

INTERESTING BUTTERFLIES OF THE CZECH REPUBLIC

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ABSTRACT.— Some butterflies of special interest in the Czech Republic (including mention of endemic Sesiidae and Zygaenidae) are noted and illustrated, particularly endemic species and endangered species. The geographical and geologic-historical summary for the Czech Republic notes the 4 major faunal elements of local nature: Hercynian District, Carpathian District, Pontico-Pannonian District, and Polonian District.

KEY WORDS: Aristolochiaceae, Asia, Asia Minor, Balkans, Bavaria, Bohemia, conservation, distribution, endemism, Europe, France, genetics, Genitianeae, Germany, hostplants, Hungary, Libytheidae, Lycaenidae, Mediterranean, mimicry, Moravia, Nearctic, Nymphalidae, Palearctic, Papilionidae, Pieridae, Poland, Polygonaceae, Quaternary, Rhopalocera, Sesiidae, Slovakia, Tertiary, Ukraine, Zygaenidae.

In the very heart of Europe lies the Czech Republic (see map). It consists of two provinces: Bohemia (the western part of the country, with Prague as the capital) and Moravia (the eastern part, with Brno as the capital)¹. Four Western Palearctic biogeographical districts meet in the territory of the Czech Republic: the Hercynian District, the Carpathian District, the Pontico-Pannonian District, and the Polonian District.

FAUNAL DISTRICTS OF THE CZECH REPUBLIC

HERCYNIAN DISTRICT

In the west, part of the Hercynian District comprises the whole of Bohemia (including its warm central part, the so-called Bohemian Basin) and most of the western and northern part of Moravia (this entire territory is the easternmost part of the Hercynian District generally called the Bohemian Massif). It comprises such ancient mountain ranges as, for example, the Šumava Mts., the Rudohoří Mts., the Krkonoše Mts., and the Jeseníky Mts., most of which form the natural boundary between Bohemia and Germany. The highest peaks of these Hercynian mountains in Bohemia attain 1300-1600m above sea-level.

CARPATHIAN DISTRICT

The next district is the Carpathian District in the east, being the westernmost promontory of the Carpathian Arch, geologically much younger than the Bohemian Massif, and forming the natural boundary between Moravia and Slovakia. The Moravian Carpathians comprise such mountain ranges as the Beskydy Mts. and the Bílé Karpaty Mts. (White Carpathians), the peaks of which attain only about 1000m above sea-level, in contrast to the peaks of the Slovakian Tatra Mts., which attain as much as

2500m above sea-level. The Moravian Carpathians also comprise the Carpathian Flysh Belt, extending over central Moravia up to close proximity with Brno. Geologically, the Bohemian Massif and the Carpathian Flysh Belt are divided by a tectonic fold running from the western Moravian town of Znojmo to the Central Moravia city of Brno and continuing towards the northeast (including the famous battlefield of Austerlitz-Slavkov) through the town of Olomouc and the Moravská Brána (Moravian Gate) depression, up to the town of Ostrava (with its extensive coal-mines) in north-eastern Moravia and reaching Poland.

PONTICO-PANNONIAN DISTRICT

The third, or Pontico-Pannonian District, comprises the southern Moravian lowlands along the Dyje and Morava rivers and their tributaries. These Pontico-Pannonian lowlands constitute the northwestern corner of the Great Hungarian Plain, and of the Basin of the Danube.

POLONIAN DISTRICT

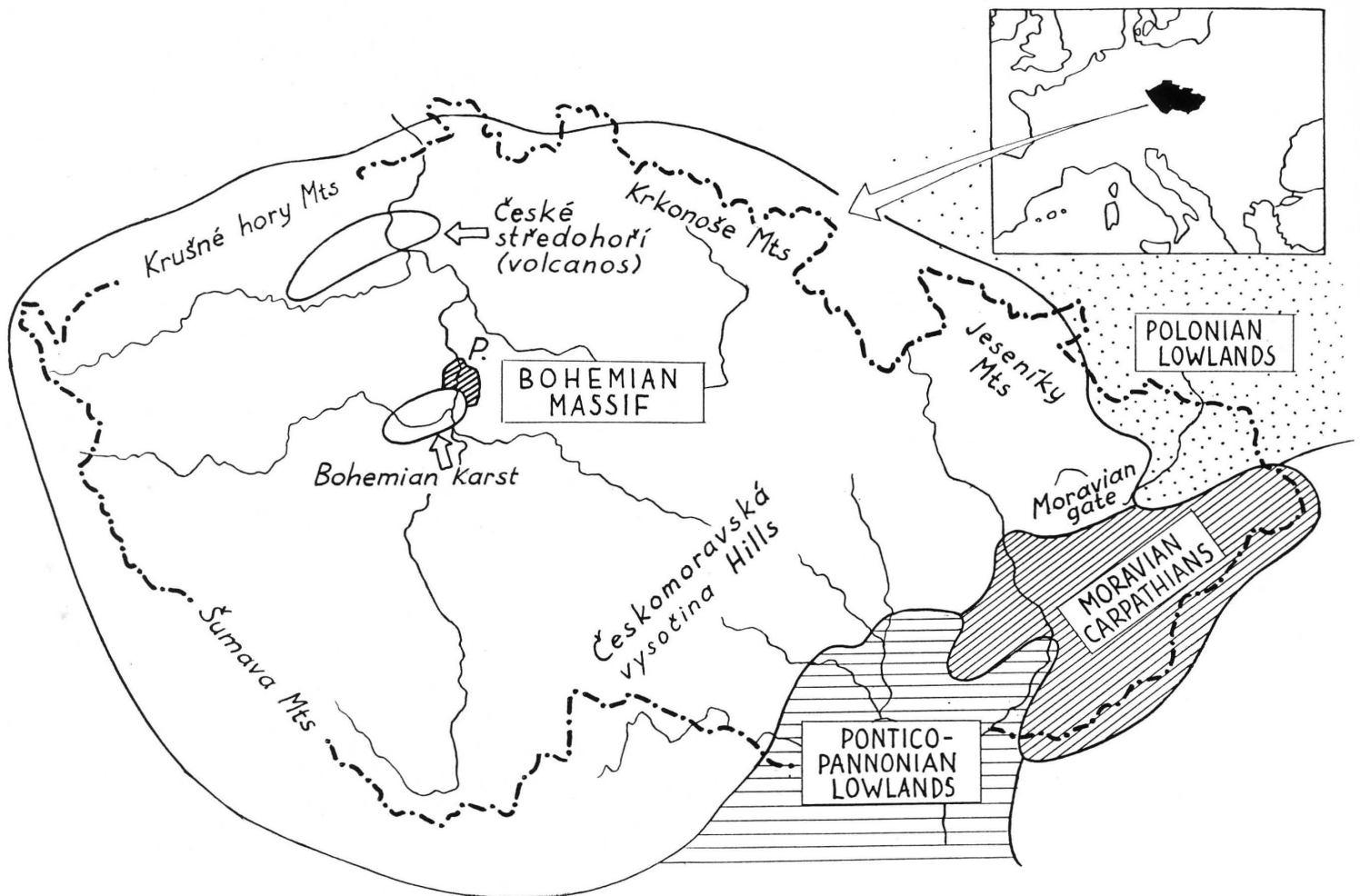
The fourth, the Polonian district, covers only minor parts of the territory of northern Moravia, being restricted to the northern foothills of the Jeseníky Mts.

LEPIDOPTERA HABITATS IN THE CZECH REPUBLIC

Whereas the territory of Bohemia is entirely Hercynian, that of Moravia is unique in that it is a cross-roads of the four biogeographical districts mentioned. This fact is reflected not only in the impressive species diversity of its fauna (including that of butterflies), but also of some polymorphous Lepidoptera. Having invaded this territory during the post-glacial period, both from the north (via the so-called Moravian Gate along the Odra River) and from the south (via the southern Moravian lowlands), their subspecies complexes hybridize, producing new habitus combinations that correspond to the Mendelian laws of inheritance². A good example of this is provided by the burnet, *Zygaena ephialtes* (Linnaeus) (Zygaenidae), in which Mendelian polymorphism is combined with a Batesian-Müllerian situation of aposematic col-

1. It is interesting to note that such names as Praha (Prague), Brno, Krkonoše, Odra, Tatra, etc., are obviously of Celtic origin. The Celts inhabited this territory before the Great Migration of Nations during the 6th century of our era when the Slavonic tribes occupied considerable parts of Central Europe.

2. J. G. Mendel, an Augustinian monk, formulated his laws of inheritance in a Brno monastery.



Map 1. Faunal districts and features of the Czech Republic.

oration. The northern, red "peucedanoid" forms of this moth cross with the southeastern, yellow "epialtoid" ones, thus producing new dihybrid combinations in the classical Mendelian ratio of 9:3:3:1.

The Hercynian fauna, inhabiting the whole of Bohemia and the western and northern parts of Moravia, conforms with that of the west European woodland zone, typical of the hilly plateaus of Germany and France. In addition, this largely woodland fauna includes some interesting butterflies characteristic of the Euro-Siberian forest belt, e.g., such nymphalid species as *Limenitis populi* (Linnaeus), *Apatura iris* (Linnaeus), *Apatura ilia* (Denis & Schiffermüller), *Nymphalis antiopa* (Linnaeus), *Polygonia c-album* (Linnaeus). These forest belt insect associations also show relationships to their Nearctic counterparts. However, Bohemia also comprises several extrazonal habitats that are specific to this territory. First of all, there are the Hercynian mountain ranges, with their butterfly taxocenoses, characterized mainly by some species of the genus *Erebia*, such as *Erebia euryale* (Esper), others tending towards endemism, such as *Erebia epiphron* (Knoch) and *Erebia sudetica* (Staudinger).

Peat bogs are another specific habitat type occurring in Bohemia. Previously an extensive late Tertiary lake district in southern Bohemia, this part turned to woodland and peatland during the Quaternary interglacial and postglacial taiga period. These peat bogs have mostly been exploited, so that only small remnants of

their former extensive areas, especially at mountain elevations, are preserved. Several remarkable and strictly protected peat bogs still exist in the Šumava Mts., close to the Bohemian-Bavarian borderline. These peat bogs harbor a characteristic Boreo-montane relict fauna (with moose, wolf, lynx), including such butterfly species as *Colias palaeno europome* (Esper) (Pieridae), *Vacciniina optilete* (Knoch) (Lycaenidae), *Proclrossiana eunomia* (Esper) and *Coenonympha tullia tiphon* (Rottemburg) (Nymphalidae), and *Palaeochrysophanus hippothoe* (Linnaeus) (Lycaenidae), etc., the first three of which are legally protected in the Czech Republic.

Together with the Tertiary volcanic hills in the České Středohoří area, the limestone area of the Bohemian Karst, edging the southern periphery of Prague, forms the so-called Prague Basin (Interior Bohemia). This is a warm enclave which, some eight thousand years ago, was connected with the Chernozem lowlands of southern Moravia. It harbors restricted, steppe-like habitats inhabited by fractions of the earlier Mediterranean faunal element, and is partly neo-endemic. The thermophilous and sub-endemic character of this warm area is reflected, for example, in the endemic occurrence of the clearwing, *Pennisetia bohemia* Kralíček & Povolný (confused for decades with the eastern Palearctic *Pennisetia pectinata* (Staudinger) from the Amur territory) (Sesiidae). Sandy stretches along the Vltava River used to be populated by such psammophilous butterfly species as *Hipp-*



Fig. 1-12. Butterflies of the Czech Republic: 1. *Parnassius apollo melliculus* Stichel, ♂ (Kozel Hill, Malá Fatra Hills, Central Slovakia, Slovakian Carpathians, 16 Jul 1986). 2. *Zerynthia polyxena* (Denis & Schiffermüller), ♀ (Brno, Central Moravia, 12 Apr 1993). 3. *Colias erate* (Esper), ♂ (Pouzďany, South Moravia, 13 Sep 1992). 4. *Colias myrmidone* (Esper), ♂ (Radějov, South Moravia, 21 Jul 1986). 5. *Euphydryas maturna* (Linnaeus), ♂ (Milovice, South Moravia, 2 Jun 1981). 6. *Limenitis populi* (Linnaeus), ♀ (Brno, Central Moravia, 23 Jun 1988). 7. *Apatura ilia* (Denis & Schiffermüller), ♂ (Veveří, Central Moravia, 7 Jun 1984). 8. *Melitaea phoebe* (Denis & Schiffermüller), ♀ (Biskupky, western Moravia, 7 Aug 1990). 9. *Chazara briseis* (Linnaeus), ♀ (Pavlovské vrchy Hills, south Moravia, 4 Aug 1991). 10. *Erebia euryale* (Esper), ♂ (Praděd, Jeseníky Mts., northern Moravia, 20 Jul 1979). 11. *Lopinga achine* (Scopoli), ♀ (Poštorná, South Moravia, 2 Jul 1977). 12. *Lycaena dispar rutilus* (Werneburg), ♂ (Střelice, near Brno, central Moravia, 12 Jun 1987) (numbering is left to right by rows).



Fig. 13-17. Lepidoptera of the Czech Republic: 13. *Maculinea rebeli* (Hirschke), ♀ (Jamolice, western Moravia, 16 Jun 1995). 14. *Agrodiaetus damon* (Denis & Schiffermüller), ♀ (Kurdějov, south Moravia, 17 Jul 1987). 15. *Vacciniina optilete* (Knoch) (Dářko peat bog, Českomoravská vysočina Hills, 12 Jul 1983). 16. *Zygaena laeta* Hübner, ♀ (Mohelno, western Moravia, 27 Jul 1981). 17. *Zygaena ephialtes* (Linnaeus) (f. *trigonellae* Esper), ♀ (Radějov, western Moravia, 17 Jul 1983).

archia statilinus (Hufnagel) (Nymphalidae), a generally endangered and protected species which still survives in the Sarmatian sand region of southern Moravia (near Hodonín).

The Moravian Carpathian District is inhabited by extreme western populations of such characteristic butterfly species as *Lasiomata petropolitana* (Fabricius) (Nymphalidae), but it lacks the high mountain species of *Erebia* which are characteristic of the High Carpathians. During the last decades also, the still declining populations of *Parnassius apollo* (Linnaeus) (Papilionidae) disappeared from all its scattered Moravian habitats, and they recently survive only in the Slovakian Carpathians. The other species, *Parnassius mnemosyne* (Linnaeus), survives in isolated colonies especially in the southern parts of Moravia, after it recently disappeared from all its Bohemian habitats. The next species that is definitely extirpated in the whole of Central Europe is *Lycaena helle* (Denis & Schiffermüller): it survived in its only Moravia habitat, a damp meadow near Olomouc in central Moravia, up to the 1950s. The species is fatally endangered in its entire European range, but survives locally in the temperate zone of Asia.

The remarkable overall species diversity of the Moravian Pontico-Pannonian district is reflected in the comparative richness of numerous animal groups, including butterflies. Rising like an island from the surrounding lowlands, the limestone Pavlovské vrchy Hills with their south-facing slopes, covered with forest-steppe, still house a considerable number of satyrid species: *Brinthesia circe* (Fabricius), *Arethusana arethusana* (Denis & Schiffermüller), *Hipparchia fagi* (Scopoli), *Hipparchia alcyone* (Denis & Schiffermüller), *Eumenis dryas* (Scopoli) and *Chazara briseis* (Linnaeus), the last of these species having been considerably decreased in numbers during the past 20 years. The Red

List species of this territory comprise *Polyommatus eroides* (Frivaldsky) (Lycaenidae) and *Pieris mannii* Mayer (Pieridae). The north-facing slopes of the Pavlovské vrchy Hills, clad in deciduous forest, were populated by such remarkable species as *Leptidea morsei major* (Grund) (Pieridae) and *Euphydryas maturna* (Linnaeus) (Nymphalidae). The above Red List taxa, most of them discovered only after World War II, seem to have recently disappeared from this territory, only *Euphydryas maturna* having been individually reported during the last few years. The loess formations in this area used to be populated by isolated colonies of *Colias chrysotheme* (Esper) (Pieridae), a representative of the Pontic distributional pattern par excellence. In spite of decimation, individual specimens are still occasionally observed. Perhaps the most beautiful and generally known representative of the Pontico-Mediterranean element, *Zerynthia polyxena* (Denis & Schiffermüller) (Papilionidae), survived only in a very limited number of habitats, most of them in close proximity to Brno. During the last twenty years this species reappeared in nearly all its historical habitats of southern Moravia. Moreover, it started to occur in secondary habitats, such as river banks and dams. It seems that it prefers warm habitats protected against cold winds during its hibernation. Moreover, its food plant, *Aristolochia clematidis* (Aristolochiaceae), is a weed controlled especially in vineyards, and this control seems to be the next limiting factor decisive for its occurrence. The warm aeolian sands along the extreme southern stretch of the Morava River still harbor the declining nymphalid species, *Hipparchia statilinus* (Hufnagel) and *Melitaea trivia* (Denis & Schiffermüller), and quite recently several colonies of the extremely thermophilous *Hyponephele lupina* (Costa) were evidenced for the first time in this area, its northernmost known population.



Fig. 18. Endangered, extirpated or rare species of the Czech Republic.

ROW 1 (left to right): *Colias chrysotheme* (Esper), ♂ (Tabulová hora, south Moravia, 21 Jun 1953): seriously endangered, legally protected. *Colias palaeno europome* (Esper), ♂ (Dářko peat bog, Českomoravská vysočina Hills, 18 Jun 1965): glacial period relict; endangered and protected, and nearly extirpated in Moravia. *Lasiommata petropolitana* (Fabricius), ♂ (Bílý kříž, Beskydy Mts., Moravian Carpathians, 18 Jul 1969): Carpathian endemic.

ROW 2 (left to right; same as row 1): *Colias chrysotheme* (Esper), ♀ (23 Jun 1953). *Colias palaeno europome* (Esper), ♀. *Lasiommata petropolitana* (Fabricius), ♀.

ROW 3 (left to right): *Lycaena helle* (Denis & Schiffermüller), ♂ and ♀ (Černovír, near Olomouc, central Moravia, 12 Jun 1951): extirpated in its last refuge in central Europe. *Colias palaeno europome* (Esper), ♂ (peat bog, near Libořezy, environs of Jindřichv Hradec, south Bohemia, 24 Jun 1956): glacial relict; legally protected. *Hipparchia statilinus* (Hufnagel), ♂ (Boř les, south Moravia, 11 Jul 1949): psammophilic species endangered in all of central Europe.

ROW 4 (left to right): *Pandoriana pandora* (Denis & Schiffermüller), ♂ (Štúrovo, southern Slovakia, 18 Jun 1948): a species rarely away from dry lowlands and plains of central Europe to the Balkans. *Hipparchia statilinus* (Hufnagel), ♀ (Bzenec, south Moravia, 16 Jul 1954): psammophilic species endangered in all of central Europe.

ROW 5 (left to right): *Proclissiana eunomia* (Esper), ♂ and ♀ (Mrtvý luh, near Volary peat bog, south Bohemia, Šumava Mts.): perhaps the last surviving colony of this species in the Czech Republic. *Pennisetia bohémica* Kralíček & Povolný, ♀ (Prague, central Bohemia, 7 Aug 1973): a neoendemic of the Czech Basin.

A striking phenomenon, characteristic of southern Moravia, is the repeated invasions of representatives of the (Pontico) Mediterranean element from the European southeast (including the Balkan Peninsula). Notably, *Pandoriana pandora* (Denis & Schiffermüller) (Nymphalidae) invaded this territory during the 1930s and 1940s and individual specimens may still be observed, especially during hot seasons. No colonies were established there by this species. Since 1950, repeated findings of *Libythea celtis* (Laicharting) (Libytheidae) document the gradual invasion of this Mediterranean species into Central Europe from neighboring Hungary. The last, extremely impressive invasion was observed for *Colias erate* (Esper) (Pieridae), a Pontico-south Siberian element inhabiting southern Ukraine and the estuary of the Danube. This species flooded Hungary, reaching southern Slovakia and southern Moravia during 1990-1991: it has established populations over the entire lowland of southern and central Moravia.

It appears, in general, that the vanishing populations of numerous central European butterflies are gradually dwindling in directions from the (north) west to the (south) east, and that especially the species accompanying the forest belt of central Europe are more endangered than those confined to xerothermophilous (Mediterranean) habitats. At the same time, occasional invasions of the representatives of the (Pontico-) Mediterranean element are observed. Butterflies (and many other species of Lepidoptera) are significant bioindicators of environmental changes due to acid rain, heavy metals, respirable asbestos fibers, organic residues (especially PCBs), etc. Additional legal measures for their protection are being prepared in the Czech Republic.

EXTIRPATED, ENDANGERED OR ENDEMIC TAXA OF THE CZECH REPUBLIC

PAPILIONIDAE

Parnassius apollo (Linnaeus) – Fig. 1

The species disappeared from its last Moravian habitats during the first two decades of this century. It is endangered also in the Slovakian Carpathians, where it survives in numerous habitats and is locally still common.

Zerynthia polyxena (Denis & Schiffermüller) – Fig. 2

This species started to disappear from its habitats in southern Moravia after WWII. During the last 10 years, the species reappeared in its original habitats and spread also to neighboring localities having stands of *Aristolochia clematidis* (Aristolochiaceae). The species needs protection against icy northern winds during hard winters to survive.

PIERIDAE

Colias erate (Esper) – Fig. 3

This species moved into southern and central Moravia after 1990 from the European southeast. It represents part of the so-called south Siberian element.

NYMPHALIDAE

Euphydryas maturna (Linnaeus) – Fig. 5

This species occurs in a general scattered distribution in Europe, but is disappearing from its central European forested habitats.

Limnitis populi (Linnaeus) – Fig. 6

A characteristic species of the Euro-Asiatic forest belt. It has shown considerable changes in population density but is not considered endangered, although local and sometimes rare.

Melitaea phoebe (Denis & Schiffermüller) – Fig. 8

Once a common species, especially in warm dry forest steppe habitats, it has disappeared from central Europe and survives only in the Balkans.

Chazara briseis (Linnaeus) – Fig. 9

Once a common satyr, it is seriously endangered and survives only in nature reserves.

Erebia euryale (Esper) – Fig. 10

This species is still common in montane and premontane habitats; it is especially characteristic of the Hercynian mountain ranges.

Lopinga achine (Scopoli) – Fig. 11

This is one of the most remarkable satyrs of the European warm deciduous forests. It is disappearing throughout Europe, becoming local and rare.

LYCAENIDAE

Lycaena dispar rutilus (Werneburg) – Fig. 12

This species declined from its principal habitats (acid meadows) and seemed endangered, especially during the 1940s and 1950s. Since these years, it has revived in numbers and invaded once ruderal habitats and peripheries of cities, feeding on a different species of *Rumex* (Polygonaceae) in secondary habitats.

Maculinea rebeli (Hirschke) – Fig. 13

A newly and important discovery for the Czech Republic. It is a myrmecophilous blue, confined to stands of *Gentiana cruciata* (Gentianaceae), an herb occurring in hilly plateaus of western and central Moravia. It is best known from the Alps, so its discovery in the Czech Republic was unexpected.

Agrodiaetus damon (Denis & Schiffermüller) – Fig. 14

This species is typical of dry steppe-like habitats, showing a scattered distribution throughout such habitats in Europe that survive as "islands" of steppe formations.

Vacciniina optilete (Knoch) – Fig. 15

The species occurs in peat bogs and belongs, together with *Colias palaene europome* (Pieridae), to the most characteristic species showing a boreal-alpine distribution. It is legally protected in the Czech Republic.

ZYGAENIDAE

Zygaena laeta Hübner – Fig. 16

This moth is one of the most characteristic members of the pontico-mediterranean distribution. From the steppes of Asia Minor, this species penetrated southern Moravia and central Bohemia, via the Danube Basin, during the warm phase of the Holocene Period. Together with the praying mantis, it is a typical representative of the Mediterranean element of central Europe.

Zygaena ephialtes (Linnaeus) – Fig. 17

This species of Zygaenidae forms two complexes in Europe: the red peudedanoid-complex of the plains of northern Germany and Poland, and the yellow ephialtoid-complex in Hungary and the Balkans. These two complexes meet in central Europe, especially in Moravia, forming a zone of hybridization that corresponds to Mendelian dihybridism. This situation is combined, moreover, with the Batesian-Müllerian mimicry of the species. Fig. 17 shows one of the ephialtoid forms from Moravia.