

The Macrolepidoptera Characteristic to our Sandy Districts

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We dispose of numerous reliable data bearing on investigations into the distribution of Hungarian butterflies and macro-moths in the various biotops. These data inform us not only on the oecological character of the several species but also on zoogeographical problems. Making use of the data at our disposal, I wish to recount on the macrolepidoptera characteristic of the sandy areas of Hungary. With regard however to the rather big number of faunal elements common also to pebbly and sodaic areas, I will include them too. Agreements are of such an extent that the list of species will increase in this way by one item only.

Since in the several biotops many species live which are not characteristic of them at all, in the selection of the species belonging to the above habitats certain criteria had to be kept in view. It had to be examined, first of all, in how far the species occurring in sandy habitats are represented in other biotops. I have utterly disregarded species of which it could be established that they can regularly be found in biotops of other kinds of soil substrates. If, on the other hand, the majority of the data regarding the collecting localities referred to biotops of sandy areas, I regarded the species in question as characteristic of psammous habitats. When judging borderline cases, I referred also to data of a quantitative nature. The decisive factor in such cases was whether the given species has populations of higher individual numbers in sandy biotops or in those of dissimilar ones. If there live populations of ascertainable higher individual numbers in psammous areas, the species may justly be held a characteristic species of sandy districts. I had not applied this selective point of view merely in the case of species having a very extensive range, as in their preponderance on sand some other factors undiscovered and unelucidated as yet, may have a certain role. I have also left unnoticed species which invaded and settled in sandy territories indubitably in the course, or as a result, of afforestations in recent times.

I have also examined, as far as possibilities permitted it, whether some species, mainly those having a large range, were represented by peculiar forms on the sand as such varieties may also be characteristic to such areas. I had found six forms in all which occur in sandy districts only or which may be regarded as characteristic varieties of such habitats, with reference to the point of view outlined in the paragraph above. In some of the cases it may be disputed whether we have to deal with an oecological race, or oecotype; on the other hand, we have instances of being faced by indubitably geographical varieties. To the former group belongs a form of *Melitaea parthenie* Bkh., collected up to now on the sand of the Great Plains only. I relegate to the other group another (and new) form, that of *Polia aliena* Hbn., to be described hereafter, found predominantly in our sandy areas even today; but also at a higher point of the Central Mountains, and the specimens collected there also bear the characteristic features of those inhabiting sandy districts.

Biotops with a sandy soil can be met with all over the country, locally in our hills and mountains too. They are more frequent at the shores of the lakes, especially around the Balaton; then alongside the rivers, as also in the islets of the Danube. Their true country begins, however, at the southern slopes of the Mts. Cserhát and the river Danube, extending southwards to our southern and eastern borders; indeed, reaching far over them. The continuity of the sand of our Plains had formerly been disrupted by intermittent and extensive swamps, converted since into agricultural areas and sodaic wastes. In some places, a few psammophilous species invade even these restricted swamp remnants; indeed it seems to be an indubitable fact that they even breed on the drier sandy patches of the marshes. We do not dispose, unfortunately, of many data of collecting localities from the eastern sandy districts of the country, especially from points more southern beyond the Tisza. This is due not only to fewer investi-

gations having been conducted here but also to the southern parts being now almost completely turned over to serve agricultural production. Investigations in the northwestern parts of the Plains (the Nyírség) seem to show that the species characteristic to our sandy districts gradually decrease in numbers towards the North and the East.

The more significant plant associations characteristic to our sandy areas will be given here based on the data, surrendered by cordial friendship, of P. J a k u c s, a profound expert of Hungarian phytocoenoses. The characteristic plant associations of our open sandy districts consist of various *Festuca* associations. The *Festuca* community of loose sand is the *Festucetum vaginatae*. This association characterizes the sand dunes of the Plains and the sandy meadows on a loose substrate. On a bound sandy soil the association *Festucetum sulcatae* takes, in the course of succession, the place of the former one. *Festucetum sulcatae* is habitually also the plant association of the clearings of forests on sand. The food plants of the caterpillars living in the grass stratum of all species of the Plains and their neighbourhood listed below are all present in these associations.

The oak forests on the sand belong to the association *Quercetum roboris*. Two of its developmental forms are frequent: *Querceto convallarietum* in humid localities, and *Querceto festucetum sulcatae* in drier places. Our collectings had been mostly conducted in the vicinity of the latter type of woods. Among deciduous trees, mention must be made yet of the Poplar group. The characteristic poplar species of the Plains is the white poplar (*Populus alba*). This tree occurs everywhere, forming groups and groves locally; so on the slopes and summits of the sand hills. The white poplar is most frequent in the Plains.

With regard to the sandy, and partially pebbly, biotops of the mountainous and hilly regions of the country, I possess data at the present time solely about the Reservation of Uzsapuszta, in the Transdanubium. On a severely degraded and pebbly substrate extensive heather abound in this area, with scattered birch groves. This territory is the more interesting, as it is one of the easternmost occurrence of a plant association, represented in a few places only in Hungary, the *Atlantic Callunetum*. Its fauna shows rather numerous relations to those of sandy districts. — Of our soda territories, I wish to specifically mention the clearings of the Ohat forest. On the clearings of this sodaic oak forest (*Querceto Festucetum sulcatae pseudovinetosum*), the food plant of *Hydroecia leucographa* Bkh., *Peucedanum officinale* forms a separate association (*Peucedano-asteretum*).

With reference to the botanical considerations, I have yet to touch on still another important question, that of the steppe. Though the great Hungarian Plains also belong to the southern Russian steppe-zone, the vegetation of the grassy steppe patches on our sandy districts and on the southern slopes of the Central Mountains differ in a certain sense from those of the steppe of Southern Russia. The Hungarian Plains are more western members of the woody steppe-zone, where some of the more eastern, the so-called good Pontic plant species do not appear any more. This is also natural, as the continental quality of the climate of the Plains is not so extreme as that of the southern Russian plains, from the eastern side of the Carpathians to the Caspian Lake. In some places of the territory between the Danube and the Tisza, the annual distribution of the rainfall is, according to the findings of Z ó l y o m i, also of a Submediterranean character. On the sand of the Plains we find rather thermophilous Ponto-Mediterranean, Submediterranean, and Mediterranean plant species instead of those having an extreme continental character. The lepidopterous fauna is in agreeable harmony with the character of the vegetation.

This less extreme continentality allows surely for the fact that some species of a southern range inhabit a part of our Plains, but are absent from the real steppe. Though the winter is frequently cold in the Plains, extremely severe winters are exceptional. On the other hand, the dry sand with its directly overlying aerial strata will warm up to an exceeding degree during unhindered insolation in the summer: there are warm days beginning in April, and hot days from May on. In hot summer periods the temperature of the atmosphere will repeatedly approach 40° Celsius, in the midday hours. The number of sunshine hours is high, whilst the number of precipitous days is small. A large portion of the rain falls in a comparatively short time, in the form of sudden and violent squalls. There are climatic qualities similar to the above ones in more than one point on the lower slopes of the bordering hills and mountains north and west of the Plains, especially on their southern inclinations; with the sole difference of the daily oscillations in temperature being smaller and their winter less cold. The amount of moisture rises in a higher degree only further away, towards the north and west; whilst continentality increases towards the NE.

After introducing above considerations I will enumerate the several species whose close connections to the biotops of the sandy districts or our soda territories could be established. In the list, I have followed the systematic order and nomenclature of my paper on the Macrolepidoptera of Hungary, and their distribution.

1. **Melanargia suwarovius** Hbst. Its sole reliable locality of capture had been in Peszér, in the center of the territory between the Danube and the Tisza. We cannot find it any more, ever since 1913; it fell victim most probably to afforestation. On the evidence of photographs published in the 1912 volume of »The Entomologist«, it lived in a *Festucetum sulcatae* association of some meadows around birch groves. It can be established from contemporary accounts of collectings that it had been on the wings in annually big numbers.

2. **Hipparchia statilinus** Hufn. We have 14 locality data from the area of Hungary. Most of them (11) refer to the sandy districts of the territory between the Danube and the Tisza. Among its biotops in the Plains there are sand hills (it is the most frequent here); meadows on the borders of woods on sand; and, in one case, an abandoned gravel-pit. The other three collecting localities are on the Transdanubium, two of them near rivers, and one at Fenyőfő, in the Mts. Bakony — wherever there are sandy areas of larger extensions. At the end of August, it is a dominant species among the butterflies of our sand-dunes.

3. **Maniola lupinus** Costa. We keep records of 8 collecting localities of this species, of which there is 1 at Fenyőfő, in the Transdanubium; 2 on the sandy islets of the Danube, (Isle Szentendre, and Csepel); 2 on the sandy spurs of the Cserhát into the Plains (Fót, Mogyoród); and the other 3 on the Plains itself (Pótharaszt, Peszér, Ágasegyháza). It had been collected among the sand hills and sandy forest clearings. It is usually mistaken for *M. lycaon* Rott., its near relative, though this latter is known from only one place shared with the former (the vicinity of the forest of Mogyoród). Neither do the periods of flight concur: *lupinus* is already on the wing at the beginning of June, whilst *lycaon* flies only from July on. The *lupinus* specimens collected in Hungary are somewhat smaller and darker than those originating from Albania and Macedonia.

4. **Argynnis niobe** ssp. **laranda** Frhst. The range of *niobe* is broken up into 3 areas in Hungary which, according to the present data, overlap nowhere. The first of them is in the West: east of the Balaton; the other in the NE of the country (Mts. Bükk and Mátra, ?Debrecen). The third is situated between the former two, on the sand of the area between the Danube and the Tisza, and the southern slopes of the Mts. Buda.

The specimens originating from the western group resemble the most those collected around Vienna and Graz; the ones belonging to the populations in the NE agree with those of Slovakia. It is characteristic to both forms that the basal field is deep black, the underside of the hind wings presents many brown and rufous brown color elements, and that the silver-spotted *niobe* form also appears beside the form *eris*. These animals indubitably belong to the northern race group of *niobe*.

The specimens of the central group substantially differ. These are bigger, with less black on the base of the wings, the black spots are smaller, less diffuse, the basic color is more rufous than brown, the underside of the hind wings is yellowish, and silver spots may be seen at the most around the ocellae. They agree essentially with ssp. *laranda* described by Fruhstorfer, though they are somewhat smaller than the specimens originating from Albania and Croatia, and the underside of their hind wings is greener by a nuance. There is no cause to give them a separate name. This form is rare in the Central Mountains, unobserved sometimes for years, but on sandy areas where the oak forests still exist, it appears annually, and occasionally in rather big numbers. Its collecting places on sandy districts are around Csepel, Gödöllő, Isa-

szeg, Peszér and Nagykáta. More than 80 per cent of all specimens of which I know derive from these localities.

5. **Melitaea parthenie** ssp. **vividicolore** Vrty. *Parthenie* is, in Hungary, a species preponderantly of hilly and mountainous areas; we know of but 2 localities where it had been caught in the Plains. These are Kisnyir, west of Kecskemét, and Peszér; both of them situated on the sand between the Danube and the Tisza. It is represented here by a subspecies, described by Verity as *vividicolore*, in 1931. Its author considers as its most characteristic feature its vivid yellowish-red color, a hue he never met with even as an individual aberration in specimens originating from other localities. There are some specimens in the Collection of the Museum, agreeing with the description of Verity. Subspecies *vividicolore* is indubitably a characteristic form of the Plains.

6. **Lycaena alciphron** Rott. We know of two collecting places of this species in the western districts of the Transdanubium (Lake Baláta, Uza); and two in the higher, more eastern regions of the Central Mountains (Mts. Mátra, Szin). It is rare in the Mts. Buda. It occurs in the highest numbers in the sandy territories between the Danube and the Tisza; I know of but a few specimens east of the Tisza. (The environments of Debrecen, and Bátorliget). In some years it is common on the loose sand between the Danube and the Tisza.

7. **Carcharodus lavaterae** Esp. The most of its collecting localities lie on the sand of the area between the Danube and the Tisza; only one locality is known in the eastern parts of the Plains (around Debrecen). Some few specimens had also been caught in the Central Mountains, on Mt. Naszál, near Vác. In some years it had been captured in rather high numbers on the sand of the Plains, especially among the sand dunes of Peszér; it also flew on the clearings of an oak forest, now cut down, on the Isle Csepel.

8. **Orgya ericae** var. **intermedia** Friv. The Hungarian specimens all originate from the sand between the Danube and the Tisza; it is to be found also in the Bánság, south of our borders. Its authentic collecting localities are Sziget-szentmiklós, Szentmártonkáta, Izsák, and Peszér. The annotated list of the Fauna Regni Hungariae, and Abafi-Aigner mention also the occurrence in Hungary of its nominate form, but our two specimens labelled with Hungarian localities derive from unreliable sources. Every single specimen of our material collected in series belongs to var. *intermedia*.

9. **Simyra nervosa** F. The collecting localities of this species are situated mainly on sandy districts, and that not only on the Plains but also around the Balaton and alongside the rivers. It also occurs, however, in not sandy localities, so in Buda and Pécs, and even in two places in the northern parts of the Central Mountains. Its populations, the most rich in individual numbers, live on loose sand in the Plains. Its caterpillar can be found, in the Mts. Buda, besides *Euphorbia* species also on *Odontites lutea* and *Linaria genisifolia*.

10. **Euxoa seliginis** Dup. We found it on sandy substrates from the Mts. Bakony to Bátorliget, and from Fót to the southern borders. I know of one specimen only not caught in a sandy locality, and this I caught myself in my flat in Buda. Supposedly, we have to deal with a specimen having wandered away from the opposite side of the capital, Pest. Its collecting localities in the Transdanubium are Fenyőfő, Balatonzamárdi, and the shores of Lake Velence;

beyond the Tisza, it had been caught in Bátorliget only. It had been found in every place on the sand between the Danube and the Tisza, wherever there had been any collecting during its period of flight. It had been captured on the meadows at the shores of the Balaton, on the forest borders and clearings of the southern appendages of the Mts. Cserhát, and mainly among the sand dunes of the Plains.

11. **Euxoa crypta** Dadd. In a recent paper of mine, I have given a detailed account of my views why I regard *crypta* a distinct species. I had then occasion to point out that it had been collected exclusively on the sandy areas of the Plains, where it occurs jointly with *tritici* and so it cannot be its oecological race. This is supported by the difference in the flying periods too: *tritici* begins to fly in the middle of June, whilst *crypta* at the end of July only. *Crypta* is never frequent. It had been collected between the Danube and the Tisza in Csepel, Szigetszentmiklós, Fót, Isaszeg, Gödöllő, Maglód, Monor and Szeged-Királyhalom. I caught it on the inflorescences of sunflowers, planted on sandy soil in Bátorliget; around an oak forest on sand at Fót, and among sand dunes in Szigetszentmiklós.

12. **Agrotis vestigialis** Rott. *Vestigialis* is also a markedly characteristic species of our sandy districts. Its collecting places in the Transdanubium are Fenyőfő, the vicinity of Sümeg, the sandy areas around Kiskorpád, the shore of the Balaton near Fonyód, and the vicinity of Esztergom, where there are also sandy places. It had been observed also in Buda, but it too must have arrived here during its wanderings, just like *seliginis*. The most of its collecting localities lie between the Danube and the Tisza, from the southern spurs of the Cserhát to the southern borders of the country. We have data of but 2 collecting places from the eastern part of the Plains: Kisvárda, and Bátorliget. Though it can be found everywhere on sandy soils, it is most frequent among the sand hills, where it may be a dominant species. 23 per cent of all macrolepidoptera collected by lamping and baiting among the sand hills of Ágasegyháza, 25—26 August, 1953, had been *vestigialis*: 109 specimens of 453 macro-moths.

13. **Scotogramma dianthi** Tausch. This species is usually regarded as the characteristic moth of sodaic territories, but it occurs also on loose sand. In the Transdanubium, we have met with it only (one specimen) on the soda shores of Lake Velence, and on the southern slopes of the Mts. Velence (another specimen). All other collecting data originate from the area between the Danube and the Tisza, and from beyond the Tisza. (The environments of Gödöllő, Peszér, Kunszentmiklós; and then Izsák, Kunhegyes, Kisújszállás, the wastes of Hortobágy; then Nádudvar, Mezőberény, Bátorliget). A specimen labelled Budapest derives probably from the sandy Pest side of the Capital. I I o s v a i V a r g a collected numerous specimens on garden flowers at dusk in Kunhegyes.

14. **Polia aliena** var. **postaliena** Kov. var. n. The majority of our collecting data comes from the sandy territories between the Danube and the Tisza, from the southern spurs of the Cserhát to Szeged. We have established its occurrence on pebbly and sandy substrates in the Transdanubium in Uzsa, Fenyőfő, and the shores of the Danube near Szentendre; I do not know the character of its collecting places in Bánhida and Szár. L. I s s e k u t z captured some specimens at higher points of the Mts. Bükk. Around sandy forests between the Danube and the Tisza, however, and especially on the sand dunes, it is not rare.

With regard to the fact that our aliena populations are separated by wide tracts of land from both those in the West (in Lower Austria), and in the East (the Mezőség in Transylvania), it seemed reasonable to compare the specimens of the several groups. The examination resulted in the finding that the above groups differ from each other in substantial features. Our specimens originating from Lower Austria comply most with the figure published by Hübner. Their pattern is rather conspicuous, the lines bordering on the median field are light, the reniform and orbicular stands out rather clearly of the *basic* color, the dark outlines of the claviform are also well observable. A brown tint is also rather striking in the basic color. The pattern of the specimens collected in Hungary is diffuse, the lines bordering on the median field almost completely dissolve into the basic color. The reniform and orbicular are obscure. With regard to the *basic* color, the grey tint comes into prominence at the expense of the brown.

I nominate this form, characteristic preeminently to our sand dunes in the Plains, var. **postaliena**. This form occurs also southwest to our borders, on the Deliblát sand Plains (Fehértelep). Holotype male: Kecskemét-Szikra, 11–12, June, 1937, leg. A. Schmidt; in the Collection of the Hungarian Natural History Museum; Allotype female: Királyhalom, 20–31 July, 1933, leg. A. Schmidt, in the Collection of the Hungarian Natural History Museum.

Paratypes: in the Collection of the Hungarian Natural History Museum: 2 ♂ 25 June, 1954, Ágasegyháza, leg. L. Kovács; 1 ♂ 1 July, 1949, Bátorliget, leg. L. Kovács; 1 ♂ 12 July, 1908, Fenyőfő, leg. A. Schmidt; 1 ♂ 19 July, 1911, Isaszeg, leg. Niameny; 7 ♂ and 1 ♀, 10 June, 1937, 2 ♂ 11–12 June, 1937, Kecskemét-Szikra, leg. A. Schmidt; 3 ♂ 20–31 July, 1933, Szeged-Királyhalom, leg. A. Schmidt; 2 ♂ 1 ♀ Pécel, leg. Ulbrich; 1 ♂ 12 July, 1938, Pótharaszt, leg. Szent-Ivány; 1 ♂ 14 June, 1909, Fehértelep, leg. Uhrík; 9 ♂ 1 ♀ 13–22 June, 1911, Fehértelep, leg. Ujhelyi; 2 ♂ 10 and 12 June, 1914, Fehértelep, leg. A. Schmidt; In the Collection of L. Issekutz: 3 ♂ 15–18 July, 1951, and 26 June, 1954, Mts. Bükk (Mt. Bálvány), leg. Issekutz; 4 ♂ 4 June, 1949, 3 June, 1950, 9 June, 1951, Fót, leg. Issekutz; 4 ♂ 11 June, 1939, 12 June, 1940, 14 June, 1942, Peszér, leg. Gy. Vargha; 1 ♂ 30 June, 1951, 30 May 1942, Szigetszentmiklós, leg. Gy. Vargha; in the Collection of L. Kovács: 1 ♀ 25 June 1954, Ágasegyháza, leg. L. Kovács; 1 ♀ 14 June, 1935, Budaörs-Csiki hegyek, leg. Uhrík; 3 ♂ 2 June, 1948, and 9 ♂ 3 June, 1949, Fót, leg. L. Kovács; 1 ♂ 13 June, 1942, Peszér, leg. Uhrík; 1 ♀ 27 June, 1942, Peszér, leg. Gy. Vargha; 4 ♂ 13 June, 1942 (1), and 14 June, 1942 (3), Peszér, leg. L. Vida; 1 ♂ 20 June, 1942, Szentendre, leg. L. Kovács.

East to Hungary, in the Transylvanian Mezőség, *P. aliena* again appears in another form. The specimens collected in Szentgotthárd are usually bigger and of a broader fore wing than those of our Plains. Their pattern is almost completely dissolved, the lines bordering the median field get lost almost tracelessly in the basic color, only the reniform and orbicular remain in outlines. In the basic color, a rust brown tint becomes dominant, grey elements are thrown into insignificance. We have 3 specimens from the Magura too, rising in Western Transylvania; these too belong here. I nominate this variety to honor Dr. A. Schmidt, who did much in his time to explore the fauna

of the Mezőség, as var. **schmidti**. Holotype male 7 June, 1910, Szentgotthárd, leg. A. S c h m i d t, in the Collection of the Hungarian Natural History Museum. Paratypes: 13 ♂: 10 June, 1909 (1); 19 June (2); 1897 (1), Szentgotthárd, leg. W a s s; 3 June, 1910 (1); 5 June (2); 7 June (3), Szentgotthárd, leg. A. S c h m i d t; 1896 (1); 1897 (1); and 1 without date, Magura, leg. W a s s.

15. **Harmodia silenes** Hbn. All specimens of which I know originate from sandy biotops with the exception of one, labelled Bánhida, the biotop of which I am not familiar with. With regard to the Transdanubium, it had been found on the southern shores of the Balaton, Balatonzamárdi; all other collecting localities are on the sandy areas between the Danube and the Tisza (Budapest, Fót, Ágasegyháza, Dabas, Bugac). We captured it on the border of the woods in Fót, and among sand hills in Ágasegyháza and Bugac.

16. **Harmodia compta** Schiff. With regard to its occurrences, we dispose of data from the Transdanubium (Magyaróvár, Simontornya), one from the Central Mountains: on the southern slopes of the Mártonhegy in Buda, where J. S z ó c s found its caterpillar. Its range in the sand between the Danube and the Tisza agrees with that of the former species but its known collecting localities extend to our southern border. This also had been collected near forests and on sand dunes.

17. **Conisania leineri** Frr. Its collecting localities are almost exclusively situated on the sandy areas between the Danube and the Tisza, from Fót and Gödöllő on, in a southern direction. J. B a l o g h captured one specimen in Balatonzamárdi, in the Transdanubium. We collected it in Fót around the sandy forest, but the most of it inhabit the sand-hill territories. It is a dominant species among the sand hills in the second half of May, so 30—40 per cent of all macrolepidoptera caught in Soltvadkert in the last days of May, 1951, had been *C. leineri*.

18. **Epia irregularis** Hufn. Of all data relating to its occurrence, the most derive from sandy districts with the exception of two. One of these is Szentgál, on the southern part of the Mts. Bakony, the other the hills of Buda. With reference to the sandy areas, we have data of its occurrence in the Transdanubium from Fenyőfő, the southern shores of the Balaton; and in the territory between the Danube and the Tisza from Gödöllő on down to Szeged. I had caught it beyond the Tisza in Bátorliget only. It is to be collected around sandy forests, and on the sand dunes; it was a condominant species with *Cucullia balsamitae* Bsd., in Peszér, 10 June, 1942 (according to L. G o z m á n y).

19. **Monima porosa** Ev. Three specimens are known from Hungary, all from the sandy areas of the Plains. The first had been caught around Tiszapolgár by Á. K i s s (25 July, 1910), the second in Ágasegyháza by Gy. É h i k (9 June, 1953), and the third in Ohat by J. J a b l o n k a y in the summer of 1954.

20. **Cucullia argentea** Hufn. Its caterpillars may be found in high numbers in certain years on *Artemisia campestris* in sandy districts. The material to be found in our home collections originate almost completely by breeding from caterpillars. Of its habitats, Fonyód on the southern shores of the Balaton, Komárom near the Danube, then Csepel and Gödöllő are situated on sandy areas. T. U h r i k found a caterpillar on dolomitic substrate in the Mts. Csiki near Budaörs. Z. K a s z a b captured a male imago in Balatonzamárdi. A b a f i

Aigner writes that he found a larva in Nógrádverőce, but he gives no information about its biotop.

21. **Cucullia asteris** Schiff. It had been collected mainly in soda and sandy districts but it seems as if it would appear in smaller numbers in areas of the first character. We even found it in the Central Mountains near Buda. Its caterpillar had not been rare around Debrecen in the 'thirties. Its collecting localities are Sopron, the shores of Lake Velence, Budapest, Üllő, Tiszaluc, Ohat, and Debrecen.

22. **Cucullia thapsiphaga** Tr. Of its known collecting localities 7 are on sandy areas (2 near the Balaton, and 5 between the Danube and the Tisza); and it had been caught in not a few instances in the Mts. Bükk. I collected it on a forest clearing in Fót, and among sand dunes in Soltvadkert.

23. **Cucullia balsamitae** Bsd. The collecting localities of this species lie predominantly between the Danube and the Tisza, from Vác-rátót to Szeged, everywhere on a sandy substrate. I consider two islets of the Danube among the collecting localities of the Plains, though they belong, with reference to public administration, to Transdanubian communities. There is only one specimen known from the Eastern part of the country, which I succeeded to capture on the sandy clearings of the municipal forest of Bátorliget. Both the imago and the larvae are frequent around sand hills. This species adapted itself in an unusually high degree to the sand. J. Szócs tried many times to feed *Chondrilla juncea* taken from the hills of Buda to caterpillars originating from the Plains, but they rather perished than to eat it. We found the caterpillars on this plant always, in the Plains.

24. **Cheligalea scopariae** Dorf. It had been collected in two localities: on the southern shore of the Balaton (Fonyód), and in Gödöllő. Both places are on sand. In Fonyód, many caterpillars had been collected on *Artemisia scoparia* in more than a few instances in Fonyód, in the 'thirties.

25. **Aporophyla lutulenta** Hbn. var. **sodata** Kov. var. n. *A. lutulenta* generally occur on sand and in soda terrains in Hungary; yet we have a collecting date from the hills of Buda. A specimen of the Dahlström Collection, and by its label allegedly originating from Pécs, does not seem to be authentic, since it has the features of the big and uniformly dark French form. Our specimens bearing reliable data do not agree with any one *lutulenta* form known by me. I do not wish to digress now on the standpoint of Heydemann (who seems to consider that there are two species united in *lutulenta*), nor to that of Boursin (who holds *A. lutulenta* Hbn., and *A. tripuncta* Frr. of Heydemann as merely two forms of the same species), but only to introduce the characteristics of our own form. Both males and females are rather small, their alar expanse 33–35 mm. The basic color of the fore wings is dark grey, tinted with some brownish. The median field is somewhat darker, in which feature it resembles the form *sedi* of Western Europe, though the contrast between the basal and the terminal on the one hand, and the median field on the other hand is much smaller. The white of the hind wings is pure. On the underside of the wings, the strength of the line corresponding to the postmedian is varying in the single specimens, just as that of the discal spot. One of the specimens originating from the Austrian Oberweiden, west of our borders, has a smoky brown fore wing, its median field is not darker, albeit, according to Heydemann, it is *tripuncta* which lives there. East and southeast to Hungary, a form resembling also that of Oberweiden occurs,

as witnessed by our specimens originating from Borosjenő (at the feet of the Transylvanian Bordering Mountains), and Orsova (the Bánság). I nominate the variety characteristic to the Hungarian sandy and soda districts, on the ground of one of its biotop, as var. **sodata**. Holotype male: 27 September, 1941, Gödöllő, leg. Szurdoky, in the Collection of L. Kovács; Allotype female 23 September, 1952, Felsőbabád, leg. L. Gözmány, in the Collection of the Hungarian Natural History Museum. Paratypes: in the Collection of the Hungarian Natural History Museum: 1 ♂ 4 Sept. 1951, Dinnyés, leg. L. Gözmány; 2 ♂, 23 Sept. 1952, Felsőbabád, leg. Gözmány; 2 ♀ 29 Sept 1948, leg. Velez; 1 ♂, 12 Oct. 1951, Nadap, leg. Gözmány; 1 ♂, 5 Oct. 1951, Ohat, leg. L. Kovács; 1 ♂, 6–7, Oct. 1952, Szeged-Fehértó, leg. Gözmány; 1 ♂ 5 Oct. 1951, Lake Velence, leg. Velez; — in the Collection of L. Issekutz: 4 ♂, 28 Sept. 1946, 20 Sept. 1947, 7 Oct. 1950, Fót, leg. Issekutz; 9 ♂ 3 ♀, 3–4 Oct. 1948, and 5–6 Oct. 1953, Ohat, leg. Issekutz; 1 ♂ 24 Sept. 1949, Peszér, leg. Issekutz, — in the Collection of L. Kovács: 1 ♂ 25 Sept. 1951, Fót, leg. Gy. Vargha; 1 ♂ 28 Sept. 1946, and 4 ♂ 20 Sept. 1947, Fót, leg. L. Kovács; 3 ♂ 1 ♀, 3 Oct. 1948, and 2 ♂ 2 ♀, 4 Oct. 1948, Ohat, leg. L. Kovács; — in the Collection of J. Szócs: 2 ♂, 20 Sept. 1947, and 11 ♂ 1 ♀, 28 Sept. 1948, Fót, leg. J. Szócs.

I collected this variety near a sandy forest in Fót (*Festucetum vaginatae* association), and on a soda meadow in Ohat (*Festucetum pseudovinae* association).

26. **Calotaenia celsia** L. With reference to the occurrences of this species, we have data from sandy districts only. Kiskorpád in Com. Somogy (Transdanubium); Fót, Gödöllő, Ócsa, Peszér, Pótharaszt, Kisnyir between the Danube and the Tisza; Debrecen and Bátorliget in the eastern part of the country. I collected it on forest clearings and meadows on the borders of oak woods in Fót, and on the forest clearings of the municipal forest of Bátorliget.

27. **Epimecia ustula** Frr. Of our home collecting localities, one lies at Lake Velence, and one on the southern parts of the Mts. Buda; most of them, however, relate to the sandy areas between the Danube and the Tisza, from Gödöllő to the southern borders. It is a regularly appearing species on sandy meadows and sand dunes.

28. **Elaphria terrea** Frr. It is the characteristic species of the territory between the Danube and the Tisza; we had collected it exclusively in this area, on sandy slopes and hills. In this district, 10 of its collecting localities are known from Fót to Kiskunhalas. It had been a dominant species among Lepidoptera in Peszér, in the first days of September, 1948: we had captured some 150 specimens with lamp and bait in a single night. Some few specimens will wander into the marshy alderwoods of Ócsa from the sandy areas.

29. **Athetis furvula** Hbn. (*lenta* Tr). It had been found on sandy areas in the whole country; it is not choicy as regards the quality of the sand substrate. Besides the sand of the Plains, where it can be caught in large quantities, it is also at home on the sand around the Balaton, indeed, on the Danubial sands in many places. It seems to invade biotops of other substrates but exceptionally and in small numbers only: we have caught two specimens among the hills of Buda. On the other hand, many occur even in marshy meadows in sandy districts.

30. **Hydraecia leucographa** Bkh. We have found its pupae and also its imagoes on the soda meadows of the Ohat forest, it indubitably breeds therefore

in this place. It is not cleared up yet whether the specimens caught in Vác and Budapest bred in these places.

31. **Chloridea nubigera** H-Sch. We dispose of a single Hungarian specimen, which I caught (3 June, 1951) in a yard of a house in Soltvadkert, on the sand of the southern Plains.

32. **Heliothis cognatus** Frr. All of its collecting localities, with the exception of one, are on sandy areas near the Balaton, between the Danube and the Tisza, and beyond the Tisza. On a not sandy area, it had been found solely in the southern part of the hills of Buda. The larvae of this species will take *Chondrilla juncea* gathered in the hills, even if they originate from sandy territories. We have collected the larvae in the vicinity of sand dunes in Ágasegyháza.

33. **Oxytrippia orbiculosa** Esp. This species breeds on sandy meadows in the area between the Danube and the Tisza, wherever its food plant on the Plains, *Iris arenaria*, thrives (Festucetum sulcatae association). Its first known locality is Szeged; later it had been found on the Isle Csepel, in Peszér, and also Kisnyír. There had been a locality on the sand of Pest too, but this had been destroyed. It reaches only to the southern parts of the hills of Buda (the Tétény plateau, Mátyáshegy, Hűvösvölgy). Its larva feeds here on *Iris pumila*.

34. **Porphyrinia noctualis** Hbn. With the exception of a date referring to the Mts. Buda (Budaörs-Mts. Csiki, a dolomitic area), all other relate to sandy districts. It occurs in Fenyőfő of the Mts. Bakony, on the sand of Kiskorpád in Com. Somogy, on the isles near Sztálinváros and Dunaföldvár, in the area between the Danube and the Tisza from Fót to Szeged, and in Bátorliget in the eastern part of the country. We collected it on the edges of the woods in Fót, and among the sand dunes of Peszér.

35. **Porphyrinia pannonica** Frr. It had been collected solely on sandy slopes and on sand dunes between the Danube and the Tisza. Its collecting localities are Göd, Fót, Isaszeg, Pótharasztt, Peszér, Kisnyír. A single specimen of Budapest refers most probably to the sandy Pest side of the capital.

36. **Earias vernana** Hbn. The most of its collecting localities are between the Danube and the Tisza (9), and on the sand around the Balaton (4). From the eastern part of the Plains 2 further localities are known; and other 4 from the Transdanubium, besides those relating to the Balaton. It had been collected in hilly areas around Kaposvár, Bánhida, and Buda; indeed, even in the Central Mountains.

37. **Catocala puerpera** Giorn. Its collecting localities are mainly on the sand of the area between the Danube and the Tisza, and on the southern shores of the Balaton. (15, that is, 4). Further places of occurrences are, in the Transdanubium, Magyaróvár, Simontornya, Buda, Szentendre; and on the left shore of the Tisza: Tiszacsege. In Szentendre, we have collected a rather high number of larvae in a sunny, warm day, on the root shoots of *Populus italica*, standing in a dry river-bottom among the hills north of the city.

38. **Eucrostes indigenata** Vill. We know of seven home localities of this species, all between the Danube and the Tisza, in the southern part of the Plains (Peszér, Kunszentmiklós, Ágasegyháza, Bugac, Tabdi and Királyhalom). The specimens had been collected among the sand hills or around forests, on sand.

39. **Sterrha sericeata** Hbn. It can be collected yearly in high numbers, mainly on the sand dunes, in the area between the Danube and the Tisza.

We found it in two places in the hills near Buda, on the dolomitic rocks of the Mts. Csiki, and in Pilisvörösvár, also on dolomite. In these latter two localities, its specimen numbers are, related to those of the sand dunes of the Plains, much lower. Ten per cent of all macrolepidoptera collected among the sand dunes of Soltvadkert, 31 May, 1951, had been *S. sericeata*.

40. ***Sterrhya sylvestraria*** Hbn. We have collected it in high numbers on the pebbly hills of the Natural Reservation of Uzsa, near Sümeg, in the Transdanubium. It had been found also in the vicinity of the Balaton; and I caught one specimen in my flat in Buda, on a not sandy territory. We had collected it between the Danube and the Tisza, from Fót to Soltvadkert, and can be found in high numbers on the sand dunes. We have met with it in the eastern part of the country in Bátorliget only.

41. ***Rhodometra sacraria*** L. We know of 3 of its collecting localities in the Transdanubium (Magyaróvár, the Kisbalaton, Szentendre), then 3 in the Plains (Peszér, Kisnyír, Szikra). The latter are in a sandy area but there are sandy areas also near those of the Transdanubium. In the absence of data to the contrary, it seemed reasonable that we mention also *sacraria* among our species characteristic to the sand; the more so as the most of our specimens originate from the sandy area between the Danube and the Tisza.

42. ***Chondrosoma fiduciaria*** Anker. We know of 3 of its collecting localities in Hungary only. One of them is the Tétény plateau, south of Buda; the other is the isle Csepel, where it flew on the sandy clearings of the Király forest, since cut down and built in; and the third is Peszér, where it lived on the sandy meadows. In the two latter places it had not been rare in the past.

43. ***Boarmia umbraria*** Hbn. It had been collected up to now solely between the Danube and the Tisza, where the sandy southern slopes of the Mts. Cserhát make their transition into the Plains; and there around sandy oak forests. Its localities are Fót, Gödöllő, Isaszeg, Pécel, Maglód, Nagykáta.

44. ***Zygaena laeta*** Hbn. It flies in high numbers in some years both between the Danube and the Tisza, and in the Transdanubium (in two places: Komárom, Fonyód). Those of the Plains are: the Pest side of Budapest, the Isle Csepel, Peszér, Dabas, Kunszentmiklós, Rémsziget, Pótharasz, Kisnyír. In the Mts. Buda, we have met with it up to Szentendre, but exceptionally only.

45. ***Zygaena cynarae*** var. ***pusztae*** Bgff. An individually rich population of this variety had been found in the Reservation of Uzsa, in the Transdanubium. Another Transdanubian locality is Pécs. Around Buda, it can be found in some places in the hills; and near Vác, on the left side of the Danube. It had been collected on the sandy territory between the Danube and the Tisza, from Gödöllő to Bugac. According to contemporary data, there had been populations of high individual numbers here, but even today, it breeds the best and ranges the farthest on the sand of the Plains. We have but a single specimen from the eastern part of the Plains (Bátorliget).

46. ***Acanthopsyche zelleri*** Mn. Its collecting localities are Budaörs (the southern edges of Mts. Csiki), Buda (Farkasvölgy); then on the sandy Pest side: Káposztásmegyér, Rákospalota, Csepel. It occurred also in the old graveyard of the Váci-út (now built in) in Pest, in a *Festucetum sulcatae* association.

47. ***Amicta ecksteini*** Led. According to I. F r i v a l d s z k y, L e d e r e r described this species by specimens collected on the Sashegy, in Buda. However, it cannot be found there any more. Not very far away from this hill, I saw its sacks, even after the war, on the southern slopes of the Széchenyi-hegy.

On the unanimous information of old collectors, it had been artificially introduced here. It lives on the sand of Rákospalota, on the Pest side, as it had bred in the old graveyard mentioned above. It had been collected in Gödöllő, Csepel, Szigetszentmiklós, and Peszér too. I have found an enormous lot of sacks on a clearing of a common locust forest near Szigetszentmiklós, in 1933. This is also the insect of *Festucetum sulcatae* associations.

48. ***Epichnopteryx undulella*** Fisch.-Rös. Its collecting localities are Káposztásmegyér, Rákospalota, Pest, Csepel, Gyón, Peszér, — sandy places all. I do not know, however, the plant association in which it lives.

49. ***Chamaesphecia masariformis*** O. It had been collected also on the Buda side (Budaörs, Buda, Budafok), yet most specimens originate from the sand of the Plains, (Csepel, Pécel, Pótharasz, Kisnyir). Its larva had been collected annually in an old graveyard in Csepel, in the past.

50. ***Chamaesphecia leucopsiformis*** Esp. The most of its collecting localities are on the Plains (Pest, Csepel, Pótharasz, Kiskunhalas, between the Danube and the Tisza; and Kunszentmárton beyond the Tisza). It had been captured yet on the Gellérthegy in Buda, flown over maybe from the Pest side; further in Nógrádszakál near the river Ipoly; and in the vicinity of the Kisbátán in the Transdanubium. I do not know the character of the two latter places.

51. ***Chamaesphecia muscaeformis*** View. I will yet list this moth among the sand-loving lepidoptera of our country as we have a specimen labelled Isaszeg, and another date of its occurrence in Szeged. For the time being, however, I consider both data as dubious, as its food plant, *Armeria maritima* (= *vulgaris*) occurs in the Mts. Bükk only, in Hungary. On this ground, I will not take it into consideration in my exposal below.

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As testified by the data just recounted, there live in Hungary about 50 lepidoptera species which occur exclusively in, or at least prefer, the biotops of sandy areas. There are among them some whose connection with sand is known since long, and which fact is also commented on by the large summarizing systematical works. *E. crypta*, *A. vestigialis*, *C. leineri*, *C. argentea*, *C. celsia*, *C. leucopsiformis* are considered unanimously as psammophilous species. These are not linked to the sand by their food plant, since these plants may flourish on substrates of other kinds too; nor by the climatical qualities of the area, as their attachment to the sand is manifest in localities of the most diverse climates. We may justly suppose that the factor connecting them with the sand is a specific combination of soil, microclimate, vegetation, and other qualities not to be found in other biotops or on other substrates. In consequence of this complete adaptation, the very existence of these species depends on living in sandy biotops.

There is to be found yet another group among the species enumerated, whose connection with sand is mentioned by some authors merely locally; possible concerning the appeasement of their demands for certain conditions of life. Such are: *H. stalinus* (imagos, according to Rühl, prefer to sit on sand), *S. nervosa*, *P. noctualis*, *S. sylvestriaria* (in Pomerania, according to Urbahn, on sand, or also on sand), *E. irregularis* (on sand in England, sec. Warren). Of these species, only *P. noctualis* is linked in some extent by its food plant (*Helychrisum arenarium*) to the sand. These species may

possibly live in related biotops of other substrates; in the absence of such, however, they are limited to the sand. An indication of this fact is that *S. sylvestraria* lives in Callunetums north of Hungary, as also in the Uzsa Reservation in our country; but to the east, where there is no heather on the Plains, it inhabits the *Festucetum vaginatae* and *F. sulcatae* associations of sandy areas.

Again, there are some species among those listed above which are tied predominantly by their food plants, in a more or less strict sense, to sandy districts. These are *H. compta* (*Dianthus serotinus*), *Ch. scopariae* (*Artemisia scoparia*), *E. vernana* (*Populus alba*). The food plant of *Ch. scopariae* thrives solely on sand in our country, no examination can therefore be made in what degree this species adapted itself to sand; the other two, concerning their food plants, may also have been relegated to the former group. *H. leucographa* is linked probably also to soda soils by its food plant. *L. alciphron*, according to the observations of Urbahn, also prefers dryness, and this circumstance may, among other things, have some role in its frequent occurrence on the dry and warm sand of the Plains.

These species, on whose connection with sand some light can be shed by home and abroad observations, are predominantly Euro-Siberian and European faunal elements, to use the habitual denominations. The majority of them range to much higher latitudes than ours, and will reach usually but the northern part of the Mediterranean; even there they are represented by possibly some special form (*L. alciphron*). We may justly suppose on the ground of their general dispersal that their heat requirements are moderate, and that they are possibly eurytherm species. In the line of the species represented by peculiar varieties in our sandy districts, also Euro-Siberian and European faunal elements dominate. From the fact that they are represented by distinct forms on the sandy areas of the Plains, we may safely infer that ecological factors found nowhere else come into play in these districts. Of the five forms developed to all appearances in this area, two are still the endemisms of the sand of the Plains (*Melitaea* ssp. *vividicolore*, *Orgyia* var. *intermedia*); whilst the other three had, locally, more or less invaded the surrounding districts (*Polia* var. *postaliens*, *Aporophyla* var. *sodata*, *Zygaena* var. *puztae*).

The majority of our psammophilous species consist of species of whose connection with sand I had not found any data in literature as yet. Strikingly, they are mainly Pontic and Ponto-Mediterranean faunal elements, with even a Mediterranean species amongst them. Most of them are, as inferred from their range, species of an increased heat demand; a significant number of them will not be found at higher latitudes than ours, — and the others but locally. So *M. lupinus*, *E. selignis*, *S. dianthi*, *H. silenes*, *E. ustula*, *Ch. nubigera*, *P. pannonica*, *E. indigenata*, *S. sericeata*, *B. umbraria*, *A. zelleri* reach the northern limit of their range in Hungary. Further, *H. cognatus*, *C. puerpera*, *E. undulella* arrive at their northernmost limits in our country and also at somewhat further north (Vienna). *Ch. lavaterae* had been found also higher up in the north, but in one or two places only. *Argynnis* ssp. *laranda*, a form described from the northeastern shores of the Adriatic Sea and of a southern character, belongs also here, together maybe with the Euro-Siberian *E. terrea*, tending towards the south in Europe.

The heat requirements of these species with a pronouncedly southern character are also expressed in the regard of their distribution and biotops in Hungary. The great majority of them had been found in the warmest points

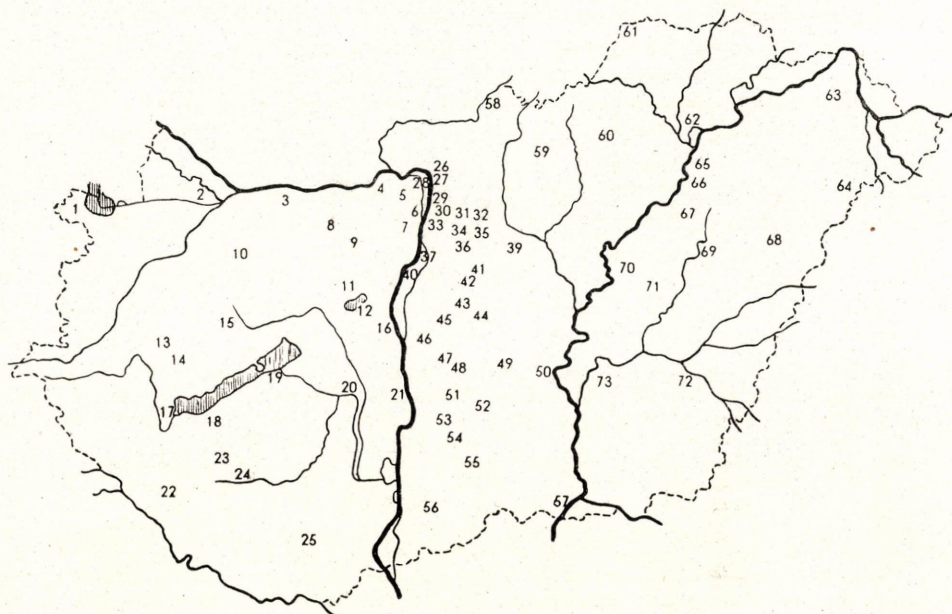
of the country, between the Danube and the Tisza; and even those which reach up to the Central Mountains will but occur on the warmest slopes of southern exposure. At the present time, I had been unable to find any other circumstance influencing their distribution in Hungary. The only one among the species which may be tied up by its food plant with sand in a certain measure is *P. pannonica*; all others may find their food plants in almost every part of the country. I am of the opinion, however, that even if there should be any one which prefers sandy districts this would not essentially alter the fact that their home distribution is primarily determined by their higher requirements concerning heat.

A smaller portion of the species, of the relations of which to sand I had not found any data in literature, are not of an expressedly southern character; nor do they extend far to the north. The main center of their range is in Eastern Europe and Western Asia, and they do not occur south of the Mediterranean. These are: *M. suwarovius*, *M. porosa*, *C. balsamitae*, *O. orbiculosa*, *Ch. fiduciaria*, *A. ecksteini*, species all characteristic to the steppe. They do not occur further in the west, beyond the last steppe-like areas. These some few species of our macro-moths represent the true steppe elements in our sandy districts and (partly) on the southern slopes of the Central Mountains. They are all adapted to steppe biotops; indeed, their specific character had most probably developed and became fixed in the steppe zone. *A. jurvula* is probably also of a similar character, and, though it occurs also at the Amur, it is represented there by a distinct form; it does not range to territories west of the Alps in Europe.

We have yet to make a cursory examination of what role the heat — requiring psammophilous species play in the animal communities, or more precisely, in the macrolepidoptera portion of the biocoenoses of the sand; that is, in how far they impress their mark on them. Among our species of the sand, with a general distribution area between the Danube and the Tisza, two have a dominant role, *E. terrea* and *A. jurvula*; they are, however, Euro-Siberian species and will gravitate the least toward the south. *S. sericeata* is a subdominant species of the sand hills but it does not occur in the southern portions of the Mediterranean. Of the steppe species, we have data of *C. balsamitae* playing a dominant role. All other species occur but in more restricted areas, or if in more extensive territories, they appear in low individual numbers and percentages in the several coenoses. Species having the highest individual numbers in our sandy districts are of a general distribution and of a certain indifference with regard to their habitats on the one hand, e. g. *M. jurtina*, *T. albicolon*; or, on the other hand, they are psammophilous species of no strict southern character, as *A. vestigialis*, or *Epia irregularis*. On the ground of the quantitative censuses made hitherto, we have to take the standpoint, at least presently, that the species of a southern character are but coloring elements in the biotops of our warm sandy districts.

We have to take up three species yet which cannot be relegated into any of the former categories. One of them, *Rh. saccharia*, is a Mediterranean faunal element, and though it will sometimes appear in more northern points in Europe, it will not breed there. Nor can it survive, in all probability, the cold of our winters; this, at least, must be inferred from the fact that all specimens had been collected up to now in the summer or in the beginning of the autumn. We have to deal maybe with the descendants of specimens invading our country in the early summer, and which may give rise to a generation in the warm

season, — but there is no further breeding. The connections of *C. asteris* and *C. thapsiphaga* to the sand I cannot elucidate at the present, in the absence of sufficiently ample data.



Explanation of the map: 1. Sopron; 2. Magyaróvár; 3. Komárom; 4. Esztergom; 5. Mts. Dunazug; 6. Szentendre; 7. Mts. Buda; 8. Bánhida; 9. Szár; 10. Fenyőfő; 11. Mts. Velence; 12. Lake Velence; 13. Sümeg; 14. Uzsa; 15. Szentgál; 16. Sztálinváros; 17. Kis-Balaton; 18. Fonyód; 19. Balatonzámárdi; 20. Simontornya; 21. Dunaiöldvár; 22. Lak-Baláta; 23. Kiskorpád; 24. Kaposvár; 25. Pécs; 26. Naszál; 27. Vác; 28. Isle Szentendre; 29. Göd; 30. Fót; 31. Mogyoród; 32. Gödöllő; 33. Rákospalota; 34. Pécel; 35. Isaszeg; 36. Maglód; 37. Csepel; 38. Üllő; 39. Nagykáta; 40. Szigetszentmiklós; 41. Monor; 42. Pótharaszti; 43. Dabas; 44. Gyón; 45. Peszér; 46. Kunszentmiklós; 47. Kisznyir; 48. Ágasegyháza; 49. Kecskemét; 50. Szikra; 51. Izsák; 52. Bugac; 53. Tabdi; 54. Solt-vadkert; 55. Kiskunhalas; 56. Réms; 57. Szeged; 58. Nógrádszakál; 59. Mts. Mátra; 60. Mts. Bükk; 61. Szin; 62. Tiszaluc; 63. Kisvárd; 64. Bátorliget; 65. Tiszapolgár; 66. Tiszacsege; 67. Ohat; 68. Debrecen; 69. Nádudavar; 70. Kunhegyes; 71. Kisujszállás; 72. Mezőberény; 73. Kunszentmárton.

Based on the above considerations, the following deductions can be made with regard to the macrolepidoptera species characteristic to our sandy districts:

1. One of the groups of macrolepidoptera characteristic of our sandy areas embraces species adapted either completely or partially to the sand, and which are primarily European or Euro-Siberian faunal elements of high temperature requirements. Five such species are represented by special forms, of which two are endemic, in the Plains and its nearest neighbourhood.

2. A considerable portion of the macrolepidoptera characteristic of our sandy districts are Ponto-Mediterranean, Pontic, and Mediterranean, and also heat — requiring faunal elements; linked mainly by their increased heat demands to our warmest areas, especially to the territory between the Danube and the Tisza, and to the psammous biotops of the southern borderland.

3. In the macrolepidoptera partial-coenose of the zoocoenoses of the biotops on sandy substrates, it could be ascertained of but one species among the heat — requiring southern and southeastern members that it will play a dominant role; all other species, and primarily those of a marked southern character, may be regarded as but characteristic species of the coenoses in question.

4. Among our macrolepidoptera characteristic of our sandy districts there are but few true styep-species; their populations are, in the majority of the cases, also small in number and usually of low individual figures.

To deduce and evaluate zoogeographical issues, the analysis of also the other faunal elements is yet to be performed.

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A homokos területeinkre jellemző nagylepkék

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Szerző számbaveszi azokat a nagylepkéfajokat, amelyek határaink között csak homokos területeken fordulnak elő vagy elsősorban homokos biotópokon gyűjthetők. Az eddigi adatok alapján 50 ilyen fajt sorol fel. A továbbiak során vizsgálat alá veszi, mi kapcsolja ezeket a fajokat a homokos területekhez. Tekintetbe véve a külföldi viszonyokat is, megállapítja, hogy a szóbanforgó fajok egy része mérsékelt hőigényű európai, euroszibériai faunaelem, amelyek többé-kevésbé általánosan alkalmazkodott a homokos területek biotópjaihoz. Egy nagyobb részük hőigényes pontomediterrán, pontusi és mediterrán faj, amelyeket hőigényük kapcsol meleg homoki biotópjainkhoz. Az utóbbiakról megállapítja, hogy általában nem lépnek fel nagy számban, így a biocénózisnak inkább csak karakterfajai. Végül leszögezi, hogy a homokos területeinkre jellemző nagylepkék sorában kevés a valódi sztyepfaj, ezeknek a populációi is gyérszámúak, egyedekben szegények.