

New records of rare pierids (Lepidoptera: Pieridae) in Slovenia

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Abstract. The authors present new and unpublished information on the distribution of three pierid species in Slovenia, i.e. *Gonepteryx cleopatra* (Linnaeus, 1767), *Colias erate* (Esper, 1805), and *Colias myrmidone* (Esper, 1781). The first two species are very recent additions to the Slovene butterfly fauna and their status in view of the new records is discussed. *Colias erate* could be considered a resident species in Slovenia as it was found in two consecutive years on two sites along the Drava channels below Formin and Zlatoličje hydroelectric power plants. *Colias myrmidone* has suffered strong decline throughout the western limit of its distribution in central Europe and should be considered near extinct in Slovenia. The last records of this species in Slovenia are documented.

Keywords: distribution, *Colias myrmidone*, *Colias erate*, *Gonepteryx cleopatra*

Izvleček. NOVI PODATKI O NAJDBAH REDKIH VRST BELINOV (LEPIDOPTERA: PIERIDAE) V SLOVENIJI - Avtorja predstavlja nove in neobjavljene podatke o razširjenosti treh vrst belinov *Gonepteryx cleopatra* (Linnaeus, 1767), *Colias erate* (Esper, 1805) in *Colias myrmidone* (Esper, 1781) v Sloveniji. Prvi dve vrsti sta najnovejši pridobitvi v favni dnevnih metuljev Slovenije in v luči novih najdb je razprava o njunem stalnem pojavljanju v Sloveniji. *Colias myrmidone* je v zadnjih letih izginil iz mnogih predelov srednje Evrope na zahodni meji svojega areala. Tudi pri nas ga lahko prištevamo med vrste na robu izumrtja. Predstavljeni podatki dokumentirajo izginotje te vrste v Sloveniji. Vrsta *Colias erate* je verjetno stalna vrsta v Sloveniji, saj je bila najdena v dveh zaporednih letih na dveh območjih ob kanalih Drave pod hidroelektrarnama Formin in Zlatoličje.

Ključne besede: razširjenost, *Colias myrmidone*, *Colias erate*, *Gonepteryx cleopatra*

Introduction

Slovenia lies at the junction of four zoogeographical regions, all characterised by specific and rich butterfly fauna. The Mediterranean region extends into the coastal area of Slovenia and the Vipava valley, while the alluvial planes of the Drava and Mura Rivers, including the

neighbouring hills, could be regarded as part of the Pannonian region. The largest part of Slovenia, however, is covered by the Alpine region with its transition zones to colline belt and the Continental region. Nevertheless, typical butterfly representatives of the first two regions are hard to pick, and the prefix sub-Mediterranean (-Pannonian) characterises the habitats and faunas of both regions more precisely.

One of the candidates as a representative of the Mediterranean butterfly fauna is certainly *Gonepteryx cleopatra* (Linnaeus, 1767), for the first time recorded in Slovenia in July 1988 (Carnelutti 1989). A specimen was caught and examined in the Dragonja valley near Sečovlje. The species had been earlier listed by Carara (1928) for the fauna of Trieste region, but even the author doubted the validity of the record. The second specimen was found on July 27th 1996 at an unusually high altitude (900 m) on Mt. Velika Plešivica in the vicinity of Croatian border SW of Ilirska Bistrica about 40 km inland (Verovnik 1997). These two records were most probably strayed animals from the nearby populations in Croatian Istria, where the species is resident as far north as the Mirna valley (Carnelutti 1989). The three new records from the coastal region could present a slight expansion of the species along the Adriatic coast.

The second pierid *Colias erate* (Esper, 1805) could be under the present distribution considered an Eastern European faunal element in Slovenia, and is currently the species which has expanded its range in Europe to the greatest extent. The species' range was limited to an area eastward from the Crimea until the 1960s. After this it gradually expanded westwards, but was limited to the Transcarpathian plains until end of the 1980s (Hesellbarth et al. 1995). Further westward expansion has been documented by the first records from Hungary in 1988 (Hrebly & Gyulai 1990), Slovakia in 1989 (Horka 1991), Croatia in 1989 (Kranjčev 1991), and Austria in 1990 (Hellmann 1991). The first record for Slovenia came with a short delay in 1993, when a single male was collected at Hraščica near Gančani in the plains north of the Mura River (Gomboc 1996). Despite further efforts by Slovenian entomologists, no further specimens were recorded until 2003, when the first author found a specimen at the Drava River channel near Formin.

The Danube clouded yellow *Colias myrmidone* (Esper, 1781) had a different fortune in Slovenia compared with the two previously mentioned species. It seems to be losing grounds in Europe and is retreating eastwards. Regional extinction has been reported from Germany, Austria, Hungary (Van Swaay & Warren 1998) and Czech Republic (Beneš & Konvička 2002). The species should be considered near extinct in Slovenia as it has not been recorded for more than a decade. Most of the sites where species survived until the mid-1980s were reexamined and many potential sites in NE Slovenia have been surveyed without success. Documentation of the last records is presented in this paper.

Unpublished records

Gonepteryx cleopatra

The species was found at three sites in the coastal region of Slovenia:

- 30.3.1998 – single male NW of the village of Jelarje at Spodnje Škofije; altitude: 200 m; coordinates: 13° 47' 15"E, 45° 34' 53"N; Šalamun, A.
- 1.7.2002 – single male among large number of *Gonepteryx rhamni* (Linnaeus, 1758) below the cliffs NW of the village of Zanigrad at Hrastovlje; altitude: 280 m; coordinates: 13° 54' 46"E, 45° 30' 59"N; Predovnik, Ž.
- 16.6.2003 – single badly worn male in the village of Osp below the cliffs, altitude: 70 m; coordinates: 13° 51' 50"E, 45° 34' 15"N; Verovnik, R.

Colias erate

The species was found at two sites along the channels of the Drava River below the hydroelectric powerplants Formin and Zlatoličje. At both sites the habitat was xerothermic grassland on SW facing channel slopes, partially overgrown with bushes in the otherwise rural countryside. The lower parts of the slopes were occasionally mown and this is where most of the specimens were observed.

- Formin – altitude 220 m, coordinates: 16° 03' 44" E, y: 46° 24' 02"N; Predovnik, Ž.
 - 6.9.2003 – single slightly worn male
 - 26.5.2004 – freshly emerged male
 - 30.6.2004 – single slightly worn male
 - 5.7.2004 – single worn male
 - 10.9.2004 – three males
 - 19.9.2004 – single worn male
 - 30.9.2004 – nine males and a copula, most of the males and the female were fresh.
- Zlatoličje – altitude 230 m, coordinates: 15° 48' 53" E, y: 46° 26' 46"N Predovnik, Ž.
 - 7.9.2004 – two badly worn males

Colias myrmidone

The records from 1982 onwards are included in the list. The presence of the species based on earlier records has already been summarized by Hafner (1909), Jež (1983), and Carnelutti (1992b).

- 3.6.1982 – single male in Mušenik village at Črna na Koroškem; altitude 570 m; coordinates: 14° 51' 30"E, 46° 28' 37"N; col. Jeseničnik T; det. Verovnik R.

- 20.6.1982 – at Lake Negova below the village of Negova; altitude 230 m; coordinates: 15° 57' 50"E, 46° 35' 43"N; Lesar T.
- 20.6.1982 – at Lake Blaguš near Videm pri Ščavnici; altitude 240 m; coordinates: 16° 00' 12"E, 46° 34' 01"N; Lesar T.
- 3.6.1983 – near the village of Zgornji Slemen, Kozjak; altitude 700 m; coordinates: 15° 31' 28"E, 46° 36' 57"N; Lesar T.
- 22.7.1984 – few fresh males in the pasture above the Jeger farm at Zg. Razborca near Slovenj Gradec on the W slopes of Pohorje Mts; altitude: 900 m; coordinates: 15° 11' 37"E, 46° 29' 04"N; Stropnik M.
- 15.6.1989 – single male in wet meadow near the Črni potok stream E of Kotlje, Ravne na Koroškem; altitude: 460 m; coordinates: 15° 00' 01"E, 46° 31' 03"N; Verovnik R.
- 25.7.1993 – single male in wet meadow W of Stražišče, Kranj; altitude: 380 m; coordinates: 13° 50' 06"E, 46° 13' 50"N; Porenta B.

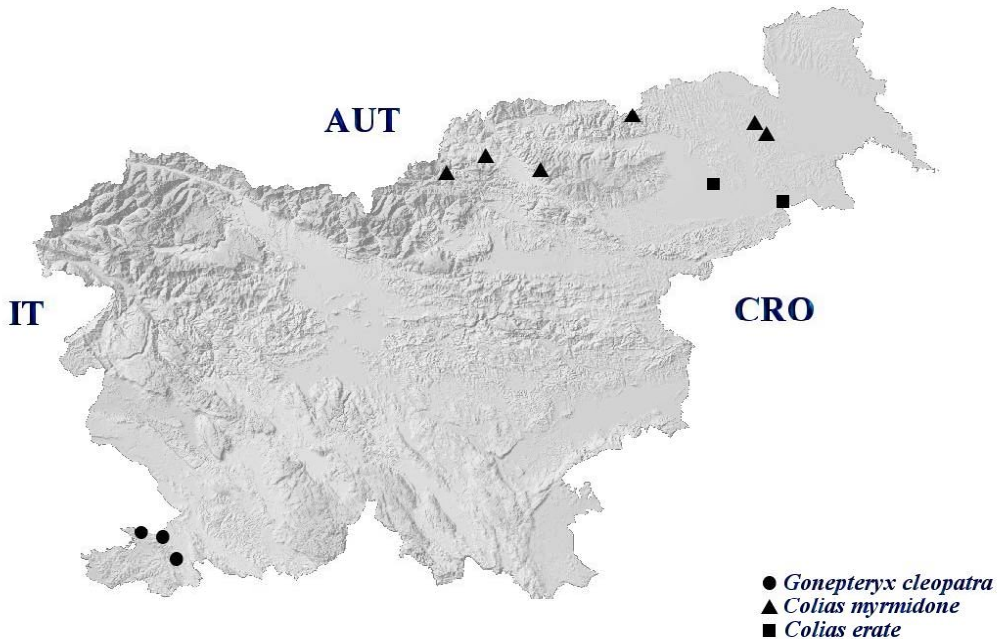


Figure 1. Distribution of new and unpublished records for rare pierids (Lepidoptera: Pieridae) in Slovenia.
 Slika 1. Razporeditev novih in neobjavljenih podatkov za redke vrste belinov (Lepidoptera: Pieridae) v Sloveniji.

Discussion

Regional or national faunas are highly dynamic and new species appear or go regionally extinct in short periods of time. In the last century, human impact has overrun the slow climatic changes that tailored the distribution of potentially mobile animal groups in the past. Butterflies in Europe have much benefited from human traditional farming in the past, and maintenance of these semi-natural grasslands and their management constitute an essential part of butterfly conservation. On the other hand, intensive farming and urbanisation have caused large-scale extinction of several butterfly species, especially in Western Europe (Maes & Van Dyck 2000).

The investigation of changes in the distribution and composition of butterfly fauna in Slovenia is hampered by scarcity of older faunistic publications and lack of intensive survey that would give comparable results for the entire country. Only in the last decade has a deliberate action been taking aim at the production of a national distribution atlas of butterflies in Slovenia. Despite a shortage of past distribution information, some positive changes have been observed in Slovenian butterfly fauna. Some of the previously rare and local species (Carnelutti 1992a) have become much more widespread. Among these, *Polyommatus amandus* (Schneider, 1792), *Brenthis ino* (Rottemburg, 1775), and *Heteropterus morpheus* (Pallas, 1771) are the most prominent examples. The three species studied are new changes to the butterfly fauna of Slovenia.

The presence of *Gonepteryx cleopatra* in Slovenia has been anticipated for quite some time, as it is a common species along the Adriatic coast (Jakšič 1988) and locally present also in the warmest parts of the southern Alps in Italy (Sala 1996) and occasionally in Switzerland (SBN 1994). The three new records in the coastal region do not confirm a permanent residency of the species in Slovenia, but the increasing frequency of observations indicates that it might soon be resident here. All the observed specimens were males, which are much easier to identify than females, whose presence would be a stronger indicator of their residency. To monitor the expansion of this species into Slovenia, a special attention should be given to the inspection of *Gonepteryx* females in the coastal part of Slovenia and in the Vipava valley.

The presence of a viable population of *Colias erate* in Slovenia is undisputed, and the observation of a copula and a large number of males at different occasions gives us good hopes that the species will survive in this region. *Colias erate* is a well-known migratory butterfly, and rivers serve as natural corridors for its expansion. Thus the presence of its colonies near the Drava River in Slovenia is not unexpected. Such colonies at the edge of their distribution are very vulnerable to climatic fluctuations (e. g. very cold winters) and human

impact (collecting included). Therefore further monitoring of the known colonies and similar habitats in the neighbourhood will be necessary to determine the establishment of the species in Slovenia.

The males of *Colias erate* could be identified on the wing due to intensive pale yellow coloration contrasting the broad black border similar to that in *Colias croceus* (Furcroy, 1785). Both species share the same habitat with the much more common *Colias croceus*. They have a similar fast patrolling flight low over the ground with abrupt and short stops. The larval food plant *Medicago sativa* L. has not been found at the sites along the channel, but they are most certainly present in the neighbouring rural countryside. Since the adult and larval habitat is entirely anthropogenic no specific conservation effort is needed.

The present existence of *Colias myrmidone* in Slovenia is highly questionable, given the fact that the systematic search in the last eleven years has yielded no results. Its existence in Slovenia cannot be entirely ruled out, as it is best exemplified in its rediscovery in the vicinity of Kranj in 1993 after a gap of almost 60 years. According to the material present in the collections of the Natural History Museum of Slovenia, the species was last collected on the nearby Soriško polje in 1935 and Medvode in 1937 (Čelik et al. 2004). Whether the collected specimen was a strayed migratory specimen or one of the last members of for a long time overlooked population remains disputable. Due to the lack of migrations at its NW area border in Germany (Kudrna & Mayer 1990), where the species probably became extinct in the 1990s (Settele et al. 2000), one should be inclined towards the second option.

At the beginning of the 20th century, the species was locally abundant in the hills west of Ljubljana and in the western part of Dolenjska region (Šentjernej, Novo mesto) (Hafner 1909). Its presence in NE Slovenia was first mentioned by Hoffmann & Klos (1914) for the surroundings of Maribor. In 1989, the second author found the species in the Slovenian part of Carinthia and it turned out that this was the last of the three recordings in this part of Slovenia. These finds were exciting though not entirely unexpected. The species was locally present also in the Austrian part of Carinthia in the Drava River valley as far west as Villach (Thurner 1948). Recently, the species went extinct in most parts of Austria with few populations left in the north-eastern part of the country (Höttinger & Pennerstorfer 1999). In order to enhance our possibilities for refinding (and conserving) *Colias myrmidone* in Slovenia much more information on habitat preferences and ecology of closest extant populations should be gathered.

Povzetek

Zaradi položaja na stičišču štirih zoogeografskih regij ima Slovenija izredno bogato favno dnevnih metuljev. Tipični predstavnik mediteranske regije je *Gonepteryx cleopatra* (Linnaeus, 1767), ki je bil v Sloveniji prvič opažen leta 1988 (Carnelutti 1989). Skupaj s tremi novimi podatki je bila doslej ta vrsta pri nas opažena petkrat. Vrsta *Colias erate* (Esper, 1805) sodi med trenutno najbolj ekspanzivne vrste v Evropi in je bila v Sloveniji prvič opažena v letu 1993 (Gomboc 1996), pet let kasneje kot v vzhodnem delu panonske nižine na Madžarskem (Hreblay & Gyulai 1990). Pri tretji vrsti *Colias myrmidone* je žal trend v nasprotni smeri in vrsta v zadnjih enajstih letih ni bila več opažena.

Gonepteryx cleopatra je bila najdena v obalnem delu Slovenije v bližini vasi Jelarje pri Škofijah (1998), pri Zanigradu nad Hrastovljami (2002) in v vasi Osp (2003). Vrsta *Colias erate* je bila prvič opažena ob kanalu hidroelektrarne Formin že septembra 2003. Na tej lokaliteti je bila v letu 2004 najdena še večkrat, poleg tega pa je bila opažena v podobnem habitatu na kanalu hidroelektrarne Zlatoličje. Za vrsto *Colias myrmidone* so podana le opažanja od 1982 dalje, saj so prejšnje najdbe povzete že v drugih virih (Hafner 1909, Jež 1983, Carnelutti 1992). V obdobju od 1982 do 1993 je bila vrsta trikrat najdena na Koroškem (Črna, Kottlje, Zgornja Razborca), v Slovenskih Goricah (Zgornji Slemen, Blaguško jezero, Negovsko jezero), nazadnje pa je bila opažena v vlažni dolini zahodno od Stražišča pri Kranju.

Regionalne in nacionalne favne niso nespremenljive, saj se nove vrste lahko pojavljajo ali lokalno izumrejo v zelo kratkih časovnih obdobjih. Obravnavane tri vrste so dober primer sprememb v favni dnevnih metuljev Slovenije v zadnjih desetletjih. Vrsto *Gonepteryx cleopatra* smo v Sloveniji že dolgo pričakovali, saj je splošno razširjena vzdolž hrvaške obale Jadrana (Jakšič 1988), pojavlja pa se tudi na južnem obrobju Alp (Sala 1996). Novi podatki ne potrjujejo stalnega pojavljanja te vrste v Sloveniji, je pa velika možnost, da ga napovedujejo. Za ugotavljanje nadaljnjega širjenja te vrste pri nas bo treba natančneje pregledovati samice vrst *Gonepteryx* v območju obalnega dela Primorske in Vipavske doline.

Colias erate je v Sloveniji po dosedanjih ugotovitvah vrsta z geografsko zelo omejeno razširjenostjo, zato si kljub migratorni naravi zasluži nekaj naravovarstvene pozornosti. Populacije na robu areala so zaradi vpliva človeka in potencialnih ekstremnih klimatskih razmer zelo ranljive in nagnjene k izumrtju. Larvalni habitat in prehranjevalni habitat imagov sta izrazito antropogena in nista ogrožena. Smiselno pa je vsaj v začetni fazi preprečiti prekomeren odlov osebkov, zato naprošava bralce, naj podatkov v članku ne zlorabijo za pobijanje. Za ugotavljanje stalnosti vrste pri nas bo treba nenehno spremljati stanje v že znanih kolonijah in iskati vrsto v podobnih habitatih v bližnji okolici.

Preživetje *Colias myrmidone* v Sloveniji je zelo vprašljivo, vendar ponovne najdbe ne moremo v celoti izključiti. To dokazuje tudi najdba pri Kranju, kjer je bila vrsta ponovno odkrita po skoraj 60 letih. Vrsta je bila nazadnje najdena na bližnjem Soriškem polju letu 1935 in Medvodah 1937 (Čelik et al. 2004). Glede na podatke o stalnosti in redkih migracijah na SZ robu areala v Nemčiji (Kudrna & Mayer 1990) je mogoče, da se je ta vrsta tu ohranila neopažena skozi vsa ta leta. Da bi izboljšali naše možnosti za ponovno odkritje (in varovanje) te vrste, bi bilo nujno pridobiti čim več podatkov o habitatih in ekologiji nam najbližjih še obstoječih populacij.

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Literature

- Beneš J., Konvička M. (Eds.) (2002): Butterflies of Czech Republic: Distribution and conservation, part I. SOM, Prague, 478 pp.
- Carnelutti J. (1989): VIth contribution to the knowledge of Lepidoptera of Slovenia. Biol. Vest. 37(1): 1-9.
- Carnelutti J. (1992a): Red data book of Lepidoptera (Macrolepidoptera) of Slovenia. Varstvo narave 17: 61-104.
- Carnelutti J. (1992b): Metulji dnevnik Dolenjske. Dolenjski zbornik 145-151.
- Carrara G. (1928): Macrolepidotteri del territorio di Trieste. Atti del Museo civico di storia naturale di Trieste 11(1): 63-116.
- Čelik T., Verovnik R., Rebeušek F., Gomboc S., Lasan M. (2004): Strokovna izhodišča za vzpostavlanje omrežja Natura 2000: metulji (Lepidoptera): končno poročilo - 2. mejnik. Biološki inštitut Jovana Hadžija, Ljubljana, 297 pp.
- Gomboc S. (1996): Vier weitere Neufunde für die Grossschmetterlingsfauna Sloweniens. Acta Ent. Slo. 4(2): 101-105.
- Hafner I. (1909): Verzeichnis der bisher in Krain beobachteten Grossschmetterlinge. Carniola 3: 77-108.
- Hellmann W. (1991): *Colias erate* Esp. - auch in Österreich! (Lepidoptera: Pieridae). Zeitschrift der Arbeitsgemeinschaft österreichischer Entomologen 43(1-2): 50.
- Hesselbarth G., Van Oorschot H., Wagener S. (1995): Die Tagfalter der Türkei unter Berücksichtigung der angrenzenden Länder. Wagener s.v., 2200 pp.
- Hofmann F., Klos R. (1914): Die Schmetterlinge Steiermarks, Teil 1. Mitt. des Nat. Ver. Steiermark 50: 184-323
- Horka J. (1991): A new brimstone species for Czechoslovakia. Živa 39(5): 222.
- Höttinger H., Pennerstorfer J. (1999): Rote Listen ausgewählter Tiergruppen Niederösterreichs - Tagfalter (Lepidoptera: Rhopalocera & Hesperidae). Amt der NÖ Landesregierung, Abteilung Naturschutz, St. Pölten, 128 pp.
- Hreblay M., Gyulai P. (1990): Appearance of *Colias erate* Esp., a potential new pest of alfalfa in Hungary. Novenyvedelem 26(2): 64-65.
- Jakšić P. (1988): Provisional distribution maps of the butterflies of Yugoslavia. Acta entomologica Jugoslavica- editiones separatae I, 214 pp.
- Jež M. (1983): Osnovne karakteristike favne dnevnih metuljev (Lepidoptera, Diurna) slovenskega Podravja, Biol. Vest. 31(1): 83-106
- Kranjčev R. (1991): *Colias erate* (Esp. 1804) - a new species for the fauna of Podravine and for the whole of Croatia. Priroda, Zagreb 80 (8): 21-23.
- Kudrna O., Mayer L. (1990): Grundlagen zu einem Artenhilfsprogramm für *Colias myrmidone* (Esper, 1780) in Bayern. Oedippus 1: 1-46.

- Maes D., Van Dyck H. (2000): Butterfly diversity loss in Flanders (north Belgium): Europe's worst case scenario? *Biological conservation* 99 (3): 263-276.
- Sala G. (1996): *Butterflies of Lake Garda and the surrounding Territory*. SEM, 160 pp.
- SBN (Schweizerischer Bund für Naturschutz), (1994): *Tagfalter und ihre Lebensräume: Arten, Gefährdung, Schutz, Vol I*. Pro Natura, Basel, pp. 516.
- Thurner J. (1948): *Die Schmetterlinge Kärnten und Osttirols*. Carinthia II, special edition 10, 200 pp.
- Van Swaay C., Warren M. (1998): *Red data book of European Butterflies (Rhopalocera)*, Volume 1., Dutch Butterfly Conservation, Strasbourg, 125 pp.
- Verovnik R. (1997): *Prispevek k poznavanju favne dnevnih metuljev (Lepidoptera: Rhopalocera) jugozahodne Slovenije*. Zbornik poročil, Ljubljana, 33-44.