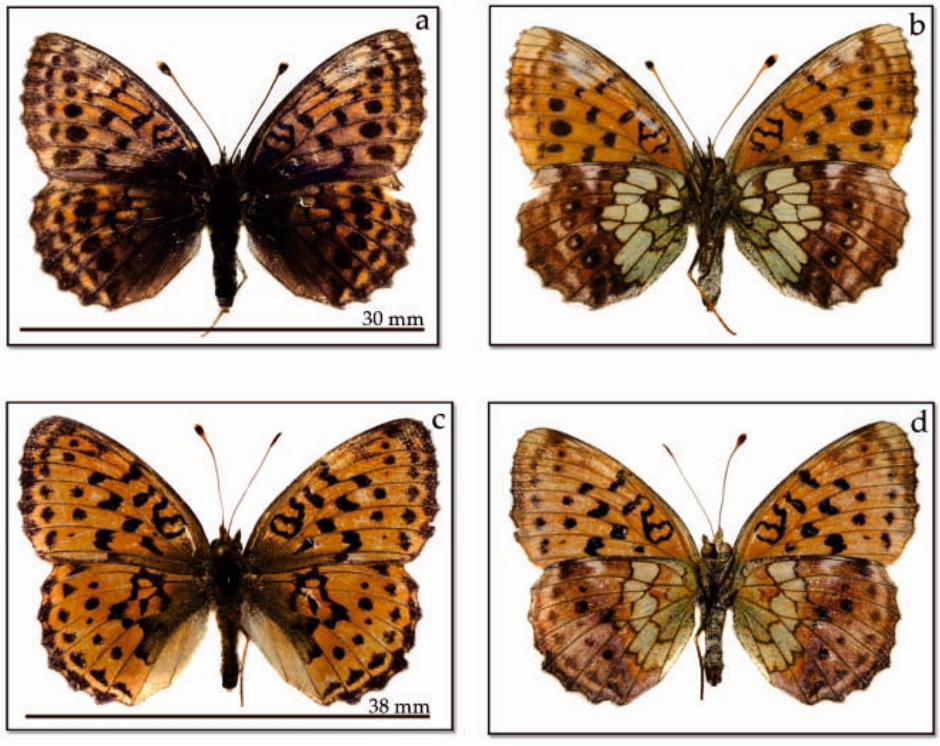

Fig. 1. Forewing and hindwing upper- and under-sides of *Brenthis ino* (Rottemburg, 1775) (a,b) and *Brenthis daphne* (Denis & Schiffermüller, 1775) (c,d) collected at the Sunđerac locality in Velebit Nature Park

is wholly yellow and visible as a discrete, rectilinear spot separating the cell from the dark post-discal area (Fig. 1). Additionally, Matsuoka et al. (1983) investigated the allozyme data of *B. ino* and *B. daphne* which showed lack of genic differentiation between them, indicating that their divergence might be a relatively recent event in evolutionary history. *B. daphne* and *B. ino* are both Palaearctic species. According to Tolman & Lewington (1997) the Marbled Fritillary (*B. daphne*) is distributed from southern Europe, north-eastern Turkey, Iraq, Iran, southern Siberia, Mongolia and China to Japan. On the other hand, the Lesser Marbled Fritillary (*B. ino*) is present from Europe, Turkey, throughout temperate Asia and the Polar Urals to Japan (Tolman & Lewington, 1997). In European scope, the

Lesser Marbled Fritillary has a wider range and can be found in northern Europe as well (Danish mainland, Norway, Sweden and Finland) (http://www.faunaeur.org/), but has disappeared from the Netherlands through habitat loss, probably land drainage (Chinery, 1989).

According to Lepidopterologen-Arbeitsgruppe (1987) the Lesser Marbled Fritillary is a univoltine butterfly with adults flying from mid-June to the end of July and at the highest altitudes until August. Males are usually on patrol in search of females, while females spent the most of time flying and nectaring. The nectar plants most used are *Cirsium* spp. and *Centaurea jacea* L. by males and *Sanguisorba officinalis* L. and *Knautia arvensis* (L.) Coult. by females (Zimmermann et al., 2005). Females lay eggs singly and larvae live solitarily. Larvae host plants are *Filipendula ulmaria* (L.) Maxim., *Sanguisorba officinalis* L., *Rubus* spp. and various others (Zimmermann et al., 2005).

The Lesser Marbled Fritillary is one of the rare successful wetland butterflies (Zimmermann et al., 2005). According to Van Swaay & Warren (1999) the Lesser Marbled Fritillary populations are increasing in countries neighbouring Croatia, Slovenia and Hungary, as well as in Luxembourg and the Czech Republic. At the end of the 20th century the *B. ino* was rare, local and considered vulnerable in Slovenia (Carnelluti, 1992) but has lately become much more widespread (Predovnik & Verovnik, 2004). According to the latest paper on the demography, dispersal and behaviour of the Lesser Marbled Fritillary in western Bohemia (Czech Republic) by Zimmermann et al. (2005) this is for several reasons, like syntopic feeding on a wider range of plants, low selectivity for habitat architecture and the availability of extensive hay meadows with infrequently mown parts.

On the other hand *B. ino* has disappeared from the Netherlands (Chinery, 1989), and it is decreasing in Austria, where a decrease of 75-100% has been perceived over the last 25 years, in Germany, Denmark and Romania, where a decrease of 15-25% has been perceived over the last 25 years (Van Swaay & Warren, 1999), as well as in Bulgaria (Ganev, 1985) and Serbia (Jakšić, 2003). According to IUCN classification the Lesser Marbled Fritillary has been classified as vulnerable (V) in Bulgaria and endangered (E) in Serbia (Yugoslavia) (Jakšić, 2003).

Material and Methods

Butterflies were collected using an entomological net in Velebit Nature Park at the Sunđerac locality on July, 28th 2005. Specimens are now placed in the butterfly collection in the Department of Zoology in the Croatian Natural History Museum in Zagreb.

Taxonomic determination was done according to Tolman & Lewington (1997), and butterfly nomenclature according to Karsholt & Razowski (1996). The geological bedrock was proved using geological sheet-map Gospić (L 33-127, 1:100000).

Results and Discussion

In July 2005, while collecting and observing butterflies at different locations in Velebit Nature Park, we found two species from the *Brenthis* genus at 1146 a.s.l. at the Sunđerac locality, on July 28th 2005 (Fig. 1). Abundance and frequency of occurrence of *B. daphne* were much higher than that of *B. ino* (only two specimens observed and collected).

Besides *Nymphalis xanthomelas* (Denis & Schiffermüller, 1775), *Apatura metis* Freyer, 1829 and *Nymphalis vau-album* (Denis & Schiffermüller, 1775) (Šašić & Kučinić, 2004) and according to previous finds the Lesser Marble Fritillary is one of the rarest nymphalid butterflies in Croatian fauna. Hitherto it has been found on several locations in small populations (Fig. 2). The first find was that of Josef Mann in 1866 in the area that was then called the Croatian Military Border, probably in Josipdol although no precise location was given (Mann, 1867). That same locality was cited by Abafi-Aigner et al. (1896) several years later in 1896.

The next *B. ino* finding site was discovered at Plitvice Lakes, close to Plitvički Ljeskovac (Koča, 1901). At that locality Gjuro Koča found only one specimen, on July, 17th 1891.

Next, while collecting and observing Macrolepidoptera in the Kupa River valley (the upper course of the Kupa River) Lidija Mladinov collected one specimen of B. ino near the Croatian-Slovenian border at Čedanj on July, 13th 1980 (Mladinov, 1980).

The next finding site of the Lesser Marbled Fritillary was marked as a dot by Jakšić (1988) in the provisional distribution maps of the butterflies of Yugoslavia the Žumberak Mt. peak Sveta Gera. Overviewing butterfly collections in the

Fig. 2. The distribution of the Lesser Marbled Fritillary (*Brenthis ino* Rott.) in Croatia. 1-Josipdol (Mann, 1867; Abafi-Aigner et al., 1896), 2- Plitvički Ljeskovac (Plitvice Lakes) (Koča, 1901), 3, 4-Žumberak Mountain-Sveta Gera & Slapnica (Jakšić, 1988; Bojanić, 2001), 5-Čedanj (Kupa River valley) (Mladinov, 1980), 6-Sunđerac (Nature Park Velebit, leg. I. Mihoci)

Department of Zoology in the Croatian National History Museum we came upon six specimens of the Lesser Marbled Fritillary in Lorković's butterfly collection. They were all collected by Zdravko Lorković from July, 21st to July, 23rd 1921 at the locality Sveta Gera. Also there are two recent findings: Sveta Gera June, 14th 1991 and Slapnica June, 9th 2001 (Bojanić, 2001)

In July 2005 two specimens of B. ino were collected at the locality Sunđerac in Velebit Nature Park. Sunđerac is a well-preserved, large wet-meadow com-

plex with a few minor springs rising at the meadow boundary and continuing in streams with a short flow. According to the geological sheet-map of Gospić (L 33-127) the geological surface at of Sunđerac is an alternation of calcareous and dolomitic substrates. Because of the very specific floristic diversity Sunđerac is protected as a Floristic Reserve. Although, Sunđerac is still well preserved the main conservation concern is that forest succession should be prevented in that specific wetland habitat.

In the same habitat we have also collected pierids *Aporia crataegi* (Linnaeus, 1758), *Pieris brassicae* (Linnaeus, 1758), *Colias crocea* (Fourcroy, 1785), *Gonepteryx rhamni* (Linnaeus, 1758), lycaenids *Lycaena virgaureae* (Linnaeus, 1758), *Celastrina argiolus* (Linnaeus, 1758), nymphalids *Vanessa atalanta* (Linnaeus, 1758), *Inachis io* (Linnaeus, 1758), *Brenthis daphne* (Denis & Schiffermüller, 1775), *Polygonia egea* (Cramer, 1775), *Boloria euphrosyne* (Linnaeus, 1758), *Argynnis paphia* (Linnaeus, 1758), *Argynnis adippe* (Denis & Schiffermüller, 1775), *Argynnis aglaja* (Linnaeus, 1758), *Melanargia galathea* (Linnaeus, 1758), *Hipparchia semele* (Linnaeus, 1758), *Hipparchia fagi* (Scopoli, 1763), *Erebia oeme* (Hübner, 1804), *Erebia ligea* (Linnaeus, 1758), *Coenonympha arcania* (Linnaeus, 1761), *Coenonympha glycerion* (Borkhausen, 1788) and hesperid *Ochlodes venata* (Bremer & Grey, 1853).

Future investigations will be focused on establishing the distribution of *B. ino* in Croatia, defining the size and number of the known and detecting new populations, understanding the ecological requirements that affect population structure, dynamics and persistence. All these factors will contribute to an easier definition of the faunistic status and possible threat category of *B. ino* in Croatia.

Acknowledgements

The research was supported by grant from the KEC project and project 01-83007 of Croatian Ministry of Science, Education and Sports. We would like to thank dr. sc. Nikola Tvrtković (CNHM Zagreb) for supporting and organizing the investigations undertaken. Also, we would like to thank David Mihoci for photographing collected specimens.

References

ABAFI-AIGNER ET AL., 1896. Fauna Regni Hungariae. Regia societas scientiarum naturalim Hungarica, Budapest, pp. 85.

BOJANIĆ, D., 2001. Visinska razdioba danjih leptira (Rhopalocera) na području Žumberačke gore. Diplomski rad, PMF, Biološki odsjek, pp. 66.

CARNELLUTI, J., 1992. Rdeči seznam ogroženih metuljev (Macrolepidoptera) v Sloveniji. Varstvo narave 17: 61-104.

CHINERY, M., 1989. Butterflies & day-flying moths of Britain and Europe. William Collins Sons & Co. London, pp. 315.

GANEV, J., 1985. Red List of Bulgarian Butterflies and larger Moths, Entomologist's Gazette, vol. 36: 115-118.

JAKŠIĆ, P., 1988. Privremene karte rasprostranjenosti dnevnih leptira Jugoslavije (Lepidoptera, Rhopalocera). Jugoslavensko entomološko društvo. Posebna izdanja 1. Zagreb, pp. 215.

JAKŠIĆ, P., 2003. Red Data Book of Serbian Butterflies. Lepidoptera: Hesperioidea and Papilionoidea. Institute for nature conservation of Serbia. Belgrade, pp. 198.

KARSHOLT, O. & RAZOWSKI, J., 1996. The Lepidoptera of Europe. A Distributional Checklist. Apollo Books, pp. 380.

KOČA, GJ., 1901. Prilog fauni leptira (Lepidoptera) Hrvatske i Slavonije. Glasnik Hrvatskog naravoslovnog društva, XIII (1-3): 1-67.

LEPIDOPTEREN-ARBEITSGRUPPE, 1987. Tagfalter und ihre Lebensräume. Schweizerischer Bund für Naturschutz. Basel, pp. 516.

MANN, J., 1867. Schmetterlinge gesammelt im J. 1866 um Josefsthal in der croat. Militärgrenze. Verhandlungen der zoologisch-botanischen Gesellschaft in Wien, XVII: 63-76.

MATSUOKA, N., CHIBA, Y., SAITOH, K. 1983. Allozymic similarity in two species of the genus *Brenthis* (Lepidoptera: Nymphalidae). Comparative Biochemistry and Physiology Part B: Biochemistry and Molecular Biology, 74 (3): 385-387.

MLADINOV, L.,1980. Lepidoptera iz doline gornjeg toka rijeke Kupe, IV. Geometridae. Acta entomologica Jugoslavica. 16 (1-2): 69-91.

PREDOVNIK, Ž. & VEROVNIK, R., 2004. New records of rare pierids (Lepidoptera: Pieridae) in Slovenia. Natura Sloveniae 6 (2): 39-47.

ŠAŠIĆ, M. & KUČINIĆ, M., 2004. The Red Data List of Croatian Butterflies. In MARKOVIĆ, D. (ur). Državni zavod za zaštitu prirode.

TOLMAN, T. & LEWINGTON, R., 1997. Butterflies of Britain and Europe. Harper Collins Publishers. London, pp. 320.

VAN SWAAY, C.A.M. & WARREN, M.S., 1999. Red Data Book of European Butterflies (Rhopalocera). Nature and Enviroment Series No. 99. Council of Europe. Strasbourg, pp. 260.

ZIMMERMANN, K., FRIC, Z., FILIPOVA, L. & KONVIČKA, M. 2005. Adult demography, dispersal and behaviour of *Brenthis ino* (Lepidoptera: Nymphalidae): how to be a successful wetland butterfly. Eur. J. Entomol, 102: 699-706.

http://www.faunaeur.org/