

The species of the genus *Aethes* Billberg 1821 of Hungary (Lepidoptera: Tortricidae)

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FAZEKAS I.: *The species of the genus Aethes Billberg, 1821 of Hungary (Lepidoptera: Tortricidae).*

Abstract: A checklist and biological data of the *Aethes*-Fauna of Hungary are presented, together with the distributed of each species. The latest version of the checklist of the *Aethes* species is compiled with new and updated information. The habitats of all the species are described. A single specimen of a totally unknown species of Tortricidae turned up from the Hungary. The genitalia proved to be unlike those of any other European species, or indeed from anywhere in Eurasia. It is probably an undescribed species. The study is completed with references for the Hungarian distribution of the species either.

Keywords: Lepidoptera, Tortricidae, *Aethes*, checklist, distribution, biology, habitat, Hungary

Introduction

In the present study the *Aethes* species of Hungary are listed. Tortricidae are yet to be included in the revision of fauna of Hungary. The data of many species lists is vague since the recorders do not examine the genitalia. During the next years, the intention is to examine all the material in the Hungarian Tortricidae collections and to prepare detailed distribution maps for all species.

During the past 30 years the author has examined in detail the taxonomy and geographical distribution of the genus *Aethes* in Hungary. There have been substantial changes in the nomenclature and taxonomic status of species and subspecies. According to the present state of this research, 22 *Aethes* taxa are present in Hungary.

The study includes original reference to all available names (valid names and synonyms). A summary of the Hungarian distribution and phenology with detailed information about flight period or periods; biology including foodplant(s); habitat including the altitude of occurrence.

Material and methods

More than 6000 collection specimens of Hungarian *Aethes* species have been examined, about 900 dissected and their genitalia analysed. The author has studied the *Aethes* material in public collections in Komló, Pécs, Kaposvár, Zirc, Szombathely, Budapest, Gyöngyös, Vienna, München and some private collections as well. Distribution maps of the species show the hypothetical resident distribution area (grey), combined with localities from which specimens have been examined (black dots). The white ring is ref-

erences data. Phenology is given mainly on the basis of examined collection data, and data from references are used only as a supplement. Larva foodplants and habitats are the author's own original data, personal communications and taken from the references. The species vertical distribution refers mainly to the analysis of collection data, the author's own original data, and with references data used as additional source. Original data from electronic database of Excel is in the Biological Coll. of Regiografo (H-Komló).

Results and discussion

In the present study, a checklist of valid names synonyms of the Hungarian *Aethes* species is included.

Systematic list of the Hungarian Aethes species

Aethes Billberg, 1820

1. *Ae. hartmanniana* (Clerck, 1759)

Syn.: *Phalaena lyonetelle* Linnaeus, 1758; *Phalaena wiedermannella* Müller, 1764; *Tortrix baumanniana* Denis & Schiffermüller, 1775; *Phalaena allioniana* De Villers, 1789; *Agapeta avellana* Hübner, 1822; *Argyrolepis subbaumanniana* Stainton, 1859

2. *Ae. hartmanniana* f. *piercei* Obraztsov, 1952]

Syn.: ? *Phalena gemmatella* Scopoli, 1763

3. *Ae. margarotana* (Duponchel, 1834)

Syn.: *Coccyx scabidulana* Lederer, 1855; *Phalonia capnospila* Meyrick, 1912; *Phalonida paralellana* Kennel, 1913; *Euxanthus edrisitana* Chrétien, 1922; *Phalonia paronyma* Meyrick, 1932;

4. *Ae. williana* (Brahm, 1791)

Syn.: *Coccyx zephyrana* Teritschke, 1830; *Eupoecilla luteolana* Stephens, 1843; *Cochylis marmoratana* Curtis, 1834; *Cochylis dubrisana* Curtis, 1834; *Argyrolepis virginiana* Guenée, 1845; *Argyrolepis loriculana* Guenée, 1849; *Phalonia costignata* Filipjev, 1926

5. *Ae. moribundana* (Staudinger, 1859)

Syn.: *Cochylis respirantana* Staudinger, 1879; *Cochylis dispersana* Kennel, 1899; *Cochylis dilutana* Kennel, 1899; *Cochylis helvolana* Kennel, 1900; *Phalonia lanceolata* Filipjev, 1924; *Aethes modica* Razowski, 1970

6. *Ae. nefandana* (Kennel, 1899)

Syn.: *Cochylis diacrisiana* Rebel, 1903; *Aethes chersonana* Obraztsov, 1937

7. *Ae. margaritana* (Haworth, [1811])

Syn.: *Tinea dipoltella* Hübner, 1813

8. *Ae. triangulana triangulana* (Treitschke, 1835)

Syn.: *Tortrix kuhlweiniana* Fischer von Röslerstamm, 1836; *Tortrix tergana* Eversmann, 1844

9. *Ae. rutilana rutilana* (Hübner, [1817])

Syn.: *Tinea purpurella* Coq, 1810; *Cochylis roridana* Mann, 1867

10. *Ae. smeathmanniana* (Fabricius, 1781)

Syn.: *Tortrix biviana* Duponchel, 1842; *Cochylis stachydana* Herrich-Schäffer, 1851; ?*Cochylis scissana* Walker, 1863

11. *Ae. tesserana tesserana* ([Denis & Schiffermüller], 1775)

Syn.: *Phalaena aleella* Schulze, 1776; *Pyralis heiseana* Fabricius, 1787; *Tortrix groendaliana* Thunberg, 1791

12. *Ae. sanguinana* (Treitschke, 1830)

13. *Ae. dilucidana* (Stephens, 1852)

14. *Ae. flagellana flagellana* (Duponchel, 1834)

Syn.: ?*Cochylis eryngiella* Vallot, 1829; *Cochylis eryngiana* Heyden, 1865; *Cochylis helveticana* Heyden, 1865; *Lozopera flagellana sardoa* Amsel, 1852

15. *Ae. beatricella* (Walsingham, 1898)Syn.: *Loxopera ferruginea* Walsingham, 190016. *Ae. francillana* (Fabricius, 1794)Syn.: *Loxopera francillonana* Humphreys & Westwood, 1845; *Loxopera ferulae* Müller-Rutz, 192017. *Ae. bilbaensis* (Rössler, 1877)Syn.: *Phalonia loxoperoides* Walsingham, 1903; *Loxopera mediterranea* Rebel, 1906; *Phalonia reclusa* Meyrick, 192318. *Ae. tornella* (Walsingham, 1898)19. *Ae. cnicana* (Westwood, 1854)20. *Ae. rubigana* (Treitschke, 1830)Syn.: *Tortrix badiana* sensu Hübner, 1799; *Phalonia arcticana* Brand, 183721. *Ae. kindermanniana* (Treitschke, 1830)22. *Ae. sp.**A Brief Account of Hungarian Landscape Types*

I have recorded the geographical distribution of the taxa according to the six Hungarian macroregions (Fig 1.). The geographical distribution of the taxa is exceedingly different in certain regions.

(1) The Great Hungarian Plain

Flat plains, 75-200 m. Plain with moderately continental climate, landscape types predominantly used for agriculture. On the Great Hungarian Plain one finds a more severe summer microclimate, however, than is generally prevalent in forested regions of central Europe, since the combination of open steppe and soda flats produces often relatively high surface temperatures during the summer. Average temperatures for the plain are 22°C in July and -2°C in January. Recorded maximum and minimum extremes are

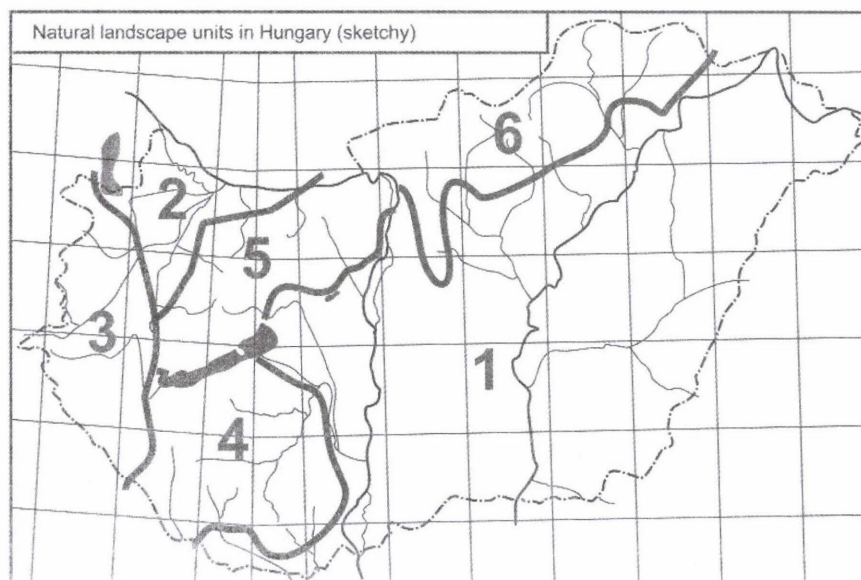


Fig. 1. Natural landscape units in Hungary: 1) Great Hungarian Plain; 2) Little Plain; 3) West Hungarian Borderland; 4) Transdanubian Hills; 5) Transdanubian Mountains; 6) North Hungarian Mountains

about 39°C and -28°C. Natural vegetation: Oak forests and grassland on sand, loess steppe, alkaline vegetation on solonchalk alluvial forests and swamps. The Hungarian plain is perhaps a typical example of the steppe or other grassland habitats favored by many *Aethes*, as far as is known, although the moths may actually prefer slight hillsides on the periphery of steppes.

(2) Little Plain

Flat plains, 75-200 m. Alluvial plain; cultivated grassland with high groundwater table and hygromorphous soils. Natural vegetation: alluvial forests and swamps, and at higher elevations oak forests and grassland on sand as well as loess steppe.

(3) West Hungarian Borderland

Valleys, foothills, medium-height mountains with broad ridges, 150-883 m. Eroded hills in the sub alpine regions on brown loess and pseudogleyeus soils with mosaics of forests mixed with Scots pine (*Pinus sylvestris*) partly used for agriculture, as well as eroded hills (250-350) with lessivated brown forest soil on brown loess; partly used for agriculture. Natural vegetation: mainly Illyrian oak-hornbeam forests as well as Illyrian beech forests and oak forests mixed with Scots pine.

(4) Transdanubian Hills

Valleys, hills, foothills, medium-height mountains, 150-682 m. Mainly in the west fixed sandy plain with minor dunes, cultivated grassland on brown earth, local a forestation and orchards. In the east at first independent hilly regions dissected by eroded valleys, mostly cultivated grassland with deep groundwater table, vineyards and major remnants of mixed forests. In the south, forested landscape types in mountains of medium height (Mecsek Mts, Villányi Mts); calcareous rock or sandstone with rendzina and lessivated brown forest soils, typically with *Tilio argenteae-Quercetum* or Illyrian oak-hornbeam forests (*Helleboro Carpinetum*), and mosaic Illyrian karst with hairy oak, karst shrub-forest and rocky swards.

(5) Transdanubian Mountains

Medium-height mountains, 200-756 m. mainly low mountains under additional sub Atlantic and submediterranean climatic influence. *Quercetum-petraeae-cerris* and *Quercetum-petraeae-Carpinetum* forests. In part hills dissected by eroded valleys; cultivated grassland with mosaic of vineyards and orchards and *Quercetum-petraeae-cerris* forests and deep groundwater table. On the mountain slopes are many kinds of karst shrub-forests and rock swards, e.g. in the Bakony Mts, in the Vértes Mts and in the Budai Mts.

(6) North Hungarian Mountains

Medium-height mountains, 300-1015 m. Extremely variable landscape type. In one respect a characteristic is the crests of volcanic mountains with black "nyírok" (regiolith) and podsolised brown forest soil, submontane beech forests (silviculture with touristic and recreational use Mátra Mts, Zempléni Mts). On the other hand the low mountains are predominantly of calcareous rocks with rendzina and brown soil (Bükk Mts, Aggteleki Mts). The Bükk Mts and Aggteleki Mts are at present a National Park. Natural vegetation: mainly *Quercetum-petraeae-cerris*, submontane oak hornbeam forests, submontane and montane beech forests, e.g. in the Mátra Mts (1015 m), in the Bükk Mts (958 m) and in the Zempléni Mts (783 m).

Treatment of the species of Aethes in Hungary

Aethes Billberg, 1820

Species which are characteristic of Neotropical, Oriental and Holarctic regions all occur. According to literature, 70-75 species are known in the Palaearctic region, and are more widespread in the western Palaearctic. A number of endemic species in Central Asia are known. There are 45 European species, of which 22 are found in Hungary.

Wingspan of the imago 8-23 mm, markings and coloration very variable. In the forewing, all veins separate or R4-R5 stalked, chorda, M-stem and CuP atrophied; in hindwing Rs-M, stalked, rearing veins run separate (Fig. 2). In *Aethes*, the assumed basic pattern consists of basal, dorso-postbasal, median and sub terminal fasciae, and a tornal marking (Fig. 3). Several of the species are polymorphic and have distinct ecological forms. Ecological variation, such as that found in *Ae. hartmanniana*, *Ae. rutilana* and *Ae. kindemanniana*, also appears to have been intensively studied. There are several groups of closely related taxa occasionally treated as valid species or, formerly, sub-species or groups of species or infraspecific taxa (e.g. *Ae. hartmanniana/piercei* and *Ae. cnicana/rubigana*).

The hindwing is usually more or less unicolorous, sometimes with darker suffusion. Usually the ground colour is brownish grey or grey, cilia paler than wing or creamy, whitish.

Recorded foodplants are mainly species of Asteraceae (Compositae). The larva lives in various parts of plants, often in stems and roots; it hibernates, and pupates in spring or early summer. The moths fly from April to September and may be uni-, bi- and multivoltine.

1. Aethes hartmanniana (Clerck, 1759) (Fig. 4, 6, 29, 30)

[*Phalaena*] *hartmanniana* Clerck, 1759, *Icones Ins.*, pl. 4, fig. 10. Locus typicus

References: ÁCS & SZABÓKY 1993, FAZEKAS 1992, 1993, 1995, 2005, GOZMÁNY 1968, RONKAY & SZABÓKY 1981, SZABÓKY 1999.

Distribution in Palaearctic: from Ural Mountains and Caucasus to Britain. According to KENNEL (1913) in Armenia and Asia Minor.

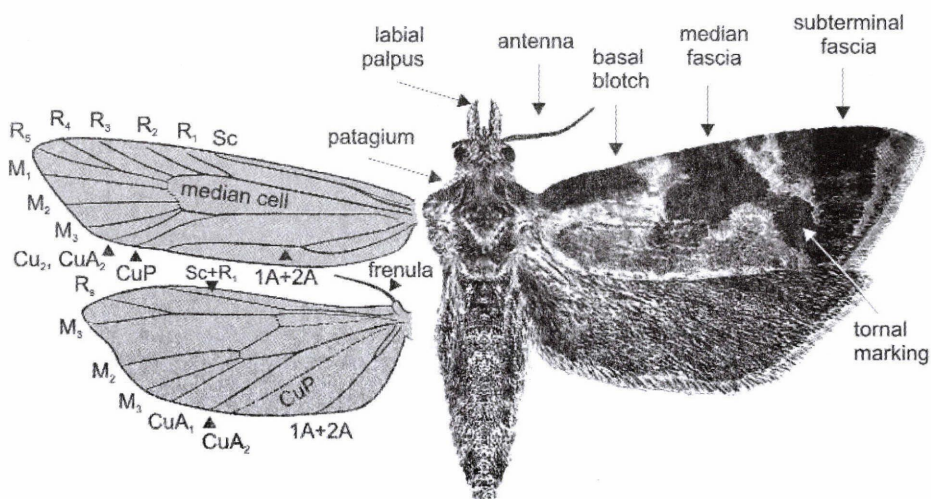


Fig. 2. Venation and forewing of *Aethes* genus

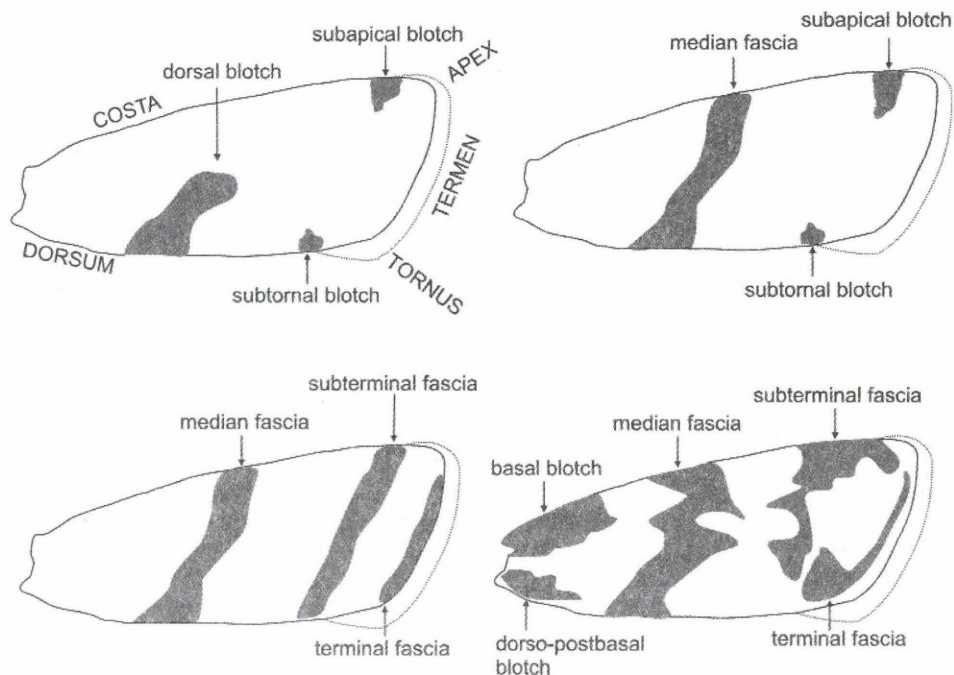


Fig. 3. Forewing patterns of *Aethes* moths, diagrams

The distribution area in Hungary: Agárd, Aggtelek, Apátistvánfalva, Balatonfüred, Bátorliget (láp), Bélapátfalva, Budapest (Mátyás-hegy), Bükkzsérc, Cserépfalu, Csévharasz, Csopak, Eger (Almár), Egerbakta, Farmos (Reketyés-ér), Fót, Fülöpháza, (kutatóház), Füzér, Gyékényes, Gyöngyös (Sár-hegy), Győr (Bácsa), Győrzámoly, (Patkányos), Harkány (Tenkes-hegy), Herend, Jászberény, Jósavfő, Kapoly, Kaposfő, Kaposvár, Kárász, Kemence-patak-völgye, Kercaszomor, Kiliántelep, Királyszállás, Kisvaszar, Komló (Egregyi-völgy), Komló (Zobákpuszt), Mátraháza, Miskolc (Barát-rét), Nagykáta, Nagykőrös, Nemesgulács, Nyirád, Olaszfalu, Óriszentpéter, Öskű, Parád, Pázmánd (Zsidó-hegy), Pécs (Árpád-tető), Pécs (PTE-arboretum), Pécs-Vasas, Pusztamiske, Rezi, Salföld, Sopron, Szakonyfalu, Szalafő-Alsószer, Szin, Szinpetri, Tabdi, Telkibánya, Érd (Tétényi-fennsík), Tihany, Ujszentmargita.

Phenology: Bivoltine. The moth flies from mid-May to mid-June and from early July to mid-August.

Biology: oligophagous. Recorded foodplants are *Scabiosa ochroleuca*, *S. columbaria*, *Succisa pratensis* and *Knautia arvensis*. The larva lives in the rootstock.

Habitat: moist rich fens, eu- and mesotrophic meadows, colline and montane hay meadows, acid grasslands and heaths. Rare and local in marshy country. Sporadic in halophytic and dry open grasslands. Altitude from 90 m to 600 m.

Comments: Widespread in the western and northern parts of Hungary. Frequent on the hills and in mountains of medium height, and avoiding the dry habitats on the plains. A rather variable species: some very dark specimens occur in water-fringing herbaceous communities. *A. hartmanniana* and *Ae. piercei* occur sympatrically in West Hungarian Borderland (FAZEKAS 1992). Further study is needed to improve knowledge about taxonomy and distribution area. For Hungarian morphology and for biology see FAZEKAS (1992).

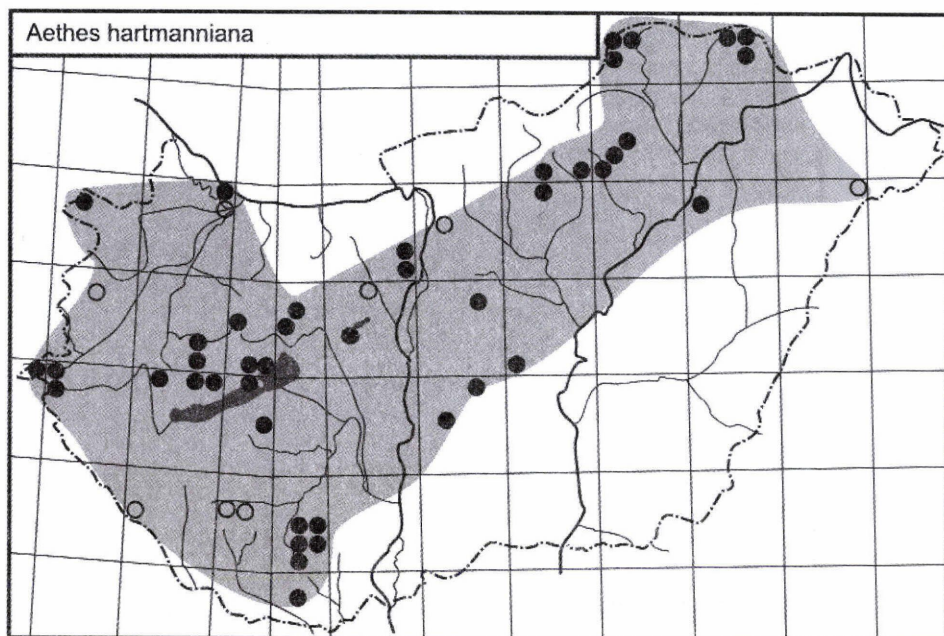


Fig. 4. Distribution of *Aethes hartmanniana* (Clerck, 1759) in Hungary

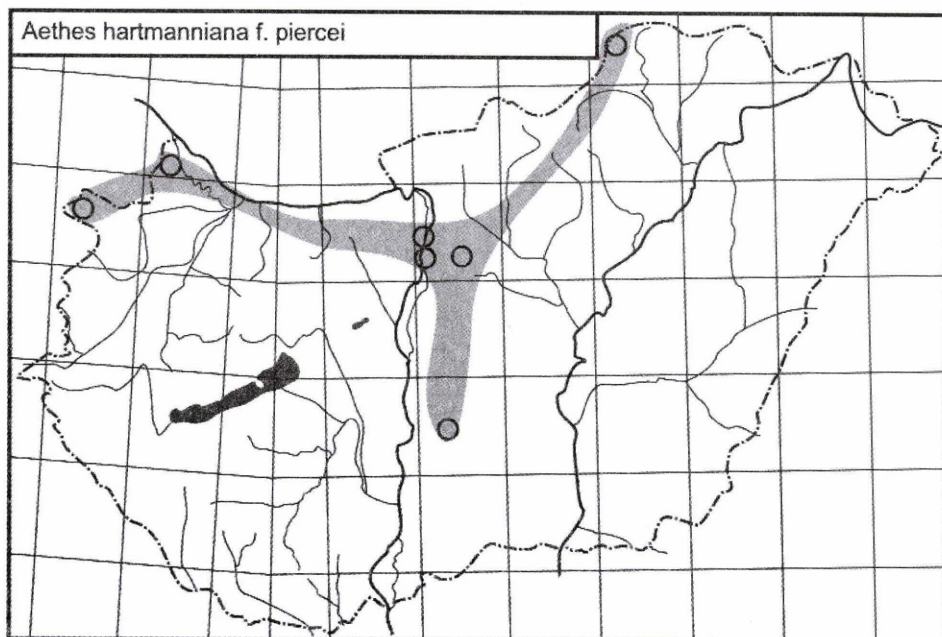


Fig. 5. Distribution of *Aethes hartmanniana* f. *piercei* (Obraztsov, 1952) in Hungary

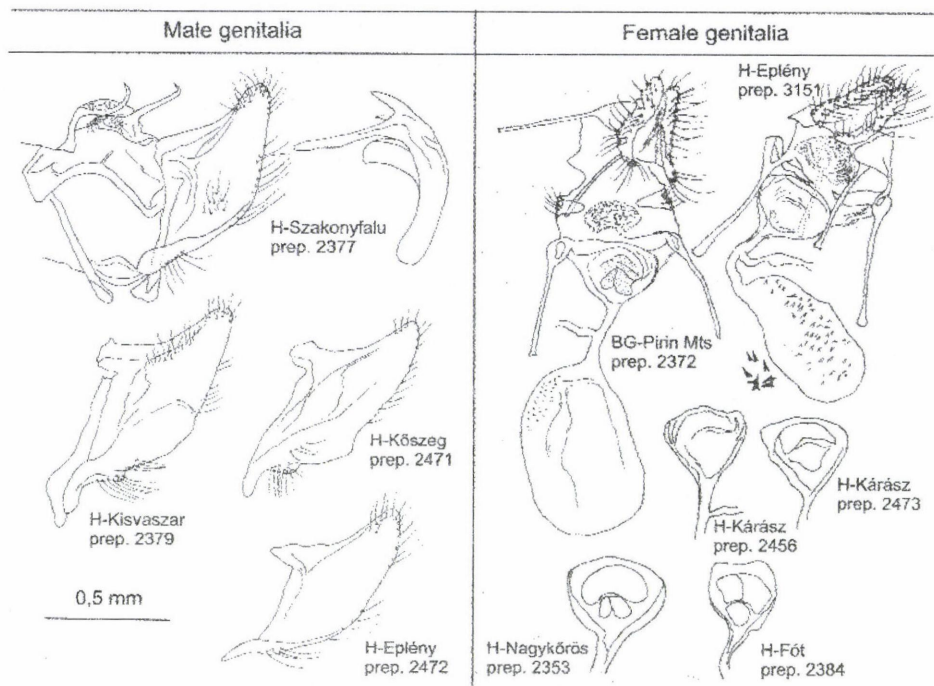


Fig. 6. Male and female genitalia of *Aethes hartmanniana* (Clerck, 1759)

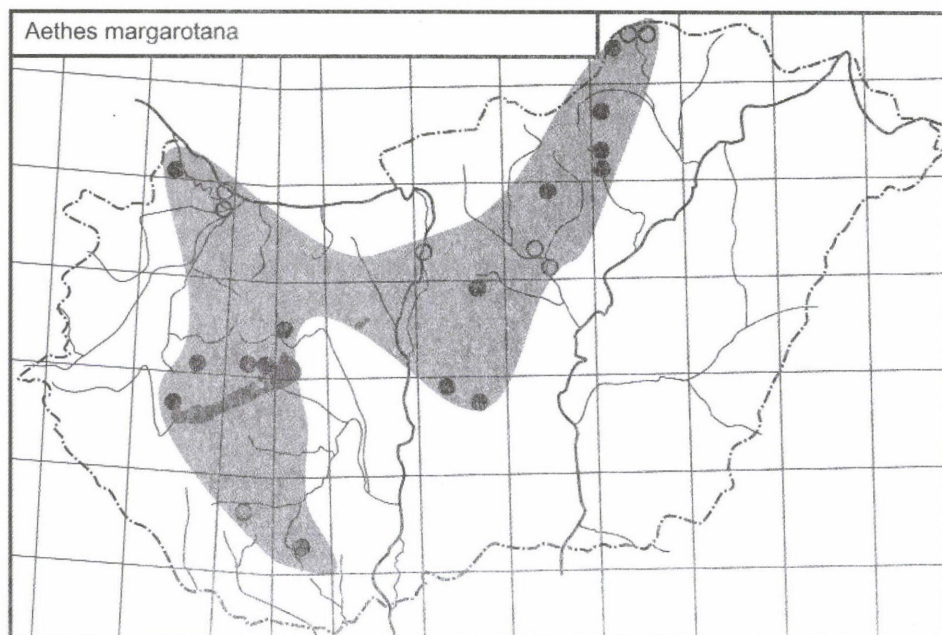


Fig. 7. Distribution of *Aethes margarotana* (Duponchel, 1836) in Hungary

2. *Aethes hartmanniana* f. *piercei* Obraztsov, 1952 (Fig. 5, 6, 29)

Aethes piercei Obraztsov, 1952, Ent. Z. Frankf. Main, 61: 157, fig. 2.

References: BRADLEY et al. 1973, FAZEKAS 1992, 1995, PETRICH 2001, RAZOWSKI 2002, SZABÓKY 1981,

Comments: known distribution in Europe: Austria, Belgium, Czech Republic, France, Germany, Great Britain, Hungary, Ireland, Italy, Netherlands, Spain, Switzerland (www.faunaeur.org: 8.2.2008). Records from Hungary are unconfirmed (SZABÓKY 1981, PETRICH 2001), and all published specimens refer to *Ae. hartmanniana*. Coloration and shape of markings as in *Ae. hartmanniana*. Male and female genitalia as in *Ae. hartmanniana*. According to BRADLEY et al. (1973), *Ae. piercei* is closely related to *Ae. hartmanniana* and some authors have suggested that it may be no more than an ecological form. RAZOWSKI (2002), states that it is probably a distinct species, but insufficiently known, showing however, only slight differences in facies and male genitalia. The genital characters of female require re-examination on additional material (Fig. 6). Nearly 100 specimens from different parts of Europe, which the author has examined, indicate that *Ae. piercei* is not specifically distinct and should be synonymised with *Ae. hartmanniana*. The detailed examination results will be published in a later study. The taxonomic problem of the two species was dealt with already in 1992, in which the following statements were made (FAZEKAS 1992). After FAZEKAS (1992): Following a thorough investigation of several hundred specimens, the author concludes that *piercei*-like examples can be found in all Hungarian populations of *Ae. hartmanniana*. Furthermore, one finds no single specific feature that would support justification for *piercei* as a distinct species. He is therefore of the opinion that the genitalia features given by Obraztsov are insufficient for an incontestable identification. On the contrary, it also increases the already known polytypical picture of the species *Ae. hartmanniana*. In addition to the problems that have arisen over identification, there have also been contradictions in descriptions of larval conditions and foodplants of this species.

Speciation processes in West Palaearctic can often be explained by isolation of populations into separate glacial refuges with subsequent inter- and postglacial expansion to the present distribution area. When discussing the European species pair *Ae. hartmanniana* and *Ae. piercei*, the speciation of these comparatively young semispecies evidently happened in the postglacial period.

3. *Aethes margarotana* (Duponchel, 1834) (Fig. 7)

References: ÁCS & SZABÓKY 1993, BRADLEY et al. 1973, FAZEKAS 1994, 1995, 2005, GOZMÁNY 1968, SZABÓKY 1999.

Distribution in Palaearctic: coastal areas between Armenia to British Isles and Northwest Africa. Interestingly, there is very little data from the Balkans. Chorotype: West Palaearctic.

The distribution area in Hungary: Ágasegyháza, Aggtelek, Alattyán, Balatonfüred, Budapest (Mátyás-hegy), Csévharaszt, Csopak, Eger, Gyenesdiás, Gyöngyös (Sár-hegy), Győr-Bácsa, Győrzámoly-Patkányos, Jászberény, Kaposvár, Komjáti, Magyaróvár, Nagyvisnyó, Nyírád, Óskú, Pécs (Árpád-tető), Síkfőkút, Szabadszállás, Szin, Szinpetri.

Phenology: univoltine, flight period from April to end July.

Biology: monophagous. The larva lives in roots and stems of *Eryngium campestre*, instead of *Eryngium maritimum* which does not occur in Hungary. Hibernation in larval stage. According to BRADLEY et al. (1973) by the beginning of September the larvae are all in the roots, where they continue to feed until they are full-grown in October. The interior of the root is eaten out leaving only a thin shell or skin, and the larva overwinters in this situation until the end of March, when it works its way to the upper part of

the root, where it hollows out a pupal chamber, pupating by early May.

Habitat: Sand steppes, lowland dry degraded grasslands (Great Hungarian Plain), slope steppes (Mátra Mts.), dry and semi-dry closed grasslands (example Bakony and Mecsek Mts.). Altitude from 100 m to 400 m.

Comments: Sporadic on the plains and hills, and uncharacteristically in the mountains of medium height. Not recorded from Eastern Hungary (Tiszántúl).

4. *Aethes williana* (Brahm, 1791) (Fig. 8, 9)

References: FARKAS 1969, FAZEKAS 1994, 1995, GOZMÁNY 1968, PETRICH 2001, SZABÓKY 1982A, 1994, 1999.

Distribution in Palaearctic: from Mongolia to North-West Africa and Western Europe. Chorotype; centralasiatic-europeo-mediterranean.

The distribution area in Hungary: Agárd, Ágasegyháza, Budapest, Dömsöd-Apajpuszta, Eger-Almár, Fülöpháza, Gyöngyös, Győr-Bácsa, Hortobágy, Izsák, Kecskemét (Nagynyír, Nyír), Komjáti, Miskolc (Garadna-völgy), Nagytétény, Nadap (Csúcsos-hegy), Pécs (Árpád-tető), Pusztapeszér, Sárkeresztúr, Sukoró, Újszentmargita.

Phenology: The moth flies in two generations from April to mid September. September specimens are known on the Transdanubia only. The third generation is not known in Hungary. The species flies actively in the evening and at sunset and during the day if the weather is warm and dry. The peak periods of swarming are April and July.

Biology: larva polyphagous, on *Daucus carota*, *Eryngium campestre*, *Gnaphalium sylvaticum* and *Helichrysum arenarium*; full-grown larva 9-10 mm long, body yellowish; pupa straw coloured, 6-7 mm long, the cocoon light brown. In Hungary, the larva is injurious to cultivated carrots (FARKAS 1969). Not uncommonly, a quarter of the crop can be destroyed. Two years are sometimes spent in the pupal stage.

Habitat: xerotherphilous species, found mainly in the closed loess and sand steppes, saline pasture, edge of agricultural land. Altitude from 90 m to 350 m.

Comments: very local in the Great Hungarian Plain, and sporadically in some habitats of the mountains at medium altitude (example Bükk and Mátra Mts.). *Ae. williana* is often a pest in plantations of carrots, especially in certain years when it becomes abundant.

5. *Aethes moribundana* (Staudinger, 1859) (Fig. 10)

References: BUDASHKIN 1993, PETRICH 2001.

Distribution in Palaearctic: widespread from the Mongolian desert to Europe. Unknown in Scandinavia and British Isles. Chorotype: Centralasiatic-European.

The distribution area in Hungary: Pákozd (PETRICH 2001). Said to have been collected on the Great Hungarian Plain. The exact localities are not known.

Phenology: Bivoltine, flying in late May to mid-June and from July to August.

Biology: According to BUDASHKIN (1993) the larvae feed in generative parts of flowers of *Sideritis taurica*; each larva utilises 4 or 5 flowers. *Sideritis taurica* does not occur in the Pannonian region, and in Hungary the larval host-plant is unknown. *Sideritis montana* does, however, occur in this area.

Habitat: riverine ash-alder woodlands (Pákozd: Kanca-hegy). CORINE code: 44.31). Presumably, the moth is to be found in the drier areas.

Similar species: on the whole, *Ae. moribundana* is an easily recognised species, but could occasionally be confused with some of its relatives. *Ae. cnicana* is very similar, and the markings on the forewing are variable, therefore in cases of doubt it is important to examine the genitalia.

Comments: *Ae. moribundana* is apparently very rare and local in Hungary, but could be overlooked and therefore careful search is required.

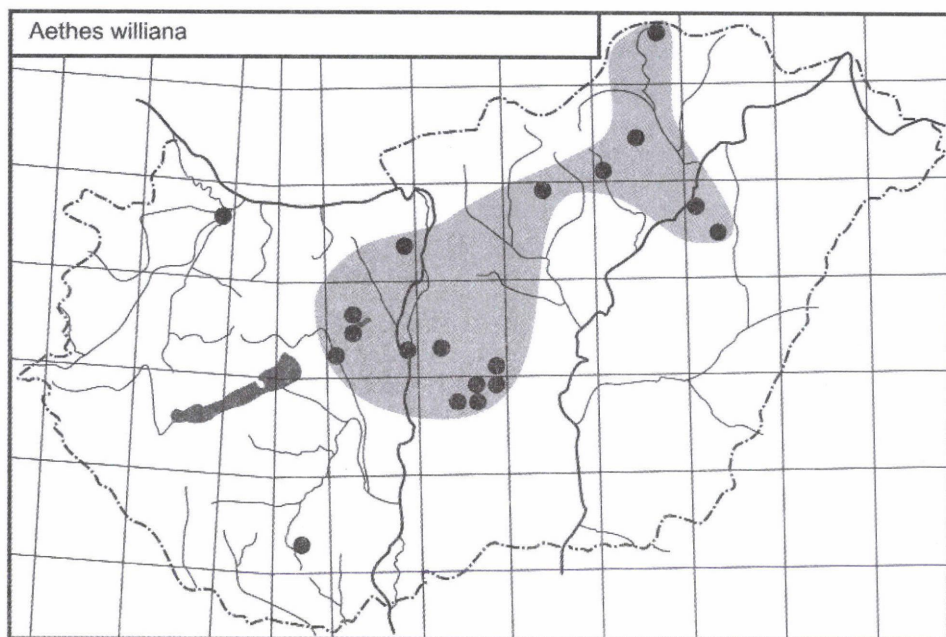


Fig. 8. Distribution of *Aethes williana* (Brahm, 1791) in Hungary

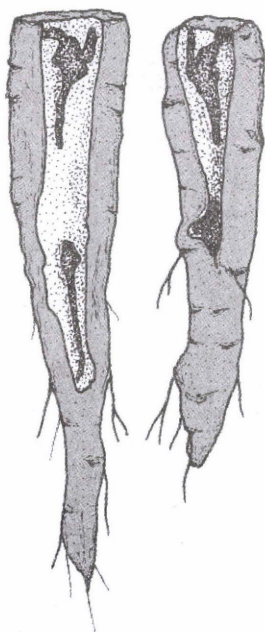


Fig. 9. *Aethes williana* (Brahm, 1791): in Hungary, the larva is injurious to cultivated carrots (FARKAS 1969)

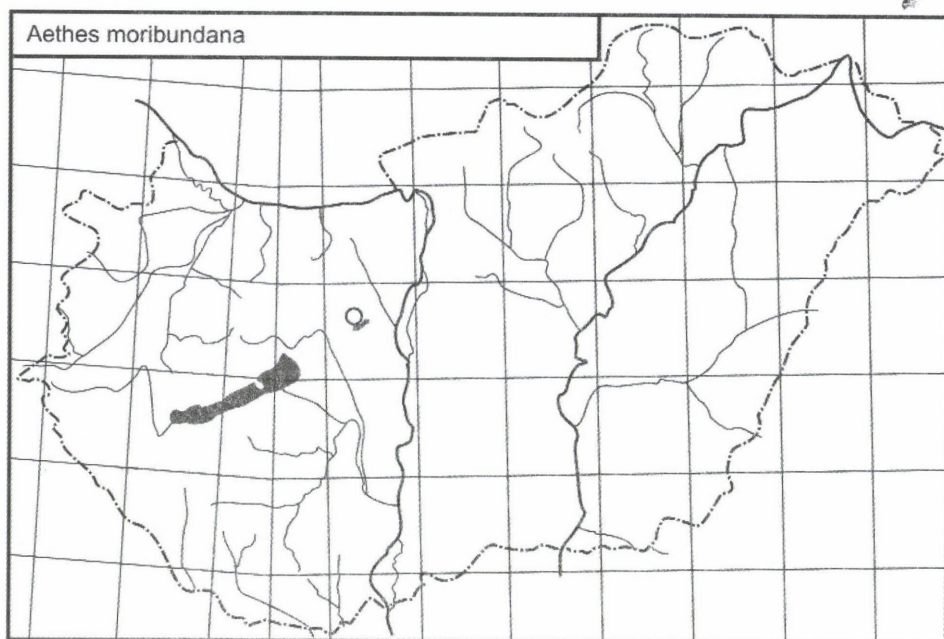


Fig. 10. Distribution of *Aethes moribundana* (Staudinger, 1859) in Hungary

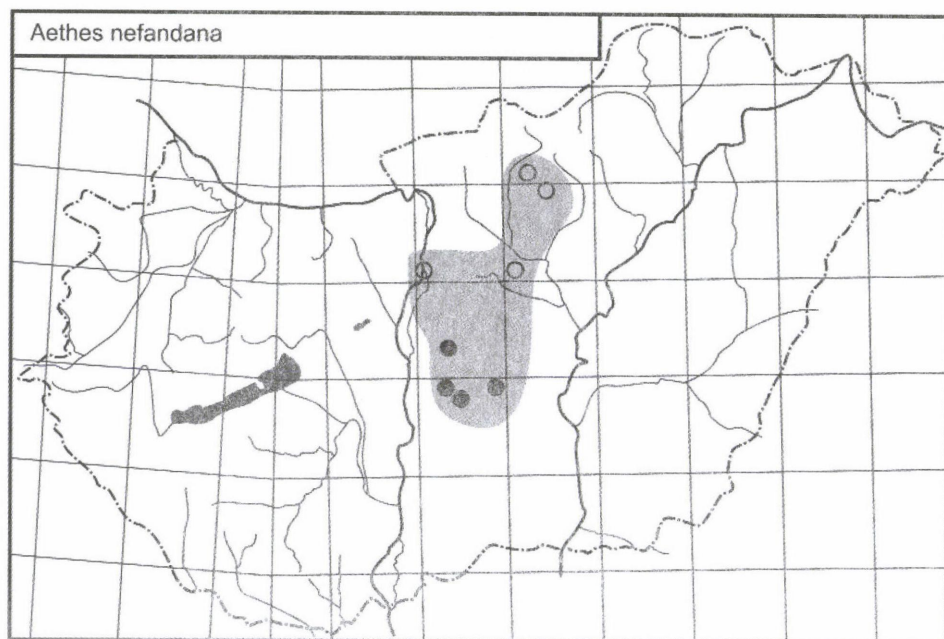


Fig. 11. Distribution of *Aethes nefandana* (Kennel, 1899) in Hungary

6. *Aethes nefandana* (Kennel, 1899) (Fig. 11, 29)

References: BUSCHMANN 2004, FAZEKAS 1995, GOZMÁNY 1968, GOZMÁNY & SZABÓKY 1986.

Distribution in Palaearctic: known from West Kazakhstan to Asia Minor, the Balkans and Central Europe (Romania, Hungary, Slovakia, Czechia, Austria). Chorotype: Turano-European.

The distribution area in Hungary: Csepel, Gyöngyös (Sár-hegy), Izsák, Kecskemét (Nagynyír), Királyhalom, Mátra Mts. (Fallós-kút), Nagykáta, Kunpeszér, Szabadszállás. First map: Fazekas (1995: p. 42, Abb. 7.)

Phenology: univoltine, the moth flies in June and July.

Biology: monophagous on *Eryngium campestre*. The distribution of *Ae. nefandana* is strongly related to that of its food plant. *E. campestre* can be found on the plain, on the hilly-country/collin (200-700 m.).

Habitat: sand steppes, lowland dry degraded grasslands (Great Hungarian Plain) and slope steppes (Mátra Mts.). Altitude from 90 m to 800 m (Mátra Mts.).

Comments: a Turano-European species, local from Kazakhstan to Pannonian region. *Ae. nefandana* is rather frequent in, and characteristic of, our sandy plains and dunes: large series are known from Csepel island, Kunpeszér, Királyhalom, and other arid localities in the central part of Hungary (Great Hungarian Plain: Kiskunság). According to Gozmány & Szabóky (1986) this watery world of the Great Hungarian Plain is very special landscape, with charms and nuisances of its own. The permanent saline lakes are among the hottest places in Europe during the summer: they expand in springtime but recede and become very shallow by July and August, in very dry and hot summers many of them may even dry out. The third main habitat type of *Ae. nefandana* in Hungary is on the southern slopes of the North Hungarian Mountains of medium height, often in semi-dry grasslands established in the place of former vineyards, mostly in steppes on slopes (Mátra Mts; Gyöngyös, Sár-hegy).

7. *Aethes margaritana* (Haworth, [1811]) (Fig. 12)

References: FAZEKAS 1994, 1995, 2002, RAZOWSKI 1996, SZABÓKY 1994, 1999.

Distribution in Palaearctic: from Central Asia to Asia Minor and Western Europe. It has not been reported from some of the Balkan countries (e.g. Croatia, Slovenia). Razowski (1996) by mistake did not publish it from Hungary. Chorotype: Central Asiatic-European.

The distribution area in Hungary: Agárd, Aggtelek, (Béke-barlang), Bakonybél, Balatonyörök, Budaörs, Budapest (Mátyás-hegy, Sas-hegy), Bükkzsérc, Csákerény, Csákvár, Cserépfalu, Darány (Kuti-örház), Dinnyés ("Fertő"), Dömsöd-Apajpuszta, Égerszög, Fényespuszta, Fenyőfő, Gyöngyös (Sár-hegy), Harkány (Tenkes-hegy), Jósvalfő, Kaposvár, Kárász, Kemence-patak-völgye, Királyszállás, Komjáti, Komló (Hasmány-tető, Kossuthakna, kőbánya), Komló-Zobákpuszta, Magyarszombatfa, Máriagyűd, Mátraháza, Mátraszentistván, Mátraszentlászló, Miskolc, Miskolc (Létrás-tető), Nadap (Csúcsos-hegy), Nagyvisnyó (Bálvány), Olaszfalu, Pákozd (Bella-fürdő, Csikmák-hegy, Kanca-hegy, Karácsony-hegy, Tompos-hegy, Tótugrás), Pázmánd (Zsidó-hegy), Pécs, (Árpád-tető, PTE-arborétum, Tettye, Vasas), Salföld, Sárkeresztúr, Sukoró, (Csúcsos-hegy, Meleg-hegy), Szabadszállás, Szalafő-Alsószer, Szin, Szinpetri (Koponya-völgy), Vérteskozma.

Phenology: Bivoltine; the moth flies from May to June and from July to August.

Biology: Larva polyphagous, probably preferring *Achillea millefolium*. Other food-plants are species of *Chamomilla*, *Chrysanthemum*, *Matricaria* and *Tanacetum*. The larva from mid-September to mid-May and from June to July, feeding on the flowers and

seeds of the footplants, living in a silken spinning, overwintering in the feeding place and pupating in the spring.

Habitat: Colline and montane hay meadows and healthy grassland; rich fens, eu- and mesotrophic meadows and tall herb communities. Rare and local in halophytic habitats and in rock- and slope steppes. Meso- to temperate hygrophilous species. Altitude from 100 to 800 m.

Comments: very local and rare on the Great Hungarian Plain, but frequent on some habitats at medium altitude in the mountains.

8. *Aethes triangulana triangulana* (Treitschke, 1835) (Fig. 13)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1994, 1995, 2002, RAZOWSKI 2002, SZABÓKY 1999.

Distribution in Palaearctic: from Dzungarian Ala Tau (Kazakhstan) to Central Europe. According to RAZOWSKI (2002) in the north reaching Scandinavia, in south Bulgaria and Ural River, also Central Asia. Unknown in Denmark and in the British Isles. Chorotype: Asiatic-European.

The distribution area in Hungary: Abasár-Pálosvörösmart, Ágasvár, (Mátra Mts.), Alattyán, Budaörs, Felsőtárkány, Fót, Gyöngyös, Gyöngyösoroszi, Kisdána, Komló-Zobákpuszta, Magyarszombatfa, Mátrafüred, Mátraszentistván, Nagyvisnyó, Szalafő-Alsószer, Szinpetri (Koponya-völgy), Újszentmargita.

Phenology: univoltine; flies between early June and late July.

Biology: Larva probably monophagous on *Veronica longifolia*. No other food plant is known, but there are doubtful records that *Veronica chamaedrys* and *V. montana* may be utilised.

Habitat: *Ae. triangulana* is a meso- and semi hygrophilous species, mainly on hills and in mountains of medium height. Water-fringing and fen tall herb communities; creek valleys often at margins of damp woodland. In Mecsek Mts (Southern Hungary) Illyrian beech and oak-hornbeam woodlands. This is a sylvan environment in a residential area, effectively a sylvan clearing, where they are private gardens and small orchards. In the immediate neighbourhood there are forests of beech and oak. Up to the year 2000, there was intensive coalmining in the area. Intensive industrial activity characterized the country for nearly 150 years, but the mines were closed in 2000 and recultivation began. Altitude from 100 m to 750 m (Mátra Mts.).

Comments: According to Razowski (2002) the nominotypical subspecies is widely distributed in Europe. The subspecies *excelentana* (Christoph, 1881) occurs in the Far East from Japan to Ussuri and Amur Territory.

9. *Aethes rutilana rutilana* (Hübner, [1817]) (Fig. 14)

References: FAZEKAS 1994, 1995, GOZMÁNY 1968, SZABÓKY 1982a, 1999.

Distribution in Palaearctic: widespread in Palaearctic and in Nearctic Regions (ssp. *canadana* Razowski, 1997). Chorotype: Holarctic.

The distribution area in Hungary: Ágasegyháza, Aggtelek, Barcs, Középrigóc, Darány (Kuti-örház), Fenyőfő, Nyírád, Orgovány, Pécs (PTE arboretum).

Phenology: the moths fly from the beginning of May to mid-July.

Biology: larva monophagous on *Juniperus communis*, overwintering from autumn to spring, and pupating in April.

Habitat: A typical xerothermophilous species of our southern sand dunes with Juniper steppe woodlands. Altitude from 90 m up to 400 m above sea-level.

Comments: a rare species with very isolated populations in the Great Hungarian Plain. Known also from the mountains of medium altitude in Mecsek (botanical gardens) and

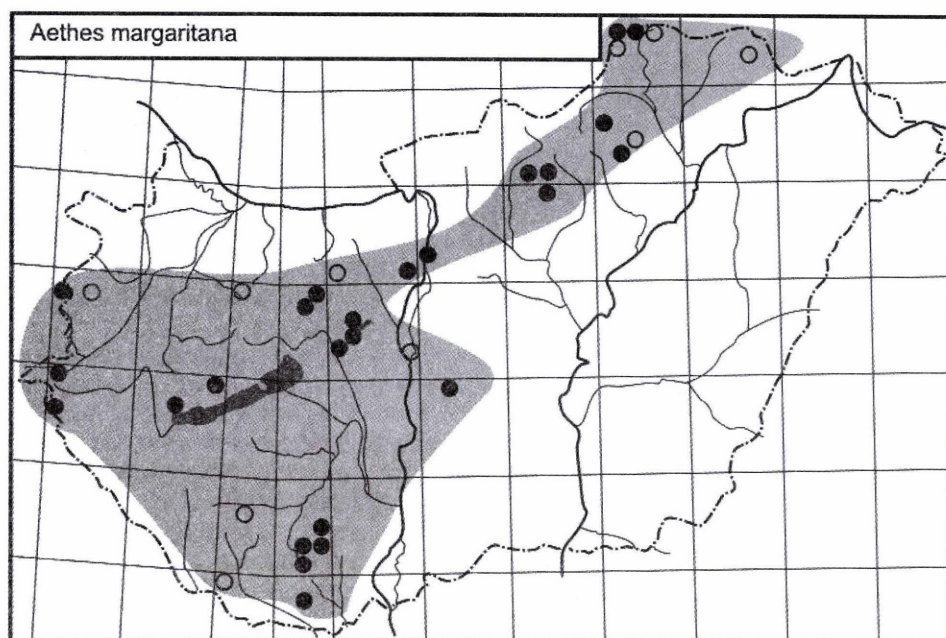


Fig. 12. Distribution of *Aethes margaritana* (Haworth, [1811]) in Hungary

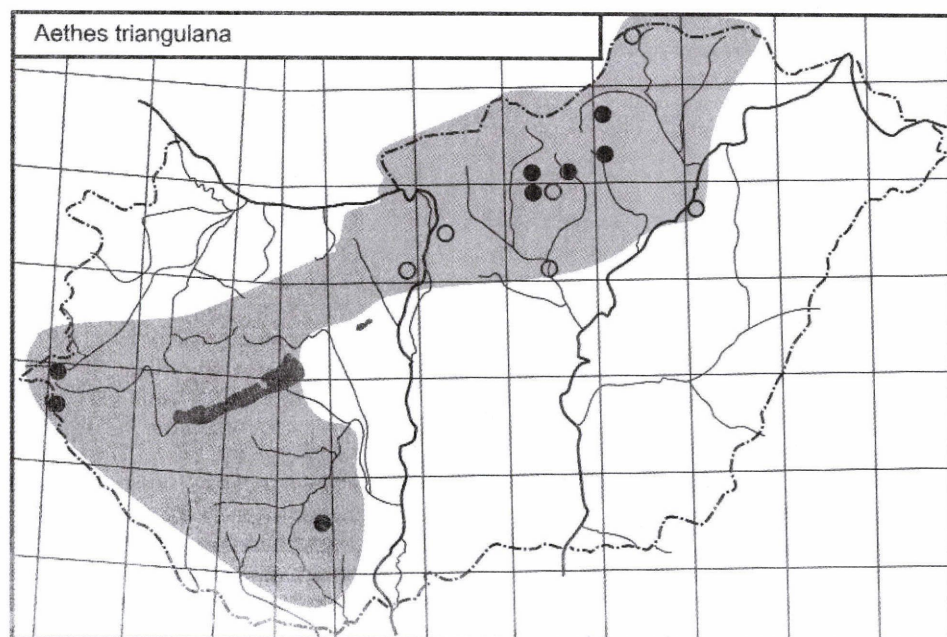


Fig. 13. Distribution of *Aethes t. triangulana* (Treitschke, 1835) in Hungary

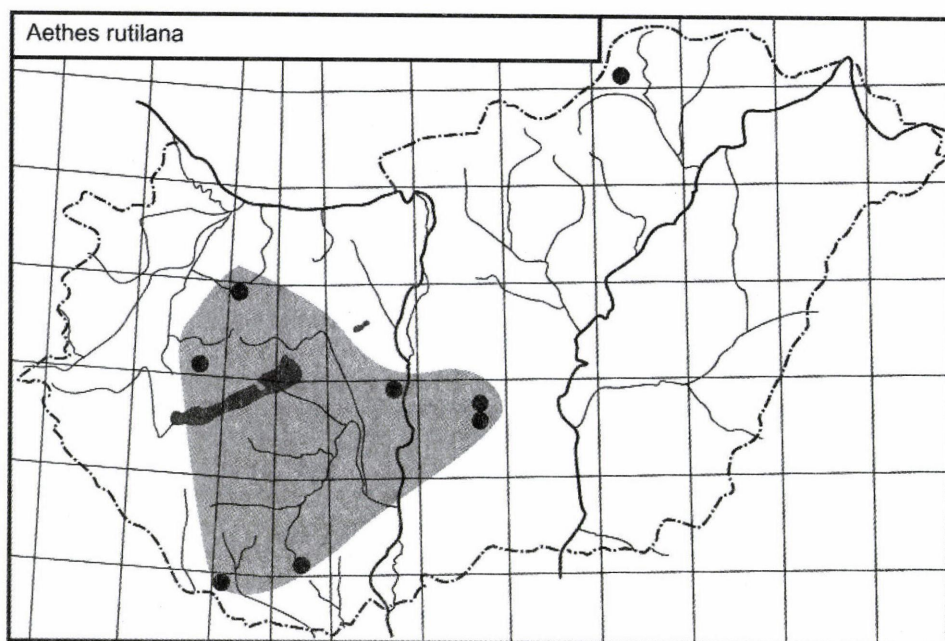


Fig. 14. Distribution of *Aethes r. rutilana* (Hübner, [1817]) in Hungary

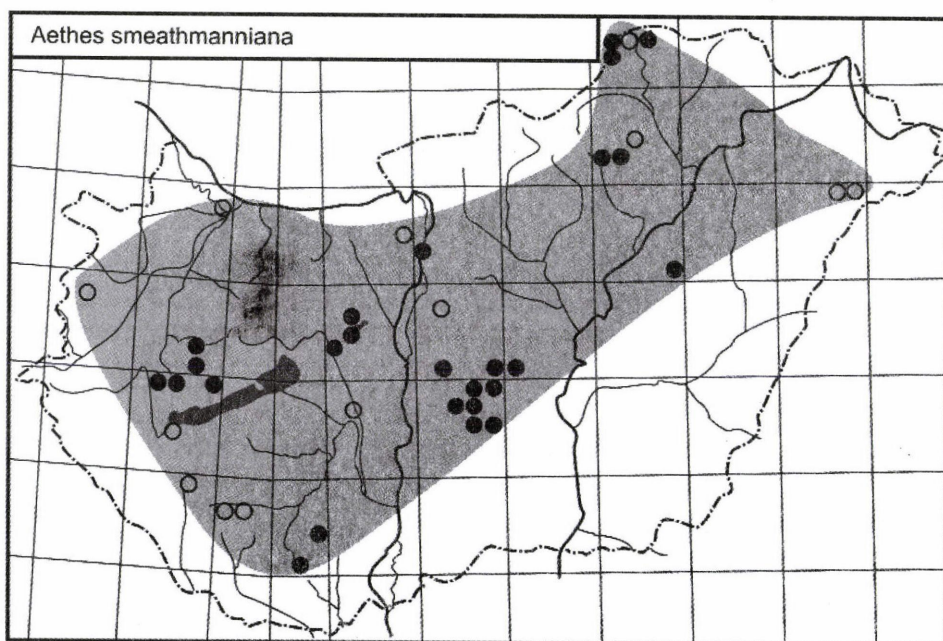


Fig. 15. Distribution of *Aethes smeathmanniana* (Fabricius, 1781) in Hungary

Aggtelek Mts (slope steppes). The nominotypical subspecies is widely distributed in Europe. Subspecies *tatricana* (Adamczewski, 1936) occurs in Tatra Mts.

10. *Aethes smeathmanniana* (Fabricius, 1781) (Fig. 15)

References: ÁCS & SZABÓKY 1993, BRADLEY 1973, FAZEKAS 1994, 1995, 2002, PETRICH 2001, RONKAY & SZABÓKY 1981, SZABÓKY 1982a, 1999.

Distribution in Palaearctic: widely distributed from Baikal Territory to Western Europe. In southern Europe from northern Spain across France to southern Balkan Peninsula, with isolated populations in the Apennines, and Peloponnese. Known from Nearctic in Canada and northern USA. Chorotype: Holarctic.

The distribution area in Hungary: Agárd, Ágasegyháza, Aggtelek, Bátorliget (marsh), Böhönye, Budapest, Bugac, Bükkzsérc, Dinnyés, Felsőtárkány (Vár-hegy), Fülöpháza (Szívó-szék), Győr-Bácsa, Izsák (Kolon-tó), Jósvalfő, Kaposfő, Kaposvár, Kárász, Kecskemét-Nagynyír-Nyír, Komjáti, Komló (Egregyi-völgy), Kunadacs, Miskolc, Nadap (Csúcsos-hegy), Nagyiván, Nagykörös, Nyírbátor, Nyírad, Ócsa (Nagy-erdő), Olaszfalu, Orgovány (Kargala), Óriszentpéter, Pákozd (Hurka-völgy, Kanca-hegy, Karácsony-hegy, Mészeg-hegy, Tompos-hegy, Tóthugrás), Pécs (PTE arboretum), Pilisvörösvár, Pusztamiske, Rezi, Salföld, Sárkeresztúr, Síkfőkút, Simontornya, Sukoró, (Csúcsos-hegy, Meleg-hegy), Szalafő-Alsószer, Szinpetri, Uzsabánya, Vörs.

Phenology: bivoltine, in two generations, mid-April to June and July to mid-September

Biology: Larva polyphagous in withered leaves of herbaceous plants, especially on Asteraceae (Compositae). Mostly recorded on *Achillea millefolium*, *Anthemis arvensis*, *A. cotula*, *Centaurea nigra* and *Lactuca sativa*. According to BRADLEY (1973) the larva lives in the flower heads or seedheads of the foodplants, eating the seeds. Pupation in April and June/July, in a silken cocoon amongst debris.

Habitat: ubiquitous species, found in colline and montane hay meadows, acid grasslands and heaths; halophytic habitats, dry open grasslands; dry and semi-dry closed grasslands; secondary and degraded marshes and grasslands; semi natural, often secondary woodland-grassland mosaics. Altitude from 90 m to 350 m.

Comments: frequent in the plains, mostly rare and local in the mountains of medium altitude. It avoids the taller mountains and cool habitats.

11. *Aethes tesserana tesserana* ([Denis & Schiffermüller], 1775) (Fig. 16, 30)

References: ÁCS & SZABÓKY 1993, BRADLEY 1973, FAZEKAS 1993, 1994, 1995, 2002, 2005, GOZMÁNY 1968, RONKAY & SZABÓKY 1981, SZABÓKY 1982a, 1994.

Distribution in Palaearctic: the subspecies-groups are widely distributed from northern Iran, southern Russia and Balkan Peninsula to Scandinavia and Britain.

The distribution area in Hungary: Agárd, Aggtelek, Balatonyörök, Balatonkenese, Bátorliget (marsh), Budaörs, Budapest (Mátyás-hegy), Bugac, Csákberény, Cserépfalu, Darány (Kuti-örház), Dinnyés, Dinnyés ("Fertő"), Eger (Tihamér-dűlő), Felsőtárkány (Vár-hegy), Fenyőfő, Gyékényes, Gyöngyös, Gyöngyös (Sár-hegy), Gyöngyöstarján, Győr-Bácsa, Győrzámoly (Patkányos), Hortobágy, Óskü, Izsák, Jászberény, Jósvalfő, Kapoly, Kaposvár, Kárász, Kemece-patak-völgye, Kiliántelep, Komjáti, Komló (Hasmány-tető), Kőkütpuszt, Kunszentmiklós, Lovasberény, (Hársas-tető, vadaspark), Mánfa (Kossuthakna), Mátrafüred, Mátraszentistván, Nagyarsány (Szársomlyó), Nagykáta, Nemesgulács, Pákozd (Kanca-hegy, Karácsony-hely, "Tóthugrás", Zsidó-hegy), Abasár-Pálosvörösmart, Pázmánd, Pécs (Árpád-tető, PTE arboretum, Vasas), Salföld, Síkfőkút, Sukoró, (Meleg-hegy), Szakonyfalu, Szava, Szin, Szinpetri, Szögliget, Tihany, Újszentmargita, Uzsabánya.

Phenology: bivoltine species which flies from May to August. The moth flies actively in the sunshine and night comes freely to light.

Biology: polyphagous, mainly on Asteraceae (Compositae), such as species of *Crepis*, *Hieracium*, *Inula* and *Picris*. In Hungary, *Picris hieracioides* is the principal footplant. According to Bradley (1973) the larva is difficult to find as there is no external evidence of feeding; it is best to dig up rootstocks in the late autumn and pot them.

Habitat: a frequent and widely distributed mesophyllous species in Hungary, from the steppes to mountains of medium height, but preferring collin and mountain hay meadows, acid grasslands and heaths. Altitude from 100 m to 350 m.

Comments: the nominotypical subspecies is widely distributed in Europe. The ssp. *magister* (Walsingham, 1900) is local in Syria. The taxonomic situation of some Asian populations is problematic.

12. *Aethes sanguinana* (Treitschke, 1830) (Fig. 17)

References: FAZEKAS 1994, 1995, 2002, SZABÓKY 1982a.

Distribution in Palaearctic: widely distributed from Ural Mts. and Asia Minor to Iberian Peninsula and northwest Africa. In Central Europe rare and local. Reputedly in Scandinavia and in Western Europe, data await confirmation, no vouchers traced. Chorotype: Turano-Europeo-Mediterranean.

The distribution area in Hungary: Ágasegyháza, Budapest, Csévharaszt, Dömsöd-Apajpuszta, Fonyód, Győr-Bácsa, Kárász, Kecskemét-Nagynyír, Kunpeszér, Nagyarsány (Szársomlyó), Pákozd (Mészeg-hegy Sár, hegy, Tótugrás), Tihany.

Phenology: univoltine, the moth flies from June to early September. Under good conditions in south Pannonian regions (Croatia, Serbia) there are two generations, between May and September.

Biology: monophagous, in roots and stems of *Eryngium campestre*.

Habitat: closed loess and sand steppes on the Great Hungarian Plain; open sand steppes (Somogy country, Little Plain); slope and rock steppes (Villányi Hills); colline dry degraded grasslands (Baranya country: Kárász). Altitude from 90 m to 350 m.

Comments: sporadic and locally rare in the plains and hills, and uncharacteristic of the mountains of medium altitude. A typical species of sand and limestone areas. Not known from west and north Hungary. The type locality of the nominotypical subspecies is in Hungary.

13. *Aethes dilucidana* (Stephens, 1852) (Fig. 18, 29)

References: BRADLEY et al. 1973, BUSCHMANN 2004, FAZEKAS 1995, RAZOWSKI 2002.

Distribution in Palaearctic: widely distributed from European Russia to Britain and NW Africa. In Central Europe local and unknown in many large areas. Chorotype: West Palaearctic.

The distribution area in Hungary: Jászberény, Ócsa (Nagy-erdő).

Phenology: in Hungary, the imago has been found in July. According to RAZOWSKI (2002) the moth flies in June and July. In Britain, recorded in July and August. In Britain frequenting grasslands in chalk and limestone areas where wild parsnip, *Pastinaca sativa*, grows, and it has also been taken in gravel pits (BRADLEY et al. 1973).

Biology: oligophagous; reported foodplants are *Peucedanum sativum*, *Pastinaca sativa* and *Heracleum sphondylium* (RAZOWSKI 2002). *Peucedanum sativum* unknown in Hungary, and *Heracleum sphondylium* is a typical montane species in the country, but the moths have not been found in the mountains.

Habitat: lowland wet degraded grasslands; the data incomplete.

Comments: in Hungary, *Ae. dilucidana* has been confused with *Ae. flagellana*

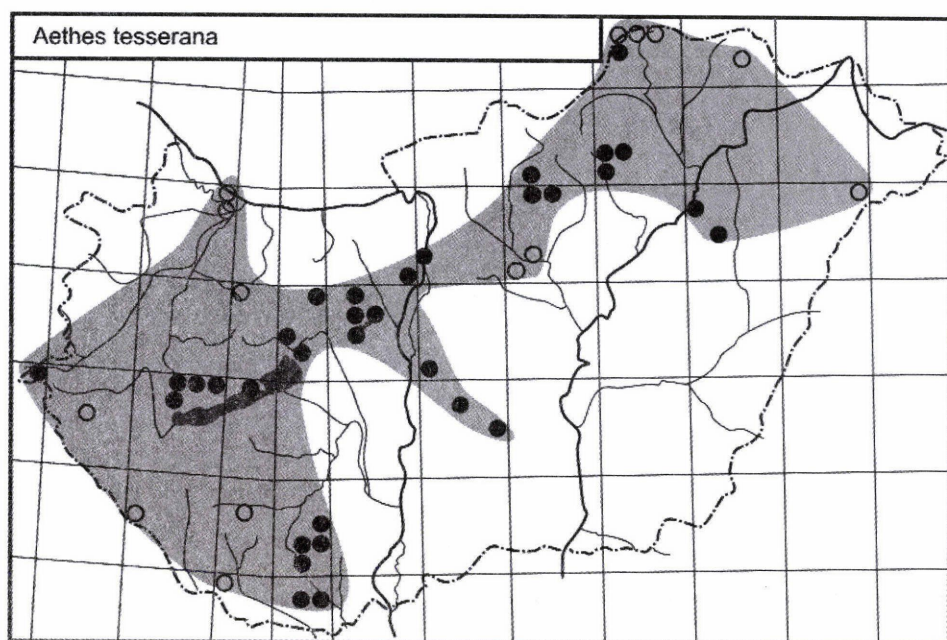


Fig. 16. Distribution of *Aethes t. tesserana* ([Denis & Schiffermüller], 1775) in Hungary

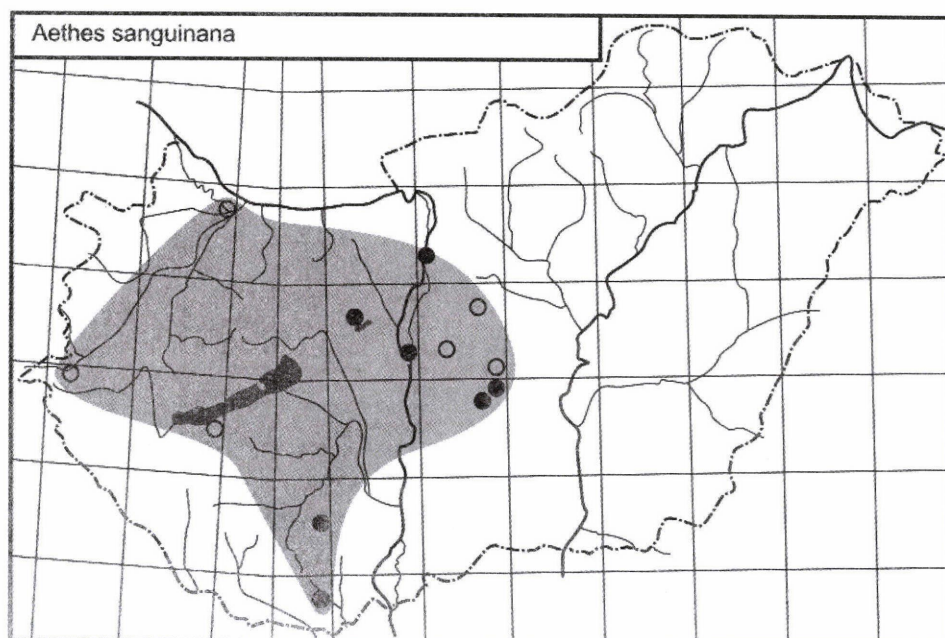


Fig. 17. Distribution of *Aethes sanguinana* (Treitschke, 1830) in Hungary

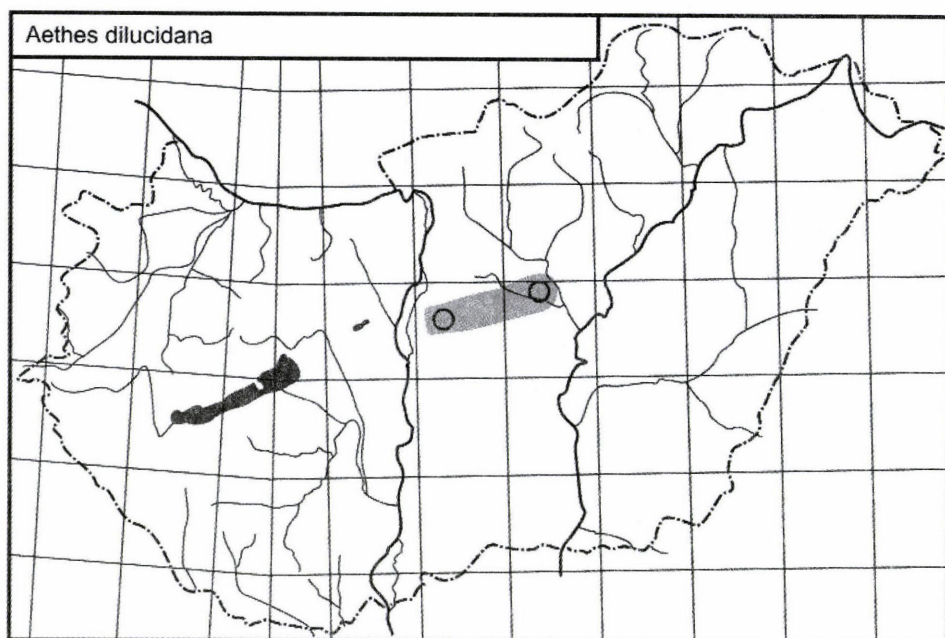


Fig. 18. Distribution of *Aethes dilucidana* (Stephens, 1852) in Hungary

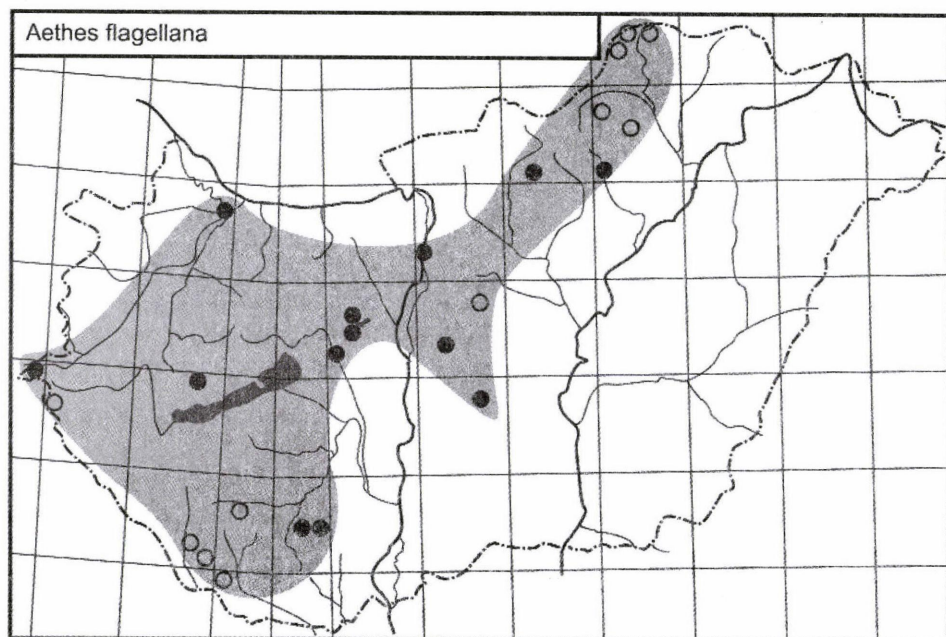


Fig. 19. Distribution of *Aethes f. flagellana* (Duponchel, 1836) in Hungary

(Duponchel, 1863), and it is probably more widespread than the records suggest. The species is apparently unknown from Transdanubia and north Hungary. More research is necessary on its distribution in our country.

14. *Aethes flagellana flagellana* (Duponchel, 1836) (Fig.19)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1994, 1995, 2002, SZABÓKY 1982a, 1994, 1999.

Distribution in Palaearctic: two subspecies are recorded in the West Palaearctic, ssp. *flagellana* Duponchel, 1836 and ssp. *atlas*i Razowski, 1962. The nominotypical subspecies is widely distributed from Central Asia, Iran and Near East to Europe. In Europe with slight disjunction. Unknown in Scandinavia and Britain. The ssp. *atlas*i known in NW Africa. Chorotype of ssp. *flagellana*: Turano-Europeo-Mediterranean.

The distribution area in Hungary: Ágasegyháza, Apátistvánfalva, Budapest (Budai Mts., Zúgliget), Csévharaszt, Darány (Kuti-órház), Dinnyés (Fertő), Eger (Tihamérdűlő), Égerszög, Győr-Bácsa, Kaposvár, Kisvaszar, Komjáti, Komló-Zobákpuszt, Magyarszombatfa, Mátraszentistván, Miskolc (Feket-sár), Nadap (Csúcsos-hegy), Nagyvisnyó (Hármas-kút), Pákozd (Kanca-hegy, Pogánykő, Tompos-hegy), Peszér, Pusztapeszér, Rinyatamási, Salföld, Sárkeresztúr, Sukoró (Csúcsos-hegy, Meleg-hegy), Szin, Szinpetri, Szulok.

Phenology: bivoltine, flying in May-June and July-August.

Biology: monophagous, the larva living from September to May in flowers and stems of *Eryngium campestre*.

Habitat: Xerothermophilous, preferring steppes and colline habitats. Very local and rare in the mountains of medium altitude (Mátra Mts.). Typical habitats are sand steppes, lowland dry degraded grasslands (Great Hungarian Plain), slope steppes (Mátra Mts.) and semi-natural, often secondary woodland-grassland mosaics (Transdanubia). Altitude from 90 m to 800 m (Mátra Mts.).

Comments: the known distribution in Hungary is very incomplete, and there is hardly any data available from big geographical areas.

15. *Aethes beatricella* (Walsingham, 1898) (Fig. 20, 29)

References: BRADLEY et al. 1973, FAZEKAS 1995, HORVÁTH 1993, PETRICH 2001, RAZOWSKI 1970, 2001.

Distribution in Palaearctic: from Dagestan and European Russia to Britain and NW Africa. According to Razowski (2001) not yet recorded from Hungary. This is incorrect: the species was already reported, correctly, from Hungary in his previous book (RAZOWSKI 1970). In Central Europe more common, but local. Chorotype: Centralasiatic-Europeo-Mediterranean.

The distribution area in Hungary: Győr-Bácsa, Győrzámoly (Patkányos), Agárd, Pákozd (Karácsony-hegy, Sár-hegy), Pátka (Kőrakás-szurdok), Sukoró (Csúcsos-hegy), Nadap (Csúcsos-hegy), Hortobágy.

Phenology: univoltine; the moth flies between May and July.

Biology: oligophagous; the foodplants are *Conium maculatum* and *Pastinaca sativa*. Another food plant, *Smyrniolum olusatrum*, is unknown in Hungary. Pupates in April, in the stem of the food plant.

Habitat: *Ae. beatricella* is a xerothermophilous species, preferring lowland habitats. Typical habitats are wooded pastures, salt meadows and dry and semi-dry closed grasslands. Interestingly, it has also been found in a gorge valley (Velencei Mts.: Pátka, Kőrakás-szurdok).

Comments: In Hungary, this species is very rare and local in the Great Hungarian Plain, Little Plain and Velencei Mts. and apparently is not found elsewhere although the food-plant is widespread. The observation is similar in Great Britain (BRADLEY et al. 1973).

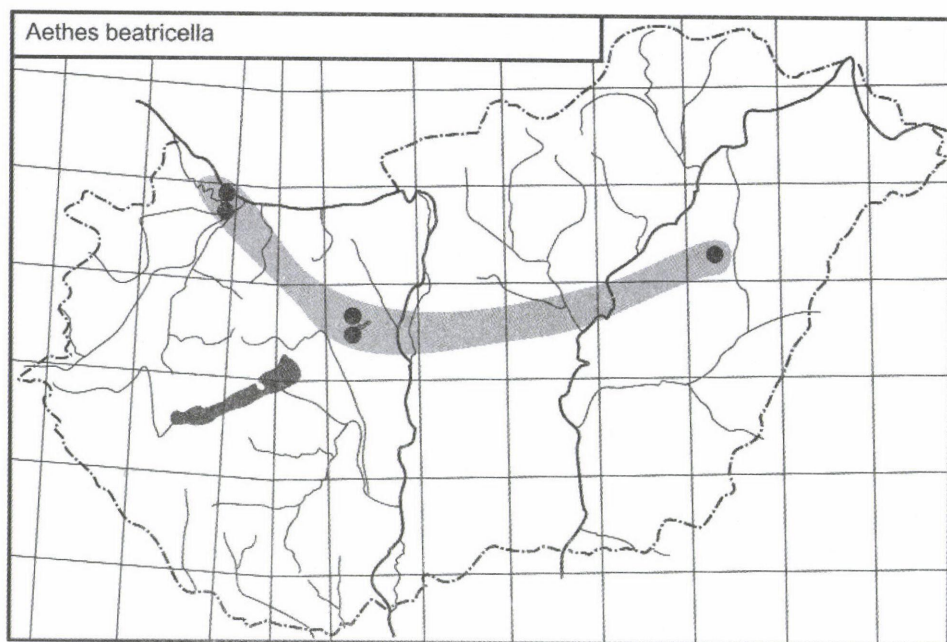


Fig. 20. Distribution of *Aethes beatricella* (Walsingham, 1898) in Hungary

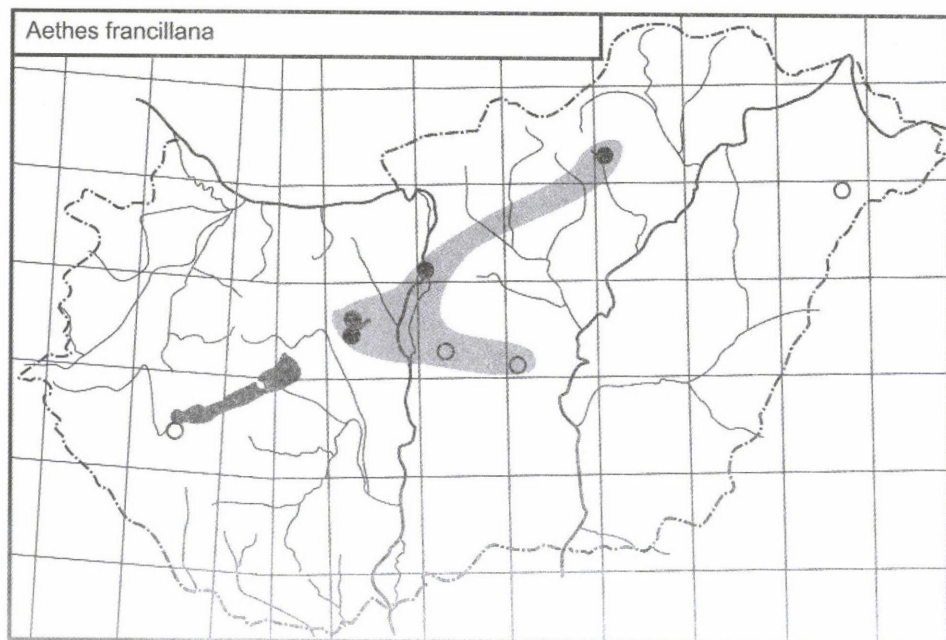


Fig. 21. Distribution of *Aethes francillana* (Fabricius, 1794) in Hungary

16. *Aethes francillana* (Fabricius, 1794) (Fig. 21, 29)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1995, RAZOWSKI 2002.

Distribution in Palaearctic: *Ae. francillana* ranges from Central Asia, Iran, and Near East, Asia Minor to Britain, NW Africa and Canary Islands. Frequent in Europe. Chorotype: W-Palaearctic.

The distribution area in Hungary: Agárd, Balaton, Budapest, Felsőtárkány, (Vár-hegy), Nagyörös, Nyírbátor (Bátorliget), Pákozd (Kanca-hegy), Pusztapeszér, Vörs.

Phenology: According to RAZOWSKI (2002) the imago flies from May to July and in southern Europe in three generations each year. The moth is univoltine in Hungary, and flies from June to mid-August.

Biology: larva polyphagous on *Angelica sylvestris*, *Daucus carota*, *Eryngium campestre*, *Pastinaca sativa* and *Peucedanum officinale*. August to April and end May, living at first in spun flowers and seeds then eating into the seeds. Pupates in April, in the stem of the food plant.

Habitat: semi-mesophilous species, often on lowlands and on ridges of hills. Habitats include closed loess and sand steppes, rich fens, eu- and mesotrophic meadows and tall herb communities, pastures and arable land with fine scale, often low-intensity agriculture (Corine code: 82.2). Altitude from 100 m to 300 m.

Comments: in Hungary, this species is local in the central counties, and apparently is not found elsewhere although the foodplants are widespread.

17. *Aethes bilbaensis* (Rössler, 1877) (Fig. 22)

References: FAZEKAS 1994, 1995, 2002, SZABÓKY 1982a, 1994, RAZOWSKI 2002.

Distribution in Palaearctic: *Ae. bilbaensis* is distributed from Central Asia to Europe and NW Africa. Absent from Scandinavia, the Baltic countries and Great Britain. In France, recorded from only a few localities. In Central Europe known mostly from Hungary, Austria, Czechia and Slovakia. Chorotype: W-Palaearctic.

The distribution area in Hungary: Agárd, Budapest (Mátyás-hegy), Dinnyés, Győrzámoly (Patkányos), Kárász, Komló (Hasmány-tető, kőbánya), Mosonmagyaróvár, Nadap (Csúcsos-hegy), Ócsa (Nagy-erdő), Pákozd (Tótugrás), Pécs (Árpád-tető), Sikkfőkút.

Phenology: univoltine; the moth flies from early July to the end of August. According to RAZOWSKI (2002) the imago is known in Europe in May-June, July, and in the south also in August and September. Vernal and autumn specimens are unknown in Hungary.

Biology: in Hungary the larva is monophagous on *Carum carvi*.

Habitat: a mesophilous species, found in rich fens, eu- and mesotrophic meadows and tall herb communities; *Arrhenathreum* hay meadows and semi-natural; semi-natural vegetation of abandoned vineyards and orchards. Altitude from 100 to 350 m.

Comments: a rare species with very isolated populations in the Hungarian Plain, and some populations on the southern hillsides of the mountains of medium altitude.

18. *Aethes tornella* (Walsingham, 1898) (Fig. 23)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1994, 1995, 2002, PETRICH 2001, RAZOWSKI 2002.

Distribution in Palaearctic: from Central Asia, Asia Minor, Balkan Peninsula and to Central Europe, Spain. In the Mediterranean countries, known mainly in Europe. Chorotype: Centralasiatic-European.

The distribution area in Hungary: Agárd, Eger, Komló (Zobákpuszt), Nadap (Csúcsos-hegy), Nagyiván, Pécs (PTE arboretum), Peszér, Sukoró (Gádé-hegy), Uppony.

Phenology: univoltine; the moth flies from June to August. According to RAZOWSKI

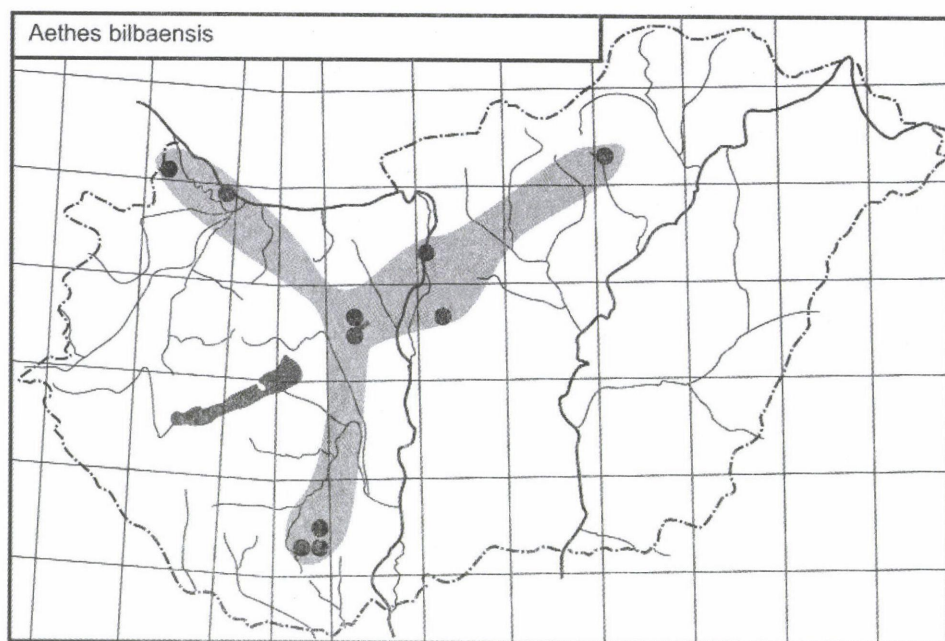


Fig. 22. Distribution of *Aethes bilbaensis* (Rössler, 1877) in Hungary

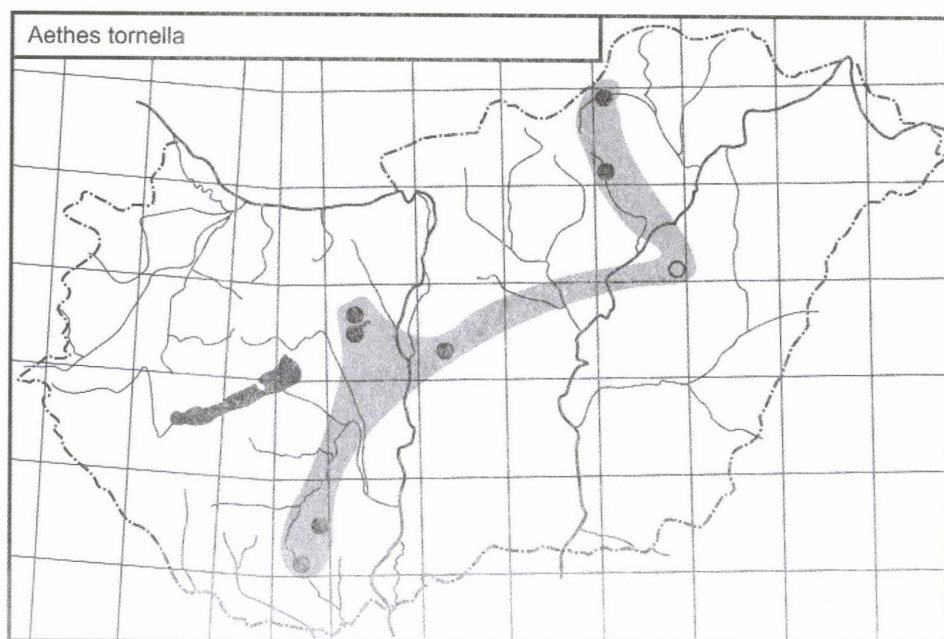


Fig. 23. Distribution of *Aethes tornella* (Walsingham, 1898) in Hungary

(2002) the adult can be collected in two generations yearly, in May-June and July, but this is not the case with regard to the Hungarian populations.

Biology: the life history of the larva is unknown.

Habitat: semi-mesophilous species, often in the lowlands and on ridges of hills. Habitats include halophytic areas, closed loess and sand steppes, dry open grasslands, colline and submontane hay meadows, acid grasslands and fine scale vineyards and orchards. Altitude from 90 m to 350 m.

Comments: sporadic and locally rare in the plains and hills, but uncharacteristic in the mountains of medium height. Uncommon almost everywhere. Not known from west Hungary.

19. *Aethes cnicana* (Westwood, 1854) (Fig. 24, 25, 30)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1991, 1994, 1995.

Distribution in Palaearctic: *Ae. cnicana* occurs almost throughout Europe except for the Mediterranean and Iberian Peninsula. Unknown in big areas on the Balkan Peninsula. Chorotype: European.

The distribution area in Hungary: Dinnyés ("Fertő"), Kárász, Komló (Hasmány-tető), Miskolc-Hámor, Pákozd (Kanca-hegy), Pécs, Szakonyfalu (Vadász-völgy), Velence.

Phenology: bivoltine; the moth flies between mid-May and early August. The adult may be netted in the evening flying sluggishly about its habitat and at night will come light.

Biology: oligophagous, the larva preferring species of *Carduus* and *Cirsium*. It overwinters in the stem of the food plant and pupates in the spring.

Habitat: *Ae. cnicana* is a mesophilous species, found in rich fens, au- and mesotrophic meadows and tall herb communities; semi-natural, often secondary woodland-grassland mosaics. Altitude from 100 to 350 m.

Comments: the species is unknown in big areas. Most probably *Ae. cnicana* and *Ae. rubigana* are sibling species, and their identification is sometimes problematic. Information given in the literature is not reliable. The data given here have been checked by examination of the genitalia (FAZEKAS 1991).

20. *Aethes rubigana* (Treitschke, 1830) (Fig. 25, 26, 30)

References: ÁCS & SZABÓKY 1993, FAZEKAS 1991, 1992, 1994, 1995, 2002, 2007, GOZMÁNY & SZABÓKY 1986, SZABÓKY 1994, 1999.

Distribution in Palaearctic: *Ae. rubigana* is widely distributed from the Japanese isles and Central Asia to Europe and NW Africa. According to RAZOWSKI (2002), *Ae. cincana* the a Palaerctic species, the repartition of which is not satisfactorily known. Most probably *Ae. rubigana*, *Ae. cnicana* and *Ae. pemeantensis* are sibling species. The three-taxon situation among siblings is very little known and thus impossible to interpret. The relationship of *Ae. cnicana* and *Ae. pemeantensis* is uncertain. The chorotype of the polytypical species-group: Asiatic-Europeo-Mediterranean.

The distribution area in Hungary: Agárd, Apátistvánfalva, Bélapátfalva, Budapest (Mátyás-hegy), Csopak, Darány (Kuti-órház), Fenyőfő, Győrzámoly (Patkányos), Jószaftó (Vas Imre barlang), Kaposfő, Kaposvár, Kárász, Kemence-patak-völgye, Királysztállítás, Kisvaszar, Komló-Zobápuszta, Lipót, Magyarszombatfa, Miskolc-Diósgyőr, Nemesgulács, Noszvaj, Ócsa (Nagy-erdő), Pákozd (Hurka-völgy), Pátka, (Kőrákás-szurdok), Pécs, Szinpetri (Kopoly-völgy), Szivásvár, Szulok, Várgesztes, Vérteskozma.

Phenology: Bivoltine species; the moth flies from early May to June and from July to August; in certain years to middle of September.

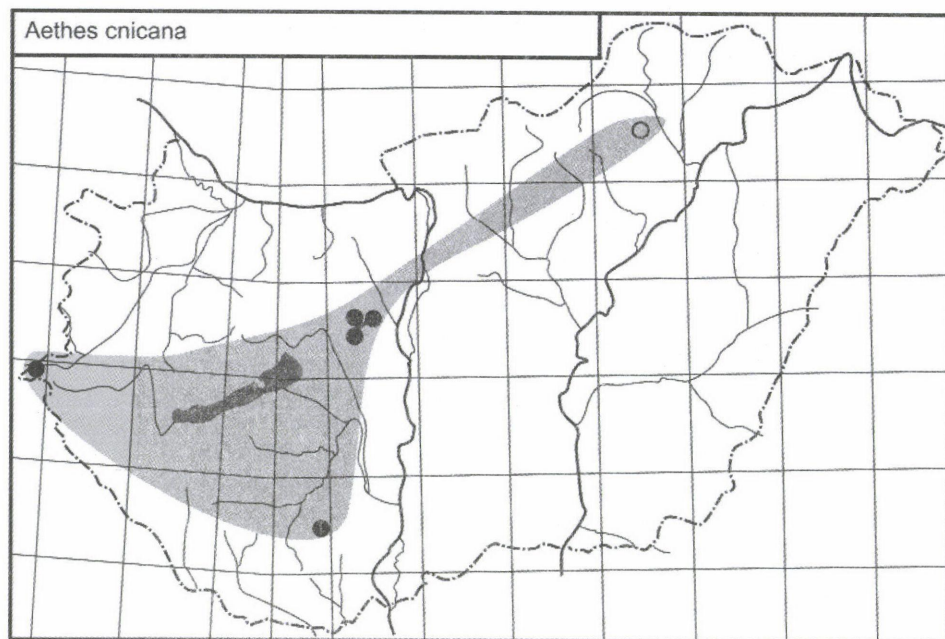


Fig. 24. Distribution of *Aethes cnicana* (Westwood, 1854) in Hungary

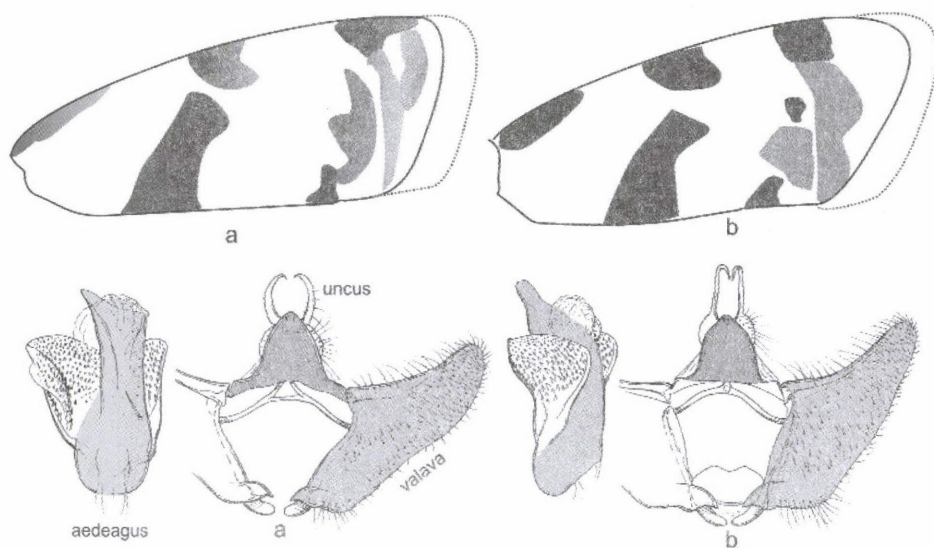


Fig. 25. Forewing patterns and male genitalia of *Aethes* spp.: a) *Ae. cnicana* (Westwood, 1854), b) *Aethes rubigana* (Treitschke, 1830). Male genitalia according to RAZOWSKI (2001)

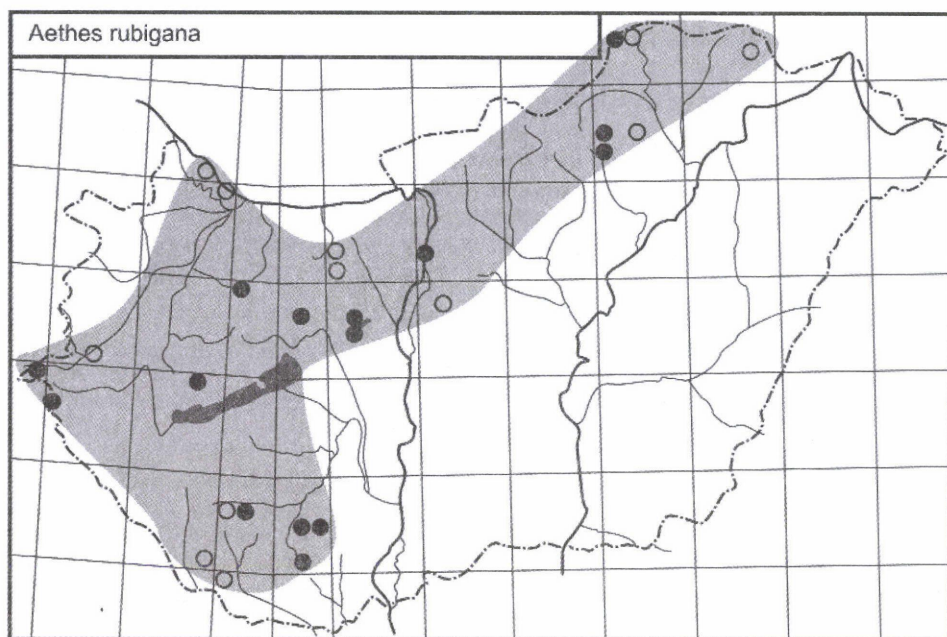


Fig. 26. Distribution of *Aethes rubigana* (Treitschke, 1830) in Hungary

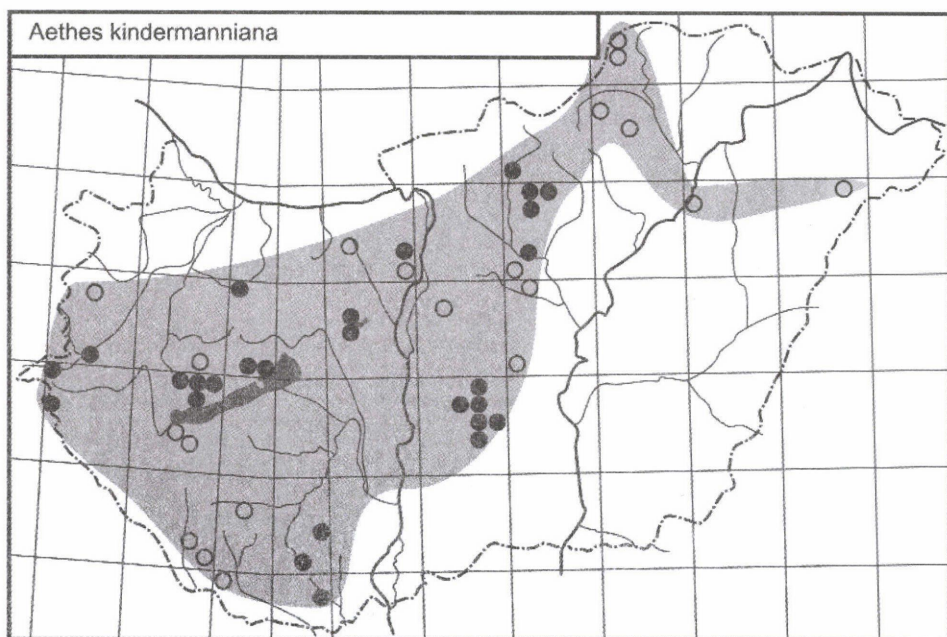


Fig. 27. Distribution of *Aethes kindermanniana* (Treitschke, 1830) in Hungary

Biology: oligophagous; the larva feeds in the stems and roots and in flowers and leaves of *Arctium lappa*, *A. minus* and *Cirsium oleraceum* and *C. vulgare*. The moths are readily attracted to light.

Habitat: in Hungary, a mesophyllous hill species which favours the rich fens, eu- and mesotrophic meadows and tall herb communities, secondary and degraded marshes and grasslands. According to GOZMÁNY & SZABÓKY (1986), in the Great Hungarian Plain (Ócsa: Nagy-erdő) it is very frequent on the edges of the marshy alder woods and the peaty meadows. The zonation of the vegetation, from the arundinic or phragmitic "alto-herbosa" through the lower sedges to the lowest belt of grass, is composed of a rather characteristic flora: besides the common *Arundo*, *Phragmites* and *Carex* species, other mainly halophilous species abound. Altitude from 90 m to 400 m.

Comments: *Ae. rubigana* and *Ae. cnicana* occur sympatrically in Hungary: in West Hungarian Borderland and Mecsek Mts. (FAZEKAS 1992). Further study is needed to improve knowledge about taxonomy and distribution area. For morphology and for biology of Hungarian material, see FAZEKAS (1991, 1992).

21. *Aethes kindermanniana* (Treitschke, 1830) (Fig. 27)

References: BUSCHMANN 2004, FAZEKAS 1992, 1994, 1995, 2002, 2007, SZABÓKY 1982a, 1994.

Distribution in Palaearctic: from Ural region to southern Scandinavia, France and Spain. Unknown in Great Britain and part of the Benelux countries. Chorotype: European.

The distribution area in Hungary: Ágasegyháza, Balatonfüred, Bócsa, Budakeszi, Budaörs (Csiki-hegyek), Budapest, Bugac, Csákberény, Csopak, Darány (Kuti-örház), Dinnyés, Égerszög, Famos, Fenyőfő, Fülöpháza, Gyöngyös, Gyöngyös (Sár-hegy), Gyöngyöshalász, Gyöngyöstarján, Izsák (Kolon-tó), Jászberény, Jósvafő, Kaposvár, Kapuvár, Királyszállás, Komló-Zobákpuszt, Lovas, Magyarszombatfa, Marcali, Mátrafüred, Miskolc, Nagyharsány (Szársomlyó), Nagykáta, Nagykőrösi-erdő, Nagyvisnyó, Nemesgulács, Nyirád, Nyírbátor (Bátorliget), Ócsa (Nagy-erdő), Olaszfalu, Orgovány (Kargalla), Pásztó, Pécs (PTE arboretum), Rinyatamási, Salföld, Sukoró (Meleg-hegy), Szalafő-Alsószer, Szár, Szigliget, Szulok, Újszentmargita, Uzsabánya, Vörs.

Phenology: bivoltine; the moth flies from early May to late June and of middle from July to early September.

Biology: Larva oligophagous, living in tips of branches and spun flowers of *Artemisia campestris*, *Chrysanthemum vulgare* and *C. leucanthemum*.

Habitat: ubiquitous; in rich fens, eu- and mesotrophic meadows and tall herb communities, colline and montane hay meadows, acid grasslands and heaths; dry and semi-dry closed grasslands; secondary and degraded marshes and grasslands. Rare and local on sloping steppes and on rocky steppes (Mecsek Mts. and Villányi Hills). Altitude from 90 m to 400 m. The type locality of the nominotypical subspecies is in Hungary.

Comments: according to GOZMÁNY & SZABÓKY (1986), the moth is particularly abundant in the dune region of the Great Hungarian Plain (Duna-Tisza köze region)

22. *Aethes* sp. (Fig. 28)

References: FAZEKAS 2007.

A single specimen of a totally unknown species of Tortricidae turned up from the mountain range: Mecsek Mts, Kárász, 24.08.1984. leg et coll. Fazekas, No. 2301. The genitalia proved to be unlike those of any other European species, or indeed from anywhere in Eurasia. It is probably an undescribed species. The wing venation and the genitalia indicate that it is a member of the genus *Aethes*. In size and wing pattern, the new

species is most like *Ae. kindermanniana* (Treitschke, 1830) and *Ae. conversana* (Walsingham, 1908), but the genitalia differ are very different. The primary colour of the forewing is white, the cross lines olive-drab, with yellowish scales. The hindwing is pale olive-drab. Unfortunately, the head was damaged, so the antenna and labial palpus cannot be characterised. The species will be described fully in a later study, but it is figured here.

Discussion

To date 22 Hungarian *Aethes* species are known. This is about 40% of the Europe fauna. The Hungarian species occur mainly on the xeric- and the mesoxeric grasslands (Tabl. 1). Most of them are oligo- or monophagous, 20% polyphagous (Tabl. 2). The majority of species are found in the lowlands areas, but several occur in the mountains of medium altitude. The western area of the country is largely unexplored. (Tabl. 3). The type locality of the nominotypical subspecies of *Ae. sanguinana* and *Ae. kindermanniana* is in Hungary. *Ae. moribundana* is known from just a single locality in Hungary, and *Ae. dilucidana* from only two places. They are therefore considered to be endangered, although the size of the populations is not known. Six species are widespread throughout the country: *Ae. hartmanniana*, *Ae. margarotana*, *Ae. williana*, *Ae. smeathmanniana*, *Ae. tesseraana* and *Ae. rubigana* (Tabl. 3). *Aethes vicinana* Mann, 1859 has been stated to occur in Hungary (GOZMÁNY 1968), but no specimen exists and the presence of this species here remains doubtful. According to RAZOWSKI (1970, 2001, 2002), *Ae. vicinana* is known only from Algeria, Morocco and Sicily.

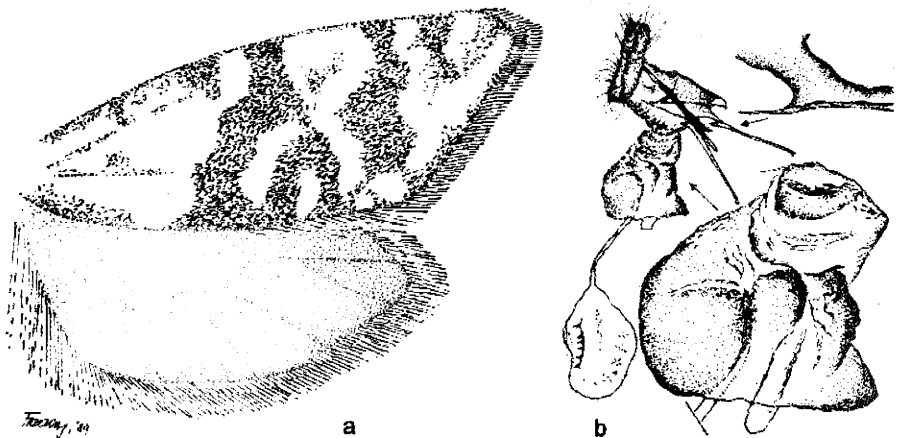


Fig. 28. *Aethes* sp.: a) forewing patterns, b) female genitalia (Hungary, Mecsek Mts, Kárász, 24.08.1984. leg. Fazekas, gen. prep. no. 2301)

Larval foodplants information

The botanical nomenclature of the Hungarian wild flowers in this list is based on "A magyarországi edényes flóra határozója" by SIMON (1992).

- Achillea millefolium* - *Ae. margaritana*,
Ae. smaeathmanniana
Angelica sylvestris - *Ae. francillana*
Anthemis arvensis - *Ae. smeathmanniana*
Anthemis cotula - *Ae. smaeathmanniana*
Arctium lappa - *Ae. rubigana*
Arctium minus - *Ae. rubigana*
Artemisia campestris - *Ae. kindermanniana*
Carduus spp. - *Ae. cnicana*
Carum carvi - *Ae. bilbaensis*
Centaurea nigra - *Ae. smaeathmanniana*
Chamomilla spp. - *Ae. margaritana*
Chrysanthemum leucanthemum - *Ae. kindermanniana*
Chrysanthemum spp. - *Ae. margaritana*
Chrysanthemum vulgare - *Ae. kindermanniana*
Cirsium spp. - *Ae. cnicana*, *Ae. rubigana*
Conium maculatum - *Ae. beatricella*
Crepis spp. - *Ae. tesserana*
Daucus carota - *Ae. francillana*
Eryngium campestre - *Ae. margarotana*,
Ae. nefandana, *Ae. sanguinana*, *Ae. flagellana*, *Ae. francillana*
Gnaphalium sylvaticum - *Ae. williana*
Helichrysium arenarium - *Ae. williana*
Heracleum sphondylium - *Ae. dilucidana*
Hieracium spp. - *Ae. tesserana*
Inula spp. - *Ae. tesserana*
Juniperus communis - *Ae. rutilana*
Knautia arvensis - *Ae. hartmanniana*
Lactuca sativa - *Ae. smaeathmanniana*
Matricaria spp. - *Ae. margaritana*
Pastinaca sativa - *Ae. dilucidana*, *Ae. beatricella*, *Ae. francillana*
Peucedanum officinale - *Ae. francillana*
Peucedanum sativum - *Ae. dilucidana*
Picris spp. - *Ae. tesserana*
Scabiosa columbaria - *Ae. hartmanniana*
Scabiosa ochroleuca - *Ae. hartmanniana*
Sideritis montana - ? *Ae. moribunda*
Succisa pratensis - *Ae. hartmanniana*
Tanacetum spp. - *Ae. margaritana*
Veronica longifolia - *Ae. triangulana*

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Table 1. Characteristic *Aethes* fauna assemblages in Hungary: xe-gr= xeric grasslands, me-gr= mesoxeric grasslands, fm-me= fresh submontane meadows, th-fo= tall-herb formations, we-me= wet meadows, t= typical habitat, r= rare and local, s= sporadic, u= uncertain

species	xe-gr	me-gr	fm-me	th-fo	we-me
<i>Ae. hartmanniana</i>	s	t	t	r	r
<i>Ae. hartmanniana f. piercei</i>			u	u	u
<i>Ae. margarotana</i>	t	s			
<i>Ae. williana</i>	t	s			
<i>Ae. moribundana</i>				u	
<i>Ae. nefandana</i>	t	r			
<i>Ae. margaritana</i>	r	t	t	t	t
<i>Ae. triangulana</i>	r	t	t	t	s
<i>Ae. rutilana</i>	t	s			
<i>Ae. smeathmanniana</i>	t	t	s	r	
<i>Ae. tesserana</i>	s	t	t		
<i>Ae. sanguinana</i>	t	s			
<i>Ae. dilucidana</i>	r				
<i>Ae. flagellana</i>	t	t	r		
<i>Ae. beatricella</i>	r	u			
<i>Ae. francillana</i>	r				
<i>Ae. bilbaensis</i>	r	r			
<i>Ae. tornella</i>	r	r			
<i>Ae. cnicana</i>		r			
<i>Ae. rubigana</i>	s	t			
<i>Ae. kindermanniana</i>	r	t	s	s	
<i>Ae. sp.</i>		u			

Table 2. Food plant spectrum of Hungarian *Aethes* species: monoph= monophagous, oligoph= oligophagous, polyph= polyphagous

species	monoph	oligoph	polyph
<i>Ae. hartmanniana</i>		o	
<i>Ae. hartmanniana f. piercei</i>		o	
<i>Ae. margarotana</i>	m		
<i>Ae. williana</i>			p
<i>Ae. moribundana</i>	m		
<i>Ae. nefandana</i>	m		
<i>Ae. margaritana</i>			p
<i>Ae. triangulana</i>		o	
<i>Ae. rutilana</i>	m		
<i>Ae. smeathmanniana</i>			p
<i>Ae. tesserana</i>			p
<i>Ae. sanguinana</i>	m		
<i>Ae. dilucidana</i>		o	
<i>Ae. flagellana</i>	m		
<i>Ae. beatricella</i>		o	
<i>Ae. francillana</i>			p
<i>Ae. bilbaensis</i>	m		
<i>Ae. tornella</i>	?	?	?
<i>Ae. cnicana</i>		o	
<i>Ae. rubigana</i>		o	
<i>Ae. kindermanniana</i>		o	
<i>Ae. sp.</i>	?	?	?

Table 3. Distribution of *Aethes* species in Hungarian geographical regions: HP= Great Hungarian Plain; LP= Little Plain; WB= West Hungarian Borderland; TH= Transdanubian Hills; TM= Transdanubian Mountains; NM= North Hungarian Mountains; p= present; ?= uncertain

species	HP	LP	WB	TH	TM	NM
<i>Ae. hartmanniana</i>	p	p	p	p	p	p
<i>Ae. hartmanniana f. piercei</i>	p		p			
<i>Ae. margarotana</i>	p	p	p	p	p	p
<i>Ae. williana</i>	p	p	p	p	p	p
<i>Ae. moribundana</i>	?				p	
<i>Ae. nefandana</i>	p					p
<i>Ae. margaritana</i>	p			p	p	p
<i>Ae. triangulana</i>	p		p	p	p	p
<i>Ae. rutilana</i>	p			p	p	p
<i>Ae. smeathmanniana</i>	p	p	p	p	p	p
<i>Ae. tessera</i>	p	p	p	p	p	p
<i>Ae. sanguinana</i>	p	p		p	p	
<i>Ae. dilucidana</i>	p					
<i>Ae. flagellana</i>	p	p		p	p	p
<i>Ae. beatricella</i>	p	p			p	
<i>Ae. francillana</i>	p				p	p
<i>Ae. bilbaensis</i>	p	p		p	p	p
<i>Ae. tornella</i>	p			p	p	p
<i>Ae. cnicana</i>	p		p	p	p	p
<i>Ae. rubigana</i>	p	p	p	p	p	p
<i>Ae. kindermanniana</i>	p		p	p	p	p
<i>Ae. sp.</i>				p		
Number of species	20	10	10	16	18	16

Fig. 29. Adults of *Aethes* spp.: a) *Aethes hartmanniana* (Clerck, 1759), b) *Aethes hartmanniana* f. *piercei* (Obraztsov, 1952), c) *Aethes beatricella* (Walsingham, 1898), d) *Aethes francillana* (Fabricius, 1794), e) *Aethes dilucidana* (Stephens, 1852), f) *Aethes nefandana* (Kennel, 1899)

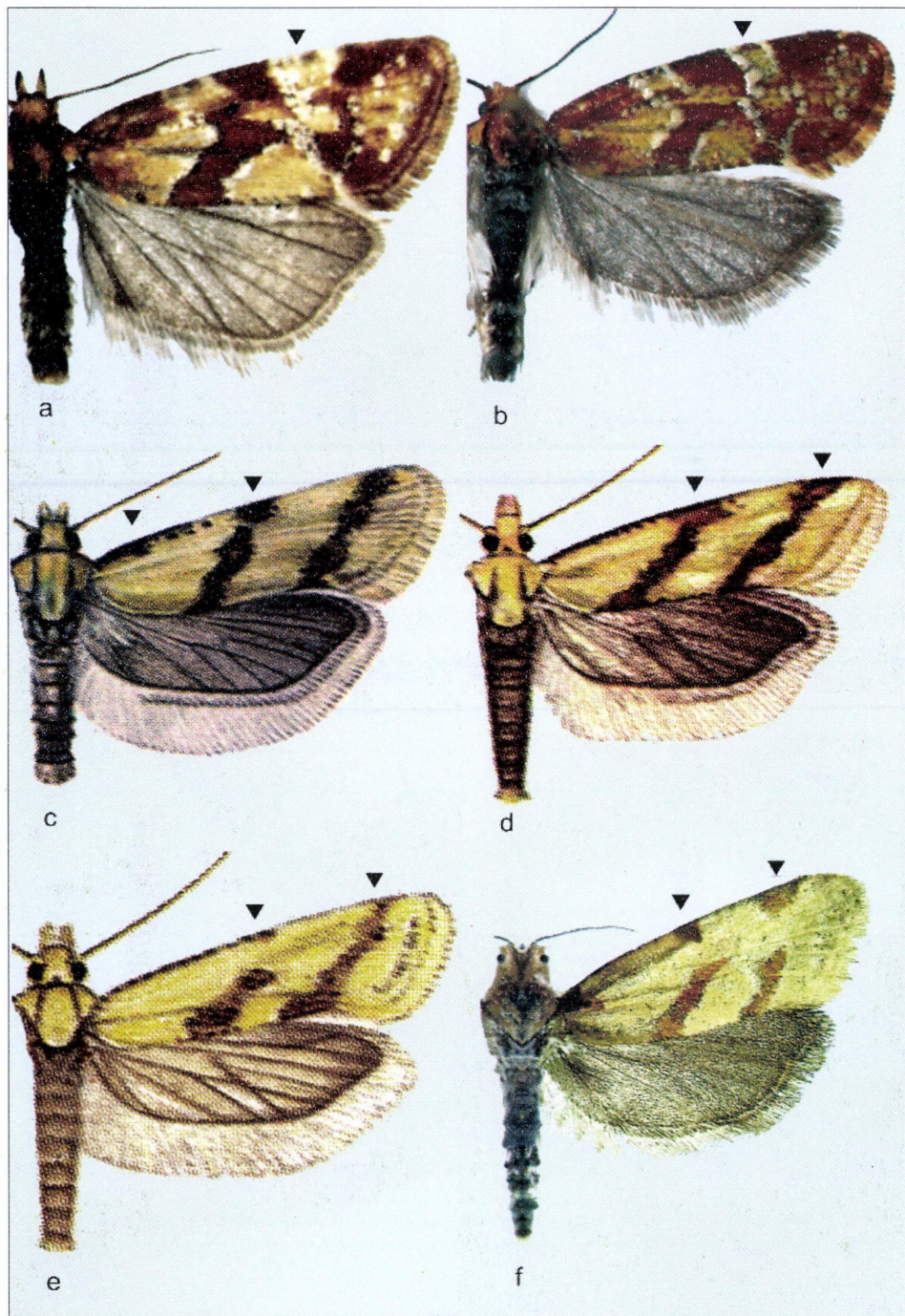
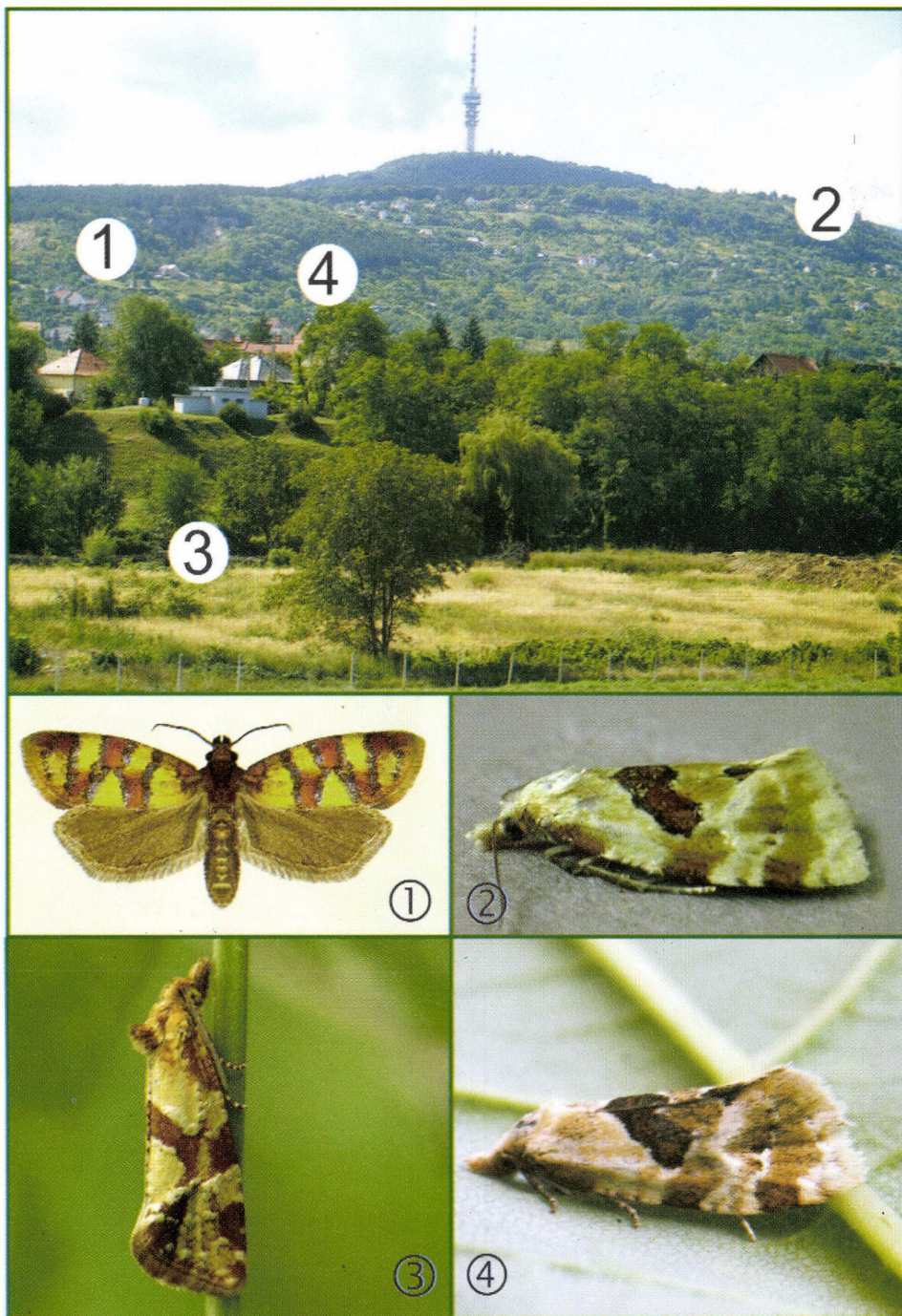


Fig. 30. Habitat of *Aethes* spp. in Mecsek Mts.: 1) *Aethes t. tessera* ([Denis & Schiffermüller], 1775), 2) *Aethes rubigana* (Treitschke, 1830), 3) *Aethes hartmanniana* (Clerck, 1759), 4) *Aethes cnicana* (Westwood, 1854)



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