STUDIA

UNIVERSITATIS BABEŞ-BOLYAI

BIOLOGIA

2

1987

CLUJ-NAPOCA

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ANUL XXXII 1987

STUDIA

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BIOLOGIA

2

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STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXII, 2, 1987

NEMATODE SPECIES *(NEMATODA: PLECTINAE)* NEW FOR THE ROMANIAN FAUNA

IULIANA POPOVICI*

SUMMARY. — Thirteen nematode species belonging to the subfamily *Plectinae* were recorded in a variety of natural and agricultural ecosystems from Romania. Six of these species, namely *Plectus decens, P. sambesii, P. silvaticus, Chiloplectus loricatus, Ceratoplectus armatus* and *C. assimilis* are new records for the Romanian fauna. Males of *Chiloplectus loricatus* were found and described here for the first time.

A vast ecological programme on the soil fauna of natural and agricultural ecosystems was performed in Romania during the last decade.

Some nematode populations belonging to the subfamily *Plectinae (Plectidae)* were recorded during these investigations. Six new species for the Romanian fauna were added to the other 9 recorded until 1974 [1, 2, 5—7]. Thirteen species of *Plectinae*, of the 15 now known in Romania, were collected during the period 1974—1986 from different ecosystems in the Carpathians and north-west of them. These ecosystems comprise forests — from plain oak forest to subalpine dwarf shrubs-, montane and subalpine meadows and pastures, agricultural fields and orchards. The variety of the studied ecosystems enabled us to widen the distribution of these nematode species on the territory of Romania.

The paper presents biometric and morphological data as well as the distribution of the 6 nematode species new for the Romanian fauna, namely: *Plectus decens, P. sambesii, P. silvaticus, Chiloplectus loricatus, Ceratoplectus armatus* and *C. assimilis*. Several common and widely distributed species of *Plectinae*, recorded by us, will also be mentioned.

The specimens fixed in aqueous solution of formaldehyde and triethanolamine (TAF) and mounted in glycerol are preserved on slides.

Details on habitats and sampling sites of these 6 nematode species are presented in Table 1, in which the code of the sampling sites is also specified according to the Universal Transverse Mercator system (U.T.M.) [4].

Now we characterize the 6 nematode species new to the Romanian fauna. The following symbols are used: n — specimen number; L — total body length; a — L/maximum body width; b — L/oesophagus length; c — L/tail length; V — distance from vulva to anterior body extremity in % of L; c' — tail length/anal diameter; Pex — position of excretory pore behind the anterior end.

Plectus decens Andrássy, 1985

Females(n=5): L=0.74 mm (0.60—0.82); a=28 (26—29); b=3.4 (3.0—4.2); c=8.0 (6.9—8.9); V=49% (47—50); c'=7.2 (6.8—8.3).

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Table 1

Details on habitats and localities of record for the nematode species new for the Romanian fauna

Sample number	Ecosystem	Soil type	Locality	U.T.M. code
1	2	3	4	5
1	Spruce forest	Acid brown	Mt. Bihor, Călineasa, 1200 m	FS 45/56
2	Spruce forest	Acid brown	Mt. Bihor, basin of Someşul Cald river, 1100 m	FS 46/56
3	Spruce forest	Acid black	Mt. Bihor, Arieşeni, 900 m	FS 34
4	Beech forest	Terra rossa	Mt. Bihor, Bulbuci Valley, 900 m	FS 16
5	Beech forest	Rendzina	Mt. Bihor, Bulz Valley, 900 m	FS 16
6	Beech forest	Typical brown	Mt. Bihor, Băiţa Valley, 900 m	FS 25/34
7	Pasture	Rendzina	Mt. Bihor, basin of Ponor, 1300 m	FS 16/26
8	Spruce forest	Cryptopodzolic brown	Mt. Vlădeasa, near chalet, 1500 m	FS 27/38
9	Spruce forest	Rendzina	Mt. Vlădeasa, Pietrele Albe, 1550 m	FS 36/46
10	Beech-spruce forest	Acid black, andic	Mt. Vlădeasa, Preluca Rabului, 1200 m	FS 27/37
11	Beech-spruce forest	Acid black	Mt. Vlădeasa, Capra Hill, 1080 m	FS 28
12	Dwarf shrubs	Brown podzolic	Mt. Vlădeasa, Vlădeasa Peak, 1825 m	FS 36/46
13	Beech forest	Brown podzolic	Mt. Vlădeasa, Săcuieu, 900 m	FS 38
14	Beech forest	Typical regosol	Mt. Vlădeasa, Leşu, Iadu Valley, 750 m	FS 18/28
15	Beech forest	Typical rendzina	Mt. Vlădeasa, Remeţi, 650 m	FS 28
16	Beech forest	Typical acid brown	Mt. Vlădeasa, Drăgan Valley, 700 m	FS 39/49
17	Meadow	Rendzina	Mt. Vlădeasa, Pietrele Albe, 1500 m	FS 36/46

Table 1 (continued)

Sample number	Ecosystem	Soil type	Locality	U.T.M. code
1	2	3	4	5
18	Clearing	Acid brown, andic	Mt. Vlădeasa, Zîrna brook, 1250 m	FS 47/56
19	Meadow	Colluvial-alluvial	Mt. Bihor, Poiana Ponor, 1000 m	FS 16/26
20	Spruce forest	Acid black	Mt. Retezat, Zlătuia Valley, 1550 m	FR 54/64
21	Timberline spruce forest	Ranker	Mt. Retezat, Faţa Retezatului, 1810 m	FR 54/64
22	Dwarf shrubs	Lithic podzol	Mt. Retezat, Faţa Retezatului, 1950 m	FR 54/64
23	Timberline spruce forest	Brown eu-mesobasic	Mt. Retezatul Mic, Faţa Iarului, 1750 m	FR 41/51
24	Dwarf shrubs	Rendzinic lithosol	Mt. Retezatul Mic, Piatra Iorgovanului, 1900 m	FR 41/51
25	Dwarf shrubs	Rendzinic lithosol	Mt. Retezatul Mic, Piule, 1950 m	FR 41/51
26	Subalpine pasture	Rendzina	Mt. Retezatul Mic, Piatra Iorgovanului, 1700 m	FR 41/51
27	Subalpine pasture	Rendzinic lithosol	Mt. Retezatul Mic, Piule, 1900 m	FR 41/51
28	Beech forest	Acid brown, umbric	Mt. Gilău, Huza Valley, 700 m	FS 76
29	Beech forest	Luvic brown	Mt. Rodnei, Rebra Valley, 550 m	LN 14
30	Beech forest	Acid brown	Mt. Maramureş, Ferneziu, 490 m	FT 99
31	Mixed oak and cerris forest	Luvic brown	Ardud village, Satu Mare district, 130 m	FT 38/48
32	Evergreen oak forest	Cambic pseudorendzina	Baciu village, Cluj district, 500 m	FS 98
33	Plain oak forest	Luvic brown pseudogleic	Noroieni, Satu Mare district, 125 m	FT 39/49
34	Beech forest	Brown	Cerna Valley, Jelerău brook, 500 m	FQ 17
35	Apple orchard	Pseudogleic, verticluvic	Tg. Mureş, 400 m	LM 15/16

The species is recognized by the medium size length, not set off head, amphids large (1/4 of the corresponding body diameter), cardia long (20 μm), rectum unusually long (2.5 times longer than anal body diameter), slender and twisted tail.

Habitat and locality: samples 21 and 29 (for details see Table 1 and Fig. 1).

Plectus sambesii Micoletzky, 1916

Females (n=2): L=0.67—0.79 mm; a=26.6—27.0; b=3.5—3.6; c=8.8.—9.4; V=51.6—52.1 %; c'=5.7—6.0; Pex=106.7—107.5 μm.

It can be easily separated from *P. parvus* Bastian, 1865 by the forward directed cephalic setae and longer and arcuate tail [3].

Habitat and locality: samples 1, 5, 26 and 28 (Table 1 and Fig. 1).

Plectus silvaticus Andrássy, 1985

Females (n=7): L=1.44 mm (1.33—1.62); a=20.9 (18.3—23.3); b=4.2 (3.9—4.3); c=10.9 (9.3—11.6); c'=3.7 (3.3—4.0); V=50.7% (48.7—54.1); Pex=181.2 μm (165.0—189.5).

Closely related to *P. parietinus* Bastian, 1865, this species is distinguished by the broader head with lower lips, weaker oesophagus bulb, slender tail and the subterminal seta („spur") situated at 20—25 μm from the tail tip. These two species are almost always distributed together.

Habitat and locality: samples 6, 10, 16, 19, 23—30 and 35 (Table 1 and Fig. 1).

Chiloplectus loricatus Andrássy, 1985

Females (n=9): L=1.07 mm (0.89—1.36); a=20.8 (18.7—23.7); b=3.7 (3.4—4.1); c=9.6 (9.0—10.5); V=52.4% (49.4—55.6); c'=4.0 (3.9—4.1); Pex=144.7 μm (130—163); eggs=44.5—47.7/25.4—26.0 μm.

Males (n=3): L=1.05 mm (0.95—1.16); a=23.4 (22.3—24.7); b=3.8 (3.7—3.9); c=9.5 (8.9—11.2).

Species of medium length, cuticle unusually thick (3.5—4.5 μm) with very strong annulation on the anterior extremity of the body, lips well separated, amphids large (3.0—3.2 μm wide), tail arcuate.

Males were found and described here for the first time.

Male similar to female. Stoma 26.3 μm (24.0—28.7) long, excretory pore 149.4 μm (143.2—152.5) behind anterior body end. Cuticle 3.5—4.5 μm thick. Spicules slight asymmetrical: the left one 26.2—27.5 μm, the right one 27.5—31.2 μm long. Gubernaculum 9.5—10 μm long. No preanal papilla. One (n=2) or two (n=1) large preanal supplements: 15—20 μm. Tail more strongly curved than in female, with a ventral papilla and 7 pairs of setae (Fig. 2).

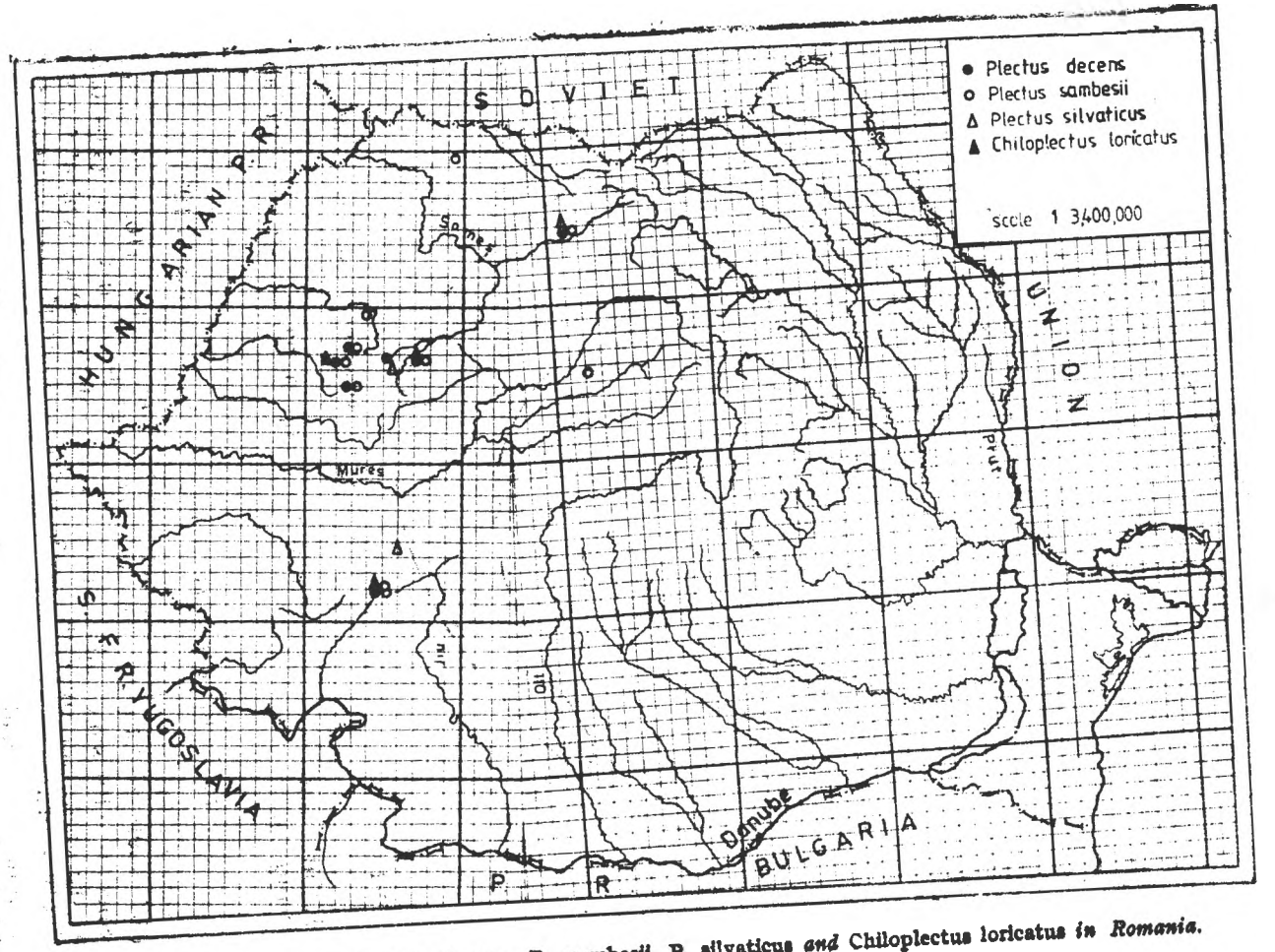

Fig 1. *Distribution of* **Plectus decens, P. sambesii, P. silvaticus** *and* **Chiloplectus loricatus** *in* ***Romania.***

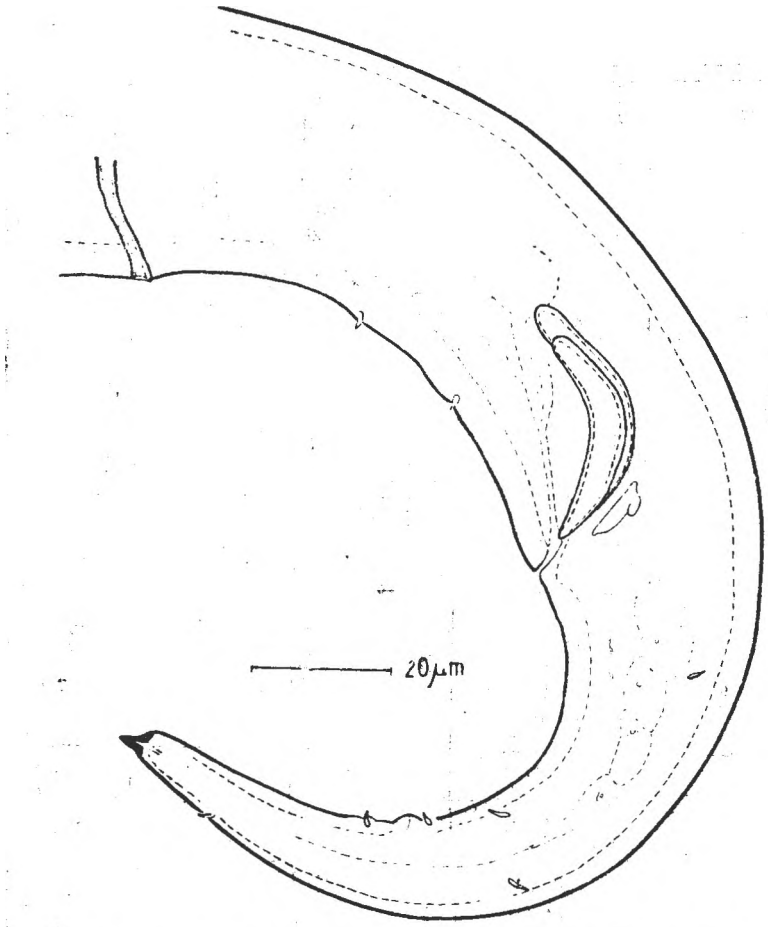

Fig. 2. *Posterior end of the male of* Chiloplectus loricatus *Andrássy, 1985.*

Habitat and locality: samples 2, 6, 10, 19, 23, 25, 28 and 29 (Table 1 and Fig. 1).

Ceratoplectus armatus (Bütschli, 1873) Andrássy, 1984

Females (n=10): L=0.42 mm (0.36—0.56); a=17.7 (16.1—20.6); b=3.6 (3.3—3.9); c=8.4 (7.0—9.6); V=49.6% (47.0—52.7); c'=4.7 (4.0—6.0).

Species with small and plump body, cephalic setae typical for the genus, reaching far over the lips, stoma tubular (14.5—19.0 µm), tail relatively short.

Habitat and locality: samples 1, 5, 6, 10, 12, 20—23, 26—29 and 31—34 (Table 1 and Fig. 3).

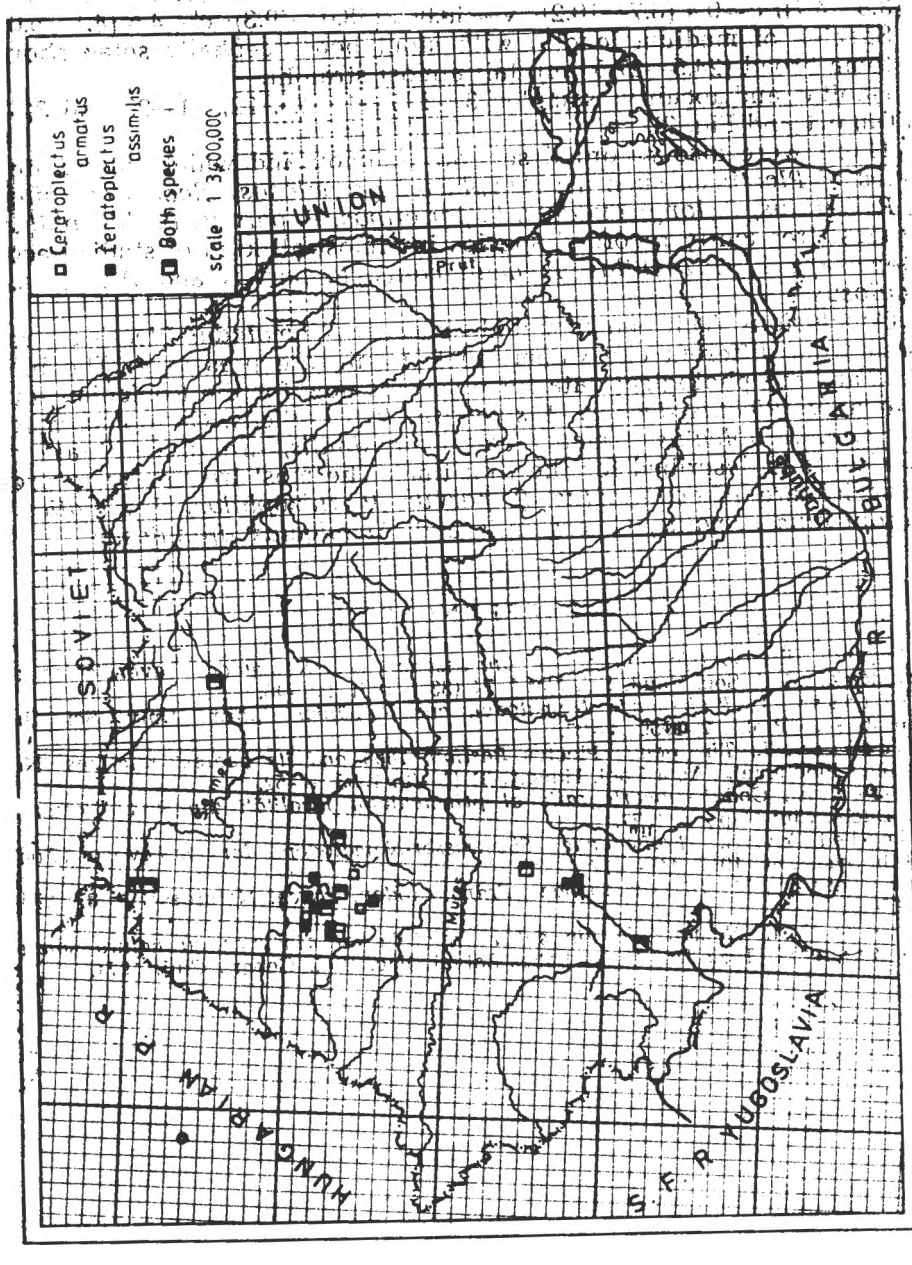

Fig. 3. *Distribution of* Ceratoplectus armatus *and* C. asimilis *in Romania.*

Ceratoplectus assimilis (Bütschli, 1873) Andrássy, 1984

Females (n=4): L=0.94 mm (0.80—1.05); a=18.6 (17.1—21.0); b=4.3 (3.8—4.7); c=9.4 (8.7—10.2); V=48.8% (48.0—49.3); c'=4.5 (4.1—5.0).

Species of medium length, with stout body, cephalic setae shorter, stoma broad (24.5—27.5 µm), tail almost straight.

Habitat and locality: samples 3—5, 7—18, 20, 22, 24—29 and 31—34 (Table 1 and Fig. 3).

There were also recorded several common and widely distributed species of *Plectinae*, such as; *Anaplectus granulosus, Plectus acuminatus, P. cirratus, P. longicaudatus, P. parietinus, P. parvus, P. rhizophilus.* The most frequently recorded species in almost all kind of studied ecosystems are *P. rhizophilus, P. acuminatus, P. parvus* and *Anaplectus granulosus.*

Conclusions. Thirteen nematode species *(Nematoda: Plectinae)* recorded from different ecosystems in Romania are presented. The biometric and morphological data for 6 species new for the Romanian fauna, namely: *Plectus decens, P. sambesii, P. silvaticus, Chiloplectus loricatus, Ceratoplectus armatus* and *C. assimilis,* are given. Male of *C. loricatus* is described for the first time. The most frequently recorded species are *P. acuminatus, P. parvus, P. rhizophilus, P. silvaticus, Ceratoplectus armatus, C. assimilis* and *Anaplectus granulosus.*

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MAMESTRA BRASSICAE L. *(LEPIDOPTERA: NOCTUIDAE)*: STUDIES ON THE LARVAL DENSITY AND THE CAPTURE OF MALE MOTHS WITH SEX ATTRACTANT TRAPS IN DIFFERENT ECOSYSTEMS

GHEORGHE STAN*, IOAN COROIU*, NICOLAE TOMESCU, PETRE SCUTĂREANU***, and LIDIA POP******

SUMMARY. — The capture of *Mamestra brassicae* L. males in sex attractant traps with Z11—16: Ac was studied on a cabbage culture comparatively with the attack frequency or larval density during 1984—1986. No correlation could be noticed between the two parameters: a small number of males were captured during a severe attack, and the decrease in the attack level (for the 3 years) did not bring about a decrease in the number of males captured. The capture of *Mamestra brassicae* L. males with sex attractant traps set in agricultural and natural ecosystems was largest in forest and then in those from the cabbage culture. *Mamestra brassicae* is suggested to have a characteristic behaviour for flight, reproduction and feeding, and probably a high ability of aggregation and dispersion. The successful use of the synthetic sex pheromone in the control and management of this species requires thorough future researches on adult emergence, flight and reproduction behaviour, pheromone quality and a practical way of working with traps.

The success of using biotechnologies and biological methods in pest control largely depends upon thorough knowledge of the species biology, ecology and behaviour. Among these researches, synthetic sex pheromones can be applied to various pest control strategies [2, 5, 12]. Pheromone traps were successfully used in estimating the distribution pattern of populations [3], although it has been noticed that the level of field populations can be hardly estimated by the number of males captured [4]. Even the effective application of chemicals in pest management strategy implies sampling techniques for estimating the distribution of the insect population within a habitat, a fact which requires investigations on attack frequency, distribution and density of larvae or of other stages [1, 3, 9, 13].

The cabbage armyworm, *Mamestra brassicae* L., is a polyphagous species that raises many problems regarding the attractivity of the synthetic sex pheromone, due to its complex composition, and also due, it seems, to the lack of close correlation between the number of males captured with sex attractant traps and the density of larval populations [6]. The distribution pattern of populations as well as flight and mating behaviour in nature have been little studied so far.

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The paper examines the results obtained, between 1984—1986, on the attack frequency and larval density of *Mamestra brassicae*, in a cabbage field, correlated with the number of males captured with pheromone traps in the same field. Some other data on male capture with sex attractant traps in agroecosystems and natural ecosystems are also presented.

Materials and methods. Experiments were carried out yearly in a cabbage field with a surface generally larger than 2.5 ha, and placed around the Didactical Experimental Station in Florești (18 km West of Cluj-Napoca) alongside of the river Someș. The surface close to the cabbage plot was cultivated with vegetables, and further away, with wheat and maize. Three sticky traps of a changed Montedison model (sticky base 960 cm^2, 30×32 cm) were yearly set in the cabbage field at more than 100 m from one another and 1—1.2 m above the ground. The traps were baited with Z11—16 : Ac (4 mg). The baits consisted of rubber septa supplied by the Laboratory of Fine Organic Synthesis, Chemistry Institute of Cluj-Napoca. Synthesis, analysis and conditioning pattern have been previously presented [11]. The traps were kept in field from June till the end of the second flight, *i.e.* 74, 68 and 78 days in 1984, 1985 and 1986, respectively. Baits were changed every 20 days and observations were recorded every 2—3 days. Three surfaces of 10×10 m were randomly selected close to the traps, for a manual control of each cabbage, and the number of larvae (for all ages) was recorded a few days before harvesting the cabbage. In 1984, the larvae, aged 3—6 days, were carried to the laboratory where their growth continued, so that mortality, pupation and the percentage of parasitism could be observed.

In another area, close to Florești Station (around the village Luna de Sus), a transect comprising one slope of the Someș river valley was selected for experi-

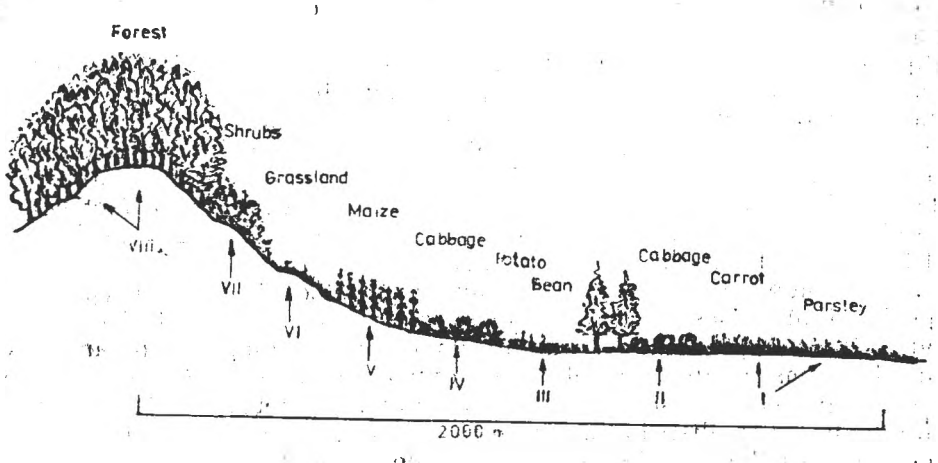

Fig. 1. ***Schematic representation of a transect through different types of habitats for studying the capture of*** **Mamestra brassicae** ***males in sex attractant traps*** **(Luna de Sus, Cluj district, 4—26 Aug. 1986). The arrows mark trap setting. The Roman numbers represent the traps from a certain habitat.**

ments in 1986. The capture of *Mamestra brassicae* males in sex attractant traps with Z11—16 : Ac (2 mg) could be, thus, observed in different types of ecosystems. The transect was 2,000 m long, 150—200 m wide (depending on culture plant) and comprised a variable vegetation consisting of: cultures of vegetables (cabbage, potato, bean, carrot, parsley), maize, grassland, shrubs and forest. Twenty-four traps of the above-mentioned model were set on this transect between 4—26 August 1986 : 3 for each type of habitat (Fig. 1). The difference in altitude between the plots with cultures (I—IV) and the forest (VIII) was about 500 m. The distance between the 3 traps of each plot was about 50 m, and in the forest of about 75 m. Observations were recorded every two days. Six control traps without bait (Table 2) were set for comparison. Several traps with variants of synthetic pheromonal compounds (Table 3) were also set for comparison in the Baciu forest (22 km NW of Cluj-Napoca) and checked weekly between 7 July—15 Oct. 1986. This area is characterized by an old deciduous forest surrounded by orchards and cultures of wheat and maize, where only small surfaces have been used for vegetable cultures, none of them closer than 700—800 m to the skirt of the forest. The traps were randomly set inside the forest, at about 100 m from one another and 1.7—2.0 m above the ground, at a minimum distance of about 200 m from the skirt. The baits were changed every 20 days.

The frequency of attack was expressed in percentages for all the 3 surfaces studied ((number of plants attacked/total No. of plants)×100). The data on male capture were transformed into $\sqrt{0,5+X}$, prior analysing the variance, by using the Duncan's New Multiple Range Test.

Results and discussion. Data on the attack frequency and larval population density in *Mamestra brassicae* as well as the number of males captured in sex attractant traps are presented in Table 1. A severe attack was recorded in 1984; extremely few cabbages did not contain larvae; some of them were 30—50% destroyed. It should be mentioned that no chemicals were applied on the crops in 1983 and 1984. Nevertheless, the number of males captured in 1984 was the lowest in all the 3 years. In 1985 and 1986, after an intense use of pesticides, the attack frequency was much lower than in 1984. The fall in

Table 1

The attack frequency and larval density of Mamestra brassicae **and the number of males caught in sex attractant traps baited with Z11—16 : Ac in a cabbage field**
(Luna de Sus, 1984—1986)

Year	Attack frequency (%)	Larval density/attacked plant				No. plants/m² ($\bar{x}$)	Dead larvae recorded in field (%)	$\bar{x}$ captured males/trap/night
		Age 1—3		Age 4—6				
		$\bar{x}$	Range	$\bar{x}$	Range			
1984	87.4	3.2	1—11	3.4	2—16	9.2	2.8	0.12
1985	44.5	1.7	1—4	0.6	1—7	11.1	1.5	0.46
1986	19.2	0.3	1—3	0.2	1—5	10.9	1.1	1.26

larval population density was, however, accompanied by an increase in the number of males captured. This discrepancy many have various causes. On the one hand, the level of larval populations may be influenced by the oviposition level, biotic factors, chemicals, climatic conditions, etc. On the other hand, the capture of males in traps may depend upon female competition and attractivity of the sex pheromone, quality of baits, type of trap and position, species behaviour, etc. Considering the data resulting from our preliminary researches in *Mamestra brassicae* we appreciate that chemicals largely influence the level of larval populations, but it also seems, as we shall further examine, that adults have a characteristic behaviour and the habitat they prefer differs from that preferred by larvae. Similar researches on other species have pointed out the influence of chemical treatments upon the ratio number of larvae/number of males captured. In *Earias insulana,* a correlation between the number of males captured in traps and the density of larvae could not be estimated because of the chemicals applied, but a good correlation could be set up in the absence of chemicals [3]. In *Pectinophora scutigera,* the variations in the number of males captured were not correlated with the application of chemicals, and no close connection could be depicted between capture volume and plant damage [9]. According to our experiments, the species *Mamestra brassicae* seems to be a somewhat similar case to the above-mentioned ones. Other researchers experimenting with Z11—16 : Ac also recorded this observation [6, V. Ciochia and I. Roşca, personal communication]. The density of larvae from a habitat with a certain plant preferred as trophic base is generally correlated with the level of oviposition. It is interesting to notice that in *Mamestra brassicae* the dynamics of male capture in sex attractant traps and the dynamics of oviposition reveal a highly positive correlation [1]. The males captured with pheromonal traps in *Mamestra configurata* were a sign of female abundance, a fact evinced by egg-laying activities [13].

Very little is known on the behaviour and flight ability, aggregation or adult dispersion in *Mamestra brassicae*. There may be a correlation with the development of crop plant, the reproduction behaviour, the level and flight of the population from a preferential habitat. In *P. scutigera,* the correlation between capture of males and larval infestation was considered to be influenced by local movements of males on different cotton-cultivated plots [9], while in *M. configurata,* the number of males captured in sex attractant traps, during a certain period of time was influenced by the level of development of the crop plant [13]. It is well-known that the flight is closely connected to other biological activities (feeding, sexual maturation, finding new ecological niches, reproduction, etc.), and it may be highly complex in polyphagous species. We consider that *Mamestra brassicae* displays such a flight behaviour, correlated mainly to reproduction and possibly to feeding and to a certain preference for a certain trophic base.

We have also examined the presence of adult males in different ecosystems and have found that they presented trophic demands diffe-

rent from those of larvae. Table 2 contains the data on male capture in traps with Z11—16 : Ac. A high capture was recorded in the traps set in cabbage culture, probably in correlation with the preferential plant for larvae and the oviposition. An important capture was recorded in the traps from carrot and parsley cultures, probably due to the aspect of the culture plant or the lack of chemical treatments. Significantly lower captures were obtained with the traps from the other ecosystems, except for the forest, where the largest number of males was captured, as compared to the other habitats, considering that the forest was rather far from any cabbage plot. The capture in intermediary habitats (maize, grassland, shrubs) was significantly smaller. An interesting record was the specificity below 50% of Z11—16 : Ac in the traps from vegetable cultures. A large number of males belonging to *Discestra trifolii* and *Ochropleura plecta* were also captured in these traps [11]. If we also consider the data recorded in the Baciu forest (Table 3) in August, only males of *Mamestra brassicae* were captured in traps. Thus, the specificity was 100% for the Luna de Sus area. In the Baciu area, where the traps were kept till October, the specificity varied between 58.6 and 92.8% depending on the pheromone variant used, as a large number of *Mesogona acetosellae* Den. et Schiff. and *Agrochola macilenta* Hb. males were also captured. The traps from the Luna de Sus forest (26 Aug. — 20 Sept.) also captured a

Table 2

Number of Mamestra brassicae males caught in sex attractant traps baited with Z11—16 : Ac (2 mg) in different ecosystems (Luna de Sus, Cluj district, 4—26 Aug. 1986)

Group of traps*	$\bar{x}$ males caught/trap/night**		Specificity (%)
	4—14 Aug.	14—26 Aug.	
I Carrot, parsley	0.88 ab	0.51 b	24.5
U.T.*** „ „	0 c	0 c	—
II Cabbage	1.06 a	1.66 ab	37.4
III Potato, bean	0.13 bc	0.05 c	N.S.****
IV Cabbage	1.42 a	1.90 a	48.2
U.T. „	0 c	0.04 c	—
V Maize	0.06 c	0.02 c	N.S.
VI Grassland	0.04 c	0 c	N.S.
VII Shrubs	0.08 c	0.02 c	11.5
VIII Forest	1.94 a	2.01 a	100.0
U.T. „	0 c	0.04 c	—

* Marked as in Fig. 1.
** Means followed by the same letter in a column are not significantly different at the 5% level of confidence based on Duncan's New Multiple Range Test.
*** Two unbaited (control) traps.
**** Not significant.

Table 3

Number of Mamestra brassicae males caught in sex attractant traps baited with different variants of synthetic pheromonal compounds in Baciu forest (Cluj district), 1986 (5 Jul.—21 Aug.: 2 traps/variant; 25 Aug.—12 Sept.: 4 traps/variant)

Variants*	$\bar{x}$ captured males/trap/night		Specificity** (%)
	5 Jul.—21 Aug.	25 Aug.—12 Sept.	
U.T.	0	0	
B—4	0.59	0.44	92.8
TB	0.16	0.10	58.6
J	—	0.36	86.6

* U.T. — Two unbaited traps. B—4 — Z 11—16 : Ac (4 mg). TB — Z 11—16 : Ac (4 mg) + 16 : Ac (0.4 mg). J — Z 11—16 : Ac (3.5 mg) + 16 : Ac (0.4 mg). + E 11—16 : Ac (0.1 mg).
** The traps were left in the forest till 15 Oct. 1986, and the specificity was estimated for the period of 7 Jul. — 15 Oct. 1986.

large number (117) of *Mesogona acetosellae* males and a smaller number of males belonging to the species *Agrochola macilenta, Dychonia aprilina* L. and *Conistra vaccinii L.* [G. Stan *et al.*, unpublished data].

Although, for the time being, only males have been recorded with sex attractant traps (and supposing the flight dynamics was similar both for males and females), the presence of *Mamestra brassicae* in natural ecosystems, where K-strategists are competitive, is an interesting record. The characteristic features of r-strategists [8, 10] may reflect the correlation of a certain stage in the life cycle with a certain stage in behaviour. We consider that, in such a case, the most important sequence is reproduction, and in this respect, the forest offers a habitat for temporary aggregation. Thus, the adults (all or part of them), after emerging in the habitats where the larvae have pupated, fly to neighbouring natural ecosystems for feeding, calling and mating. Afterwards, the females fly again to the cultures with plants that are a preferred trophic source for larvae and where they begin the egg-laying. The forest may be a preferred ecosystem that offers ecological conditions according to the ecological requirement of the species, as it is less subjected to negative factors than other habitats. The males captured in cabbage fields come from the local population, and also from neighbouring habitats as a response to the pheromone. It is possible that distinct populations of natural ecosystems are also involved, beside the populations in agroecosystems. Also there is a competition between the synthetic and the natural sex pheromone because the females emerge, fly and get mature sooner than the males [7].

The fact that the females get sexually mature before the males, and their high reproduction ability, raise difficult problems to the use of the synthetic sex pheromone in controlling this species. This requires the finding of a highly specific pheromonal variant with a maximum attractivity. The optimum time and place for setting traps should also be carefully chosen. Researches have proved so far that, when using sex pheromone in pest control, it is very important to correlate the number of males caught in pheromone traps with the real density of the field population. This correlation is influenced by many factors, the most important ones depending on traps, pheromone quality and sexual attractivity of males [12]. These are in fact the aims of our researches on *Mamestra brassicae*, in order to find a way of effectively using the synthetic sex pheromone in pest control and management.

Conclusions. 1. In the period of 1984—1986, no correlation was found between attack frequency or larval density and the number of *Mamestra brassicae* males captured in traps with Z11—16 : Ac.

2. In the traps with Z11—16 : Ac (2 mg) set in forest the number of males captured was highest as compared to the traps set in agroecosystems.

3. The adults of *Mamestra brassicae* manifest a characteristic behaviour concerning flight, feeding and reproduction and probably they have a high capacity of migration and aggregation.

4. Z11—16 : Ac may be used for studying dynamics and density of *Mamestra brassicae* populations, but for control and management, new researches are needed to establish the maximum attractivity of the synthetic sex pheromone, to work out a practical method with traps in relation to biology, ecology and behaviour of this species.

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STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXII, 2, 1987

ÜBER DIE WECHSELKRÖTE (*BUFO VIRIDIS* LAUR.) AUS ZYPERN

BOGDAN STUGREN* und POÜLLOU TASSOULA**

SUMMARY. — On the Green Toad (*Bufo viridis* Laur.) of Cyprus. The Green Toad of Cyprus differs from that of Europe, by high abundance of specimens with light vertebral line, by greater body-size, as well as by long and large parotids. Therefore, it does not belong to *B. viridis viridis*, which inhabits Europe and Western Siberia. Neither is it an endemic, insular subspecies of *B. viridis*. The Cypriot population represents the subspecies *B. viridis arabicus* Heyden, which inhabits Southwest Asia.

Einleitung. Das Vorkommen der Wechselkröte in Zypern ist seit 1910 bekannt [4]. Ihre Rassenangehörigkeit wurde aber bisher nicht erforscht. In allgemeinen Übersichten der Amphibienfauna Europas [15] und der UdSSR [24], samt den nahe liegenden Ländern Afrikas und Asiens, wird Zypern als Teilgebiet des Verbreitungsraumes von *B. viridis* nicht erwähnt. Da schon seit langer Zeit kein neues Material von *B. viridis* aus Zypern gemeldet wurde, entstand die Vermutung, dass die Art auf Zypern längst ausgestorben ist (R o t h, P., Persönliche Mitteilung, 1985). In Spezialarbeiten über die Wechselkröte aus dem Vorderen Orient [5, 7] wird Zypern ebenfalls nicht beachtet. Hier wird versucht, den taxonomischen Status, bzw. die Rassenangehörigkeit von *B. viridis* aus Zypern aufzuklären.

Das untersuchte Material besteht aus 37 Stücken, innerhalb der Stadt Nikosia im Gartengelände, vom Dipl.-Biol. P. Tassoula im Mai 1985 gesammelt. Sämtliches Material wird im Zoologischen Museum der Babeş-Bolyai-Universität in Cluj-Napoca aufbewahrt (Nrn. 442—443 der Reptilien und Amphibien-Sammlung).

Die hier angewandte Methode beruht vorerst auf dem Hervorheben gewisser Trennungsmerkmale für Unterarten, wo jedoch keine Klarheit herrscht. Ältere Autoren [19] haben mehrere „Varietäten" beschrieben, die aber geographisch nicht lokalisiert waren und später als Unterarten (geographische Rassen) nicht anerkannt wurden. Es wurde deswegen betont [24], dass alle Versuche auf Grund von Farben- und Zeichnungsvariationen der Dorsalseite Unterarten aufzustellen, erfolglos geblieben sind. Und dennoch wurde der Gedanke nicht fallengelässen, dass in Innerasien [15], sowie im Süden des Areals, ausserhalb des europäischen Kontinents [22], die Spezies durch besondere Unterarten vertreten wäre, während die Nominatrasse auf Europa und Westsibirien beschränkt sei. Die morphologische Abgrenzung der Unterarten der Wechselkröte voneinander ist jedoch schwierig und unsicher. Laut neueren Untersuchungen [16], soll die Nominatrasse durch das Vorhandensein von wenigstens 3 Querflecken auf den Vorderextremitäten, von den innerasiatischen Rassen abgetrennt sein. Als weiteres Merkmal zur Abgrenzung von Unterarten sind die Dimensionen der Parotis im Verhältnis zur Länge des Auges in Betracht gezogen. Wir betrachten auch das Vorkommen eines hellen Rückenbandes als ausschlaggebend, da eine derartige Rückenzeichnung ein genotypisches und folglich konstantes Merkmal darstellt.

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** *Nicosia, Trikoupi 59 B, Republic of Cyprus*

Tabelle 1

Körperproportionen von *Bufo viridis* aus Nikosia, Zypern

KRL — Kopf + Rumpf—Länge. KL — Kopf—Länge. F. — Femur—Länge. T. — Tibia—Länge. LP — Länge der Parotis. BP — Breite der Parotis. LA — Länge des Auges (alle Masse in mm).

Nr.	KRL	KL	KRL/KL	F.	T.	F./T.	LP	LA	BP	BP/LA
1	2	3	4	5	6	7	8	9	10	11
1	70	16	4,37	21	20	1,05	12	5	6	0,83
2	64	14	4,57	25	22	1,13	11	6	5	1,20
3	62	18	3,44	19	21	0,90	13	6	6,5	0,09
4	65	15	4,33	21	24	0,87	14	6	6	1,00
5	62	15	4,13	20	23	0,86	13	5	6	0,83
6	70	18	3,88	26	26	1,00	12	5	7	0,71
7	66	20	3,30	23	23	1,00	13	6	8	0,73
8	64	19	3,36	22	25	0,88	12	4	8	0,50
9	63	18	3,50	20	24	0,83	12	6	6	1,00
10	57	14	4,07	18	21	0,85	11	7	7	1,00
11	72	17	4,23	23	26	0,88	12	6	8	0,73
12	60	12	5,00	20	23	0,86	10	6	6	1,00
13	57	13	5,15	23	25	0,92	12	6	6	1,00
14	74	17	4,35	22	18	1,22	14	5	7	0,71
15	66	15	4,40	24	21	1,14	12	7	6	1,16
16	69	13	5,30	18	20	0,90	10	5	8	0,62
17	58	19	3,05	22	23	0,95	14	7	8	0,87
18	56	14	4,00	20	19	1,05	13	6	6	1 00
19	61	13	4,84	21	25	0,84	11	5	7	0,71
20	64	12	5,33	23	25	0,92	10	6	6	1,00
21	68	14	4,85	21	19	1,10	11	6	6	1,00
22	60	13	4,61	16	21	0,76	12	4	7	0,57
23	77	19	4,05	24	27	0,88	14	9	8	1,12
24	59	14	4,21	21	23	0,91	12	5	6	0,83
25	69	14	4,92	25	23	1,08	12	5	6	0,83
26	59	13	4,53	19	20	0,95	9	5	6	0,83
27	61	14	4,35	24	22	1,09	8	5	7	0,71
28	60	15	4,00	21	22	0,95	12	6	7	0,85
29	62	17	3,64	21	22	0,95	11	6	7	0,85
30	64	19	3,36	19	20	0,95	11	4	6	0,66
31	65	15	4,33	20	22	0,90	12	6	5	1,20
32	60	11	5,45	20	22	0,90	9	6	6	1,00
33	63	16	3,93	15	21	0,71	11	5	5	1,00
34	73	19	3,84	21	21	1,00	11	5	6	0,83
35	60	19	3,15	23	24	0,95	10	5,5	6	0,91
36	53	15	3,53	19	20	0,95	7	4,5	4	1,10
37	54	14	3,85	20	20	1,00	8	5	5	1,00

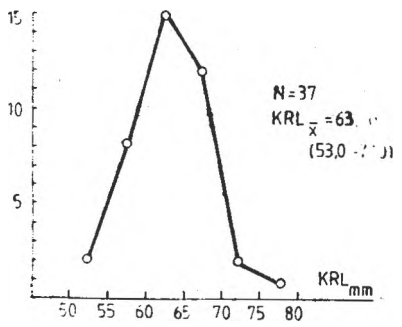

Abb. 1. *Häufigkeitsverteilungen der KRL-Grössenklassen bei* Bufo viridis *aus Nikosia, Zypern.*

Abszisse — KRL-Grössenklassen. Ordinate — Entsprechende Häufigkeiten. $KRL_{\bar{x}}$ — Mittelwert. In Klammern — Minimum und Maximum von KRL.

Ergebnisse. Wie aus der Tabelle 1 hervorgeht, weisen die **Körperproportionen** des zypriotischen Materials bedeutende Grössen auf. Der Mittelwert ($\bar{x}$) der *Kopf+Rumpf—Länge* (KRL) beträgt 63,70 mm. Aus Abb. 1 wird ersichtlich, dass bei der Mehrheit der Stücke die KRL über 60 mm erreicht. Das Verhältnis der KRL zur Kopf-Länge (KL) überragt bei 20 Stükken von 37, bzw. bei 54,00% die Grösse von 4,00. Dabei wurden unsere Exemplare nicht nach dem Geschlecht geordnet, da der sexuelle Dimorphismus bei der Wechselkröte kaum angedeutet ist. Aus Abb. 2 geht hervor, dass die *Femur-Länge* (F.) hinter der *Tibia-Länge* (T.) kaum zurückbleibt.

Die **Parotiden** sind gross, stets über 10 mm lang. Die Parotis-Breite ist, bei der Mehrheit der Stücke, wie aus Abb. 3 ersichtlich, geringer als die Länge des Auges.*

Wie üblich bei der Art *B. viridis*, ist auch in Zypern die **Zeichnung der Dorsalseite** recht verschiedenartig. Es gibt sowohl kleinfleckige als auch grossfleckige Stücke. Bemerkenswert ist das häufige Auftreten des *hellen Rückenbandes*. Von 37 untersuchten Stücken weisen 19,

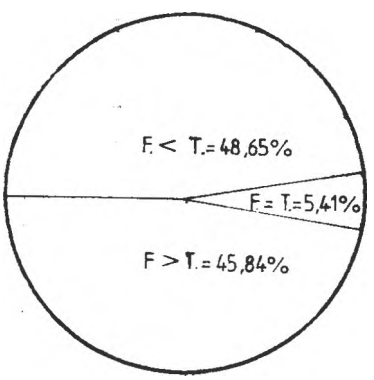

Abb. 2. *Prozentanteil verschiedener Verhältnisse von F. zu T. bei* Bufo viridis *aus Nikosia, Zypern.*

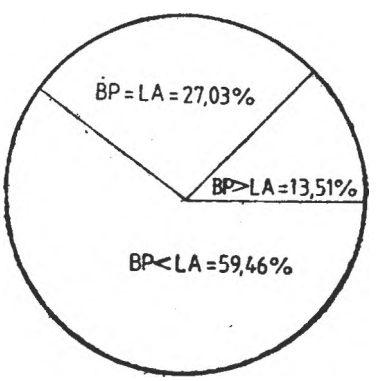

Abb. 3. *Prozentanteil verschiedener Verhältnisse der Breite der Parotis (BP) zur Länge des Auges (LA) bei* Bufo viridis *aus Nikosia, Zypern.*

* Bei allen Exemplaren wurde die rechte Parotis und das rechte Auge abgemessen.

Tabelle 2

Körperproportionen von *Bufo viridis* aus verschiedenen Fundorten in Rumänien

Die Katalognummern (Kln) beziehen sich auf die Reptilien und Amphibien-Sammlung im Zoologischen Museum der Babeş-Bolyai-Universität, Cluj-Napoca. Abkürzungen von 3 bis 13 haben dieselben Erklärungen wie in der Tabelle 1 (alle Masse in mm). Initialbuchstaben in der Kolonne (2) bedeuten: L. D. — Lucia Duşa; N. P. — Nicolae Popovici; B. S. — Bogdan Stugren.

Kln	Fundort, Datum, legit	Nr.	KRL	KL	KRL/ KL	F.	T.	F./T.	LP	BA	LA	BP/ LA
1	2	3	4	5	6	7	8	9	10	11	12	13
201	Kap Dolojman am Razelmsee, B.S., 5.6. 1957	1	56	11	5,09	23	21	1,09	12	6	5	1,20
206	Floreşti, bei Cluj-Napoca, N.P., 25.4. 1957	2	69	16	4,31	24	23	1,08	13	7	6	1,16
		3	68	19	3,63	23	23	1,00	13	7	6	1,16
		4	70	19	3,68	24	23	1,08	12	7	8	0,87
		5	65	16	4,06	25	24	1,04	11	5	5	1,00
207	ibidem, N.P., 25.4. 1957	6	69	17	4,05	24	26	0,92	14	5	7	0,71
		7	60	19	3,16	29	26	1,11	15	9	8	1,12
		8	69	19	3,63	28	27	1,03	17	6	7	0,85
		9	63	19	2,84	21	26	0,80	12	5	7	0,71
208	Sulina, Donaudelta, B.S., 31.5. 1957	10	33	8	4,12	14	12	1,16	5	3	3	1,00
		11	22	7	3,66	10	10	1,00	3	2	2	1,00
209	Kalkmassiv Scăriţa-Belioara, 1 300 m ü. M., Westkarpaten, B.S., 26.6. 1597	12	73	20	3,60	24	25	0,96	14	7	9	0,77
210	Nimigea-de-Jos, Kreis Bistriţa-Năsăud, L.D., 10.5. 1952	13	56	13	4,30	22	22	1,00	15	4	4	1,00

bzw. 51,35% dieses Merkmal auf. Die *Vorderextremitäten* zeichnen sich ausnahmslos durch 3 bis 6 Querflecken aus. Die **Ventralseite** ist glatt, nicht gekörnelt und fleckenlos, oder nur mit wenigen, kleinen Flecken auf Brust und Kehle.

Diskussion. Um die Rassenangehörigkeit der Wechselkröte aus Zypern festzustellen, wurde unser zypriotisches Material mit 13 Stücken aus Rumänien, die zweifellos die Nominatrasse vertreten, verglichen. Literaturangaben [20] wurden auch zum Vergleich herangezogen.

Wie aus der Tabelle 2 hervorgeht, sind bei Stücken aus Siebenbürgen und aus der Dobrudscha die **Körperproportionen** ebenfalls von bedeutender Grösse (KRL meistens über 60 mm). Mittelwerte wurden für das rumänische Material nicht berechnet, da es genetisch und ökologisch uneinheitlich ist. Die Stücke stammen aus verschiedenen Fundorten und Lebensstätten, z. B. von der Schwarzmeerküste und aus dem Donaudelta, sowie aus der Siebenbürgischen Niederung und aus den Westkarpaten (hier bei einer Höhe von 1 300 m ü. M.). Das KRL/KL-Verhältnis zeigt in Rumänien nur bei wenigen Stücken einen grösseren Wert als 4,00, während in Zypern der Anteil solcher Stücke mehr als 50% beträgt, wie oben schon erwähnt. Laut Literaturangaben [19, 22], zeichnen sich Wechselkröten der Mittelmeerländer durch grössere Dimensionen als jene aus Mitteleuropa aus, indem die südlichen Stücke eine Grösse von 140 mm erreichen sollen. Der Vergleich des zypriotischen mit dem rumänischem Material bringt dafür keine eindeutige Bestätigung, aber auch keine Widerlegung. Bei keinem uns bekanntem Stück aus Zypern erreicht die KRL 140 mm. Vergleicht man die KRL unserer Reihe aus Zypern mit Werten desselben Merkmals bei Reihen aus verschiedenen Teilen der UdSSR [20], so ergibt sich, z. B., dass das KRL aus Zypern (=63,70) höher als die entsprechende Grösse im Gebirgs- und Steppenteil der Krim (59,75 und bzw. 47,72) ist. Nach dem $KRL_{\bar{x}}$ zu urteilen, sind die zypriotischen Stücke bedeutend grösser als Stücke aus Georgien and Aserbaidshan (55,05), Armenien (45,55) und dem Ferganabecken (53,2), dagegen kleiner als Stücke aus Turkmenien (68,89). Merkwürdigerweise und wahrscheinlich ganz zufällig sind die Mittelwerte von KRL in Zypern und in der südukrainischen Steppe (Oblast Cherson) annähernd gleich (63,70 und bzw. 62,63).

Zum Unterschied von Zypern, wo der Anteil der Stücke mit grösseren Femur- als Tibia-Längen nur leicht von dem Anteil der Stücke mit grösseren Tibia- als Femur-Längen abweicht, stellen bei unserem Material aus Rumänien Stücke mit längerem Femur die überwiegende Mehrheit (66,64%) dar.

Abb. 4. *Querflecken auf der linken Vorderextremität bei* Bufo viridis *aus Nikosia, Zypern.*

Zusammenfassend können wir sagen, *dass die Wechselkröte aus Zypern durch die Grössen der Körperproportionen sich ohne Schwierigkeiten in die Variationsgrenzen von* B. viridis viridis *aus Mitteleuropa, Transkaukasien und Turkmenien einreihen lässt.*

Durch die Anzahl der **Querflecken auf den Vorderextremitäten,** die oben als 3—6 angeführt wurde, stimmt die Wechselkröte aus Zypern mit der für *B. viridis viridis* charakteristischen Anzahl über (wenigstens 3) [16] (Abb. 4). Bei dem rumänischen Material sind 4—7 Querflecken auf den Vorderextremitäten vorhanden.

Unseres Erachtens *genügen jedoch diese Tatsachen nicht um die Wechselkröte aus Zypern als* B. viridis viridis *zu betrachten.* D'ɜ

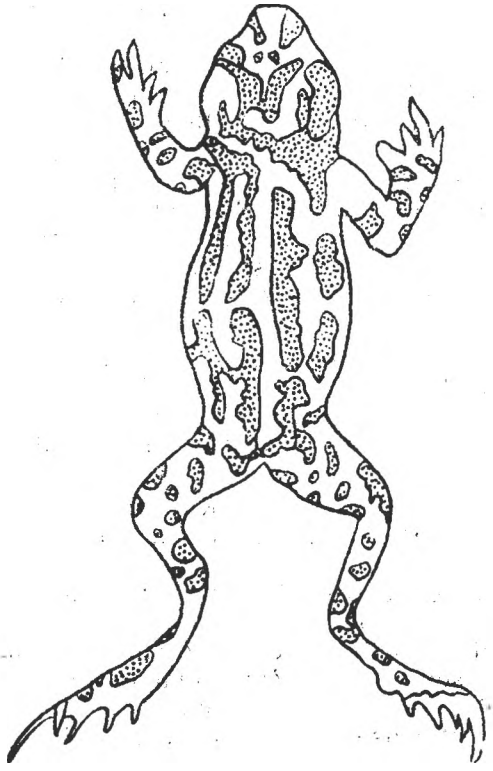

Abb. 5. *Rückenzeichnung bei* Bufo viridis arabicus *aus Nikosia, Zypern. Exemplar mit hellem Rückenband und dunklen Längsstreifen (Katalognummer 443, Reptilien und Amphibien-Sammlung, Zoologisches Museum der Babeş — Bolyai-Universität, Cluj-Napoca).*

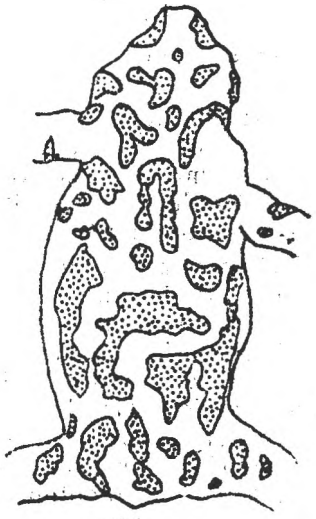

Abb. 6. *Rückenzeichnung bei* Bufo viridis arabicus *aus Nikosia, Zypern. Kleinfleckiges Exemplar ohne hellem Rückenband (Katalognummer 442/18, Reptilien und Amphibien-Sammlung, Zoologisches Museum der Babeş — Bolyai-Universität, Cluj-Napoca).*

Zeichnung der Dorsalseite scheint hier von grösserer Bedeutung zu sein als die Körperproportionen. Die Körperproportionen unterliegen den Schwankungen der Umweltfaktoren, während die allgemeine Form der Zeichnung der Dorsalseite genbedingt ist. Die Wechselkröte aus Zypern unterscheidet sich von der Wechselkröte aus Mitteleuropa durch *das häufige Vorkommen von Stücken mit hellem Rückenband* (Abb. 5). ein oben schon erwähntes Merkmal. Ferner ist für das zypriotische Material auch die Bildung von zusammenfliessenden, dunklen Längsstreifen kennzeichnend (Abb. 6). Durch diese Zeichnungsmerkmale ist *B. viridis* aus Zypern von von *B. viridis* aus Mitteleuropa unverkennbar verschieden und *gehört demgemäss nicht zu B. viridis viridis.*

Ein helles Rückenband ist für *B. viridis viridis* nicht kennzeichnend, obwohl es stellenweise auch bei dieser Form ausgebildet sein kann

[19]. Das Vorkommen von Stücken mit hellem Rückenband ist für das Rhein-Main-Gebiet [13], Rumänien [9], Polen [2] und die UdSSR [1, 24] nicht angeführt. In Niederösterreich kommt bei einigen Stücken ein schwach ausgebildetes helles Rückenband vor [10]. In Italien und Algerien weisen einige Stücke bloss Spuren eines hellen Rückenbandes auf [3]. Wo sich aber in Mitteleuropa *B. viridis* mit der Kreuzkröte (*B. calamita* Laur.) vermengt, tritt bei ersteren ein helles Rückenband durch Verbastardierung und Genfluss auf [6, 8], da bei *B. calamita* ein helles Rückenband charakteristisch ist. Auf der Insel Zypern ist aber ein Genfluss von *B. calamita* kommend unmöglich, so dass hier das helle Rückenband die Deutung eines Rassenmerkmals von *B. viridis* haben kann.

Daraus folgt aber nicht unbedingt, dass Zypern von einer dieser Insel eigenen, besonderen Unterart von *B. viridis* bewohnt wird. Ein Vergleich mit Wechselkröten aus dem unweit gelegenen vorderasiatischen Festland kann einen höheren Aussagewert erbringen, als die Beschreibung einer neuen Unterart.

Wir besitzen leider kein Vergleichsmaterial aus Kleinasien und Syrien. Die Art ist aus mehreren Fundorten von Syrien und Liban gemeldet [26], aber nicht beschrieben. Für die Wechselkröte aus SO-Türkei sind helles Rückenband und dunkle Längsstreifen kennzeichnend [7]. Deswegen wurde die kleinasiatische Population als Vertreter von *B. viridis arabicus* Heyden bestimmt. Dieselben Merkmale sind, wie oben schon gezeigt wurde, für die Wechselkröte von Zypern charakteristisch, woraus sich ergibt, dass beide Populationen derselben Unterart angehören. Somit betrachten wir die Wechselkröte von Zypern ebenfalls als *B. viridis arabicus*.

Die Verbreitung dieser Art in Vorderasien ist kaum erforscht. Auf Grund von Belegestücken wird die östliche Grenze der Unterart über Irak bis Iran, südostwärts bis zum Persischen Golf gezogen [5]. Der Holotyp stammt aus der Halbinsel Sinai [7]. Die westliche Grenze verläuft wahrscheinlich irgendwo durch Kleinasien, ohne genau festgestellt zu sein.

Die Angehörigkeit der Wechselkröte aus Zypern zu *B. viridis arabicus* besagt, dass die zypriotische Population näher der vorderasiatischen als der kretischen steht, da auf der Insel Kreta die Wechselkröte durch die Nominatrasse vertreten ist [22]. Dort weist die Wechselkröte keine Besonderheiten auf [23]. Durch das helle Rückenband erinnert *B. viridis arabicus* aus Zypern an *B. raddei* Strauch aus dem Amurbecken und der Mongolei, sowie an *B. viridis pseudoraddei* Mertens aus Pakistan. Diese Unterart hat aber sehr kurze Parotiden [14], während bei *B. viridis arabicus* die Parotiden bis 14 mm Länge aufweisen. Viel länger sind aber die Parotiden bei *B. viridis turanensis* Hemmer, Schmidtler et Böhme aus den Niederungen Mittelasiens [11] Gegenüber *B. viridis asiomontanus* Pisanets et Shcherbak aus dem Hochgebirge von Innerasien, zeichnet sich *B. viridis arabicus* durch breitere Parotiden aus. Auf Grund des BP/LA-Verhältnisses ist die zy-

priotische Population an *B. viridis turanensis* näher als an *B. viridis asiomontanus*.

Schlussbetrachtungen. Durch die vorliegende Arbeit wird gezeigt, dass *B. viridis* in Zypern nicht ausgestorben ist, sondern ein ständiges Element in der anthropogenen Landschaft darstellt und dass die zypriotische Wechselkröte nicht zu *B. viridis viridis* gehört, aber auch keine für diese Insel eigene, endemische Unterart bildet. Ferner wird gezeigt, dass die Wechselkröte aus Zypern der Unterart *B. viridis arabicus* angehört.

Die Verbreitung der Wechselkröte auf der Insel bleibt, wie zuvor, unbekannt. Wir haben bloss gezeigt, dass die Spezies in der Hauptstadt Nikosia zu Hause ist, also in der Gartenlandschaft inmitten der Niederung Mesaoria. Diese ist mit Gewässern gut versorgt [21]. Die Kröten finden daher geeignete Laichplätze in diesem Teil der Insel. Ob die Wechselkröte auch in trockenen Biotopen im Westen der Insel, sowie am Meeresstrande im Süden und an den Küsten des Grossen Salzsees bei Larnaka vorkommt, wissen wir nicht. Aus dem niederschlagsreichen, bewaldeten Gebirgsmassiv Troodos, meldete W e r n e r [25] die Wechselkröte nicht.

Ohne Vergleichsmaterial aus dem asiatischen Festland können wir die Verwandschaftsbeziehungen von *B. viridis arabicus* nicht erörtern. Nach neueren Befunden [12, 20], lässt sich die Mikroevolution und Artbildung innerhalb des *B. viridis*-Artenkreises (*B. viridis* zusammen mit *B. danatensis* Pisanets und *B. katastii* Boul., beide aus Innerasien) nur durch die Erfassung der Evolutionsmechanismen des Genoms beurteilen. Man kann aber schon heute behaupten, dass, zum Unterschied von Europa, in Vorder-, Mittel- und Innerasien die Evolution des Artenkreises *B. viridis* mit hoher Geschwindigkeit verläuft, wobei tiefgreifende Umbildungen des Chromosomensatzes zustande kommen und zahlreiche lokale Evolutionseinheiten mit unterschiedlichen taxonomischen Niveaus entstehen [17, 18].

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HERPETOLOGISCHE VERHÄLTNISSE IM SÜDOSTEN VON PELOPONNES

BOGDAN STUGREN* und NIKOLAOS AGADAKOS**

SUMMARY. — Herpetological Pattern of the Southeast of Peloponnesus. There are only 4 species of European amphibians and reptiles which reach Cape Maléa, the southeasternmost point of Peloponnesus, as well as of the Balkan Peninsula and the European mainland, at latitude 36° 10' north and longitude 23° 10' east of Greenwich. The faunal list comprises one species of toad (*Bufo viridis* (Laur.)), one of lizard (*Lacerta trilineata* Bedriaga), and two species of snakes (*Elaphe longissima* (L.) and *Natrix natrix* (L.)).

Kap Maléa ist die südöstlichste Landspitze der Halbinsel Peloponnes, sowie der Balkanhalbinsel und zugleich des europäischen Festlandes. Es ist die Spitze des dritten, östlichen „Fingers", bzw. der östlichen Halbinsel der grossen Halbinsel Peloponnes, die im Südosten einen engen Landstreifen zwischen dem Lakonischen Golf im Westen und dem Ägäischen Meer im Osten bildet. Kap Maléa liegt bei 36° 30' n. Br. und 23° 10' ö. L. Der Südosten von Peloponnes stellt eine nicht bewaldete Landschaft dar, welche von der mediterranen Trockenheide (Phrýgana) eingenommen ist [3].

Hier wird die Frage aufgeworfen, welche europäischen Amphibien und Reptilien, vom Norden her einwandernd, die südöstlichste Landspitze von Peloponnes erreichen. Literaturangaben darüber fehlen, obwohl die reiche Herpetofauna von Peloponnes verhältnismässig eingehend erforscht ist, nicht aber jene von Kap Maléa. Weder ältere [1, 6], noch neuere [4] Autoren erwähnen Kap Maléa als Fundort in ihren Artenlisten der griechischen Amphibien und Reptilien.

Das hier vorgelegte Material wurde vom zweiten Autor im Mai—Juni 1983 im Bereich des Kaps Maléa, an der Westküste dieser Landspitze, nämlich an den Ufern des Golfes von Vátika, eine Einbuchtung des Lakonischen Golfes, südlich von Neápolis, gesammelt. Diese kleine Sammlung wird im Zoologischen Museum der Babeş-Bolyai-Universität aufbewahrt.

Unsere **Artenliste** ist spärlich. Sie umfasst nur 4 Spezies, jede bloss durch ein Exemplar vertreten. Darunter sind nur eine Amphibienart und 3 Reptilienarten (eine Echse und zwei Schlangen) zu vermerken. Es sind:

Amphibia: Wechselkröte (*Bufo viridis* (Laur.));

Reptilia: Riesensmaragdeidechse (*Laceta trilineata* Bedriaga), Äskulapnatter (*Elaphe longissima* (L.)) und Ringelnatter (*Natrix natrix* (L.)).

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Keines von den untersuchten Exemplaren weist taxonomisch verwertbare Besonderheiten auf. Unsere Wechselkröte ist von Stücken aus Siebenbürgen (Rumänien) überhaupt nicht unterscheidbar. Die Riesensmaragdeidechse von Kap Maléa weist 4 Paare von Inframaxillaren auf. Es ist ein konstantes Artmerkmal, das, zum Unterschied von der Zahl der Längsreihen von Ventralschildern, keine Variationen zeigt [2]. Unser Exemplar, ein erwachsenes Männchen, hat 6 Längsreihen von Ventralschildern und ein ziemlich deutliches Massetericum, ferner Halsseiten ohne Blaufärbungen, wodurch es in die Nominatrasse einreihbar ist. Bei der Äskulapnatter ist nichts besonderes zu vermerken. Bei der Ringelnatter fehlen die gelben Halbmondflecken am Hals. Das entspricht der Schlussfolgerung von Werner [6], der eine grosse Anzahl von Ringelnattern aus dem Peloponnes untersuchte, dass in diesem Teile des Artareals die gelben Halbmondflecken verdüstert sind. Unser Exemplar ist in die geographische Rasse *N. natrix persa* (Pall.) einzureihen, da bei *persa* dieses Merkmal oft vorkommt. Laut Mertens [5], gehören Ringelnattern aus der Balkanhalbinsel, südlich des Balkangebirges, der Rasse *persa* an, die jedoch uneinheitlich und veränderlich ist.

Diskussion. Merkwürdig ist am Golf von Vátika das Fehlen zahlreicher Arten, die im südlichen Landstreifen von Peloponnes häufig vorkommen. So fehlt hier der Seefrosch (*Rana ridibunda* Pall.), der unweit westlich, bei Kalamata vorkommt. Es fehlen ebenfalls die Taurische Eidechse (*Lacerta taurica* Pall.) und die im Süden von Peloponnes endemische Art *L. peloponnesiaca* Bibron et Bory, welche aber in der Umgebung von Kalamata vom zweiten Autor gesammelt wurden. Ob für diese Abwesenheit die exzessive Trockenheit des Kaps Maléa verantwortlich ist, oder die Zufälligkeit, welche das Sammeln von Reptilien in mediterranen Ländern bestimmt, lässt sich an Hand unseres Materials nicht entscheiden.

Zusammenfassung. Die südöstlichste Landspitze des europäischen Festlandes ist spärlich von Amphibien und Reptilien bevölkert. Die geringe Artenzahl beweist die Verarmung der Herpetofauna am Südrande des Kontinents, dafür ist vielleicht die ökologische Lage, die Trockenheide, verantwortlich.

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ERNÄHRUNGSPHYSIOLOGISCHE UNTERSUCHUNGEN ZUR EIERPRODUKTION UNTER INDUSTRIELLEN BEDINGUNGEN

ZOLTÁN KIS*, MIRCEA POP* und ION SECHEL**

SUMMARY. — Nutrition-Physiological Investigations on Egg Production under Industrial Conditions. The firmness of egg shell conditions even the existence of eggs. The firm shell assures the physical integrity of eggs during different manipulations they undergo from laying to their consumption. The authors have worked out and applied, under both laboratory and industrial conditions, a fodder additive formulation aiming at improving the firmness of egg shell. The results obtained have shown that administration of this additive to the fodder of hens led to a considerable increase in the shell firmness, to a marked improvement of the yolk colour and also to an increase in the total egg production.

Die Verwertung der industriellen Abfälle zu produktiven Zwecken ist eine der lebenswichtigsten Fragen der modernen Ökonomie [1]. Die praktische Anwendung dieses Prinzips erhält in der Nahrungsmittelindustrie eine stets wachsende Bedeutung. Innerhalb dieser, steht die Eierproduktion an erster Stelle [2, 4]. Es wurde festgestellt, dass ein 1%-er Verlust der Eier (durch zufälliges Zerbrechen) jährlich einen Schaden von vielen Millionen Lei verursacht. Daher wurden mehrere Experimente unternommen, deren Hauptzweck die Verbesserung der mechanischen Widerstandsfähigkeit der Eierschale, sowie im allgemeinen die Erhöhung der Produktionskapazität war. Um dieses Ziel zu erreichen, richteten wir unser Augenmerk auf die Stimulierung des Stoffwechselpotentials des Geflügels durch eine reiche Zuführung von eibildenden Stoffen (Mineralien, energetische Stoffe, Vitamine), die wir aus bestimmten Abfällen und billigen Produkten erhielten [3, 5]. Gleichzeitig wurden auch Wirtschaftlichkeit und industrielle Anwendbarkeit verfolgt. Von diesen orientativen Ergebnissen ausgehend, stellten wir einen Nahrungszusatz zusammen, der sowohl auf die Widerstandsfähigkeit der Schale, als auch auf die Vitalität der Hühnern eine stimulierende Wirkung ausübte.

Material und Methode. Unser Nahrungszusatz hat die folgende Zusammensetzung:

Quarzsand	2,5%
Saturationsschlamm von der Zuckerherstellung	30,5%
Eierschale	4,0%
Sonnenblumenschrot	8,0%
Futterhefe	2,0%
Knochen- und Fleischmehl	5,0%
Getrocknete Rübenschnitzel von der Zuckerherstellung	30,0%
Getrocknete Weizensprosseln	15,0%
Getrocknete Möhre	3,0%

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Den Untersuchungen dienten 7000 Legehühner (Farm Nr. 2, Turda) und 20 Hühner, die unter Laborbedingungen in Cluj-Napoca erforscht wurden. Es wurden 1200 Analysen unternommen um die Härte und das Gewicht der Eierschale, das Gesamtgewicht der Eier und die Farbe des Eigelbs zu untersuchen. Die Widerstandsfähigkeit der Schale wurde durch Druck (g/mm^2) geprüft, die Farbe des Eigelbs auf Grund des Yolk Colour Fan „Roche" Testes und die Gesamtproduktion und Schwankung des Hühnerbestandes laut Evidenz der Züchterei. Als Vergleichsgruppe dienten 5700 Hühner derselben Rasse und aus derselben Halle.

Die einzelnen Teile des Zusatzes wurden zunächst getrocknet und fein zerkleinert. Vor der Mischung wurden der Sand und der Schlamm, die Hefe und der Schrot zwecks Desinfizierung und chemischer Aktivierung drei Stunden ultravioletter Bestrahlung ausgesetzt. Die tägliche Dosis bestand aus 10 g/Huhn 18 Tage hindurch. Zur Analyse wurden je 150 Eier, in einem Abstand von 2, 5, 11, 14 und 18 Tagen vom Beginn der Untersuchung verwendet.

Ergebnisse und Diskussion. Aus der Tabelle 1 wird ersichtlich, dass nach den ersten 5 Tagen der Hinzugabe unseres Zusatzes die Härte der Eierschale zwar zunimmt, der Unterschied zur Vergleichsgruppe bleibt aber statistisch unsignifikant. Die Härte der Eierschale wuchs auch bei den nicht behandelten Hühnern. Wir sind geneigt dieses durch die Wiederherstellung des gestörten Stoffwechsels der Hühner nach einen Korise-epidemie zu erklären, die unseren Untersuchungen vorausgegangen war. Es soll hier erwähnt werden, dass bei den ersten Untersuchungen auch diejenigen Eier zum Vergleich herangezogen wurden, die wir von denselben Hühnern vor dem Experiment erhalten hatten. Die konkludente Wirkung der Zuführung unseres Nahrungszusatzes auf die Widerstandsfähigkeit der Schale zeigte sicht erst in den letzten Tagen der Untersuchung und zwar durch ein Anwachsen von 23,7% gegenüber der Vergleichsgruppe. Was die anderen, von uns verfolgten Faktoren betrifft, stellten wir ein geringes Anwachsen des Gewichtes der Schale und der Eier, sowie eine dunklere Farbe des Eigelbs fest.

Was die Produktivität betrifft wurde laut Angaben der Züchterei eine 12,9%-ige Erhöhung der behandelten Hühnern gegenüber der Vergleichsgruppe verzeichnet (Tabelle 2).

Tabelle 3 zeigt die während der Untersuchung erfolgte Mortalität (laut Angaben der Züchterei) im Vergleich zu den unbehandelten Hühnern. Bei den behandelten Hühnern war der Verlust um 12,3% geringer als bei den unbehandelten.

Schlussfolgerungen. Die Verabreichung des Nahrungszusatzes bestimmte einen verbesserten Widerstand der Eierschale, eine erhöhte Eierproduktion und einen bedeutenden Rückgang der Mortalität. Der Nahrungszusatz, der einen Teil der gewöhnlichen Nahrung der Hühner bildet, ist billiger als das gewöhnliche Futter und wirkt sich dabei positiv auf die Verwertungskapazität der Nahrung bei Legern aus.

Tabelle 1

Entwicklung der untersuchten Indizen der Hühnereier in der Periode *28.XI.—21.XII.1978*
(Mittelwerte)

Vergleichsgruppe (Probenzahl: 510)						Experimentgruppe (Probenzahl: 690)					
Datum	Gesamtgewicht (GG) (g)	Schalengewicht (SG) (g)	Verhältnis GG/SG	Schalenhärte (g/mm²)	Eigelbfarbe	Datum	Gesamtgewicht (GG) (g)	Schalengewicht (SG) (g)	Verhältnis GG/SG	Schalenhärte (g/mm²)	Eigelbfarbe
28.XI.	59,18	5,74	10,34	1311	6,59	5.XII.	62,59	5,84	10,71	1255	7,32
30.XI.	62,48	5,72	10,92	1211	7,11	9.XII.	62,35	6,11	10,20	1340	8,06
15.XII.	60,74	5,54	10,96	1352	7,14	15.XII.	60,87	5,58	10,90	1628	7,27
21.XII.	59,60	5,39	11,03	1645	7,21	18.XII.	61,14	5,36	11,40	1560	7,29
						21.XII.	60,90	5,82	10,46	2751	7,30
M.=	60,47	5,59	10,80	1380	7,01	M.=	61,57	5,74	10,73	1707	7,45
% gegenüber der Vergleichsgruppe							1,8	2,68	—0,65	23,7	6,27

Tabelle 2

Eierproduktion bei den Vergleichs- und Experimenthühnern
(Gesamtbestand 12.700, davon Vergleichsgruppe 5.700; Experimentgruppe 7.000; Untersuchungsdauer 18 Tage)

Gesamtbestand		Vergleichsgruppe		Experimentgruppe	
Absolute Produktion	Durchschnitts-produktion/ Huhn	Absolute Produktion	Durchschnitts-produktion/ Huhn	Absolute Produktion	Durchschnitts-produktion/ Huhn
135.300	10,65	56.680	9,94	78.620	11,23

Tabelle 3

Mortalität bei den Vergleichs- und Experimenthühnern
(Gesamtbestand 12.700, davon Vergleichsgruppe 5.700; Experimentgruppe 7.000; Untersuchungsdauer 18 Tage)

Gesamtbestand		Vergleichsgruppe		Experimentgruppe	
Absolute Mortalität	Prozentuelle Mortalität	Absolute Mortalität	Prozentuelle Mortalität	Absolute Mortalität	Prozentuelle Mortalität
135	1,06	65	1,14	70	1,00

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STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXII, 2, 1987

SENSIBILITÉ CENTRALE ET PÉRIPHÉRIQUE VIS-À-VIS DES GRAISSES ET L'IMPACT DES STIMULATIONS ADÉQUATES SUR L'ACTIVITÉ BIOÉLECTRIQUE DE L'HYPOTHALAMUS LATÉRAL ET DE LA RÉTICULÉE MÉSENCÉPHALIQUE

MIRCEA POP* et VASILE BAN**

SUMMARY. — Central and Peripheral Sensitivity to Lipids and Effect of Adequate Stimulations on Bioelectric Activity of the Lateral Hypothalamus and the Reticulate Formation. The recording of bioelectric variations in the lateral hypothalamus and the reticulate formation revealed differences in their sensitivity to small amounts of triolein as well as peculiarities of the bioelectric responses to ingestion (by gavage) of a certain quantity of sunflower oil or milk. The reciprocal influence of alternative intrahypothalamic and gastric lipid stimulation was also studied. Conclusions are drawn regarding the sensitivity to lipids of the central and peripheral nervous structures investigated and the possibility of their reciprocal interaction is commented.

L'hypothalamus est une vaste aire réceptrice des signaux provenant du milieu intérieur et des viscères, ainsi qu'un important centre d'intégration et de régulation de l'homéostasie et des fonctions végétatives générales de l'organisme. Les fonctions digestives et de nutrition, vu leur rôle dans l'économie générale de l'organisme, occupent un lieu à part dans l'ensemble des intégrations et régulations hypothalamiques. A ce niveau on trouve les centres de la faim et de la satiété et des neurones sensibles aux principaux nutriments absorbés dans le sang [8, 11, 12]. L'ingestion et la présence des nutriments dans le tube digestif est signalée à l'hypothalamus par des afférences spécifiques. On y a mis en évidence (parmi d'autres) des chémorécepteurs sensibles aux glucides et acides aminés [2, 9—11, 13]. En ce qui concerne la présence des récepteurs pour les acides gras, il n'y a pas d'indications morphologiques et physiologiques, mais l'existence des récepteurs polymodaux [7, 11] et divers résultats expérimentaux [1, 4—6, 14] la suggèrent indirectement.

Dans nos recherches on a abordé le problème dans le contexte de l'interaction entre la stimulation directe de l'hypothalamus par trioléine et la stimulation gastrique par l'introduction de l'huile et du lait.

Matériel et méthodes. Les expériences ont été faites sur des rats blancs de souche Wistar (220—250 g) anesthésiés, avec du nembutal. Les électrodes en acier inox, dont le diamètre de la pointe désisolée était de 0,12 mm, ont été introduites dans l'aire hypothalamique latérale (HL) et dans la réticulée mésencéphalique (F. rét.) à l'aide de l'appareil stéréotaxique, d'après les coordonnées de l'atlas stéréo-

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taxique de De Groot [3]. Simultanément et parallèlement avec l'électrode de dérivation de l'aire hypothalamique latérale (dans l'une des variantes expérimentales, avec l'électrode introduite dans la réticulée mésencéphalique), à une distance de 0,5 mm de celle-ci, on a introduit l'aguille d'une microseringue (diamètre de 0,45 mm) pour l'injection de la trioléine. A la fin des expériences on a fait le contrôle anatomique des zones répérées.

Tous les enregistrements bioélectriques ont été faits en dérivation monopolaire, l'électrode de référence étant placée sur le pavillion de l'oreille de l'animal. Comme appareil d'enregistrement des phénomènes bioélectriques a été utilisé l'électroencéphalographe type 8RG—1 (RDA).

On a enregistré les modifications bioélectriques de l'aire hypothalamique latérale et de la réticulée mésencéphalique, dans les variantes expérimentales suivantes: a) injection de 0,2 microlitres trioléine (Merck) dans l'aire hypothalamique latérale: b) injection de la même quantité de trioléine dans la réticulée mésencéphalique; c) introduction de l'huile de tournesol (1 ml/100 g poids corp.) par le gavage dans l'estomac; d) introduction par le gavage dans l'estomac de la même quantité de lait; e) l'effet de la trioléine injectée en HL, sur le fond des modifications produites par l'action de l'huile ingerée, et vice-versa; f) mêmes expériences avec l'ingestion du lait par le gavage. Les enregistrements bioélectriques ont commencés 45—60 sec. après les interventions expérimentales mentionnées.

Résultats et discussions. Nos résultats confirment la sensibilité de l'hypothalamus latéral vis-à-vis des acides gras [4], mais de surcroît ils attestent que la réticulée mésencéphalique n'est pas dépourvue elle non plus d'une telle propriété (fig. 1 a et c). Il y a, certes, des différences entre les réponses bioélectriques des deux structures et elles deviennent encore plus marquées après l'addition d'une même quantité de trioléine (Fig. 1 b et d).

L'ingestion par le gavage de l'huile de tournesol provoque l'aplatissement du tracé des ondes lentes enregistrées au niveau de l'hypothalamus latéral et une considérable accélération du rythme au niveau de la réticulée mésencéphalique (Fig. 2b). L'injection de 0,2 microlitres trioléine dans l'hypothalamus latéral fait revenir l'allure des tracés à un niveau presque normal (Fig. 2c). L'addition de la même quantité de l'huile par le gavage (20 min. après la première), sur le fond de l'action de la trioléine, provoque cette fois des modifications bioélectriques

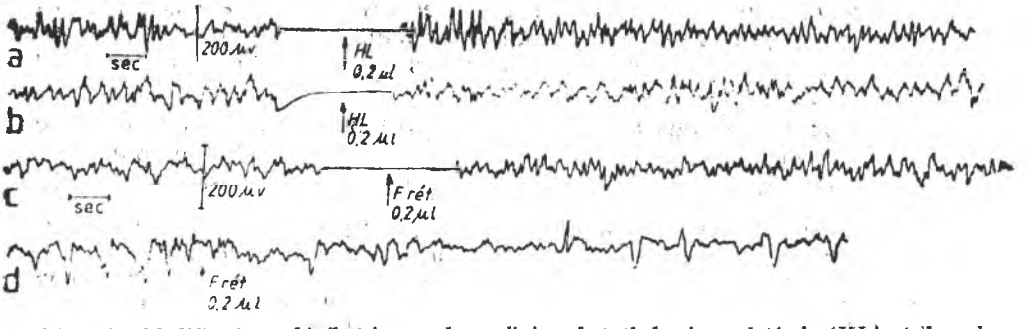

Fig. 1. *Modifications bioélectriques dans l'aire hypothalamique latérale (HL) et dans la réticulée mésencéphalique (F. rét.) après l'injection de la trioléine dans les mêmes zones cérébrales.*

a et c — Première injection. b et d — Deuxième injection.

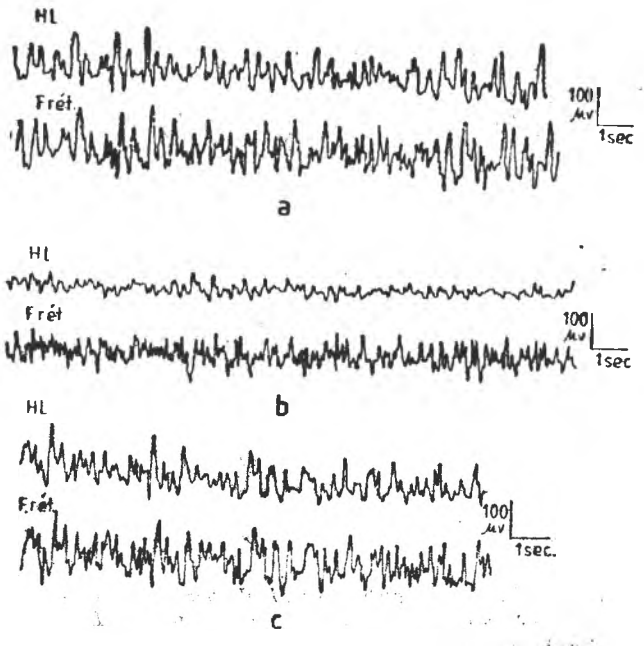

Fig. 2. *Effets de l'ingestion de l'huile (par le gavage) et de l'injection de la trioléine dans l'aire hypothalamique latérale (HL) sur l'activité bioélectrique dans HL et F. rét.*

a — Tracé normal. b — 1 min. après l'ingestion de l'huile par le gavage. c — L'effet de l'injection de la trioléine au niveau de HL (1 min. après l'ingestion de l'huile).

seulement au niveau de l'aire hypothalamique latérale (Fig. 3c). L'ingestion par le gavage du lait (même quantité que l'huile) exèrce une faible influence sur l'activité bioélectrique de l'hypothalamus latéral, mais provoque une notable accélération du rythme de la décharge bioélectrique au niveau de la réticulée mésencéphalique (Fig. 4b). L'injection de la trioléine dans l'hypothalamus latéral, sur le fond de l'action intragastrique du lait, n'a qu'une faible influence sur l'activité biélectrique de la même région (Fig. 5b). L'addition de la même quantité de lait par le gavage (20 min. après la première) fait augmenter la fréquence de la décharge bioélectrique au niveau de la réticulée mésencéphalique et n'influence guère l'activité bioélectrique de l'hypothalamus latéral (Fig. 5c).

Nos résultats plaident pour l'existence d'une sensibilité de l'estomac vis-à-vis des graisses, quoiqu'on ne connaisse pas encore la nature des récepteurs spécifiques. La sensibilité du duodénum et de l'intestin grèle vis-à-vis des graisses a été démontrée [1, 4—6]. Elle pourrait être expliquée, vraisemblablement, par la présence des chémorécepteurs polymodaux à ce niveau [11] et cela pourrait être valable, s'il en est ainsi, pour l'estomac aussi. Itina et collab. [6] montrent que les

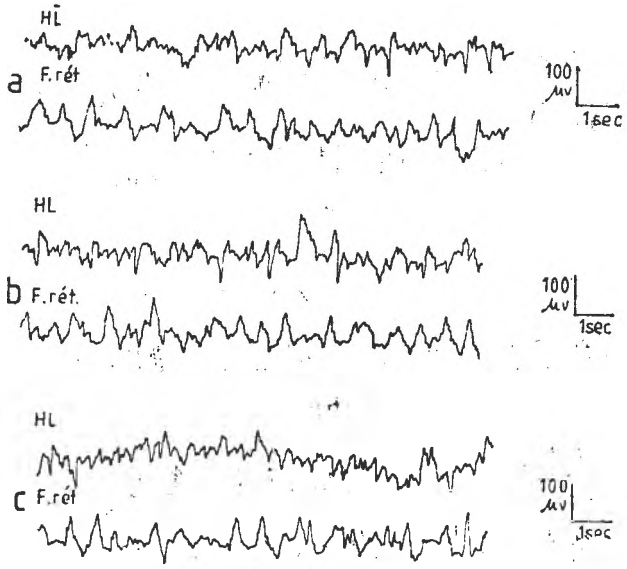

Fig. 3. *Effets de l'ingestion de l'huile par le gavage sur le fond de l'action de la trioléine au niveau de HL.*

a — Tracé normal. b — 1 min. après l'injection de la trioléine. c — L'effet de l'ingestion de l'huile par le gavage.

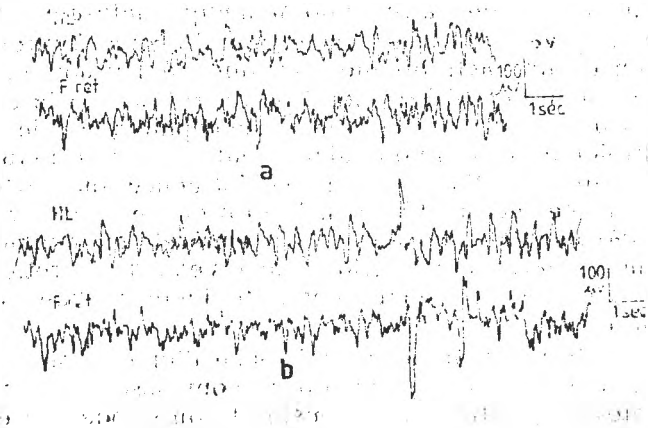

Fig. 4. *L'effet de l'ingestion du lait par le gavage sur l'activité bioélectrique dans HL et F. rét.*

a — Tracé normal. b — L'effet de l'ingestion du lait par le gavage.

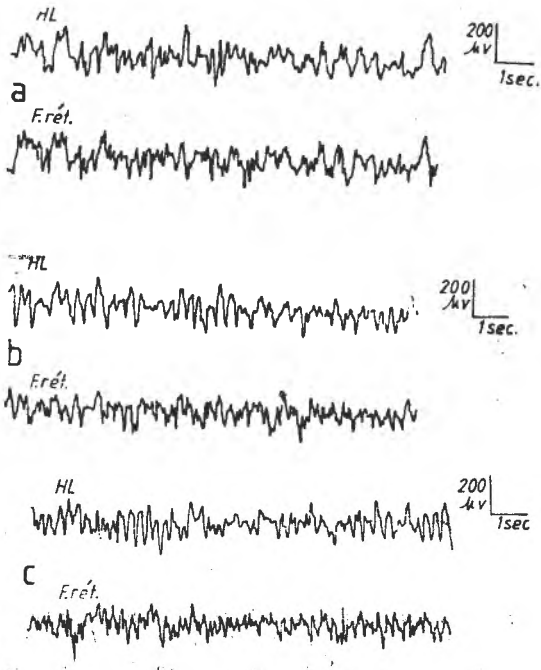

Fig. 5. *Influences réciproque de l'action du lait ingéré par le gavage et de l'injection de la trioléine dans HL.*

a — Tracé normal, 15 min. après l'ingestion du lait par le gavage. b — L'effet de la trioléine. c — L'effet de l'ingestion du lait par le gavage sur le fond de l'action de la trioléine au niveau de HL.

graisses sont de très puissants excitants au niveau de l'intestin, plus puissants même que le pain et la viande. Au niveau de l'estomac, paraît-il, la situation est inverse. D'après S o b a k i n [14], l'activité bioélectrique de l'estomac à l'ingestion des graisses est beaucoup plus modeste que celle engendrée par l'ingestion du pain ou de la viande. Dans nos expériences, l'ingestion de l'huile par le gavage provoque au niveau de l'hypothalamus latéral et de la réticulée mésencéphalique des réponses bioélectriques plus nettes que l'ingestion de la même quantité de lait.

L'injection de la trioléine en HL a des effets différents sur les réponses bioélectriques engendrées par l'huile et le lait intragastrique. Les réponses à l'huile sont nettes autant au niveau hypothalamique, qu'au niveau de la réticulée mésencéphalique, tandis qu'au lait, elles sont remarquables seulement au niveau de la réticulée mésencéphalique. À leur tour, l'huile et le lait intragastrique exercent des effets facilitateurs différents sur les réponses provoquées par la trioléine injectée en HL. L'huile, par exemple, facilite l'effet de la trioléine au niveau de deux structures étudiées (HL et F. rét.), tandis que le lait ne

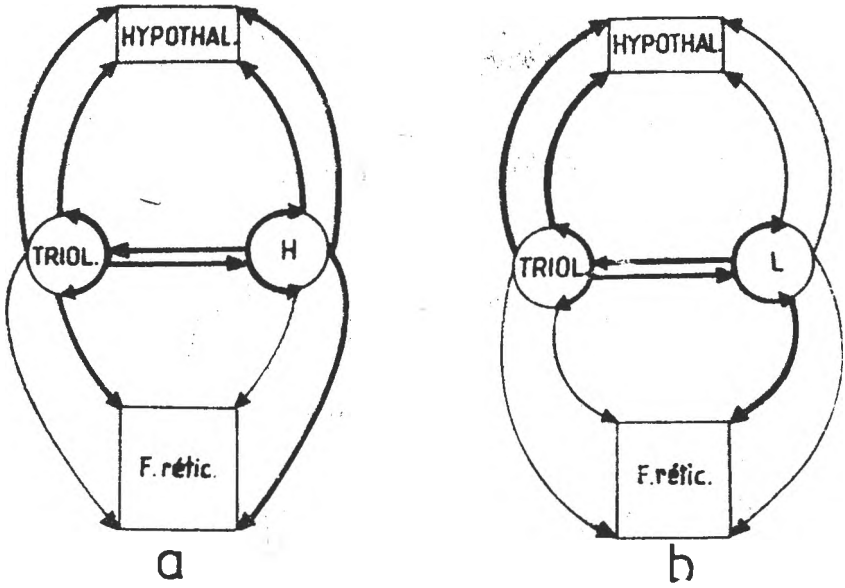

Fig. 6. *Schémas synthétiques des influences activatrices de la trioléine (TRIOL.) et de l'huile (H) sur l'activité bioélectrique de l'hypothalamus latérale et de la réticulée mésencéphalique.*
a — Interactions huile-trioléine. b — Interactions lait (L_l)-trioléine.
Les traits pleins extérieurs marquent un degré plus important des influences.

facilite que légèrement son effet au niveau de l'hypothalamus latéral. L'ensemble des interactions est résumé schématiquement dans la Fig. 6a et b.

Conclusions. 1. L'hypothalamus latéral et la réticulée mésencéphalique répondent à l'injection directe d'une très petite dose de trioléine. 2. L'ingestion de l'huile et du lait par le gavage provoque des modifications bioélectriques spécifiques au niveau de l'hypothalamus latéral et de la réticulée mésencéphalique. 3. La stimulation alternative des chémorécepteurs gastriques et hypothalamiques met en évidence des réponses bioélectriques qui marquent des interactions caractéristiques entre les deux catégories des récepteurs.

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FUNCTIONAL AND ULTRASTRUCTURAL ASPECTS OF LIVER MITOCHONDRIA ISOLATED FROM RATS INTOXICATED WITH ETHIONINE AND TREATED WITH Mg^{2+} ORGANIC COMPLEXES

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SUMMARY. — Liver mitochondria isolated from rats intoxicated with ethionine and treated with different Mg^{2+} organic complexes show an improvement of certain functional parameters, such as the respiratory control ratio and the stability of the membrane potential and Ca^{2+} fluxes, as compared to mitochondria of the untreated intoxicated animals. Electron microscopy also reveals different degrees of structural recovery in mitochondria of treated animals. The best results were obtained with Mg-glutamogluconate, whereas Ca-Mg-gluconolactate and Mg-glutamolactate were much less efficient.

Continuing our line of research regarding the effect of certain Mg^{2+}-containing organic salts on different functional parameters of liver mitochondria isolated from experimentally intoxicated rats [8, 9], we have undertaken a more extensive study of the effects of such Mg^{2+} complexes on the functions and ultrastructure of both isolated and *in situ* mitochondria. This paper will deal only with the isolated mitochondria, although short references to the results obtained on hepatic sections will be occasionally made.

The functional parameters selected for study were the respiratory control ratio and the stability of the membrane potential and of the calcium fluxes. The significance and the importance of these parameters as well as of the ultrastructural aspects, in connection with their use in the estimation of the recovery state of the mitochondria, have been described in our previous articles [6—9].

Materials and methods. Male Wistar rats of about 130 g, kept on a normal diet, were intoxicated with ethionine (10 mg/100 g body weight) and part of them additionally treated with a 5% solution of one of the following Mg^{2+} containing complexes: Ca-Mg-gluconolactate, Mg-glutamolactate, Mg-glutamogluconate (0.5 ml/100 g body weight in each case). The intoxication and the treatment were performed by gavage, according to a protocol similar to one already described [8]. The rats were sacrificed 3 days after the treatment or the last ethionine dose.

Mitochondria were isolated according to standard procedures [4], the isolation medium consisting of 250 mM sucrose, 5 mM Tris-HCl (pH 7.3) and 0.1 mM EDTA. The washing and suspending medium lacked EDTA. Oxygraphic measurements were performed in a 0.5-ml cell with a Clark oxygen electrode, in a medium consisting of 100 mM sucrose, 80 mM KCl, 5 mM Tris-HCl (pH 7.3), 2.5 mM KPi (Pi — inorganic phosphate) and 2 mM $MgSO_4$. This is referred to as the phosphorylating me-

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dium (PM). Two variants of this medium were used: with and without 1 mM NaEDTA. 2 mg of mitochondria/ml were used with glutamate+malate as substrates (5 mM each) or 1 mg/ml with succinate (5 mM). Substrates were administered as K^+ salts. ADP was added at a concentration of 0.1—0.2 mM, in 2 or 3 successive injections, at intervals of about 2—3 minutes.

Spectral recordings for membrane potential and free Ca^{2+} were performed with a Specord M 40 split-beam spectrophotometer, at 660 nm, using diS-C_2-(5) as a membrane potential probe and antipyrylazo III as a calcium indicator. A special procedure was employed in order to avoid the artifacts which usually appear in connection with split-beam measurements (see [9]). The details of each experiment can be found in the figures and their legends.

Mitochondrial ultrastructure was studied with the aid of a TESLA BS—500 electron microscope. For this purpose, an aliquot of 0.1—0.2 ml was extracted from the oxygraphic cell after the exhaustion of the second ADP pulse and processed according to a protocol described previously [6, 7].

All the chemicals used were of analytical grade. ADP, rotenone and antipyrylazo III were from Sigma and diS-C_2-(5) from Eastman-Kodak. The Mg^{2+} organic complexes were produced by Biofarm (Bucharest).

Results and discussion. Table 1 presents the statistical results of the oxygraphic measurements performed in the presence of succinate as a respiratory substrate. Higher respiratory control ratios (RCR) were obtained with glutamate+malate, but essentially following a similar pattern as that presented in Table 1. Since only succinate was used for membrane potential and Ca^{2+} measurements and no additional relevant information could be extracted from the glutamate results, they will not be presented here.

The first observation that can be made from Table 1 is the lower-than-usual respiratory control ratios. Since the experiments were performed during May 1986, shortly after the Chernobyl accident, and the results improved later on (first half of July), we could speculate on this coincidence, of course, without considering it as firm evidence. There may have been some other causes, such as technical difficulties with the pH adjustment, etc.

Table 1

Respiratory control ratio (RCR) with succinate (5 mM)

Medium	Group no.	Treatment	$RCR_1 \pm SEM$	$RCR_2 \pm SEM$
PM + EDTA	1.	CONTROL	2.83±0.20	2.95±0.11
	2.	Ethionine intoxicated (E.I.)	2.41±0.11	2.43±0.08
	3.	E.I. + Ca—Mg-gluconolactate	2.47±0.16	2.46±0.17
	4.	E.I. + Mg-glutamolactate	2.41±0.16	2.39±0.34
	5.	E.I. + Mg-glutamogluconate	2.58±0.39	2.60±0.39
PM — EDTA	1.	CONTROL	2.13±0.18	2.04±0.23
	2.	Ethionine intoxicated (E.I.)	1.86±0.08	1.70±0.14
	3.	E.I. + Ca—Mg-gluconolactate	2.04±0.22	1.80±0.16
	4.	E.I. + Mg-glutamolactate	1.83±0.13	1.66±0. 6
	5.	E.I. + Mg-glutamogluconate	2.15±0.13	1.95±0.15

The second and more important observation is the decrease of RCR in mitochondria obtained from intoxicated animals (group no. 2) as compared to the control (group no. 1). Moreover, the group treated with Mg-glutamogluconate (no. 5) shows a visible improvement. The results are in fact comparable to the control, which is not the case with the groups treated with Ca-Mg-gluconolactate or Mg-glutamolactate (no. 3 and 4, respectively). Although, due to the small number of preparations and the relatively small differences between groups, no statistical significance could be attached to either the decrease (for group no. 2) or the increase (for group no. 5) of the respiratory control ratio, the situation is confirmed by the results obtained with glutamate and by other methods (membrane potential and Ca^{2+} measurements, electron microscopy of isolated and *in situ* mitochondria).

Mitochondria with higher-than-average RCR were used for membrane potenial and Ca^{2+} measurements in all groups, in order to compensate for the generally low values of RCR.

Fig. 1 illustrates the kinetics of membrane potential (A) and calcium fluxes (B) in control mitochondria, under the conditions of metabolic efforts represented by the addition of inorganic phosphate (Pi) and calcium (Ca^{2+}). We have used Pi since phosphate anion is known to be involved not only in Ca^{2+} uptake but also in Ca^{2+} efflux [1, 2, 5, 10]. It can be seen from the figure that the membrane potential increases slightly upon addition of Pi, attaining a new steady state. It decreases slightly on the addition of Ca^{2+} and remains at a relatively high level for about 2 minutes, after which it collapses. In the parallel ex-

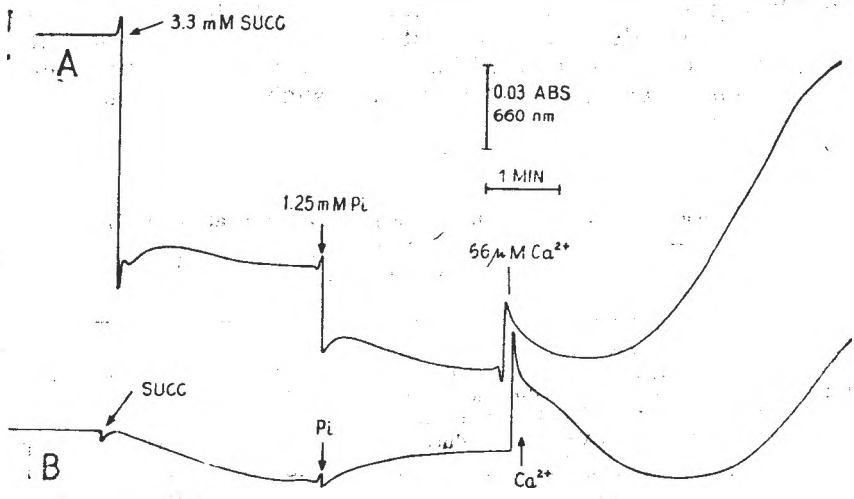

Fig. 1. *Kinetics of membrane potential (A) and calcium fluxes (B) in control mitochondria.* 0.75 mg mitochondrial protein/ml is suspended in 100 mM sucrose + 80 mM KCl + 5 mM Tris-HCl (pH 7.3) + 2 mM $MgSO_4$ + 5 μM rotenone. 1.5 μM diS—C_3—(5) (in A) or 50 μM antipyrylazo III (in B) are also present in the sample cuvette. 3.3 mM K-Succinate, 1.25 mM KPi and 66 μM $CaCl_2$ are added as indicated, to both cuvettes.

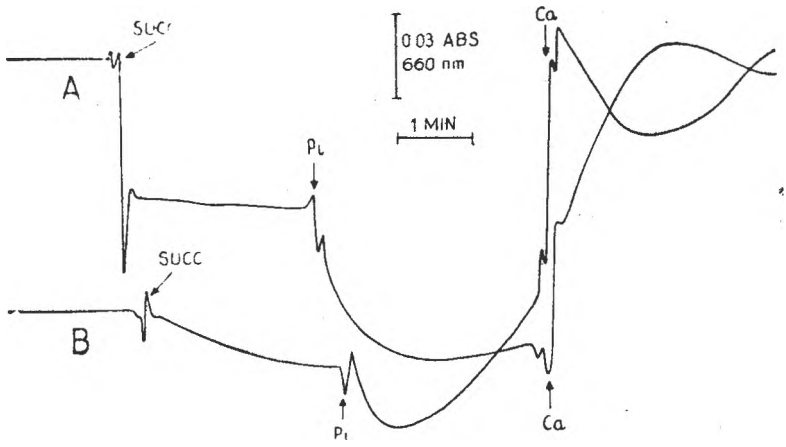

Fig. 2. *Effect of ethionine intoxication on mitochondrial membrane potential (A) and calcium fluxes (B).*
Conditions as in Fig. 1.

periment, the addition of Pi induces a small Ca^{2+} efflux. Under these conditions a pulse of Ca^{2+} is taken up by mitochondria and retained as long as the membrane potential has not decreased below a certain limit. Finally, along with the collapse of the membrane potential, all the accumulated Ca^{2+} is lost in the suspending medium. The stability of the membrane potential and the Ca^{2+} steady state depends on the integrity of the mitochondria [1, 2].

A rather different picture can be seen in Fig. 2, which represents the kinetics of membrane potential and calcium fluxes in mitochondria obtained from ethionine intoxicated rats. The initial magnitude of the membrane potential is relatively low; it increases strongly upon addition of Pi and collapses immediately after the addition of Ca^{2+}. Also, the addition of Pi induces a brief Ca^{2+} uptake, followed in a short time by a massive efflux. These phenomena are indicative of mitochondrial impairment.

Fig. 3 is an illustration of the same phenomena (membrane potential and calcium fluxes) in mitochondria obtained from rats which, after intoxication, were treated with Mg-glutamogluconate. In can be seen that these mitochondria have partly regained their capacity for controlling membrane potential and calcium fluxes, although they are still sensitive to even moderate concentrations of Ca^{2+} in their suspending medium.

The results obtained with the other two Mg^{2+} complexes have not been reproduced here, since they look very close to those obtained with intoxicated animals, in the absence of any treatment.

Mitochondrial ultrastructure, as revealed by electron microscopy, confirms the results obtained by the functional methods already presented.

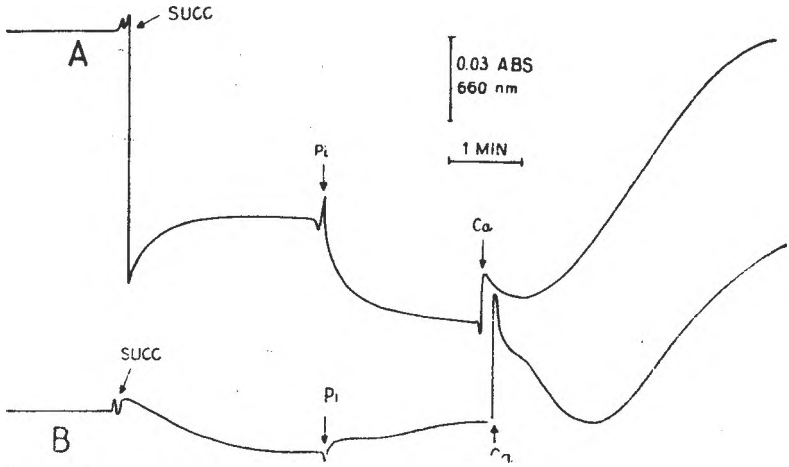

Fig. 3. ***Characteristics of membrane potential (A) and calcium fluxes (B) in mitochondria isolated from rats intoxicated with ethionine and treated with Mg-glutamogluconate.***

Conditions as in Fig. 1.

The ultrastructure of mitochondria respiring on glutamate+malate in phosphorylating medium supplemented with EDTA (PM+EDTA) is presented in Fig. 4. This is characterized by the major presence of slightly or moderately condensed mitochondria (for terminology and its significance see [3, 6, 7]). One can also see a small number of orthodox as well as a few swollen or supercondensed mitochondria. The orthodox and the slightly condensed states are considered as normal cases, whereas swelling and supercondensation are negative phenomena, which would finally lead to mitochondrial disintegration.

Fig. 5 presents the ultrastructural picture of mitochondria obtained from ethionine intoxicated rats (glutamate+malate as substrates). It can be seen that in this case the majority of the mitochondria are in the condensed or supercondensed state (sometimes, with a falciform appearance), evidently affected by intoxication.

In agreement with the functional methods, the best recovering effect is obtained with Mg-glutamogluconate (Fig. 6). In this case, the mitochondria are in a situation intermediate between those presented in Figs. 4 and 5. With the other Mg^{2+} complexes, the situation was similar or close to that of the mitochondria obtained from untreated intoxicated animals.

Similar results were obtained when succinate was used as a substrate.

As can be seen in Fig. 7, the general picture of control mitochondria respiring with succinate (in PM+EDTA) is close to the corresponding case with glutamate+malate, although both the ortodox (positive feature) and supercondensed mitochondria (negative feature) seem

Fig. 4. *Ultrastructural aspects of control mitochondria respiring with glutamate + malate (G + M) in phosphorylating medium (PM) + EDTA.* × 21,000.

Fig. 5. *Effect of ethionine intoxication on mitochondrial ultrastructure* (G + M in PM + EDTA). × 22,400.

Fig. 6. ***Ultrastructure of mitochondria isolated from rats intoxicated with ethionine and treated with Mg-glutamogluconate*** (G + M in PM + EDTA). × 15,000.

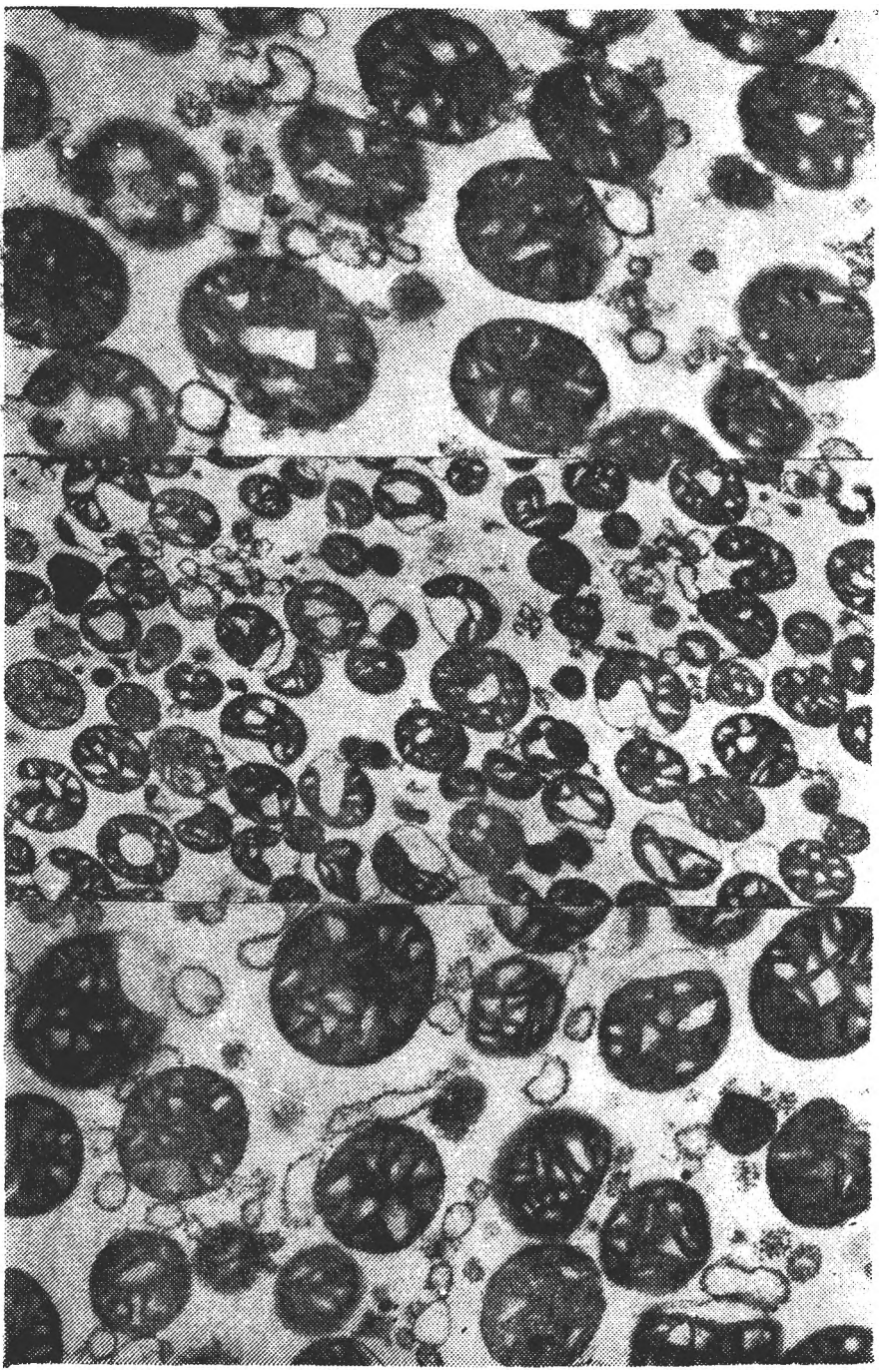

Fig. 7. *Ultrastructural aspects of control mitochondria respiring with succinate (Succ) in phosphorylating medium (PM) + EDTA.* × 21,000.

Fig. 8. *Effect of ethionine intoxication on mitochondrial ultrastructure* (Succ in PM + EDTA). × 12,000.

Fig. 9. ***Ultrastructure of mitochondria isolated from rats intoxicated with ethionine and treated with Mg-glutamogluconate*** **(Succ in PM + EDTA). × 21,000.**

to be present in a somewhat higher proportion. Mitochondria from intoxicated animals (Fig. 8) are mostly supercondensed, whereas those from rats treated with Mg-glutamogluconate (Fig. 9) look very similar to the control.

It is probably worth mentioning that electron microscopy of the hepatic sections also confirm, even to a greater extent, the beneficial effect of the treatment with Mg^{2+} complexes, the most efficient being Mg-glutamogluconate (results to be presented elsewhere).

However, a question arises regarding the Ca-Mg-gluconolactate, which in the case of allyl alcohol intoxication proved to have salutary effects on the stability of the membrane potential and calcium fluxes [9], whereas in the present case it had little effect. The most reasonable explanation is that the two types of intoxication have different requirements for Ca and Mg, in the recovery process, and that the organic support of these ions is also important. Of course, we have not used Mg-glutamogluconate in the case of allyl alcohol intoxication, so it might turn out that this Mg^{2+} complex could have even better results in that type of intoxication.

Conclusions. From the results of our present and recent studies [8, 9], it is clear that the Mg^{2+} organic complexes can be successfully used for improving the functional performances of mitochondria from rats intoxicated with different hepatotoxic drugs. However, further studies are necessary to critically assess the role of each ion and organic compound in various types of intoxication.

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EFFECT OF LONG-TERM FERTILIZATION ON THE ENZYME ACTIVITIES IN A TECHNOGENIC SOIL RESULTED FROM THE RECULTIVATION OF IRON STRIP MINE SPOILS

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SUMMARY. — A long-term fertilization and crop rotation experiment was carried out on a technogenic soil located in the southern zone of the Căpuş iron strip mine (Cluj district, Romania). In the 9th year of this experiment, the highest increase in the soil enzymatic activities and in the maize, oats and sainfoin yields was noticed to appear under the influence of the organo-mineral (farmyard manure + NPK) fertilization applied; farmyard manure or mineral fertilization alone was less efficient. Invertase activity significantly correlated with maize yield, and phosphatase activity with sainfoin yield. Fertilization increased to a larger extent the crop production capacity than the biological potential (enzymatic activities) of the studied technogenic soil.

Some enzymological aspects of the revegetation of spoil heaps at iron strip mines located within the Kursk Magnetic Anomaly region (USSR) were dealt with by Sviridova and Panozishvili [11] and Zasorina [12, 13], Blaga *et al.* [1, 2] and Bunescu and Blaga [3] assayed enzyme activities in spoils levelled for their recultivation in different zones of the Căpuş iron strip mine (Cluj district, Romania) and in adjacent native soils. Spoil plots installed in the southern zone of the Căpuş iron strip mine and recultivated with sainfoin or orchard grass for 3 years were compared enzymologically by Drăgan-Bularda *et al.* [5].

As there are no literature data concerning the effect of fertilization on enzyme activities in technogenic soils resulted from the recultivation of iron strip mine spoils, we have initiated the study of this problem with spoil plots under a long-term fertilization and crop rotation experiment at the Căpuş iron strip mine.

Material and methods. In November 1985, this year being the 9th one of the fertilization and crop rotation experiment carried out in the southern zone of the Căpuş mine, samples were collected for enzymological analyses from the 5—20 cm depth of plots representing 5 fertilization variants:

V_1 — unfertilized (control);
V_2 — farmyard manured (40 t/ha);
V_3 — complexly fertilized (farmyard manure 40 t/ha + $N_{100}P_{60}K_{40}$);
V_4 — NPK-fertilized at the rate of $N_{100}P_{60}K_{40}$;
V_5 — NPK-fertilized at a higher rate ($N_{200}P_{180}K_{120}$).

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The farmyard manure used was an unfermented cattle manure.

N was administered as NH_4NO_3, P as simple superphosphate and K as potash salt.

Each variant comprised plots which in 1985 were cultivated with maize (*Zea mays*, Betu 240 hybrid), oats (*Avena sativa* cv. Cenad) or sainfoin (*Onobrychis viciaefolia* cv. Sparta).

The soil samples were allowed to air-dry in the laboratory, then sieved to pass a 2-mm screen and analyzed for determining their invertase, urease, posphatase, actual and potential dehydrogenase activities as well as their nonenzymatic H_2O_2-splitting capacity. We should mention that the heat-labile H_2O_2-splitting capacity (catalase activity) was negligibly low in all samples.

Invertase activity was determined polarimetrically [7], in reaction mixtures consisting of 5 g of soil, 2 ml of toluene, 10 ml of distilled water and 5 ml of a 20% sucrose solution, and was expressed as percent sucrose hydrolysis/5 g of soil in 48 hours at 37°C.

In order to determine urease activity, a technique based on the method of Sumner [10] was applied. The reaction mixtures were prepared from 5 g of soil, 2 ml of toluene, 5 ml of a 9.6% phosphate buffer solution (pH 7.0) and 5 ml of a 3% urea solution. The activity was recorded as mg of NH_4^+ produced by 5 g of soil in 48 hours at 37°C.

Phosphatase activity was assayed according to Krámer and Erdei [8], in reaction mixtures composed of 5 g of soil, 2 ml of toluene and 10 ml of an 0.5% disodium phenylphosphate solution. This activity is expressed as mg of phenol/5 g of soil in 48 hours at 37°C.

For determination of dehydrogenase activity, the method of Casida *et al.* [4] was used. The reaction mixtures consisted of 3 g of soil, 0.5 ml of a 3% 2, 3, 5-triphenyltetrazolium chloride solution, 1 ml of distilled water (actual dehydrogenase activity) or 1 ml of a 3% glucose solution (potential dehydrogenase activity) and distilled water in an amount sufficient to saturate the soil and to form a 1—2 mm aqueous layer on the surface of the reaction mixtures. Both actual and potential dehydrogenase activities are given as mg of triphenylformazan produced by 3 g of soil in 48 hours at 37°C.

A technique based on Kappen's permanganometric method [6] was applied for determining the H_2O_2-splitting capacity, in reaction mixtures composed of 5 g of soil, 10 ml of distilled water and 2 ml of a 3% H_2O_2 solution. H_2O_2-splitting is expressed as mg of H_2O_2 decomposed by 5 g of soil per hour at 20°C.

For the measurement of each activity, control reaction mixtures without substrate and/or without soil were also prepared.

The yields of maize and oats were recorded as kg of grains/ha, and that of sainfoin as kg of green mass/ha.

The analytical data were submitted to statistical processing in order to establish the correlation between enzymatic and nonenzymatic catalytic activities and crop yields. For evaluation of significance the multiple *t* test was used [9]. Relative activities were calculated by taking the maximum value of a given activity as 100%. The sum of the relative activity values for a fertilization variant represents its „enzymatic indicator". The relative crop yield in a fertilization variant was calculated like the enzymatic indicator.

Results. The results of enzymological analyses and the crop yields are presented in Table 1 which shows that each activity was detectable in each fertilization variant of the 3 crop plants studied.

Minimum activity values were found in the unfertilized variant (invertase and phosphatase in plots of all the 3 plants; urease in the maize plot; potential dehydrogenase in the oats plot), in the NPK-fertilized variants (urease in the oats and sainfoin plots; actual dehydrogenase in plots of all the 3 plants; potential dehydrogenase in the maize and sainfoin plots) or in the farmyard manured or complexly

Table 1

Enzymatic and nonenzymatic catalytic activities and crop yields in plots of a technogenic soil under long-term fertilization

Crop plant	Fertilization variant	Activity						Crop yield
		Invertase	Urease	Phosphatase	Actual dehydrogenase	Potential dehydrogenase	Nonenzymatic H_2O_2-splitting	
Maize	V_1	15.74	0.075	3.35	0.206	0.406	135.87	125
	V_2	25.62	0.172	3.57	0.287	0.477	102.31	3,887
	V_3	47.17	0.218	3.50	0.249	0.656	93.98	6,250
	V_4	44.86	0.117	3.90	0.118	0.265	136.64	5,604
	V_5	43.26	0.141	3.58	0.118	0.343	141.69	5,958
Oats	V_1	12.60	0.091	3.30	0.131	0.193	130.55	712
	V_2	24.20	0.152	3.48	0.243	0.318	115.45	2,458
	V_3	23.79	0.095	3.47	0.287	0.737	109.88	3,479
	V_4	26.27	0.090	3.61	0.193	0.205	144.61	3,133
	V_5	42.20	0.122	3.42	0.118	0.229	131.10	3,441
Sainfoin	V_1	25.21	0.143	3.56	0.249	0.437	136.92	27,083
	V_2	26.92	0.253	3.71	0.581	0.924	83.96	36,041
	V_3	52.85	0.228	4.10	0.962	1.012	105.91	55,104
	V_4	53.86	0.143	3.94	0.109	0.221	135.07	33,937
	V_5	48.00	0.126	3.81	0.218	0.393	142.48	39,791

fertilized variants (nonenzymatic H_2O_2-splitting in plots of all the 3 plants). The yields of all the 3 plants were lowest in the unfertilized variant.

Maximum activity values were recorded in the complexly fertilized variant (invertase and urease in the maize plot; phosphatase in the sainfoin plot; actual dehydrogenase in the oats and sainfoin plots; potential dehydrogenase in plots of all the 3 plants), in the NPK-fertilized plots (invertase in the oats and sainfoin plots; phosphatase in the maize and oats plots; nonenzymatic H_2O_2-splitting in plots of all the 3 plants) or in the farmyard manured variant (urease in the oats and sainfoin plots; actual dehydrogenase in the maize plot). The yields of all the 3 plants were highest in the complexly fertilized variant.

When the analytical data obtained in the 5 variants were examined together, positive correlations were found between enzymatic activities and crop yields (Table 2). The only exception was actual dehydrogenase activity, which correlated negatively with the maize yield. The correlation between invertase activity and maize yield was significant at $p = 0.02$ level, while that between phosphatase activity and sainfoin yield was significant at $p = 0.05$. The other correlations were unsignificant at $p = 0.05$. Nonenzymatic H_2O_2-splitting capacity correlated negatively and unsignificantly with the yield of each of the 3 plants.

Table 3 shows that in each fertilization variant the mean values of the relative enzymatic and nonenzymatic catalytic activities of the

Table 2

Correlation coefficients between enzymatic and nonenzymatic catalytic activities and crop yields in plots of a technogenic soil

Activity	Yield					
	Maize		Oats		Sainfoin	
Invertase	0.952	(0.02)*	0.763	(0.20)	0.667	(0.25)
Urease	0.691	(0.20)	0.117	(0.90)	0.452	(0.40)
Phosphatase	0.599	(0.30)	0.687	(0.25)	0.889	(0.05)
Actual dehydrogenase	−0.266	(0.70)	0.388	(0.60)	0.776	(0.20)
Potential dehydrogenase	0.107	(0.90)	0.439	(0.50)	0.602	(0.30)
Nonenzymatic H_2O_2-splitting	−0.234	(0.80)	−0.120	(0.90)	−0.340	(0.60)

* Significance of the correlation coefficients is given in parentheses.

Table 3

Mean values of relative enzymatic and nonenzymatic catalytic activities in plots of a technogenic soil

Fertilization variant	Mean values of relative activities in plots cultivated with:		
	Maize	Oats	Sainfoin
V_1	48.518 a*	43.828 a	58.952 a
V_2	58.353 a	54.448 a	75.041 ab
V_3	69.143 a	57.492 a	93.552 b
V_4	59.588 a	52.125 a	63.158 ab
V_5	61.268 a	55.892 a	65.313 ab

* Numbers followed by the same letter in a column are not significantly different at $p = 0.05$.

studied technogenic soil increased in the following order: sainfoin>maize>oats.

Table 3 also shows that these mean values are lowest in the unfertilized variant and highest in the complexly fertilized variant in the plots of all the 3 plants. In the maize plots, NPK-fertilization at both rates had a stronger increasing effect on the activities than farmyard manuring, while the reverse was true for the sainfoin plots. In the oats plots, the order of the increasing effect was the following: NPK at the higher rate>farmyard manure>NPK at the lower rate. But the differences between variants in respect of the relative activities of their soil are not significant at $p = 0.05$. The only exception is the difference between the complexly fertilized and the unfertilized sainfoin plots.

One can deduce from Table 4 that both the enzymatic indicator and the relative crop yield are lowest in the unfertilized variant and highest in the complexly fertilized one. But farmyard manuring and NPK-fertilization affected differently these two parameters: the enzymatic indicator increased in the order: farmyard manure>NPK at the higher rate>NPK at the lower rate, while the increase of relative crop yield appeared in the order: NPK at the higher rate>NPK at the low-

Table 4

Enzymatic indicators and relative crop yields in plots of a technogenic soil

Fertilization variant	Enzymatic indicator	Relative crop yield
V_1	302.596 a*	71.60 a
V_2	375.684 ab	198.23 b
V_3	440.374 b	300.00 c
V_4	349.742 ab	244.92 bcd
V_5	364.946 ab	266.43 bce

* Numbers followed by the same letter in a column are not significantly different at $p = 0.05$.

er rate>farmyard manure. Table 4 also indicates that under the influence of long-term fertilization the enzymatic indicator of the studied technogenic soil did not increase to such a large extent as the relative crop yield did. This means that long-term fertilization is able to greatly enhance the crop production capacity of the technogenic soil, but the increasing effect of long-term fertilization on the biological potential of the technogenic soil, as reflected by its enzymatic activities, is the result of much slower processes.

Conclusions. 1. Long-term fertilization of a technogenic soil led to increased enzyme activities and crop yields as compared to the unfertilized control.

2. Complex, *i.e.* organo-mineral fertilization had a stronger increasing effect on enzyme activities and crop yields than organic or mineral fertilization alone.

3. The enzyme activities correlated positively with crop yields. The correlations between invertase activity and maize yield, and between phosphatase activity and sainfoin yield were significant.

4. Under the influence of long-term fertilization, the crop production capacity of the studied technogenic soil increased to a larger extent than its biological potential reflected by its enzymatic activities.

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A VALUABLE COLLECTION OF LEPIDOPTERA IN THE ZOOLOGICAL MUSEUM OF THE UNIVERSITY IN CLUJ-NAPOCA (Part I)

LÁSZLÓ RÁKOSY*

SUMMARY. — The paper, which is mostly a catalogue, presents a less-known side line in the activity of the late Professor Ştefan Péterfi, i.e. his passion for Lepidoptera. The collection he gathered as a young scientist contains at present 4990 specimens belonging to about 1000 taxa.

Professor Ştefan Péterfi (1906—1978), well-known as a specialist in algology and plant physiology [1], also wrote several interesting books on pigeons [2—4, 6] and gathered a beautiful collection of lepidoptera.

The gathered material was thoroughly prepared and labelled. The finest specimens were captured between 1927—1930 around Cluj and in the Apuseni Mountains. The captures were carried out day and night, using an acetylene lamp with a reflecting cloth screen. For rare species, difficult to capture in nature, Ştefan Péterfi patiently grew laboratory cultures and obtained very beautiful specimens of *Ocneria rubea* F., *Eriogaster lanestris* L., *E. catax* L., *Lasiocampa quercus* L. a.s.o. He also acquired some rare and even extremely rare species by exchange with other lepidopterists. His main partner for exchange was the well-known lepidopterist László Diószeghy from Arad, who sent him many rare species and subspecies, such as: *Aplasta ononaria* Fuessly, *Idaea dumitata* Hfn., *Perizoma incultaria* H.S., *Discoloxia blomeri* Curtis, *Baptria tibiale* Esp., *Cleorodes lichenaris* Hfn., *Fagivorina arenaria* Hfn., *Boarmia viertlii* Bohatsch, *Scotochrosta pulla* Den. et Schiff., *Rileyiana fovea* Tr., *Orthosia schmidtii* Diószeghy, *Amphipyra micans* Led. and others. In his turn, Ştefan Péterfi sent to László Diószeghy over 80 specimens of lepidoptera, which can now be found in the collection of the museum in Sfîntu Gheorghe.

Another partner for exchange was Daniel Czekelius from Sibiu, who sent him several interesting specimens such as: *Pericallia matronula* L., *Dasorgya selenitica* Esp., *Endromis versicolora* L., *Ochrostigma melagona* Bkh., as well as various microlepidoptera. Some extremely valuable specimens came from Professor Adrian Ostrogovich. Some of them are *Zygaena loti caliacrensis* Reiss (lectoparatype), *Z. contaminei* Bsd., *Ochropleura melanura albida* Caradja, *Cucullia tanaceti* Den. et Schiff., all captured at Balcic, and *Orodemnias quenselii* Paykull from the Bucegi Mountains (Babele).

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Besides these 3 lepidopterists, Ştefan Péterfi also kept up exchanges with A. Caradja, and he sent some species for identification to D. Czekelius, L. Diószeghy, A. Caradja and A. Naufock. Many of the species identified by D. Czekelius, as well as the *Zigaenidae* identified by A. Naufock, still bear labels with register numbers.

Some of the species captured by Ştefan Péterfi himself at Fînaţele Clujului are *Philotes bavius hungaricus* Diószeghy, *Eriogaster lanestris* L., *E. catax* L., *Saturnia spini* Den. et Schiff., while *Hyphoraria aulica* L., *Euchalcia consona* F. were captured around Cluj. An extremely valuable faunistic and zoogeographic element is *Dysauxes punctata* F. found at Cheile Turzii.

The outdoor excursions with a view to collecting lepidoptera diminished in number after 1930, although the passion for „flying petals" continued unaltered. The material that remained unprepared contains labels that come up to 1953.

The collection set up by Prof. Ş. Péterfi probably comprised more than 6000 well-prepared, labelled and partly identified specimens. It was kept in 25 special 50/35 cm boxes made up of black carboard. Unfortunately, the collection suffered great losses during World War II. Most of the material was then partly or even entirely destroyed.

The author of the present check-list took over the collection that had been kept by the Professor's son, Dr. Leontin Ş. Péterfi, and indulged in a minute work of restauration and identification. The amateur lepidopterist from Cluj-Napoca, Carol Bere, also played an important part in restoring the material.

Nowadays the collection comprises 4990 specimens, out of which 4357 have been processed for this catalogue. They belong to 770 species and subspecies, *i.e.* the superfamilies *Hepialoidea, Sesioidea, Zygaenoidea, Noctuoidea, Geometroidea, Sphingoidea, Notodontoidea, Bombycoidea, Cossoidea, Hesperioidea* and *Papilionoidea*.

Table 1 displays synthetically the lepidopterous material of Prof. Ştefan Péterfi's collection that is presented in this paper. The rest of the material, *i.e.* 635 specimens of microlepidoptera, will be processed in a future paper, after a previous checking of doubtful species by well-known specialists of this group.

In setting up this catalogue, the modern nomenclature brought up to date by Dr. A. Popescu-Gorj [5] was used with certain changes, while the classification was done according to the latest conception of the Romanian lepidopterist Prof. Dr. E. V. Niculescu, to whom we are extremely grateful for his guidance.

I express my deepest thanks to Dr. Leontin Ş. Péterfi and to all my collegues from the Laboratory of Ecology within the Biological Research Centre of Cluj-Napoca for their help. Special thanks go to the head staff of the Faculty of Biology, Geography and Geology for

Table 1

List of the Lepidoptera families in the collection „Professor Ştefan Péterfi"

Family	No. of species and sub-species	No. of specimens
Hepialidae	6	20
Sesiidae	12	35
Zygaenidae	17	285
Limacodidae	1	3
Heterogynidae	1	20
Lymantriidae	12	30
Arctiidae	31	133
Ctenuchidae	3	49
Nolidae	2	6
Noctuidae	217	553
Drepanidae	3	11
Thyatiridae	6	12
Geometridae	254	1291
Sphingidae	14	41
Notodontidae	20	37
Dilobidae	1	1
Endromidae	1	1
Lasiocampidae	10	41
Saturniidae	4	10
Cossidae	5	11
Hesperiidae	19	157
Lycaenidae	41	405
Papilionidae	6	86
Pieridae	17	308
Nymphalidae	37	375
Satyridae	30	436
Total = 26	770	4357

the care and support in publishing the data on the collection „Professor Ştefan Péterfi".

The collection has been donated to the Zoological Museum of the University in Cluj-Napoca.

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RILOR DE COLECTARE
INDEX OF COLLECTION SITES

Abrud	— **oraș, jud. Alba**
	— **town, Alba county**
Apahida	— **comună, jud. Cluj**
	— **commune, Cluj county**
Ardeu	— **sat, jud. Hunedoara**
	— **village, Hunedoara county**
Azuga	— **oraș balnear, jud. Prahova**
	— **health resort, Prahova county**
Babele	— **vîrf în M-ții Bucegi**
	— **summit in the Bucegi Mts.**
Baciu	— **comună la N—V de Cluj-Napoca**
	— **commune North-West of Cluj-Napoca**
Balcic	— **oraș în N—E Bulgariei**
	— **town in the North-East of Bulgaria**
Baia de Criș	— **comună, jud. Hunedoara**
	— **commune, Hunedoara county**
Băbești	— **sat, jud. Satu Mare**
	— **village, Satu Mare county**
Becaș	— **vale din împrejurimile Clujului (S—E)**
	— **valley in the neighbourhood of Cluj-Napoca**
Bod	— **oraș, jud. Brașov**
	— **town, Brașov county**
Beholț	— **sat lîngă Deva, jud. Hunedoara**
	— **village near Deva, Hunedoara county**
Brașov	— **împrejurimile municipiului Brașov**
	— **the surroundings of the town Brașov**
Bucegi	— **Munții Bucegi**
	— **Mountains**
București	— **împrejurimile municipiului București**
	— **the surroundings of our capital**
Călineasa	— **zona Padiș, Mții Apuseni**
	— **the Padis area, the Apuseni Mts.**
Căpâlnaș	— **sat lîngă Lipova, jud. Arad**
	— **village near Lipova, Arad county**
Căpușul Mic	— **sat lîngă Gilău, jud. Cluj**
	— **village near Gilău, Cluj county**
Cheile Baciului	— **chei, comuna Baciu, jud. Cluj**
	— **gorges, the village Baciu, Cluj county**
Cheile Remetea	— **chei în jud. Bihor**
	— **gorges in the Bihor county**
Cheile Runcului	— **chei în Mții Trascăului, jud. Alba**
	— **gorges in the Trascău Mts., Alba county**
Cheile Turenilor (Turului)	— **chei la 21 km S—E de Cluj-Napoca**
	— **gorges 21 km South-East of Cluj-Napoca**
Cheile Turzii	— **chei lîngă municipiul Turda, jud. Cluj**
	— **gorges near the town Turda, Cluj county**
Cimitirul Central	— **Cimitirul Central din Cluj-Napoca**
	— **Central Cemetery in Cluj-Napoca**
Cluj	— **împrejurimile municipiului Cluj-Napoca, fără specificare exactă**
	— **the surroundings of the town Cluj-Napoca, without precise specification**
Crișul Repede	— **defileu al Crișului Repede**
	— **pass of the river Crișul Repede**
Cucurbăta	— **Muntele Cucurbăta Mare (1849 m), Mții Bihorului**
	— **The Cucurbăta Mare Mt. (1849 m), the Bihor Mts.**
Culac Mare	— **deal lîngă Balcic, Bulgaria**
	— **hill near Balcic, Bulgaria**

D. — deal (ex. Dealul Hoia)
hill (e.g. D. Hoia)

Detunata — rezervaţie geologică în Mţii Apuseni
— Geological Reserve in the Apuseni Mts.

Deva — împrejurimile municipiului Deva
— the surrounding of the town Deva

Dobrin — vîrf în Mţii Gilăului (1500 m)
— summit in the Gilău Mts. (1500 m)

Domogled — vezi Mt. Domogled
— see Domogled Mt.

Drăgoiasa — vîrf în Mţii Bihorului, jud. Cluj
— summit in the Bihor Mts., Cluj county

Eforie Sud — staţiune balneară, pe litoralul Mării Negre
— seaside resort (Black Sea)

Făgădău — deal în S—E -ul Clujului, astăzi cartier de locuinţe
— hill in the town Cluj-Napoca, nowadays a lodging district

Făget — deal, pădure la S de Cluj-Napoca
— hill, forest South of Cluj-Napoca

Feleac — dealul Feleacului (744 m) la S de Cluj-Napoca
— the hill Feleac (744 m) South of Cluj-Napoca

Finaţele Clujului — rezervaţie botanică, la N de Cluj-Napoca
— Botanical Reserve, North of Cluj-Napoca

Floreşti — comună la V de Cluj-Napoca
— commune, West of Cluj-Napoca

Gălişer — deal la S—V de Cluj-Napoca
— hill South-West of Cluj-Napoca

Gura Apei — localitate situată la S—V de Mţii Retezatului
— locality South-West of the Retezat Mts.

Hoia — deal situat la N—V de Cluj-Napoca
— hill North-West of Cluj-Napoca

Hunedoara — împrejurimile municipiului Hunedoara
— the surroundings of the town Hunedoara

Ineu — oraş lîngă Arad
— town near Arad

Jucu de Sus — comună, jud. Cluj
— commune, Cluj county

Lăpuşnic — sat, jud. Hunedoara
— village, Hunedoara county

Lita Romană — comună, jud. Cluj
— commune, Cluj county

Mada — sat lîngă Geoagiu Băi, jud. Hunedoara
— village near Geoagiu Băi, Hunedoara county

Mănăştur — zonă verde a municipiului Cluj-Napoca, azi cartier de locuinţe
— green area of Cluj-Napoca, nowadays a lodging district

Mărişel — sat în Mţii Gilăului, jud. Cluj
— village in the Gilău Mts., Cluj county

Măgura Călăţelei — deal lîngă comuna Călăţele, jud. Cluj
— hill near the village Călăţele in the Apuseni Mts., Cluj county

Mt., Mţii — Munte, Munţii
Mt., Mts — Mountain, Mountains

Mţii Bucegi — zona Babele-Omu din Mţii Bucegi (2000—2500 m)
— the area Babele-Omu in the Bucegi Mts. (2000—2500 m)

Mţii Cibinului — exemplar din Mţii Cibinului, fără localizare exactă
— specimen from the Cibinului Mts, without any precise location

Mt. Codru — se referă la Munţii Codru Moma
— the Codru Moma Mts.

Mt. Cucurbăta — vezi Cucurbăta
— see Cucurbăta

Mt. Dobrin — vezi Dobrin
— see Dobrin

Mt. Domogled — masiv calcaros, rezervaţie naturală (1106 m) lîngă Băile Herculane
— calcareous mountain (1106 m), Nature Reserve near Băile Herculane
Mt. Măgura — (1345 m), în Mţii Gilăului
— (1345 m), in the Gilău Mts.
Nighighiş — sat lîngă Deva, jud. Hunedoara
— village near Deva, Hunedoara county
P = pădure
— forest
P. Ţigăneşti — pădure din împrejurimile Bucureştiului
— forest near Bucureşti
Peana — vezi Vf. Peana
— see Vf. Peana
Pleşca — vezi Vf. Pleşca
— see Vf Pleşca
Peştişul Mic — sat, jud. Hunedoara
— village, Hunedoara county
Piatra Arsă — Cabană turistică în Mţii Bucegi
— touristic chalet in the Bucegi Mts.
Poeni — sat în Mţii Vlădeasa, jud. Cluj
— village in the Vlădeasa Mts., Cluj county
Răcătău — sat în Mţii Gilăului, jud. Cluj
— village in the Gilău Mts., Cluj county
Retezat — masivul Retezat
— the Retezat Mts.
Riul Sadu — comună submontană, jud. Sibiu
— submontane commune, Sibiu county
Rişnov — oraş, jud. Braşov
— town, Braşov county
Saschiz — comună, jud. Mureş
— commune, Mureş county
Săcărîmb — sat, jud. Hunedoara
— village, Hunedoara county
Sălicea — sat lîngă Cluj-Napoca
— village near Cluj-Napoca
Scăriţa Belioara — rezervaţie naturală (1300 m) în Mţii Apuseni, jud. Alba
— Nature Reserve in the Apuseni Mts. (1300 m), Alba county
Scutari — localitate din Albania
— locality in Albania
Sibiu — împrejurimile municipiului Sibiu
— the surroundings of the town Sibiu
Stana — sat lîngă Huedin, jud. Cluj
— village near Huedin, Cluj county
Suatu — rezervaţie botanică, jud. Cluj
— Botanical Reserve, Cluj county
Tarcău — Mţii Tarcăului
— the Tarcău Mts.
Techirghiol — staţiune balneară pe litoralul Mării Negre
— seaside resort (Black Sea)
Tîrgu Mureş — împrejurimile municipiului Tg. Mureş
— the surroundings of the town Tîrgu Mureş
Trascău — Mţii Trascăului, ramură a Mţ-lor Apuseni
— the Trascău Mts., part of the Apuseni Mts.
V = vale
= valley
V. Abruzelului — vale lîngă Abrud
— valley near Abrud
V. Căprioarei — vale la S de Cluj-Napoca
— valley South of Cluj-Napoca
V. Crişului Repede — vezi Defileul Crişului Repede
— see Pass of the Crişul Repede river

V. Calului — vale din împrejurimile municipiului Cluj-Napoca
— valley in the surroundings of Cluj-Napoca

V. Drăganului — valea pîrîului Drăgan, afluent al Crişului Repede; cabană turistică
— valley of the Drăgan stream, affluent of the Crişul Repede river, touristic chalet

V. Gîrbăului — valea pîrîului Gîrbău, la vest de Cluj-Napoca
— valley of Gîrbău stream, West of Cluj-Napoca

V. Ierii — valea rîului Iara, afluent al Arieşului, comună, jud. Cluj
— valley of the Iara river, affluent of the Arieş, village, Cluj county

V. Jepilor — abrupt stîncos dinspre Buşteni spre Caraiman, Mţii Bucegi
— steep rocky slope between Buşteni and Caraiman, the Bucegi Mts.

V. Mişidului — valea rîului Mişid, afluent al Crişului Repede, Mţii Bihor
— valley of the Mişid river, affluent of the Crişul Repede, the Bihor Mts.

V. Negruţei — valea pîrîului Negruţa, afluent al Someşului Cald, zona Mărişel
— valley of the Negruţa stream, affluent of the Someşul Cald river, near Mărişel

V. Pleşca — valea pîrîului Pleşca, la vest de Cluj-Napoca
— valley of the Pleşca stream, West of Cluj-Napoca

V. Popii — valea pîrîului Popii, la V de Cluj-Napoca
— valley of the Popii stream, West of Cluj-Napoca

V. Poklos — valea pîrîului Poklos de lîngă Tg. Mureş
— valley of the Poklos stream, near Tg. Mureş

V. Ponor — vale în Mţii Apuseni, zona Padiş
— valley in the Apuseni Mts., the Padiş area

V. Răcădăului — vale la S—E de Braşov, azi cartier de locuinţe
— valley South East of Braşov, nowadays a lodging district

V. Zerna — vale din masivul Vlădeasa, Mţii Apuseni
— valley in the Vlădeasa Mts., the Apuseni Mts.

Vf. — vîrf
— summit

Vf. Peana — vîrf de (833 m), la S de Cluj-Napoca
— summit (833 m), South of Cluj-Napoca

Vlădeasa — masiv muntos (1834 m), Mţii Bihorului
— mountains (1834 m) belonging to the Bihor Mts.

Viţa — sat lîngă Beclean pe Someş, jud. Bistriţa-Năsăud
— village near Beclean pe Someş, Bistriţa-Năsăud county

Vîrtop — zona Peşterii Vîrtop, cătun Casa de Piatră, jud. Alba
— the ara of Vîrtop Cave, the hamlet Casa de Piatră, Alba county

Zau de Cîmpie — rezervaţie botanică, jud. Mureş
— Botanical Reserve, Mureş county

ABREVIERI
ABREVIATIONS

det. — determinat de ...
— identified by ...

(e). — date consemnate pe baza etichetelor, materialul fiind distrus
— data recorded on label evidence, the material being destroyed

ex. — exemplar (e)
— specimen (s)

ex l. — ex larva

ex p. — ex pupa

leg. — legit

in coll. — în colecţia ...
— in the collection ...

prep. genit. — preparat genital
— genital preparation

Ord. LEPIDOPTERA

Subord. PARASTERNIA*

Superfam. HEPIALOIDEA

Fam. HEPIALIDAE

Hepialus Linnaeus

H. humuli humuli Linnaeus
2 ♂♂: Retezat 14.VII.1924 (leg. Diószeghy); Răcătău 14.VII.1929.
2 ♀♀: Retezat (1 000 m) 7.VII.1929, 29.VI.1929 (leg. Diószeghy).

Phymatopus Wallengren (= *Hepiolopsis* Börner)

Ph. hecta Linnaeus
1 ♂: Ineu 27.X.1928 (leg. Diószeghy).

Korscheltellus Börner.

K. fusconebulosa fusconebulosa De Geer
2 ♂♂: Retezat 6.VII.1924 (leg. Diószeghy); Vlădeasa (V. Zerna) 17.VII.1929.

K. dacicus Caradja (in coll. Péterfi = *lupulinus* Linnaeus)
2 ♂♂: Finaţele Clujului 20.V.1929 (2 ex.).

Pharmacis Hübner

Ph. carna transsylvanica Daniel
2 ♂♂: Retezat (1300 m) 20.VII.1928; Vlădeasa (1500 m) 17.VII.1929.
1 ♀: Scărişa Belioara 17.VII.1933.

Triodia Hübner

T. sylvina Linnaeus
6 ♂♂: Cluj 15.VIII.1926; Ineu 30.VIII.1929 (leg. Diószeghy); Cluj 3.IX.1928; Cluj 6.IX.1928 (3 ex.).
2 ♀♀: Ineu 19.VIII.1924 (leg. Diószeghy); Finaţele Clujului 9.IX.1928.

Superfam. PSYCHOIDEA**

Superfam. SESIOIDEA

Fam. SESIIDAE

Paranthrene Hübner

P. tabaniformis Rottemburg
1 ex.: Sibiu 9.VIII.1925 (leg. Czekelius).

Sesia Fabricius

S. apiformis Clerck
1 ex.: Cluj (Făget), 1926.

Synanthedon Hübner (= *Conopia* Hübner)

S. tipuliformis Clerck
5 ex.: Rîşnov 9.VII.1927; 13.VII.1927 (2 ex.); Cluj (V. Pleşca) 12.VII.1928; Cheile Turzii 8.VII.1936.

S. cephiformis Ochsenheimer
1 ex.: Retezat (1100 m) 4.VIII.1932 (leg. Diószeghy).

S. formicaeformis Esper
2 ex.: Cluj (D. Galişer) 28.VII.1933; Retezat (1100 m) 4.VIII.1933 (leg. Diószeghy).

S. vespiformis Linnaeus
3 ex.: Cluj 3.VI.1936; Cluj (V. Popii) 20.VII.1930; Ineu 8.VII.1933 (leg. Diószeghy).

S. scoliaeformis Borkhausen
1 ex.: Căpuşul Mic 16.V.1943 (ex. l.).

Chamaesphecia Spuler

Ch. annellata Zeller
1 ♂: Techirghiol 28.VI.1927 (leg. et det. Caradja).
1 ♀: Eforie Sud (Carmen Sylva) 29.VI.1927 (leg. et det. Caradja).

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* The suborder *Parasternia* Niculescu 1971 includes all lepidoptera, *except Hesperioidea* and *Papilionoidea*, which belong to the suborder *Aparasternia* Niculescu.

** Due to certain difficulties in identification, the *Psychidae* family will be processed in another paper.

f. *oxibeliformis* Herich-Schäffer
1 ♂: Eforie Sud 29.VI.1927 (leg. et det. A. Caradja).
Ch. bibioniformis Esper
1 ex.: Balcic (D. Culac Mare) 18.VII.1928 (leg. Ostrogovich).
Ch. tenthrediniformis Denis et Schiffermüller (= *empiformis* Esper)
9 ex.: Cluj (D. Hoia) 5.VI.1932; Cluj (V. Pleşca) 12.VII.1928 (2 ex.); 10.VII.1927 (4 ex.); Cluj (V. Popii) 20.VII.1930; Cluj (D. Galişer) 28.VII.1933.
Bembecia Hübner
B. triannuliformis Freyer
5 ex.: Cheile Turzii 9.VII.1936 (4 ex.); Cluj (V. Pleşca) 12.VII.1928.
Chamaesphecia sp ?
2 ex.: Cluj 30.VI.1927; Cluj 6.VII.1932 (damaged).

Superfam. ZYGENOIDEA

Fam. ZYGAENIDAE

Subfam. *Procridinae*
Rhagades Wallengren
R. pruni Denis et Schiffermüller
2 ex.: Sibiu (D. Viilor) 20.VI.1917 (leg. D. Czekelius); Szokolya (Hungary) (leg. Gaal).
Adscita Retzius
Subgenus **Adscita** Retzius
A.(A.) statices Linnaeus
23 ex.: Stana 1.VII.1928 (3 ex.); Finaţele Clujului 8.VI.1930; 9.VI.1929 (3 ex.); 26.VI.1928; Cluj (V. Popii) 27.VI.1928; 22.VI.1928; 26.VI.1933; 13.VII.1928 (5 ex.); 8.VI.1929 (3 ex.); Cluj (V. Pleşca) 5.VI.1927 (2 ex.); 12.VII.1928; 18.VII.1927.
A.(A.) geryon Hübner*
5 ex.: Finaţele Clujului 29 VI.1928 (nr. 86, 133); 9.VI.1928 (nr. 134); Budapesta 3.VII.1933 (leg. Uhrik) (2 ex.).
Subgenus **Lueasia** Alberti
A.(L.) subsolana Staudinger (= *cognata* sensu Rossi)
4. ex: Finaţele Clujului 29.VI.1928; 30.VI.1929 (3 ex.) (nr. 86, 128, 142, 143).
Subgenus **Jordanita** Agenjo
A.(J.) globulariae Hübner (= *cognata* Jordan)
33 ♂♂: Cluj (V. Popii) 16.VI.1928 (5 ex.) (nr. 88, 89, 90, 91, 92); 31.V.1929 (2 ex.) (nr. 98, 91); 14.VI.1929 (17 ex.) (nr. 149, 144, 145, 154, 159, 157, 151, 152, 156, 147, 158, 153, 163, 146, 148, 150, 161); 8.VI.1929 (3 ex.); Cluj Mănăştur (2 ex.) (nr. 4409a, 87); Finaţele Clujului 9.VI.1929 (2 ex.) (nr. 96.99); 26.VI.928 (nr. 95); Cluj (V. Pleşca) 2.VI.1929 (nr. 93); Sălicea 24.VI.1928 (nr. 101).
3 ♀♀: Cluj (V. Popii) 27.VI.1928 (nr. 106); Finaţele Clujului 16.VI.1929 (nr. 104); 9.VI.1929.
Subgenus **Rocesia** Alberti
A.(R.) budensis Speyer et Speyer
6 ex.: Finaţele Clujului 20.V.1929 (nr. 104); 3.VI.1928 (nr. 141); 9.VI.1929 (nr. 133); 27.VI.1928 (nr. 135); 26.VI.1928 (2 ex.) (nr. 137, 138).
Subfam. *Zygaeninae*
Zygaena Fabricius
Subgenus **Zygaena** Fabricius
Z.(Z.) ephialtes pannonica Holik
16 ex.: Cluj (Mănăştur) 25.VII.1927 (4 ex.); Sălicea 29.VII.1928 (3 ex.); 31.VII.1928; Cluj (Făget) 27.VII.1927 (2 ex.); Cluj (V. Pleşca) 5.VIII.1928; 17.VII.1927 (2 ex.); 25.VII.1926; Cluj (Vf. Peana) 31.VII.1932; Cluj 12.VIII.1932.

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* The specimens of the *Procridinae* subfamily were identified by A. Naufock and still bear the labels with matriculation numbers.

f. *icterica* Lederer
2 ex.: Cluj (Mănăştur) 25.VII.1927; Sălicea 31.VII.1928.
2 ex.: Cluj (V. Pleşca) 5.VIII.1928; Sălicea 29.VII.1928.

f. *peucedani* Esper
37 ex.: Cluj (V. Pleşca) 29.VII.1928 (4 ex.); 5.VIII.1928; 17.VII.1927 (4 ex.); 21.VII. 1929; Cluj (V. Popii) 22.VII.1928 (2 ex.); Cluj (Mănăştur) 25.VII.1927 (6 ex.); 28.VII.1927 (6 ex.); 26.VII.1927; Cluj (Făget) 27.VII.1927 (7 ex.); Finaţele Clujului 30.VI.1929; Cluj 12.VI.1923; Sălicea 29.VII.1928 (3 ex.).

Z.(Z.) viciae dacica Caradja (= *meliloti* auct.)
7 ex.: Cluj (V. Pleşca) 1.VII.1928 (3 ex.); Finaţele Clujului 29.VI.1928; Sălicea 21.VII. 1928 (2 ex.); Stana 1.VII.1928.

Z.(Z.) osterodensis osterodensis Reiss (= *scabiosae* auct.)
7 ex.: Cluj (V. Pleşca) 8.VII.1928 (2 ex.); Cluj (Făget) 21.VI.1927 (2 ex.); Scăriţa Belioara 17.VII.1933 (2 ex.); Cheile Turzii 25.VI.1933.
ab. *pluto* 15.VI.1927 Finaţele Clujului (det. Czekelius).

Z.(Z.) fipendulae filipendulae Linnaeus
37 ex. Finaţele Clujului 15.VI.1927; 26.VI.1928 (2 ex.); 29.VI.1928 (2 ex.); 30.VI.1929; 10.VII.1928; 21.VII.1929; Cluj (V. Popii) 22.VII.1928; 20.VIII.1930; Cluj (Mănăştur) 12.VI.1927; 24.VI.1927 (ab. *cytisi* Hb. det. Czekelius (nr. 88); 12.VI.1927; Cluj (V. Pleşca) 1.VII.1928 (2 ex.); 12.VII.1928; 21.VII.1930 (2 ex.); Cluj 12.VII.1928; 1.VII.1928; 12.VII.1932; Sălicea 29.VII.1928 (7 ex.); 21.VII.1929 (2 ex.); Stana 1.VII.1928 (2 ex.); Cheile Turzii 25.VI.1933; Răcătău 14.VII.1929; 3.VII.1928; V. Ierii 13.VII.1929.

Z. (Z.) lonicerae lonicerae Scheven
11 ex.: Cluj (Făget) 29.VI.1927 (3 ex.); Cluj (V. Pleşca) 1.VII.1928 (2 ex.); 7.VII.1929 (2 ex.); 12.VII.1929 (2 ex.); Cluj (Făgădău) 22.VII.1928; Răcătău 3.VII.1928.

Z. (Z.) angelicae transcarpathina Hormuzachi
9 ex.: Cluj (V. Popii) 16.VI.1929; 22.VII.1928; Cluj (V. Pleşca) 1.VII.1928; 21.VII. 1929; Cluj (Făgădău) 22.VII.1928; Cluj (Mănăştur) 29.VI.1927; Finaţele Clujului 10.VIII.1928; Sălicea 21.VII.1929; Răcătău 3.VII.1928.

Subgen **Agrumenia** Hübner (= *Lycastes* Hb; *Lictoria* Burgeff)

Z. (A.) carniolica onobrychis Denis et Schiffermüller
17 ex.: Cluj (Mănăştur) 18.VI.1927 (10 ex.); Cluj (V. Popii) 10.VII.1928; Finaţele Clujului 30.VI.1929 (3 ex.); 15.VII.1928 (3 ex.).

Z. (A.) loti (= *achilleae* auct.) *transsylvaniae* Burgeff
12 ex.: Cluj (V. Popii) 24.VI.1926; Cluj (V. Pleşca) 8.VII.1928; 26.VI.1927; 21.VII. 1929 (2 ex.); Cluj (Vf. Peana) 31.VII.1932; Cluj (Mănăştur) 18.VI.1927; Cluj 12. VII.1932; Finaţele Clujului 30.VII.1929; 21.VII.1929; Sălicea 29.VII.1928; 31.VII. 31.VII.1928.

Z. (A.) loti loti Denis et Schiffermüller
9 ex.: Cluj (V. Popii) 16.VI.1929 (2 ex.); 21.VI.1921; Cluj (Mănăştur) 12.VI.1927 (2 ex.); Cluj (V. Pleşca) 21.VII.1929; Finaţele Clujului 30.VI.1929; Stana 1.VII.1928 (2 ex.).

Z. (A.) loti caliacraensis Reiss
1 ♀ lectoparatype Balcic (Culac Mare) 16.VII.1928 (leg. Ostrogovich).

Subgenus **Mesembrynus** Hübner

Z. (M.) contaminei Boisduval (= *punctum* auct.)
2 ex.: Balcic (Dealul Culac Mare) 19.VII.1928; 21.VII.1928 (leg. Ostrogovich).

Z. (M.) purpuralis pluto Ochsenheimer
31 ex.: Cluj (V. Popii) 16.VI.1929 (4 ex.); 22.VI.1928 (2 ex.); Cluj (V. Pleşca) 1.VII. 1928 (4 ex.); 10.VI.1930 (4 ex.); 8.VII.1928 (f.?); Cluj (Mănăştur) 12.VI.1927 (2 ex.); Cluj 12.VIII.1922; 2.VIII.1922; Finaţele Clujului 30.VI.1929 (3 ex.); 29.VI. 1921; Sălicea 7.VI.1933; Cheile Turzii 25.VI.1933 (2 ex.); Mt. Măgura 4.VII.1928 (2 ex.); Răcătău 3.VII.1928; Scăriţa Belioara 17.VII.1933; Drăgoiasa 25.VII.1934*

* As the *Zygaenidae* family has not been thoroughly studied so far in Romania, certain changes in its taxonomy are expected to occur, and this will also affect the material in the collection „Ş. Péterfi".

Fam. LIMACODIDAE

Apoda Haworth (= *Cochlidium* Hübner = *Cochlidion* auct.)

A. limacodes Hufnagel
1 ♂: Cluj (V. Popii) 15.VI.1930.
2 ♀♀: Cluj (V. Popii) 15.VI.1930; Sibiu (Dealul Viilor) 29.VI.1927 (leg. Czekelius).

Fam. HETEROGYNIDAE

Heterogynis Rambur

H. penella Hübner (*paradoxa* Rambur)
20 ♂♂: Cluj (V. Pleşca) 24.V.1931 (7 ex.); 19.VI.1932 (7 ex.); 2.VI.1929; Cluj (V. Popii) 2.VI.1930 (2 ex.); 7.V.1931; 22.VI.1928; 26.VI.1933.

Superfam. NOCTUOIDEAE

Fam. LYMANTRIIDAE

Laelia Stephens

L. coenosa coenosa Hübner
1 ♂ 1♀: Techirghiol 28.VIII.1924 (ex.p.); 22.VIII.1924 (ex.p.).

Orgyia Ochsenheimer

O. antiqua Linnaeus
3 ♂♂: Cluj (D. Gălişer) 28.VII.1933 (2 ex.); V. Pleşca 7.X.1928.

Dasychira Hübner

D. fascelina Linnaeus
3 ♂♂: Cluj 7.VII.1927; V. Popii 8.VII.1933; 10.VIII.1933.

D. pudibunda Linnaeus
2 ♂♂: Cluj 22.V.1921; Rîul Sadu 20.VI.1927 (leg. Czekelius).
2 ♀♀: Cluj 1.III.1925 (ex.l.); Răcătău 14.VII.1929.

Dasorgya Staudinger

D. selenitica Esper
1 ♂: Saschiz 7.VI.1914 (ex. l.) (leg. Czekelius).

Penthophera Germar (= *Hypogymna* Hübner)

P. morio Linnaeus
3 ♂♂: Cluj (Mănăştur) 22.V.1927; Fînaţele Clujului 4.VI.1933; Tg. Mureş (V. Poklos) 4.VI.1928.
1 ♀: Cluj 6.VI.1927 (ex. l.).

Euproctis Hübner (= *Porthesia* Stephens)

E. chrysorrhoea Linnaeus
3 ♂♂: Cluj 19.VI.1927 (ex.l.); 26.VI.1928; 4.VII.1929.
1 ♀: Fînaţele Clujului 30.VI.1929.

E. similis Fuessly
3 ♂♂: Cluj (V. Pleşca) 31.VII.1927; 5.VIII.1928 (2 ex.).

Leucoma Hübner (= *Stilpnotia* Humphreys and Westwood)

L. salicis Linnaeus
1 ♂: Cluj 5.VI.1924.

Oeneria Hübner

O. rubea Fabricius
1 ♂, 1 ♂: Cluj 6.VIII.1923 (ex. ovo); Ineu 7.VIII.1929 (leg. Diószeghy).

Lymantria Hübner

L. monacha Linnaeus
1 ♂: Cluj (D. Feleacului) 22.VII.1928.

L. dispar dispar Linnaeus
3 ♂♂: Cluj 23.VII.1927; Cluj (V. Popii) 24.VIII.1928; Boholţ 21.VII.1931.
2 ♀♀: Boholţ 21.VII.1931; Cluj 10.VIII.1927 (ex. l.).

Fam. ARCTIIDAE

Thaumatha Walker

T. senex karwajszki Diószeghy
1 ex.: Ineu 13.VI.1926.

Setina Schrank

S. irrorella Linnaeus
16 ♂♂: Cheile Turzii 25.VI.1933; Sălicea 19.VIII.1928 (6 ex.); Sălicea 12.VIII.1928; 31.VII.1927; 29.VII.1928 (6 ex.); Mt. Măgura 4.VII.1928.
5 ♀♀: Sălicea 31.VII.1927; 26.VIII.1928 (4 ex.).

Miltochrista Hübner

M. miniata Forster
3 ex.: Cluj (Vf. Peana) 31.VII.1932; Sălicea 31.VII.1927; Cheile Turenilor 24.VII.1933.

Atolmis Hübner (= *Gnophria* Stephens)

A. rubricollis Linnaeus
1 ♂: Mt. Măgura 4.VII.1928.

Cybosia Hübner

C. mesomella Linnaeus
6 ex.: Cluj (V. Popii) 8.VI.1933; 15.VI.1930; Cluj (V. Pleşca) 10.VI.1930 (2 ex.); 21.VII.1929; Finaţele Clujului 30.VI.1929.

Pelosia Hübner

P. muscerda muscerda Hufnagel
2 ♀♀: Ineu 10.VI.1928 (leg. Diószeghy), 9.VI.1928 (leg. Diószeghy).

Eilema Hübner (= *Litosia* auct).

E. sororcula Hufnagel
1 ♂: Cluj (V. Pleşca) 8.V.1927.

E. griseola Hübner
1 ♀: Sălicea 29.VII.1928.

E. pygmaeola Doubleday (= *pallifrons* Zeller)
1 ♂: Cluj (Sălicea) 24.VI.1928.

E. lutarella Linnaeus
1 ♂: Cluj 2.VIII.1925.

E. complana balcanica Daniel
3 ♀♀: Cluj 3.VII.1927; Sălicea 3.VIII.1930; Cheile Turzii 23.VII.1933.

E. lurideola Zincken
2 ♂♂: Cheile Turzii 23.VII.1933; Cluj 2.VIII.1927.

Lithosia Fabricius

L. quadra quadra Linnaeus
3 ♂♂: Cluj 30.VII.1933; Cluj (V. Pleşca) 17.VIII.1927; Ineu 6.VI.1927 (leg. Diószehgy).

Spiris Hübner (= *Euprepia* Ochsenheimer)

S. striata Linnaeus
1 ♂: Ineu 11.VIII.1920 (leg. Diószeghy).
f. *pallida* Btlr.
1 ♂: Ineu 30.V.1925 (leg. Diószeghy).

Coscinia Hübner

C. cribraria pannonica Daniel
4 ♂♂: Mada 10.VI.1928; Cheile Turzii 6.VII.1929; 23.VII.1933 (2 ex.).
2 ♀♀: Cheile Turzii 25.VI.1933; Trascău 6.IX.1931.

Parasemia Hübner (= *Nemeophila* Stephens)

P. plantaginis carpathica Daniel
6 ♂♂: Retezat (1300 m) 17.VI.1923 (leg. Diószeghy); (1200 m) 8.VII.1929 (leg. Diószeghy); (1200 m) 20.VI.1923; 2.VII.1929 (leg. Diószeghy); Lăpuşna 12.VII.1930 (2 ex.).
f. *hospita* Den. et Schiff.
3 ♂♂: Valea Drăganului 8.VI.1935; Răcătău 3.VII.1928; Vlădeasa 17.VII.1929.
f. lutea Tutt.
2 ♀♀: Retezat (1200 m) 14.VII.1929 (leg. Diószeghy). V. Drăganului 18.VII.1929.

Orodemnias Wallengren

O. quenselii quenselii Paykull
1 ♂: Babele (Mţii Bucegi) 1.VII.1928 (leg. Ostrogovich).

Aretinia Eichwald

A. caesarea Goeze
1 ♂: Cluj 9.V.1927.
2 ♀♀: Cluj 30.IV.1929; 18.V.1928.

Hyphoraria Hübner

H. aulica aulica Linnaeus
1 ♂: Cluj (V. Popii) 16.V.1930.
6 ♀♀: Cluj (V. Popii) 8.V.1931; 13.V.1928; 22.V.1930 (2 ex.); 11 V.1931; Finaţele Clujului 18.V.1931.

Pericallia Hübner

P. matronula matronula Linnaeus
1 ♂: Rîul Sadu VII.1928 (leg. Czekelius).

Arctia Schrank (= *Epicallia* Hübner)

A. caja caja Linnaeus
4 ♂♂: Cluj 1.VIII.1927 (2 ex.) ex. l.); 27.VII.1927 (ex. l.); 15.VIII.1927 (ex. l.).
2 ♀♀: Cluj 22.VIII.1929 (2 ex.).

A villica villica Linnaeus
2 ♂♂: Ineu 12.VI.1928 (leg. Diószeghy); Rîul Sadu VII.1928 (leg. Czekelius).
1 ♀: Valea Drăganului 8.VI.1935.

Diacrisia Hübner

D. sannio sannio Linnaeus
3 ♂♂: Cluj 19.VII.1927; Săcărîmb 8.VI.1928; Vlădeasa (V. Zerna) 17.VII.1929.

Spilosoma Curtis (= *Spilosoma* Stephens = *Spilarctia* Butler)

S. lubricipeda lubricipeda Linnaeus (= *menthastri* Denis et Schiffermüller)
5 ♂♂: Cluj 18.V.1927; 23.V.1927; 21.V.1927; 10.VII.1928; Finaţele Clujului 16.VII. 1933.
3 ♀♀: Cluj 29.V.1927 (ex.l.); Cluj (Mănăştur) 1.V.1927; Cheile Turzii 23.VII.1933.

S. luteum luteum Hufnagel (= *lubricipeda* Linnaeus)
3 ♂♂: Cluj 29.V.1927 (ex.l.); 4.VII.1929; Finaţele Clujului 26.VI.1928.
1 ♀: Cheile Turzii 25.VI.1933.

Diaphora Stephens (= *Cycnia* auct.)

D. mendica Clerck
4 ♀♀: Cluj (V. Pleşca) 1.V.1927; 2.VI.1927; Sălicea 2.VI.1929; Cheile Turzii 10.V.1929

Phragmatobia Stephens

P. fuliginosa fuliginosa Linnaeus
2 ♂♂: Cluj 18.VI.1929; Sălicea 3.VIII.1930.
1 ♀: Cluj 2.V.1932.

f. esikii Diószeghy
1 ♂: Ineu 19.VIII.1924 (leg. Diószeghy).

Rhyparia Hübner

R. purpurata purpurata Linnaeus
2 ♀♀: Cheile Runcului 16.VII.1933; Retezat (1400 m) 15.VII.1928 (leg. Diószeghy).

Callimorpha Latreille (= *Panaxia* Tams)

C. dominula Linnaeus
10 ♀♀: Poieni 19.VII.1929; Valea Drăganului 18.VII.1929; Lăpuşna 12.VII.1930 (3 ex.); Cheile Turzii 6.VII.1929; Rişnov 8.VII.1927; Sălicea 22.VII.1928; V. Ierii 13.VII.1932; Floreşti (Cluj) 13.VII.1932.

Euplagia Hübner

E. quadripunctaria Poda
1 ♂: Cheile Turzii 13.VII.1930.
3 ♀♀: Cluj (V. Pleşca) 27.VII.1927; Cluj (Mănăştur) 25.VII1927; Sălicea 29.VII. 1928.

Tyria Hübner (nec *Thyria*)

T. jacobeae Linnaeus
8 ♂♂: Cluj (Vf. Peana) 3.VI.1936; Cluj 22.VII.1930; Răcătău 5.VII.1929 (2 ex.); Valea Drăganului 18.VI.1929; Vlădeasa (V. Zerna) 18.VII.1929.

Fam. CTENUCHIDAE (= SYNTOMIDAE = AMATIDAE)

Syntomis Ochsenheimer

S. phegea Linnaeus
39 ex.: Cluj (V. Popii) 2.VIII.1930 (5 ex.); 22.VII.1928; 20.VIII.1930 (7 ex.); Cluj (V. Pleşca); 21.VII.1929 Cluj (Baciu) 23.VII.1929; Răcătău 5.VII.1928 (3 ex.); 3.VII.1928 (5 ex.); V. Ierii 6.VII.1928 (2 ex.); 13.VII.1932; Răcătău 14.VII.1929 (2 ex.); Mt. Măgura 4.VII.1928 (4 ex.); Mărişel 3.VII.1927 (2 ex.); V. Drăganului 25.VII.1934; Cheile Turzii 23.VII.1933 (3 qx.); Sălicea 21.VII.1929.

Dysauxes Hübner

D. ancilla Linnaeus
6 ex.: Cluj (Mănăştur) 17.VII.1927 (2 ex.); Cluj (V. Pleşca); 22.VII.1928; 29.VII.1928; Cluj (Vf. Peana) 31.VIII.1923; Cheile Turenilor 24.VII.1933.

D. punctata Fabricius
3 ex.: Cheile Turzii 13.VIII.1930 (3 ex.).
f.? (*famula pontica* Friese?)
1 ex.: Vác Szurmay (no other data).

Fam. NOLIDAE

Nola Leach (= *Roeselia* Hübner = *Celama* Walker)

N. cucullatella Linnaeus
1 ♂ (gen. I): Ineu 24.VI.1928 (leg. Diószeghy).
1 ♀ (gen. I): Ineu 24.VI.1927 (leg. Diószeghy).
1 ♂ (gen. II): Ineu 2.IX.1928 (leg. Diószeghy).

N. cicatricalis Treitschke
3 ♂♂: Ineu 10.IV.1923; 12.IV.1927; 2.IV.1929 (leg. Diószeghy).

Fam. NOCTUIDAE
Subfam. *Noctuinae*

Euxoa Hübner

E. obelisca Denis et Schiffermüller
1 ex.: 15.VIII. Cluj (e).

Agrotis Ochsenheimer (= *Scotia* Hübner)

A. cinerea Denis et Schiffermüller
2 ex.: Cluj 22.V.1931; Rîul Sadu 25.V.1927 (leg. Czekelius) (e).

A. exclamationis exclamationis Linnaeus
10 ♂♂: Cluj (V. Popii) 29.V.1931; 4.VI.1931; 11.VIII.1927; 18.VIII.1927; 16.VI.1927; 19.VI.1927; 18.V.1927; 24.V.1930; Cluj (Baciu) 15.V.1927; Rîul Sadu 25.V.1927 (e).
1 ♀: Valea Ierii 12.VII.1932.

A. crassa Hübner
4 ♂♂: Ineu 21.VIII.1931 (2 ex.); 1.IX.1929; 1 ex., unlabelled.
1 ♀: Ineu 27.VIII.1931 (all ex. collected by Diószeghy).

Axylia Hübner

A. putrix Linnaeus
2 ex.: Cluj 29.V.1927; 19.VI.1927.

Ochropleura Hübner

Subgenus Diehagyris Lederer

O. (D.) melanura albida Caradja
2 ex.: Balcic 6.VII.1929 (2 ex.) (leg. Ostrogovich).

Subgenus Ygoga Nye

O.(Y.) signifera Denis et Schiffermüller
1 ex.: Cluj 29.VI.1927.

Subgenus Ochropleura s. str.

O.(O.) praecox Linnaeus
1 ex.: Rîul Sadu 5.IX.1926 (leg. Czekelius).

O.(O.) plecta Linnaeus
2. ex: Cluj 9.V.1927; Sălicea 3.VII.1930.

Chersotis Boisduval

C. rectangula Denis et Schiffermüller
1 ex.: Ineu (leg. Diószeghy) (e).

C. multangula Hübner
1 ex.: Ineu 13.VIII.1924 (leg. Diószeghy).

Noctua Linnaeus (= *Triphaena* Ochsenheimer)

N. pronuba Linnaeus
2 ex.: Cheile Turzii 6.VII.1929; Cluj 1.IX.1923.

N. fimbriata Schreber (= *fimbria* Linnaeus)
2 ex.: Ineu 11.VI.1920 (leg. Diószeghy); Răcătău 14.VII.1929.

N. orbona Hufnagel
2 ex.: Ineu 17.VI.1930 (2 ex.) (leg. Diószeghy).

Spaelotis Boisduval
S. ravida Denis et Schiffermüller
1 ex.: Peştişul Mic (Alpestes) 17.VII.1931.
Diarisa Hübner
D. dahlii Hübner (= *festiva* Den. et Schiff. = *primulae* Esper)
1 ex.: Rîul Sadu 1927 (leg. Czekelius).
D. rubi Vieweg
1 ex.: Cluj 30.VII.1927.
Xestia Hübner (= *Amathes* Hübner)
X. c-nigrum Linnaeus
3 ex.: Cluj 21.V.1927; 29.V.1927 (2 ex.).
X. triangulum Hufnagel
1 ex. Cluj (spre Sălicea) 10.VIII.1931.
X. baja Denis et Schiffermüller
1 ex.: Cluj 8.VIII.1926.
X. rhomboidea Esper (= *stigmatica* Hübner)
1 ex.: Ineu 9.VIII.1924 (leg. Diószeghy).
X. castanea neglecta Hübner
4 ex.: Ineu 7.IX.1928 (2 ex.), 4.IX.1928 (2 ex.) (leg. Diószeghy).
X. xanthographa Denis et Schiffermüller
1 ex.; Ineu 12.IX.1925 (leg. Diószeghy).
Anaplectoides Mc Dunnough
A. prasina Denis et Schiffermüller
1 ex.: Răcătău 14.VII.1929.
Cerastis Ochsenheimer
C. rubricosa Denis et Schiffermüller
2 ex.: Sibiu (Viile Sibiului) 5.IV.1925 (leg. Czekelius); Ineu 6.IV.1920 (leg. Diószeghy).
C. leucographa Denis et Schiffermüller
1 ex.: Rîul Sadu IV.1927 (leg. Czekelius).
Subfam. *Hadeninae*
Hada Billberg (= *Lasionycta* Aurivillius)
H. nana Hufnagel (= *dentina* Denis et Schiffermüller)
2 ex.: Cluj 7.VII.1929; Sălicea 3.VII.1930.
Pachetra Guenée
P. sagittigera Hufnagel (= *leucophaea* Denis et Schiffermüller)
1 ex.: Rîul Sadu 25.V.1927 (leg. Czekelius).
Sideridis Hübner
S. anapheles Nye (= *evidens* Hübner)
1 ex.: Cluj 27.V.1931.
Mamestra Ochsenheimer
Subgenus **Mamestra** Ochsenheimer
M.(M.) brassicae Linnaeus
2 ex.: Cluj 3.VIII.1928; 28.VI.1931.
Subgenus **Melanchra** Hübner
M.(M.) persicariae persicariae Linnaeus
1 ex.: Rîul Sadu, 26.VI.1926 (leg. Czekelius).
f. *accipitrina* Esper
1 ex.: Rîul Sadu VII.1928 (leg. Czekelius).
Subgenus **Lacanobia** Billberg
M.(L.) contigua Denis et Schiffermüller
1 ex.: Cluj 10.IX.1928.
M.(L.) thalassina thalassina Hufnagel
3 ex.: Cluj 18.V.1927; 19.V.1927; 27.VII.1927 (det. Czekelius).
M.(L.) suasa Denis et Schiffermüller (= *dissimilis* Knoch)
1 ex.: Cluj 12.VII.1930.
M.(L.) w-latinum Hufnagel (= *genistae* Borkhausen)
1 ex.: Cluj 15.V.1927.
M.(L.) oleracea Linnaeus
5 ex.: Cluj 21.V.1927; 22.V.1931; 3.VI.1927; 17.VI.1927 (2 ex.).

Subgenus **Ceramica** Guenée
M.(C.) pisi pisi Linnaeus
1 ex.: Rîul Sadu VII.1928 (leg. Czekelius).
Hadena Schrank (= *Harmodia* Hübner = *Dianthoecia* Boisduval)
H. rivularis Fabricius
3 ex.: Cluj 19.VII.1927; 28.VII.1927; Ineu 7.VII.1926 (leg. Diószeghy).
H. perplexa perplexa Denis et Schiffermüller (*lepida* Esper = *carpophaga* Brahm)
1 ex.: Ineu 22.V.1928 (leg. Diószeghy).
H. compta Denis et Schiffermüller
2 ex.: Sibiu (Ville Sibiului) 3.VI.1917; 15.VI.1917 (leg. Czekelius).
H. confusa Hufnagel (= *nana* Rottemburg)
1 ex.: Rîul Sadu 10.VIII.1927 (leg. Czekelius).
H. luteago luteago Denis et Schiffermüller
6 ex.: Cluj 6.VII.1925; 4.VII.1929 (2 ex.); 19.VI.1927; 18.VII.1933; Peştişul Mic (Alpestes) 12.VII.1931.
Eriopygodes Hampson
E. imbecilla Fabricius
1 ex.: Răcătău 12.VI.1926 (e).
Cerapteryx Curtis
C. graminis Linnaeus
2 ex.: Rîul Sadu 26.VI.1926 (leg. Czekelius); Retezat 30.VII.1922 (leg. Diószeghy).
Tholera Hübner (= *Epineuronia* Rebel)
T. cespitis Denis et Schiffermüller
2 ex.: Cluj 3.II.1926 (det. Czekelius); Ineu 15.IX.1929 (leg. Diószeghy).
T. decimalis Poda (= *popularis* Fabricius)
6 ex.: Cluj 9.IX.1926; 16.IX.1927; V. Popii 13.IX.1928 (3 ex.).
Egira Duponchel (= *Xylomyges* Guenée)
E. conspicillaris Linnaeus
1 ex.: Cluj 8.V.1930.
f. melaleuca Vieweg
5 ex.: Cluj 16.IV.1929; 10.V.1929 (2 ex.); 12.V.1929; Ineu 4.V.1932 (leg. Diószeghy).
Orthosia Ochsenheimer (= *Monima* Hübner = *Taeniocampa* Guenée)
O. opima Hübner
1 ex.: Finaţele Clujului 10.IV.1931.
O. gracilis Denis et Schiffermüller
1 ex.: Finaţele Clujului 24.IV.1930.
O. schmidtii Diószeghy.
2 ex.: Ineu 11.IV.1938 (leg. Diószeghy) (2 ex.).
O. stabilis Denis et Schiffermüller
4 ex.: Cluj 14.IV.1921; 7.V.1929; Cluj (Vf. Peana) 30.IV.1929 (2 ex.).
O. incerta incerta Hufnagel
4 ex.: Cluj 29.IV.1929; 30.IV.1929; 2.V.1929; 10.V.1929.
O. gothica gothica Linnaeus
4 ex.: Cluj 29.III.1921; 4.IV.1930; 3.V.1929; 4.V.1929.
Hyssia Guenée
H. cavernosa Eversmann
1 ex.: Banhida (leg. Gaal) (no other data).
Mythimna Ochsenheimer (= *Leucania* Ochsenheimer)
Subgenus **Mythimna** Ochsenheimer
M.(M.) turca turca Linnaeus
1 ex.: Ineu 22.VIII.1926 (leg. Diószeghy).
M.(M.) albipuncta Denis et Schiffermüller
3 ex.: Cluj (V. Popii) 14.VI.1929; 22.VIII.1929; Cluj 7.VIII.1927.
M.(M.) impura impura Hübner
2 ex.: Sălicea 10.VII.1933; 3.VIII.1930.
M.(M.) pallens Linnaeus
4 ex.: Cluj 25.V.1931; 3.VIII.1930; V. Popii 14.VI.1929; 15.VI.1929.
Subgenus *Leucania* Ochsenheimer
M.(L.) comma Linnaeus
2 ex.: V. Ierii 6.VII.1928; Mt. Retezat (1 000 m) 19.VII.1928 (leg. Diószeghy).

Senta Stephens (= *Meliana* Curtis)

S. fammea flammea Curtis (= *Stenoptera* Staudinger)
2 ex.: Jucu 12.VII.1929; Cluj (V. Popii) 14.VI.1929.

Subfam. *Cuculliinae*

Cucullia Schrank

C. umbratica Linnaeus
3 ex.: Cluj 4.V.1927; 5.V.1927; 18.VI.1927.

C. tanaceti Denis et Schiffermüller
1 ♂: Techirghiol 6.IX.1927 (ex l.) (prep. genit. Rákosy).

C. prenanthis Boisduval
1 ♂: Cluj 12.V.1929 (leg. et det. Ostrogovich = *C. scrophulariae* Den et. Schiff.) (det. et prep. genit. Rákosy = *C. prenanthis*).

Episema Ochsenheimer

E. glaucina f. dentimacula Hübner
1 ex.: Ineu 15.IX.1929 (leg. Diószeghy).
f. *tersoides* Boursin
1 ex.: Ineu 4.X.1920 (leg. Diószeghy).

Brachionycha Hübner

B. sphinx Hufnagel
3 ex.: Rîul Sadu 25.X.1925 (leg. Czekelius); Ineu 6.X.1924 (leg. Diószeghy); Ineu 2.XI.1933 (leg. Diószeghy) (e).

B. nubeculosa Esper
1 ex.: Rîul Sadu IV.1927 (leg. Czekelius).

Calliergis Hübner

C. ramosa Esper
1 ex.: Retezat (1150 m) 11.VII.1928 (leg. Diószeghy).

Aporophyla Guenée

A. lutulenta lutulenta Denis et Schiffermüller
5 ex.: Ineu 6.X.1929; 4.X.1929; 8.X.1929; 3.X.1929; Retezat (1200 m); 8.VII.1927 6.X.1929 (e) (leg. Diószeghy) (prep. genit. Rákosy), (in coll. det. *A. nigra* Haw.).

Scotochrosta Lederer (= *Egira* auct.)

S. pulla Denis et Schiffermüller
2 ex.: Ineu 11.IX.1928 (2 ex.) (leg. Diószeghy).

Lithophane Hübner

L. furcifera furcifera Hufnagel
1 ex.: Rîul Sadu (5.IV.1927 (leg. Czekelius).

Xylena Ochsenheimer (= *Calocampa* Stephens)

X. exsoleta Linnaeus
2 ex.: Ineu 21.X.1928 (2 ex.) (leg. Diószeghy).

Rileyiana Moucha et Chvala (*Thecophora* Lederer)

R. fovea Treitschke
3 ex.: Ineu 5.X.1929; 2.XI.1928; 19.X.1928 (♀) (leg. Diószeghy).

Diehonia Hübner (= *Agriopis* Boisduval = *Griposia* Tams)

D. aprilina Linnaeus
2 ♀♀: Ineu 21.X.1928 (2 ex.) (leg. Diószeghy).

D. aeruginea Hübner
2 ex.: Ineu 6.X.1924; 27.X.1927 (leg. Diószeghy).

Lamprostieta Hübner

L. culta Denis et Schiffermüller
2 ♂♂: Cluj 9.VII.1928; Ineu 31.VII.1929 (leg. Diószeghy).

Dryobotodes Warren (= *Dryobota* auct.)

D. eremita Fabricius (= *protea* Denis et Schiffermüller)
11 ex.: Ineu 22.X.1928 (10 ex.) (leg. Diószeghy); 1 ex. (e).
f. *incolorata* Warren
1 ex.: Ineu 22.X. 1928 (leg. Diószeghy).

D. monochroma Esper
1 ♀: Ineu 17.IX.1928 (leg. Diószeghy).
f. *suberis* Boisduval
1 ♂: Ineu 17.IX.1928 (leg. Diószeghy).

Blephatita Hampson (= *Crino* auct.)
B. ***satura*** Denis et Schiffermüller
3 ex.: Cluj 9.IX.1925; V. Popii 13.IX.1928 (2 ex.).
Polymixis Hübner
P. *polymita* Linnaeus
1 ex.: Cluj 18.VIII.1927.
Ammoconia Lederer
A. *caecimacula* Denis et Schiffermüller
2 ex.: Cluj 21.IX.1924; Ineu 24.IX.1925 (leg. Diószeghy).
Eupsilia Hübner (= *Scopelosoma* Curtis)
E. *transversa* Hufnagel (= *satellitia* Linnaeus)
2 ex.: Cluj 1.IV.1924; 30.IV.1929.
f. *albipuneta* Strand
1 ex.: Cluj 30.IV.1929 (e).
f. *brunnea* Lampa
1 ex.: Ineu 14.X.1925 (leg. Diószeghy).
Jodia Hübner
J. *croceago* Denis et Schiffermüller
2 ex.: Ineu 31.X.1928 (2 ex.) (leg. Diószeghy).
Conistra Hübner (= *Orrhodia* Hübner)
Subgenus **Conistra** Hübner s. str.
C.(C.) *vaccinii* Linnaeus
5 ex.: Ineu 6.X.1929 (2 ex.); Cluj 7.V.1929; Cluj (Vf. Peana) 30.IV.1929; 1 ex. unlabelled.
f. *obscura* Tutt.
1 ex.: Ineu 18.XI.1925 (leg. Diószeghy).
f. *spadicea* Den. et Schiff.
2 ex.: Ineu 25.X.1925; 28.IX.1929 (leg. Diószeghy).
C.(C.) *ligula* Esper
1 ex.: Ineu 24.X.1925 (leg. Diószeghy).
C.(C.) *rubiginosa* Scopoli (= *vaupunctatum* Esper)
2 ex.: Ineu 31.X.1928; 7.XII.1930 (leg. Diószeghy).
C.(C.) *veronicae* Hübner
6 ex.: Ineu 22.X.1928 (4 ex.); 22.X.1928 (2 ex.) (e).
f. *conspicua* Warren
1 ex.: Ineu 22.X.1928 (leg. Diószeghy).
Subgenus **Dasycampa** Guenée
C.(D.) ***rubiginea*** Denis et Schiffermüller
3 ex.: Ineu 11.IX.1928; 21.IX.1928; 27.X.1928 (leg. Diószeghy).
C.(D.) *erythrocephala* Denis et Schiffermüller
7 ex.: Ineu 22.X.1928 (6 ex.); 22.X.1928 (e) (leg. Diószeghy).
f. *glabra* Denis et Schiffermüller
4 ex.: Ineu 22.X.1928 (4 ex.) (leg. Diószeghy).
Agrochola Hübner
A. *circellaris* Hufnagel
4 ex.: Cluj (V. Popii) 7.X.1928; 8.IX.1928; Ineu 8.IX.1928; 14.X.1921 (leg. Diószeghy).
A. *lota* Clerck
2 ex.: Ineu 23.X.1928; 25.X.1925 (leg. Diószeghy).
A. *macilenta* Hübner
3 ex.: Ineu 25.VIII.1925; 6.XI.1928; 7.XI.1928 (leg. Diószeghy).
A. *nitida* Denis et Schiffermüller
4 ex.: Ineu 8.IX.1928 (2 ex.); 10,IX.1928, 19.X.1928 (leg. Diószeghy).
f. *obscurata* Spuler
1 ex.: Ineu 8.IX.1928 (leg. Diószeghy).
A. *helvola* Linnaeus
7 ex.: Ineu 2.X.1929 (2 ex.); 26.IX.1929 (2 ex.); 6.IX.1929; 22.X.1928 (2 ex.) (leg. Diószeghy).
A. *humilis* Denis et Schiffermüller
3 ex.: Ineu 6.X.1929 (2 ex.); 24.X.1928 (leg. Diószeghy).

A. lychnidis Denis et Schiffermüller
2 ex.: Ineu 7.XI.1931; 15.XI.1930 (leg. Diószeghy).
f. *pistacina* Den. et Schiff.
1 ex.: Ineu 27.X.1928 (leg. Diószeghy).
A. laevis Hübner
5 ex., Ineu 8.IX.1928 (3 ex.); 17.IX.1928 (2 ex.) (leg. Diószeghy).
Atethmia Hübner (= *Cirroedia* Guenée)
A. centrago Haworth (= *xerampelina* sensu Hübner)
2 ex.: Ineu 13.IX.1923; 17.IX.1928 (e) (leg. Diószeghy).
Xanthia Ochsenheimer (= *Cirrhia* Hübner)
X. aurago Denis et Schiffermüller
2 ex.: Ineu 3.X.1928 (e) (leg. Diószeghy); Cluj 5.X.1923 (e).
X. fulvago Clerck (= *sulphurago* Denis et Schiffermüller)
2 ex.: Ineu 17.IX.1928; 17.IX.1928 (e) (leg. Diószeghy).
X. icterita Hufnagel (= *fulvago* sensu Linnaeus)
1 ex.: Rîul Sadu 19.IX.1925 (leg. Czekelius).
X. gilvago Denis et Schiffermüller
2 ex.: Ineu 21.X.1929 (leg. Diószeghy); Cluj 28.IX.1927 (e).
X. citrago Linnaeus
1 ex.: Ineu 4.X.1929 (leg. Diószeghy).

Subfam. *Acronictinae* (= *Apatelinae*)

Simira Ochsenheimer (= *Arsilonche* Lederer)
S. nervosa Denis et Schiffermüller
2 ex.: Cluj 10.V.1927 (ex.p.); Finaţele Clujului 26.VII.1930.
Moma Hübner (= *Diphtera* auct.)
M. alpium alpium Osbeck
1 ex.: Rîul Sadu 20.VI.1927 (leg. Czekelius) (e).
Acronicta Ochsenheimer (= *Apatele* Hübner = *Acronycta* Treitschke)
Subgenus **Subacronicta** Kozhantshikov
A.(S.) megacephala Denis et Schiffermüller
2 ex.: Cluj 27.V.1927; Rîul Sadu 10.VII.1923 (leg. Czekelius).
Subgenus **Acronicta** Ochsenheimer
A.(A.) aceris Linnaeus
1 ex.: Cluj 4.VII.1929.
A.(A.) leporina leporina Linnaeus
1 ex.: Rîul Sadu VII/VIII (leg. Czekelius).
Subgenus **Triaene** Hübner
A.(T.) alni Linnaeus
1 ex.: Rîul Sadu 1927 (nr. 1082) (leg. Czekelius).
A.(T.) cuspis Hübner
1 ex.: Rîul Sadu 1927 (leg. Czekelius (e).
A.(T.) psi Linnaeus
3 ex.: Cluj 27.V.1927; V. Popii 10.VII.1926; Sălicea 7.VI.1933.
Subgenus **Hyboma** Hübner
A.(H.) strigosa strigosa Denis et Schiffermüller
1 ex.: Ineu 2.VIII.1927 (leg. Diószeghy).
Subgenus **Viminia** Chapman (= *Pharetra* Hübner)
A.(V.) auricoma Denis et Schiffermüller
1 ex.: Ineu 24.VI.1931 (leg. Diószeghy).
A.(V.) rumicis rumicis Linnaeus
4 ex.: Cluj 16.V.1927; 27.VII.1927; 12.VIII.1932, Cluj (Cimitirul Central) 25.VII.1936.
Craniophora Snellen
C. ligustri Denis et Schiffermüller
1 ex.: Cluj 9.VIII.1922.
Cryphia Hübner
Subgenus **Cryphia** Hübner
C.(C.) fraudatricula Hübner (= *palliola* auct.)
1 ex.: Cluj 4.VII.1922.

Subgenus Euthales Hübner

C.(E.) algae Fabricius
3 ex.: Cluj 10.VIII.1933; 12.VIII.1933; 26.VIII.1927 (det. Czekelius).

Subfam. *Amphipyrinae*

Amphipyra Ochsenheimer

A. pyramidae pyramidea Linnaeus
2 ex.: Cluj 12.IX.1925; Sălicea 21.VII.1929.

A. livida livida Denis et Schiffermüller
1 ex.: Cluj 25.IX.1924.

A. micans Lederer
1 ex.: Ineu 14.VII.1920 (leg. Diószeghy).

Dypterygia Stephens

D. scabriuscula Linnaeus
2 ex.: Cluj 12.VII.1926; Rîul Sadu 5.VI.1927 (leg. Czekelius).

Rusina Stephens (= *Stygiostola* Hampson)

R. ferruginea Esper
1 ex.: Rîul Sadu 15.VII.1926 (leg. Czekelius).

Polyphaenis Boisduval

P. sericata Esper
1 ex.: Ineu 8.VII.1931 (leg. Diószeghy).

Thalpophila Hübner

T. matura Hufnagel
3 ex.: Ineu 27.VIII.1924; 9.IX.1927; 17.IX.1928 (leg. Diószeghy).

Trachea Ochsenheimer

T. atriplicis atriplicis Linnaeus
2 ex.: Cluj 21.V.1926; 25.V.1923.

Euplexia Stephens

E. lucipara lucipara Linnaeus
3 ex.: Cluj 22.V.1921; Răcătău 14.VII.1929 (2 ex.)

Phlogophora Treitschke (= *Brotolomia* Lederer)

Ph. meticulosa Linnaeus
2 ex.: Cluj 12.VI.1935; 2.IX.1924.

Eucarta Lederer (= *Telesilla* Herrich-Schäffer)

E. amethystina amethystina Hübner
8 ex.: Ineu 1.VII.1933; 2.VIII.1934 (3 ex.); 5.VIII.1934 (2 ex.); 3.VII.1927; Căpîlnaș VII.1934 (leg. Teleki).

Goonallica Nye (= *Callogonia* Hampson)

G. virgo Treitschke
1 ex.: Ineu 11.VIII.1929 (leg. Diószeghy).

Enargia Hübner

E. ypsillon Denis et Schiffermüller (= *fissipuncta* Haworth)
4 ex.: Cluj 12.VI.1927 (2 ex.) (det. Czekelius); 10.VI.1927; Sibiu (Ville Sibiului) 4.VII. 1929 (leg. Czekelius).

Dieycla Guenée

D. oo Linnaeus
4 ♂♂: Ineu 18.VI.1930 (3 ex.); 6.VI.1931 (leg. Diószeghy).
2 ♀♀: Ineu 18.VI.1930; 21.VI.1930 (leg. Diószeghy).

Cosmia Ochsenheimer (= *Calymnia* Hübner)

C.(C.) trapezina Linnaeus
2 ex.: Cluj 10.VIII.1921; 8.VII.1927 (e).

C.(C.) pyralina Denis et Schiffermüller
6 ex.: Cluj 16.VI.1927 (4 ex.); 22.VI.1927; 4.VII.1933.

Actinotia Hübner (= *Chloantha* Boisduval)

A. polyodon Clerck
1 ex.: Cluj 10.VIII.1931.

A. hyperici Denis et Schiffermüller
1 ex.: Ineu 4.VII.1931 (leg. Diószeghy) (e).

Apamea Ochsenheimer (= *Crymodes* Guenée (= *Parastichtis* auct.)

A. monoglypha monoglypha **Hufnagel**
3 ex.: Cluj 29.VI.1929; 20.VIII.1933; Vlădeasa (V. Zerna) 17.VII.1929.
A. lithoxylaea lithoxylaea **Denis et Schiffermüller**
3 ex.: Cluj 9.VII.1927; 21.VII.1929; 20.VII.1929.
A. crenata crenata **Hufnagel** (*rurea* Fabricius)
1 ex.: Rîul Sadu 5.VII.1927 (leg. Czekelius).
A. lateritia **Hufnagel**
1 ex.: Ineu 25.VI.1921 (leg. Diószeghy).
A. remissa **Hübner** (= *obscura* Haworth)
2 ex.: Mada 10.VI.1928 (e); Retezat 24.VII.1927 (leg. Diószeghy).
A. sordens **Hufnagel** (= *basilinea* **Denis et Schiffermüller**)
1 ex.: Cluj (Cimitirul Central) 22.V.1936.
Oligia Hübner (= *Miana* Stephens = *Procus* Agassiz)
O. strigilis strigilis **Linnaeus**
2 ex.: Cluj 2.VI.1927; 9.VI.1929.
O. versicolor **Borkhausen**
3 ex.: Cluj 27.V.1931; 28.VI.1932; Răcătău 14.VII.1929.
O. latruncula **Denis et Schiffermüller**
1 ex.: Cluj 22.VI.1927.
Mesapamea Heinicke
M. secalis **Linnaeus**
1 ex.: Cluj 21.VII.1928.
Photedes Lederer (= *Petilampa* Aurivillius)
Ph. captiuncula captiuncula **Treitschke**
2 ex.: Retezat (1300 m) 10.VII.1928; 13.VII.1928 (leg. Diószeghy) (e).
Ph. pygmina **Haworth**
3 ex.: Finaţele Clujului 26.VII.1930 (3 ex.).
Amphipoea Billberg
A. oculea **Linnaeus**
f. **nictitans Borkhausen**
4 ex.: Sălicea 3.VIII.1930 (4 ex.).
Hydraecia Guenée
H. micacea **Esper**
1 ex.: Ineu 7.VIII.1929 (leg. Diószeghy).
Gortyna Ochsenheimer
G. flavago **Denis et Schiffermüller** (= *ochracea* **Hübner**)
2 ex.: Ineu 28.IX.1920; 2.IX.1926 (leg. Diószeghy).
Calamia Hübner
C. tridens **Hufnagel** (= *virens* **Linnaeus**)
1 ex.: Cluj 2.VIII.1924.
Charanyca Billberg (= *Meristis* Hübner = *Grammesia* Stephens)
C. trigrammica **Hufnagel**
4 ex.: Cluj 2.VI.1929; V. Popii 14.VI.1929; V. Drăganului 25.VII.1934; Cheile Turzii 25.VI.1933.
Hoplodrina Boursin
H. alsines **Brahm**
1 ex.: Cluj 17.VI.1927.
H. blanda **Denis et Schiffermüller** (= *taraxaci* Hübner)
1 ex.: Cluj 4.VII.1929.
H. ambigua **Denis et Schiffermüller**
1 ex.: Cluj 7.IX.1928.
Caradrina Ochsenheimer
Subgen. **Caradrina Ochsenheimer**
C.(C.) morpheus **Hufnagel**
1 ex.: Cluj 9.VII.1928.
Subgen. **Platyperigea Smith**
C.(P.) kadenii **Freyer**
2 ex.: Ineu 14.VI.1927; 30.VIII.1928 (leg. Diószeghy).
Subgen. **Paradrina Boursin**

C.(P.) clavipalpis Scopoli (= *quadripunctata* Fabricius)
3 ex.: Cluj 29.VII.1929; 20.X.1929; V. Popii 25.VIII.1934.
Athetis Hübner (*Proxenus* Herrich-Schäffer)
A. dasychira Hübner (= *furvula* Hübner)
1 ex.: Cluj 18.V.1927.
Acosmetia Stephens (= *Hydrilla* Boisduval)
A. caliginosa Hübner
2 ex.: Cluj (V. Pleşca) 26.V.1929; Ineu 17.V.1920 (leg. Diószeghy).
Aegle Hübner (= *Metoponia* Guenée)
A. hoekeritziana Hübner
1 ex.: (V. Ag-Bunar) Balcic (Bulgaria) 12.VII.1930 (leg. Ostrogovich).
Elaphria Hübner (= *Hapalotis* Hübner = *Monodes* Guenée)
E. venustula Hübner
1 ex.: Ineu 8.VI.1928 (e) (leg. Diószeghy).

Subfam. *Heliothinae*

Heliothis Ochsenheimer (= *Chloridea* Wastwood in Duncan)
H. maritima maritima Graslin
3 ex.: Cluj (V. Popii) 16.VI.1929; Cluj 24.VII.1927; Cluj (Cimitirul Central) 16.VIII. 1923.
H. ononis Denis et Schiffermüller
5 ex.: Sălicea 29.VII.1928; 3.VIII.1930 (3 ex.); V. Popii 25.VII.1927.
H. peltigera Denis et Schiffermüller
1 ex.: Cluj 5.VIII.1928.
Protoschinia Hardwick
P. scutosa Denis et Schiffermüller
1 ex.: Techirghiol (ex. l.), emerged in Cluj 25.IX.1924.
Pirrhia Hübner
P. umbra Hufnagel
2 ex.: Cluj (V. Popii) 14.VI.1929; 20.VIII.1933.
Periphanes Hübner (= *Chariclea* Curtis)
P. delphinii delphinii Linnaeus
1 ex.: Cluj 27.VII.1931.

Subfam. *Acontiinae* (= *Erastriinae*)

Eublemma Hübner (= *Porphyrinia* Hübner = *Thalpochares* Lederer)
E. parva Hübner
1 ex.: Cheile Turzii 25.VI.1933.
Lithacodia Hübner (= *Jaspidia* auct.)
L. pygarga Hufnagel (= *fasciana* auct.)
1 ex.: Rîul Sadu VII.1929 (leg. Czekelius).
Deltote Reichenbach, Leipzig
D. bankiana Fabricius (= *olivana* Denis et Schiffermüller)
1 ex.: Ineu 9.VIII.1929 (leg. Diószeghy) (e).
D. candidula candidula Denis et Schiffermüller
2 ex.: Cluj (V. Pleşca) 1927 (nr. 2460); (det. Czekelius) Cluj 3.VIII.1929.
Emmelia Hübner
E. trabealis Scopoli
5 ex.: Cluj (V. Popii) 15.VI.1928; Finaţele Clujului 20.V.1929; 30.VI.1929; Cheile Turzii 23.VII.1933; V. Drăganului 25.VII.1934.
Acontia Ochsenheimer (= *Tarache* Hübner)
A. lucida Hufnagel
2 ex.: Nighighiş (jud. Hunedoara) 14.VII.1931 (2 ex.).
f. *albicollis* Fabricius
9 ex.: Nighighiş 14.VII.1931 (7 ex.); Peştişul Mic 12.VII.1931; Ineu 19.VIII.1929.

Subfam. *Chloephorinae* (= *Westermanniinae*)

Bena Billberg
B. prasinana Linnaeus
3 ex.: Peştişul Mic 8.VII.1931; 9.VII.1931; Ineu 9.IV.1934 (leg. Diószeghy).

Subfam. *Pantheinae*

Colocasia Ochsenheimer

C. coryli Linnaeus
2 ex.: Cluj 19.VII.1928; Aggtelek (Hungary) 8.VII.1940 (e).

Subfam. *Plusiinae*

Abrostola Ochsenheimer

A. triplasia Linnaeus (= *tripartita* Hufnagel)
3 ex.: Cluj 25.V.1931; 24.VI.1929; 24.VI.1933.

A. trigemina Werneburg (= *triplasia* auct.)
3 ex.: Cluj 21.V.1977; 15.VI.1927; 9.VI.1929.

Euchalcia Hübner

E. variabilis variabilis Piller et Mitterpacher
1 ex.: Bucegi (V. Jepilor) 2.VIII.1925 (leg. Müller).

E. consona Fabricius
1 ex.: Cluj 4.VII.1929.

Diachrysia Hübner

D. chrysitis Linnaeus (= *generosa* Staudinger = *tutti* Kostrowicki)
2 ex.: Cluj 2.VI.1927; 15.VII.1927.

Macdunnoughia Kostrowicki

M. confusa Stephens (= *gutta* Guenée)
2 ex.: Cluj 9.VII.1928; 7.IX.1926.

Autographa Hübner

A. gamma Linnaeus
7 ex.: Cluj 18.VII.1928; 8.VI.1929; 25.VII.1928 (2 ex.); 14.VIII.1931; Finaţele Clujului 26.VII.1930; Mt. Măgura 4.VII.1928.

A. pulchrina Haworth (= *v-aureum* Guenée)
1 ex.: Cluj 6.VII.1926.

Syngrapha Hübner

S. interrogationis Linnaeus
1 ex.: Rîul Sadu VII.1928 (leg. Czekelius).

Subfam. *Catocalinae*

Catocala Schranck (= *Astiotes* Hübner)

C. fraxini fraxini Linnaeus
1 ex.: Cluj (Cimitirul Central) 1.VIII.1936.

C. nupta nupta Linnaeus
1 ex.: Cluj (D. Hoia) 3.VIII.1932.

C. elocata Esper
3 ex.: Cluj 7.IX.1928; 19.IX.1928 (2 ex.).

C. promissa Denis et Schiffermüller
8 ex.: Cluj (D. Hoia) 3.VIII.1932 (3 ex.); Boholţ 21.VIII.1931; Ineu 25.VI.1928 (e) (leg. Diószeghy); Ineu 17.VI.1930 (2 ex.); 24.VI.1930 (leg. Diószeghy).

C. sponsa Linnaeus
10 ex.: Cluj 12.VIII.1922; 31.VII.1928; illegible location 2.VII.1932 (5 ex.); 3 ex. unlabelled.

C. hymenea Denis et Schiffermüller
1 ex.: Ineu 7.VII.1929 (leg. Diószeghy).

Ephesia Hübner

E. fulminea fulminea Scopoli
3 ex.: Cluj 18.VII.1928; 26.VI.1927; Zau de Cîmpie 27.VIII.1930.

Minucia Moore (*Pseudophia* Guenée).

M. lunaris Denis et Schiffermüller
1 ex.: Cluj 30.V.1933.

Callistege Hübner

C. mi Clerck
10 ex.: Cluj (V. Pleşca) 8.V.1927; 20.V.1928 (2 ex.); V. Popii 24.V.1930; Finaţele Clujului 20.V.1940; Cheile Turzii 25.VI.1933 (2 ex.); Detunata 27.V.1929 (2 ex.); Săcărîmb 8.VI.1928.

Euclidia Ochsenheimer (*Ectypa* Billberg)

E. glyphica Linnaeus
11 ex.: Cluj (V. Popii) 20.V.1928 (2 ex.); 6.V.1928; V. Pleşca 6.V.1928; Braşov (V. Răcădăului) 27.V.1928; Mt. Vlădeasa 21.VII.1934; Sălicea 7.VI.1933; Finaţele Clujului 9.VI.1929; Nighighiş 14.VII.1931; Răcătău 3.VII.1928; Viţă 10.V.1928.

Aedia Hübner

A. funesta Esper
2 ex.: Cluj 15.VII.1928; 14.VII.1933.

Tyta Billberg (= *Tarache* auct.)

T. luctuosa Denis et Schiffermüller
8 ex.: Cluj (V. Popii) 19.IV.1926; V. Pleşca 6.V.1928: Finaţele Clujului 20.V.1929 (2 ex.); 21.V.1929; Tg. Mureş (V. Poklos) 4.VII.1928; Mada 10.VI.1928; Peştişul Mic 12.VII.1931.

Lygephila Billberg (= *Toxocampa* Guenée)

L. vicias Hübner
3 ex.: Finaţele Clujului 26.VII.1930; Cluj (V. Popii) 8.VI.1929; Rîul Sadu 26.VI.1913 (leg. Czekelius).

Scoliopteryx Germar

S. libatrix Linnaeus
4 ex.: Cluj (Hoia) 13.V.1926; Cluj 4.VII.1929; 10.XI.1929; Finaţele Clujului 3.VIII. 1930.

Calyptra Ochsenheimer (= *Calpe* Treitschke)

C. thalictri Borkhausen (= *capucina* Esper)
1 ex.: Ineu 3.VII.1930 (leg. Diószeghy).

Colobochyla Hübner (= *Madopa* Stephens)

C. salicalis Denis et Schiffermüller
1 ex.: Finaţele Clujului 4.VII.1929.

Laspeyria Germar

L. flexula Denis et Schiffermüller
1 ex.: Cluj 13.VIII.1927.

Parascotia Hübner (= *Boletobia* Boisduval)

P. fuliginaria Linnaeus
4 ex.: Cluj 13.VII.1930; 8.VIII.1933; 29.VII.1933; Ineu 20.VI.1928 (leg. Diószeghy).

Epizeuxis Hübner

E. calvaria Denis et Schiffermüller
2 ex.: Cluj 1.V.1931; 4.VIII.1926 (e).

Phytometra Haworth (= *Prothymnia* Hübner)

P. viridaria Clerck
2 ex.: Cluj 22.VII.1928; Sălicea 19.VII.1933.

Subfam. *Herminiinae*

Simplicia Guenée

S. rectalis Eversmann
1 ex.: Cluj 11.X.1923.

Polypogon Schrank

P. tentacularia Linnaeus
3 ex.: Sălicea 24.VI.1928; Finaţele Clujului 10.VI.1928; Cluj 22.V.1927 (e).

P. strigilata Linnaeus (= *barbalis* Clerck)
4 ex.: Cluj 20.VIII.1933 (2 ex.); V. Pleşca 17.VI.1928; Cluj (Mănăştur) 22.V.1927 (e) (det. Czekelius).

P. plumigeralis Hübner (= *crinalis* Treitschke)
1 ex.: Răcătău 14.VI.1929.

Herminia Latreille (= *Zanclognatha* Lederer = *Pechipogo* Hübner)

H. lunalis Scopoli (= *tarsiplumalis* Hübner)
1 ex.: Cluj 6.VI.1924 (e).

H. tarsicrinalis Knoch
3 ex.: Cluj 19.VI.1927; V. Pleşca 16.VI.1930; V. Popii 20.V.1928.

H. nemoralis Fabricius (= *grisealis* Denis et Schiffermüller)
1 ex.: Cluj 25.VI.1928.

Trisateles Tams

T. emortualis Denis et Schiffermüller
1 ex.: Cluj 25.VI.1920.
Paracolax Hübner
P. derivalis Hübner (= *glaucinalis* Denis et Schiffermüller)
3 ex.: Cluj 11.VI.1924; V. Pleşca 21.VII.1929; 5.VIII.1928.
Hypena Schrank
Subgenus **Hypena** Schrank
H.(H.) rostralis Linnaeus
2 ex.: Cluj 7.V.1929; 7.V.1929 (e).
H.(H.) proboscidalis Linnaeus
4 ex.: Cluj 29.V.1927 (2 ex.); Răcătău 14.VII.1929 (2 ex.).
Subgenus **Bomolocha** Hübner
H.(B.) crassalis Fabricius (= *frontis* Thunberg)
1 ex.: Rîul Sadu 20.VII.1926 (leg. Czekelius).
Schrankia Hübner
S. taenialis Hübner
1 ex.: Ineu 20.VI.1928 (leg. Diószeghy) (e).

Superfam. GEOMETROIDEA

Fam. DREPANIDAE

Drepana Schrank
D. binaria Hufnagel
1 ex.: Mănăştur-Cluj 1.V.1927.
D. falcataria falcataria Linnaeus
7 ex.: Cluj 30.VII.1927; 12.VI.1932; (Făget) 8.V.1932; Valea Negruţei 5.VII.1920; Sălicea 3.VIII.1930 (2 ex.); 1 ex., unlabelled.
Cilix Leach
C. glaucata Scopoli
3 ex.: Cluj 18.VII.1928; 19.VIII.1927; 27.VIII.1926.

Fam. THYATIRIDAE

Thyatira Ochsenheimer
T. batis Linnaeus
2 ex.: Cluj 12.VII.1926; 11.VIII.1933.
Habrosyne Hübner
H. pyritoides Hufnagel (= *detersa* Linnaeus)
2 ex.: Cluj (Cimitirul Central) 23.V.1954; Ineu 18.V.1920 (leg. Diószeghy).
Tethea Ochsenheimer (= *Palimpestris* Hübner)
T. or or Denis et Schiffermüller
3 ex.: Cluj 9.VII.1929; Răcătău 5.VII.1928; 1 ex., unlabelled.
Tetheella Werny
T. fluctuosa Hübner
2 ex.: Cluj 28.VIII.1933; Retezat (900 m) 9.VII.1928 (leg. Diószeghy).
Ochropacha Wallengren
O. duplaris Linnaeus
1 ex.: Retezat (900 m) 23.VII.1927 (leg. Diószeghy).
Aehlya Billberg (= *Cymatophora* Treitschke)
A. flavicornis flavicornis Linnaeus
2 ex.: Sălicea 14.IV.1929 (2 ex.).

Fam. GEOMETRIDAE

Subfam. *Archiearinae* (= *Brephinae*)

Archiearis Hübner
A. parthenias parthenias Linnaeus
19 ex.: Cluj (D. Feleac) 21.IV.1929 (9 ex.); 25.III.1930; 14.IV.1929 (4 ex.); (V. Căprioarei) 1.IV.1928; Făget 24.III.1929; Sălicea 31.III.1929 (3 ex.).
A. notha Hübner
14 ex.: Cluj (D. Feleac) 21.IV.1929 (7 ex.); 14.IV.1929 (3 ex.); (V. Pleşca) 20.III.1927; 25.III.1928; 25.III.1930 (2 ex.).

Subfam. *Oenochrominae*

Alsophila Hübner

A. aescularia Denis et Schiffermüller
4 ex.: Cluj 29.III.1929; 20.III.1922; 24.III.1929 (V. Pleşca); Ineu 25.III.1920 (leg. Diószeghy).

A. quadripunctaria Esper
2 ex.: Ineu 7.XII.1930 (leg. Diószeghy).

Subfam. *Geometrinae*

Aplasta Hübner

A. ononaria Fuessly
1 ex.: Ineu 27.VII.1920 (leg. Diószeghy).

Pseudoterpna Hübner

P. pruinata Hufnagel
10 ex.: Cluj 22.VI.1932; V. Pleşca 17.VII.1927; Finaţele Clujului 26.VI.1928; 29.VI. 1928; 30.VI.1929 (2 ex.); Sălicea 21.VII.1929 (2 ex.); Balcic (Bulgaria) 16.VII.1928 (leg. Ostrogovich); Cluj (Mănăştur) 14.VIII.1927.

Geometra Linnaeus (= *Hipparchus* Leach)

G. papilionaria papilionaria Linnaeus
3 ex.: Cluj 21.VI.1929; Sălicea 3.VIII.1930; Retezat (1400 m) 18.VII.1926 (leg. Diószeghy).

Comibaena Hübner

C. pustulata Hufnagel
1 ex.: Cluj (V. Popii) 14.V.1929.

Thetidia Boisduval (= *Euchloris* Hübner)

T. smaragdaria smaragdaria Fabricius
3 ex.: Cluj 27.VIII.1927; Finaţele Clujului 9.VI.1929; Ineu 29.VI.1928 (leg. Diószeghy).

Hemithea Duponchel

H. aestivaria Hübner (= *strigata* Müller)
6 ex.: Cluj 4.VI.1927; 11.VI.1927; V. Popii 14.VI.1929; Finaţele Clujului 30.VI.1929; Stana 1.VII.1928.

Chlorissa Stephens (= *Nemoria* auct.)

C. viridata Linnaeus
10 ex.: Cluj (Hoia) 8.VI.1933; (Mănăştur) 1.V.1927; (V. Pleşca) 8.V.1927; 27.V.1930, 10.VII.1927; (Mănăştur) 22.V.1927 (2 ex.); Finaţele Clujului 26.VII.1930; Cheile Baciului 15.V.1927.

Thalera Hübner

T. fimbrialis Scopoli
1 ex.: Cluj 28.V.1931.

Jodis Hübner

J. lactearia Linnaeus
7 ex.: Cluj (V. Pleşca) 8.V.1927 (2 ex.); 24.V.1930; Cluj (V. Popii) 20.V.1928; 22.V. 1927; 29.IV.1934; Finaţele Clujului 5.VI.1929.

Subfam. *Sterrhinae*

Cyclophora Hübner (= *Cosymbia* Hübner, = *Codonia* Hübner, = *Ephyra* Duponchel)

C. annulata Schulze
5 ex.: Cluj (V. Pleşca) 5.VIII.1928; Sălicea 3.VIII.1930; Stana 1.VII.1928; V. Pleşca 8.V.1927 (e).

C. pendularia Clerck (= *orbicularia* Hübner)
1 ex.: Ineu 13.VI.1925 (leg. Diószeghy).

C. albipunctata albipunctata Hufnagel
3 ex.: Sălicea 19.VIII.1928; 3.VIII.1930; 1 ex. (e).

C. albiocellaria Hübner
1 ex.: Mada 10.VI.1928.

C. ruficiliaria Herrich-Schäffer
4 ex.: Cluj 20.V.1928; 1.VI.1931; (V. Pleşca) 28.VIII.1928 (2 ex.).

C. porata Linnaeus
2 ex.: Cluj 19.V.1927; 8.V.1927 (e).

C. quercimontaria Bastelberger
1 ex.: Cluj 31.VII.1928.
C. punctaria Linnaeus
3 ex.: Cluj (Făget) 1.V.1927; (V. Pleşca) 4.VI.1933; Baciu 26.IV.1927 (e).
C. linearia Hübner
1 ex.: Săcărîmb 9.VI.1928.
Timandra Duponchel (= *Calothysanis* auct.)
T. griseata griseata W. Petersen (= *amata* auct.)
3 ex.: Cluj 10.V.1927; 23.V.1929; V. Drăganului 18.VII.1929.
Scopula Schrank (= *Acidalia* Treitschke)
S. immorata Linnaeus
6 ex.: Cluj (V. Pleşca) 5.VIII.1928; (V. Popii) 20.V.1928; Sălicea 19.VIII.1928 (2 ex.); V. Mişidului 24.V.1928; Baciu 15.V.1927 (e).
S. umbellaria Hübner
6 ex.: Sălicea 24.VI.1928 (2 ex.); 2.VI.1924; 26.VI.1933; Cluj (V. Popii) 15.VI.1930; V. Ponor 29.VII.1934.
S. ornata Scopoli
8 ex.: Cluj (V. Pleşca) 12.VIII.1928 (2 ex.); (V. Popii) 8.VI.1929; (Mănăştur) 22.V. 1927; Finaţele Clujului 10.VI.1928; 29.VI.1928; Sălicea 26.VIII.1928; V. Mişidului 24.V.1928.
S. decorata Denis et Schiffermüller
5 ex.: Cluj 12.VIII.1922; Finaţele Clujului 29.VI.1928; 9.VI.1928; 26.VI.1928; 30.VI. 1929; Drăgoiasa 25.VII.1934; Ardeu 10.VI.1928.
S. rubiginata Hufnagel
12 ex.: Cluj (V. Pleşca) 26.V.1929; 22.VII.1928; (V. Popii) 24.VII.1928 (2 ex.); Finaţele Clujului 29.VI.1928 (2 ex.); 20.V.1929; 10.VIII.1928; 21.VII.1928; Cluj 6.IX.1928; Mada 10.VI.1928.
S. submutata Treitschke (= *contiguaria* Duponchel)
1 ex.: Ineu 27.VII.1922 (leg. Diószeghy).
S. incanata Linnaeus
12 ex.: Cluj 28.VI.1928; 15.VI.1929; 20.V.1927; Cluj (V. Popii) 14.VI.1929; 26.VIII. 1928; Sălicea 2.IX.1928; 26.VIII.1928; Răcătău 3.VII.1928; Cheile Turzii 8.VI. 1932.
S. immutata Linnaeus
2 ex.: Cluj 2.VII.1928; 22.VII.1928.
S. virgulata Denis et Schiffermüller (= *strigaria* Hübner)
13 ex.: Finaţele Clujului 10.VIII.1928 (7 ex.); 26.VI.1928; 29.VI.1928; 21.VII.1928 (2 ex.); Săcărîmb 12.VII.1928; Ineu 11.VI.1922 (leg. Diószeghy).
S. floslactata Haworth (= *remutaria* Hübner)
6 ex.: Cluj 22.V.1927 (e); (V. Popii) 24.V.1931 (2 ex.); (Mănăştur) 22.V.1927; V. Drăganului 18.VII.1929 (2 ex.).
S. nemoraria Hübner
6 ex.: Cluj (V. Pleşca) 10.VI.1930; 22.V.1927; Sălicea 24.VI.1928; Mt. Măgura 4.VII. 1928; Deva 7.VI.1928 (2 ex.).
S. subpunctaria Herrich-Schäffer (= *punctata* Scopoli)
3 ex.: Răcătău 3.VII.1928; 14.VII.1929 (2 ex.).
Idaea Treitschke (= *Sterrha* Hübner)
I. rufaria Hübner
20 ex.: Cluj 12.VIII.1922 (2 ex.); (V. Popii) 22.VII.1928; Stana 1.VIII.1928; Finaţele Clujului 15.VII.1928 (12 ex.); 28.VII.1929; Cheile Turzii 6.VII.1929; Peştişul Mic 8.VII.1931; 1 ex. nr. 2933.
I. ochrata ochrata Scopoli
24 ex.: Finaţele Clujului 30.VI.1929 (5 ex.); 10.VI.1928 (3 ex.); 3.VI.1928 (2 ex.); Cluj (V. Pleşca) 21.VII.1929 (2 ex.); 12.VII.1928; Cluj (V. Popii) 22.VII.1928 (3 ex.); 31.V.1929; 16.VI.1928 (2 ex.); Cluj 22.V.1927; Sălicea 24.VI.1928; 26.VIII. 1928; 29.VIII.1926; Stana 1.VII.1928.
I. serpentata Hufnagel (= *perochraria* F.v.R., = *similata* Thbg.)
4 ex.: Cluj (V. Popii) 16.VI.1928; 24.VIII.1928; Finaţele Clujului 10.VI.1928; Stana 1.VII.1928.

I. aureolaria Denis et Schiffermüller (= *trilineata* Scopoli)
5 ex.: Cluj (V. Popii) 22.VI.1928· 13.VII.1928: Cluj (V. Pleşca) 21.VI.1927; Stana 1.VII.1928; Finaţele Clujului 29.VI.1928.
I. vulpinaria vulpinaria Herrich-Schäffer)
1 ex.: Ineu 26.VI.1931 (leg. Diószeghy).
I. rusticata Denis et Schiffermüller)
2 ex.: Cluj 23.VII.1928; 31.VII.1929.
I. laevigata Scopoli
2 ex.: Cluj 9.VII.1928; 13.VII.1928.
I. moniliata Denis et Schiffermüller
3 ex.: Finaţele Clujului 30.VI.1929 (2 ex.); Sălicea 26.VI.1933.
I. biselata Hufnagel
5 ex.: Cluj 25.VII.1928 (2 ex.); (V. Pleşca) 5.VIII.1928; 10● VII.1927; Cluj 18.VII.1928.
I. politata Hübner
2 ex.: Ineu 26.VI.1931; 3.VII.1922 (leg. Diószeghy).
I. inquinata Scopoli (= *herbariata* Fabricius)
3 ex.: Cluj 17.VI.1929; 28.V.1926; 11.VII.1928.
I. humiliata Hufnagel
6 ex.: Finaţele Clujului 29.VI.1928 (3 ex.); 26.VI.1928 (2 ex.); Sălicea 26.VI.1927.
I. dilutaria Hübner
4 ex.: Cluj 12.VIII.1922; Finaţele Clujului 30.VI.1929 (2 ex.); Balcic (D. Culac Mare) 10.VII.1930 (leg. Ostrogovich) (e).
I. seriata Schrank (= *virgulata* sensu Hübner)
1 ex.: Cluj 19.V.1929.
I. dimidiata Hufnagel
1 ex.: Ineu 9.V.1920 (leg. Diószeghy).
I. pallidata Denis et Schiffermüller
14 ex.: Cluj 25.VII.1928 (2 ex.); (V. Pleşca) 26.V.1929; Finaţele Clujului 20.V.1929 (4 ex.); 27.V.1928; 30.VI.1929; Săcărîmb 8.VI.1928 (4 ex.); Răcătău 14.VI.1929.
I. emarginata Linnaeus
2 ex.: Cluj (V. Pleşca) 31.VII.1927; 5.VIII.1928.
I. aversata aversata Linnaeus
6 ex.: Cluj 16.VI.1928; 9.VII.1928; 22.VII.1928; (Vf. Peana) 7.VIII.1930; (V. Pleşca) 21.VII.1929; Cluj 18.VII.1927 (e).
I. straminata Borkhausen (= *inornata* Haworth)
1 ex.: Cluj 25.VII.1928.
I. deversaria Herrich-Schäffer
3 ex.: Cluj 24.VII.1927; (Vf. Peana) 7.VIII.1930; Cheile Turzii 6.VIII.1929.

Rhodostrophia Hübner

R. vibicaria Clerck
15 ex.: Cluj 16.VIII.1927; (V. Popii) 16.VI.1929; 22 V.1927; (2 ex.); 12.VI.1927; Finaţele Clujului 23.VIII.1929; 15.VII.1928; 30.VI.1929; 10.VI.1928; Sălicea 16.VIII.1928; 24.VI.1928 (3 ex.); Deva 7.VI.1928; Poeni 19.VI.1929; Cluj 29.V. 1927 (e).

Lythria Hübner — Subfam. *Larentiinae*

L. purpuraria Linnaeus
18 ex.: Cluj (V. Popii) 25.VII.1927; 1.VII.1927; 25.VII.1927; 24.VIII.1928; (V. Pleşca) 5.VIII.1928; Finaţele Clujului 4.V.1930; 10.VIII.1928 (2 ex.); 15.VI.1927; Sălicea 29.VII.1928 (7 ex.); 2.VI.1928; 19.VIII.1928.

Catarhysme Hübner

C. rigata Hübner
4 ex.: Finaţele Clujului 20.V.1929; 4.VI.1930; 26.VII.1930; Ineu 26.IV.1920 (leg. Diószeghy).

Mesotype Hübner

M. virgata Hufnagel
12 ex.: Finaţele Clujului 4.V.1930 (3 ex.); 19.IV.1930 (4 ex.); 20.IV.1930; 21.VII. 1928; 28.VII.1929; 10.VIII.1928 (2 ex.).

Scotopteryx Hübner (= *Ortholitha* auct.)

S. moeniata Scopoli
4 ex.: Cluj 15.VIII.1926; Finaţele Clujului 10.VIII.1928; Sălicea 2.IX.1928; Rétezat (800—900 m) 24.VII.1926 (leg. Diószeghy).

S. chenopodiata Linnaeus (= *limitata* Scopoli)
15 ex.: Cluj (V. Pleşca) 21.VI.1929; 31.VI.1927; 22.VII.1928 (2 ex.); 26.VII.1927 (2 ex.); 21.VII.1929; 31.VII.1927; 7.VIII.1930; (V. Popii) 22.VII.1928; 13.VII.1928; Sălicea 21.VII.1929; Stana 1.VII.1928; Răcătău 3.VII.1928; Poeni 19.VII.1929.

S. mucronata Scopoli
6 ex.: Cluj (V. Pleşca) 20.V.1928; 24.V.1930; (V. Popii) 20.V.1928; Sălicea 7.VI.1933 (2 ex.); 26.V.1929

S. luridata Hufnagel (= *plumbaria* Fabricius)
13 ex.: Cluj (V. Popii) 20.V.1928 (2 ex.); (V. Pleşca) 24.VII.1930; (Făget) 1.V.1927; Sălicea 26.V.1929. (3 ex.); 2.IX.1928; 26.VIII.1928; 2.VI.1929; 29.VIII.1926; Finaţele Clujului 10.VI.1928; Mada 10.VI.1928.

S. coarctaria Denis et Schiffermüller
13 ex.: Finaţele Clujului 27.V.1928 (3 ex.); 4.V.1930 (3 ex.); 10.VI.1928; 29.V.1929; 20.V.1930 (3 ex.); 21.V.1932 (2 ex.).

S. subvicinaria Staudinger
9 ex.: Cluj 6.V.1931; (D. Hoia) 10.V.1932; 5.VI.1932; Finaţele Clujului 10.V.1931 (3 ex.); 20.V.1929; 25.IV.1930; 2.V.1932.

S. bipunctaria Denis et Schiffermüller
13 ex.: Cluj 14.VII.1927; Finaţele Clujului 26.VII.1930 (3 ex.); 10.VI.1928; 27.VI. 1929 (3 ex.); 15.VII.1928 (3 ex.); 5.VI.1929; Cheile Turzii 6.VI.1929.

Orthonama Hübner

O. obstipata Fabricius (= *fulviata* Hübner)
4 ex.: Cluj (V. Popii) 13.IX.1928; (Becaş) 9.IX.1928; Ineu 4.VII.1928; 17.VIII.1928 (leg. Diószeghy).

Xanthorhoe Hübner

X. biriviata Borkhausen (= *pomoeraria* Eversmann)
2 ex.: Finaţele Clujului 5.VI.1933; Sălicea 3.VIII.1930.

X. designata Hufnagel
4 ex.: Cluj 16.VIII.1927; V. Drăganului 18.VII.1929 (2 ex.); Ineu 6.VII.1927 (leg. Diószeghy).

X. spadicearia Denis et Schiffermüller
1 ex.: Retezat (1100 m) 24.V.1922 (leg. Diószeghy).

X. ferrugata Clerck (= *unidentaria* Haworth)
12 ex.: Cluj 29.V.1927; 16.V.1927 (2 ex.); 26.V.1931; 5.V.1927; (Făget) 26.IV.1927; (V. Pleşca) 8.V.1927 (2 ex.); Dobrin (500 m) 5.VII.1928; V. Negruţei 5.VII.1928; Sălicea 3.VIII.1930.

X. quadrifaciata quadrifaciata Clerck (= *quadrifasciata* Linnaeus)
6 ex.: Cluj 16.VI.1927; 22.VI.1927; (V. Pleşca) 3.VII.1928; (Vf. Peana) 7.VIII.1930; Rîul Sadu 1.IX.1927 (leg. Czekelius).

X. montanata Denis et Schiffermüller
15 ex.: Cluj (Vf. Peana) 7.VIII.1930 (5 ex.); Sălicea 19.VI.1932 (3 ex.); Finaţele Clujului 5.VI.1929; 30.VI.1929; Vlădeasa 17.VII.1933; V. Negruţei 5.VII.1928; Dobrin (1500 m) 5.VII.1928; Lăpuşna 12.VII.1930; Rétezat (1400 m) 11.VII.1929 (leg. Diószeghy).

X. fluctuata fluctuata Linnaues
5 ex.: Cluj 14.V.1929; 30.VIII.1926; 15.V.1928; 10.V.1927; Eger (leg. Gaál (e).

Catarhoe Herbulot

C. cuculata Hufnagel
3 ex.: Cluj 6.VI.1927; 8.V.1927; Cheile Turzii 25.VII.1933.

Epirrhoe Hübner

E. tristata Linnaeus
13 ex.: Cluj 1927 (leg. Maticska); 21.V.1935; (Făget) 1.V.1927; 26.IV.1927; (V. Popii) 20.V.1928; (V. Pleşca) 24.VI.1938; Finaţele Clujului 5.VI.1933; Sălicea 24.VI.1928 (2 ex.); 2.VI.1929; 7.VI.1933; Cluj 20.VIII.1933; Retezat 27.V.1922 (leg. Diószeghy) (e).

E. alternata alternata Müller (= *sociata* Borkhausen)
8 ex.: Cluj 8.V.1927; (V. Popii) 10.V.1929; V. Drăganului 18.VI.1929; Săcărîmb 8.VI. 1928 (2 ex.); Tg. Mureş 4.VI.1928; Cheile Turzii 17.V.1931; Ineu 16.IV.1928 (leg. Diószeghy).

E. rivata Hübner
4 ex.: Cheile Turzii 25.VI.1933; V. Drăganului 18.VI.1929; Tg. Mureş 4.VI.1928; Ineu 21.V.1925 (leg. Diószeghy).

E. galiata Denis et Schiffermüller
4 ex.: Cluj 27.V.1931; (V. Pleşca) 12.VIII.1928; Finaţele Clujului 30.VI.1929; V. Drăganului 25.VII.1934.

E. molluginata Hübner
3 ex.: Cluj 25.VII.1928; (V. Pleşca) 7.VI.1929; 25.VI.1928.

Camptogramma Stephens

C. bilineata bilineata Linnaeus
19 ex.: Cluj (V. Popii) 22.VI.1928 (4 ex.); 15.VI.1928; 17.VI.1928; Stana 22.VI.1928 (6 ex.); Cluj (Făget) 2.VI.1927; Mada 10.VI.1928; Sălicea 24.VI.1928 (2 ex.); Deva 7.VI.1928; Poeni 19.VI.1929 (2 ex.).

Entephria Hübner

E. caesiata caesiata Denis et Schiffermüller
5 ex.: Vlădeasa 17.VII.1929 (3 ex.); Retezat (2100 m) 17.VII.1928; (2250 m) 30.VII. 1927 (leg. Diószeghy).

Anticlea Stephens

A. badiata Denis et Schiffermüller
1 ex.: 2.V.1929 (unlocated) (leg. Czekelius).

Mesoleuca Hübner

M. albicillata Linnaeus
2 ex.: V. Drăganului 18.VII.1929 (2 ex.).

Pelurga Hübner

P. comitata Linnaeus
10 ex.: Cluj 19.VII.1927; 23.VII.1927; 5.VII.1927; 7.VIII.1929 (5 ex.); 3.VIII.1928; Baroti (Hungary) (leg. Gaál) (e).

Lampropteryx Stephens

L. suffumata Denis et Schiffermüller
1 ex.: Cheile Turzii 21.IV.1930.

Cosmorhoe Hübner

C. ocellata Linnaeus
6 ex.: Cluj 25.VI.1928; 28.VIII.1928; (V. Popii) 7.V.1931; 15.V.1930; 22.V.1927; Baia de Criş 27.VIII.1930.

Coenotephria Prout

C. tophaceata Denis et Schiffermüller
5 ex.: Crişul Repede 24.V.1928; Cheile Turzii 17.V.1931 (4 ex.).

C. salicata salicata Hübner
1 ex.: Cheile Turzii 13.VIII.1930.

Eulithis Hübner (= *Lygris* Hübner)

L. pyunata Linnaeus
1 ex.: Retezat (1500 m) 22.VII.1926 (leg. Diószeghy).

L. populata Linnaeus (= *dotata* Linnaeus)
3 ex.: Răcătău 14.VII.1929; Retezat (1300 m) 15.VII.1921 (leg. Diószeghy); Piatra Tilharului 22.VII.1934.

L. pyraliata Denis et Schiffermüller
13 ex.: Cluj (V. Popii) 13.VII.1928 (3 ex.); 14.VII.1927; 20.VI.1932; 8.VI.1929 (2 ex.); 20.VII.1934; Finaţele Clujului 15.VIII.1928 (2 ex.); 30.VI.1929 (3 ex.).

Cidaria Treitschke

C. fulvata Förster
4 ex.: Cluj (D. Hoia) 5.VII.1932; Ineu 12.VI.1928; 8.VI.1929 (e); 12.VI.1928 (leg. Diószeghy) (e).

Plemyria Hübner

P. rubiginata rubiginata Denis et Schiffermüller
1 ex.: Retezat (900—1100 m) 19.VII.1926 (leg. Diószeghy).

Thera Stephens

T. variata variata **Denis et Schiffermüller**
13 ex.: Mt. Dobrin (1500 m) 5.VII.1928 (6 ex.); V. Negruţei 5.VII.1928; Mt. Vlădeasa 17.VII.1929; Călineasa 25.VII.1934; Drăgoiasa 25.VII.1934; Mt. Retezat (2.000 m) 26.VII.1926 (leg. Diószeghy); Azuga 2.VIII.1927; 27.V.1923 (unlocated) (e).

T. britannica Turner (= *albonigrata* Gornik)
19 ex.: V. Negruţei 5.VII.1928 (15 ex.); Mt. Dobrin 5.VII.1928 (4 ex.).

T. stragulata Hübner
1 ex.: Azuga 9.VII.1927 (leg. Ostrogovich).

Colostygia Hübner

C. pectinataria Knoch
4 ex.: Cluj (Vf. Peana) 7.VII.1928; Cluj (Baciu) 15.V.1927; V. Crişului Repede 27.VII.1928 (leg. Ostrogovich); Săcărîmb 5.VIII.1928.

Hydriomena Hübner

H. furcata Thunberg (= *sordidata* Fabricius)
5 ex.: Cluj 25.VII.1928 (2 ex.); (Vf. Peana) 7.VII.1929 (2 ex.); Retezat (1400 m) 19.VII.1926 (leg. Diószeghy).

H. ruberata Freyer
1 ex.: Vîrtop 23.VII.1934.

H. impluviata Denis et Schiffermüller (= *coerulata* Fabricius)
2 ex.: Retezat (1400 m) 15.VII.1928 (leg. Diószeghy); Rîul Sădu 25.VII.1927 (leg. Czekelius).

Horisme Hübner

H. vitalbata vitalbata Denis et Schiffermüller
2 ex.: Cluj 22.V.1927; Finaţele Clujului 24.IV.1927.

H. tersata tersata Denis et Schiffermüller
2 ex.: Cheile Turzii 25.VI.1933; V. Negruţei 5.VII.1928.

H. calligraphata Herrich-Schäffer
1 ex.: Cheile Turzii 6.VII.1929 (e).

H. aquata Hübner
6 ex.: Finaţele Clujului 10.V.1929; 10.V.1931 (4 ex.); 21.V.1932.

Melanthia Duponchel

M. alaudaria Freyer
3 ex.: V. Negruţei 5.VII.1928 (2 ex.); Retezat (1300 m) 14.VII.1928 (leg. Diószeghy).

M. procellata procellata Denis et Schiffermüller
2 ex.: Stana 1.VII.1928; Cluj 29.V.1927 (e).

Sparganía Guenée

S. luctuata Denis et Schiffermüller (= *lugubrata* Staudinger)
2 ex.: Retezat (1800 m) 15.VII.1928; (1400 m) 27.V.1922 (leg. Diószeghy).

Rheumaptera Hübner (= *Calocalpe* Hübner)

R. hastata hastata Linnaeus
2 ex.: Retezat (900 m) 27.V.1928 (leg. Diószeghy); V. Negruţei 5.VII.1928.

R. cervinalis Scopoli (= *certata* Hübner)
1 ex.: Cluj (Cheile Baciului) 15.V.1927.

R. undulata Linnaeus
3 ex.: V. Negruţei 5.VII.1928; Mt. Vlădeasa 18.VII.1929; Sălicea 29.VII.1928.

Triphosa Stephens

T. dubitata dubitata Linnaeus
2 ex.: Cluj 12.V.1929; Ineu 28.IV.1928 (leg. Diószeghy) (e).

Philereme Hübner (= *Scotosia* Stephens)

P. vetulata Denis et Schiffermüller
4 ex.: Cheile Turzii 23.VII.1933; Finaţele Clujului 20.V.1940 (2 ex.); Cluj 19.VI.1927 (e).

P. transversata transversata Hufnagel (= *rhamnata* Denis et Schiffermüller)
7 ex.: Cluj 22.VII.1932; Stana 1.VII.1928 (3 ex.); Cheile Turzii 6.VI.1929; Cheile Turenilor 24.VII.1933; Ineu 4.VI.1920 (leg. Diószeghy).

Euphyia Hübner

E. biangulata Haworth (= *picata* Hübner)
3 ex.: Cheile Turzii 7.VII.1929 (2 ex.); (illegible locality); 2.VIII.1932.

E. frustata Treitschke
1 ex.: Retezat (700—900 m) 18.VII.1927 (leg. Diószeghy).
E. scripturata Hübner
2 ex.: Cheile Turzii 23.VII.1933; Retezat (1 000 m) 22.VII.1922 (leg. Diószeghy).
Epirrita Hübner (= *Oporinia* Hübner)
E. dilutata Denis et Schiffermüller
4 ex.: Cluj 18.X.1927 (3 ex.); 21.X.1927.
E. autumnata autumnata Borkhausen
1 ex.: Cluj 24.X.1930.
Operophtera Hübner
O. brumata Linnaeus
4 ex.: Cluj 26.X.1928 (2 ex.); 30.X.1929; 30.IX.1930.
Perizoma Hübner
P. alchemillata Linnaeus
4 ex.: Cluj 22.VII.1927; Sălicea 3.VIII.1930; V. Drăganului 18.VII.1929; Retezat (1 000 m) 19.VII.1926 (leg. Diószeghy).
P. lungdunaria Herrich-Schäffer
1 ex.: Ineu 14.VII.1927 (leg. Diószeghy).
P. minorata minorata Treitschke
1 ex.: Bucegi 28.VII.1929 (e).
P. blandiata blandiata Denis et Schiffermüller
3 ex.: Mt. Măgura 4.VII.1928; V. Ierii 6.VII.1928; Retezat (1800 m) 27.VII.1926 (leg. Diószeghy).
P. albulata albulata Denis et Schiffermüller
15 ex.: Cluj (V. Popii) 22.V.1927; 15.VI.1930; 4.VI.1928 (2 ex.); 20.V.1928; 24.V.1928; 22.VI.1928; Mt. Măgura 4.VII.1928 (2 ex.); Finaţele Clujului 3.VI.1928 (2 ex.); Cluj (V. Pleşca) 24.V.1928 (3 ex.); Retezat (800 m) 27.V.1922 (leg. Diószeghy).
P. flavofasciata Thunberg
2 ex.: Cluj 25.VI.1928; 30.VI.1927.
P. incultaria Herrich-Schäffer
1 ex.: Retezat (1200 m) 19.VII.1928 (leg. Diószeghy).
P. verberata Scopoli
3 ex.: Retezat (1 000 m) 26.VII.1928 (3 ex.) (leg. Diószeghy).
Eupithecia Curtis (= *Tephroclystia* Hübner)
E. haworthiata Doubleday (= *isogrammaria* sensu Herrich-Schäffer)
1 ex.: Ineu 23.VI.1930 (leg. Diószeghy).
E. abietaria Goeze (= *pini* Retzius)
2 ex.: V. Negruţei 5.VIII.1928; Mt. Vlădeasa 17.VII.1929.
E. linariata Denis et Schiffermüller
2 ex.: Ineu 20.V.1921; 13.VI.1930 (leg. Diószeghy).
E. irriguata Hübner
1 ex.: Ineu 10.IV.1934 (leg. Diószeghy).
E. pygmaeata Hübner
1 ex.: Cluj (V. Popii) 14.VI.1928.
E. extraversaria Herrich-Schäffer
1 ex.: Cluj 1.VIII.1932.
E. centaureata Denis et Schiffermüller (= *oblongata* Thunberg)
2 ex.: Cluj 18.V.1927; Sălicea 3.VIII.1930.
E. absinthiata Clerck
2 ex.: Cluj 19.V.1927; 12.VI.1927.
E. vulgata Haworth
1 ex.: Cluj 30.VI.1927.
E. castigata Hübner
1 ex.: Cluj (V. Pleşca) 21.IV.1930.
E. tripunctaria Herrich-Schäffer (= *albipunctata* Haworth)
1 ex.: Cluj 21.VI.1977.
E. simpliciata Haworth (= *subnotata* Hübner)
1 ex.: Ineu 27.VII.1920 (leg. Diószeghy) (e).
E. innotata Hufnagel
1 ex.: Cluj 18.V.1931.

E. pusillata pusillata Denis et Schiffermüller (= *sobrinata* Hübner)
Chloroclystis Hübner
C. chloreata Mabille
1 ex.: Cluj 10.VI.1928.
C. rectangulata Linnaeus (= *rectangularia* Boisduval)
1 ex.: Cluj 4.VI.1927.
Gymnoscelis Mabille
G. rufifasciata Haworth (= *pumillata* Hübner)
2 ex.: Ineu 13.VI.1927; 29.VI.1922 (leg. Diószeghy).
Chesias Treitschke
C. rufata rufata Fabricius
1 ex.: Rîul Sadu 5.VII.1927 (leg. Czekelius).
Aplocera Stephens
A. plagiata plagiata Linnaeus
7 ex.: Cluj 2.VI.1927; (V. Pleşca) 26.V.1929; 2.IX.1928; Sălicea 24.VI.1928; Finaţele Clujului 27.V.1928; 5.VI.1929; Mt. Cucurbăta 23.VII.1937.
A. praeformata Hübner
4 ex.: V. Drăganului 18.VII.1929 (2 ex.); V. Ierii 13.VII.1932; Mt. Codru 27.VI.1925 (leg. Diószeghy).
A. simpliciata Treitschke
1 ex.: Retezat (1900—2200 m) 28.VII.1926 (leg. Diószeghy).
Odezia Boisduval
O. atrata Linnaeus
2 ex.: Azuga 17.VII.1926; Lăpuşna 12.VII.1930.
Schistostege Hübner
S. decussata Denis et Schiffermüller
4 ex.: Finaţele Clujului 30.VI.1929 (2 ex.); Ineu 21.V.1925 (2 ex.) (leg. Diószeghy).
Lithostege Hübner
L. griseata Denis et Schiffermüller
1 ex.: Ineu 27.IV.1921 (leg. Diószeghy).
L. farinata Hufnagel
3 ex.: Cluj 29.V.1933; 15.VI.1928; Ineu 26.V.1925 (leg. Diószeghy).
Discoloxia Warren
D. blomeri Curtis
1 ex.: Retezat (1250 m) 18.VII.1928 (leg. Diószeghy).
Venusia Curtis
V. cambrica Curtis
1 ex.: (unlabelled).
Euchoeca Hübner
E. nebulata Scopoli (= *obliterata* Hufnagel)
4 ex.: Cluj (V. Pleşca) 1.VII.1928; V. Ierii 6.VII.1928 (2 ex.); Retezat (1100 m) 3. VI.1923 (leg. Diószeghy).
Asthena Hübner
A. albulata Hufnagel (= *candidata* Denis et Schiffermüller)
4 ex.: Cluj (V. Popii) 20.V.1928; (Făget) 26.IV.1927; Viţă 10.V.1928; Ineu 4.VII.1923 (leg. Diószeghy).
A. anseraria Herrich-Schäffer
1 ex.: Ineu 15.V.1928 (leg. Diószeghy).
Hydrelia Hübner
H. sylvata Denis et Schiffermüller (= *testaceata* Donovan)
1 ex.: Rîul Sadu 26.VI.1926 (leg. Czekelius).
Minoa Treitschke
M. murinata Scopoli
14 ex.: Cluj 18.IV.1924; (V. Pleşca) 2.VI.1929; (V. Popii) 24.V.1930; Finaţele Clujului 8.VI.1930; 5.VI.1933; Sălicea 20.VIII.1928; 26.VIII.1928 (2 ex.); Deva 7.VI.1928 (2 ex.); Mt. Măgura 4.VII.1928; Cluj 22.V.1927 (e).
Lobophora Curtis

L. kalitevata Hufnagel
6 ex.: Cluj 22.IV.1928 (2 ex.); (V. Popii) 29.IV.1928 (2 ex.); Sălicea 9.V.1929; Retezat (900 m) 27.V.1922 (leg. Diószeghy).

Trichopteryx Hübner (= *Nothopteryx* Prout)

T. carpinata Borkhausen
3 ex.: Cluj 14.IV.1929; 10.V.1929; (Făget) 26.IV.1927 (e).

T. sertata Hübner
3 ex.: Retezat (1 000 m) 21.X.1927; (1200 m) 27.IX.1927; (1200 m) 2.X.1927 (leg. Diószeghy).

Baptria Hübner

B. tibiale Esper
1 ex.: Retezat (900 m) 28.VI.1928 (leg. Diószeghy).

STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXXII, 2, 1987

DIN ISTORIA BIOLOGIEI

PRIORITÉS DANS L'HISTOIRE DE L'ENSEIGNEMENT BIOLOGIQUE EN ROUMANIE

SIDONIA PUIU*

SUMMARY. — Priorities in the History of Education in Biology in Romania. Several new aspects of Professor I. A. Scriban's personality are presented from an ethic and scientific point of view. Being a Moldavian of Transylvanian descent, he was up to the requirements of his time, just as his ancestors had been, „blessing the place he lived in", as the saying goes.

Professor Scriban was the first to teach zoology and compared anatomy at the Faculty of Sciences of the first Romanian University in Transylvania at Cluj, and established, by his pioneer work between the two World Wars, a scientific and universitary tradition.

He was also the first Romanian naturalist to take his PhD degree in natural sciences at home, at the Iassy University (1910), under the direction of Professor Paul Bujor. This proved the maturity of the Romanian university instruction in biology at that time.

Le 4 septembre 1919, Ion A. Scriban est nommé professeur titulaire de zoologie et d'anatomie comparée à la Faculté des Sciences de Cluj, à la première université roumaine de Transylvanie. Il y venait avec la recommandation du renommé naturaliste de Iassy, Paul Bujor, mais aussi avec sa propre capacité et passion scientifiques, prouvées dans la jeune école naturaliste de Iassy et confirmées ensuite dans la première université roumaine moderne (Iassy, 1860), où Scriban avait parachevé ses études et où il avait fait ses premières recherches scientifiques.

L'un des ressorts intimes qui avait poussé le jeune professeur à venir à Cluj semble avoir été la filon généalogique de sa famille, enraciné dans les montagnes du nord de la Transylvanie et qui comprenait de nombreuses personnalités de la vie culturelle et politique roumaine du XIX[e] siècle[1].

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[1] Les trisaïeuls de Ion Scriban vivaient à l'époque de l'illuminisme propagé par le mouvement intellectuel de Transylvanie connu sous le nom de „Şcoala ardeleană". On suppose même qu'ils ont étudié dans les rares écoles roumaines qui fonctionnaient en Transylvanie au début du XIX[e] siècle, à Blaj ou à Năsăud, en se pénétrant des idées concernant la latinité du peuple roumain et de sa langue. Ces idées ont contaminé en telle mesure la famille Scriban, que l'onomastique dont use la génération de la seconde moitié du XIX[e] siècle abonde en prénoms latins: Romulus, August, Iuliu, Traian, Laura etc. En outre, de nombreux membres de la famille du savant étaient des connaisseurs et de fervents partisans de la latinité.

Romulus Scriban (oncle du savant naturaliste), docteur en droit à To-

Le retour du Moldave à ses vieilles racines transylvaines devient à ce moment là (plus qu'un appel ancestral vers ses frères) un acte de haute conscience.

L'extraordinaire „renaissance" nationale et culturelle de la Transylvanie d'après 1918 engageait dans le front des sciences des forces qui jouissaient déjà d'un prestige international: E. Racoviță, Gh. Spacu, I. Hațieganu, Al. Borza, D. Călugăreanu, I. Popescu-Voițești, Gh. Vâlsan et bien d'autres.

Dans ces nouvelles conditions d'enseignement biologiques, Ion Scriban devait faire face au prestige de la Chaire de Zoologie de l'université hongroise, illustré avant 1919 par le professeur Apáthy István (1836—1922), qui avait une autorité scientifique mondiale. Par toute son activité, le professeur Scriban n'a fait qu'accroître ce prestige, en déployant un véritable travail héroïque de pionnièrat dans la création du cadre matériel et spirituel dont la jeune université roumaine de Transylvanie avait tellement besoin.

Ayant une structure robuste et enthousiaste et n'épargnant jamais ses efforts, le professeur travaillait jour et nuit à l'Institut et à la Chaire de Zoologie, en accomplissant à la fois le travail de préparateur, d'assistant, de chef de travaux et de conservateur des collections du musée zoologique. Il s'entendait à tout. Il apprêtait des milliers de préparations pour les travaux pratiques, il dessinait avec une étonnante dextérité les planches (conservées jusqu'aujord'hui à la Chaire de Zoo-

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rino (1864), établi à Galați comme avocat et homme de culture, parlait couramment avec ses enfants le latin. Un de ses fils August Scriban (cousin du naturaliste), un remarquable linguiste, a enseigné le latin au Lycée d'internes et au Lycée militaire de Iassy. Un autre fils de Romulus, Traian Scriban, magistrat, a envoyé un poème en tant que participant au concours intitulé „Chant de la gent latine", organisé par la „Société des langues romanes" à Montpellier en 1878, et dont le lauréat a été Vasile Alecsandri, qui y avait présenté son poème „Chant de la gent latine".

Enfin, le père même du naturaliste, August Scriban, après avoir fait ses études à Petersburg, a enseigné lui-aussi le latin au Séminaire de Socola et au Lycée National de Iassy.

De la branche des Scribans établis en Moldavie, c'est sourtout l'activité des deux hommes de lettres Neofit et Filaret Scriban (frères du grand-père du naturaliste) qui s'est remarquablement fait connaître et apprécier, principalement par le vigoureux engagement patriotique de ceux-ci. Elèves au Gymnase „Vasilian" et au Séminaire de Socola, étudiants à l'Académie „Mihăileană" et au Collège „Sf. Sava", ils allaient devenir eux-mêmes des enseignants dans ces institutions, auteurs de manuels ou d'écrits politiques en faveur de l'Union des Principautés. Neofit et Filaret Scriban étaient surtout des esprits éclairés, qui croyaient au „soleil des sciences" et „au progrès ou à la chute d'une nation" par l'éducation et la culture nationales. Ils ont cooperé aux préparatifs de l'Union des Principautés Roumaines de 1859 et leur activité en faveur de l'Union semble avoir été connue et appréciée même par l'ambassadeur de Napoleon III, Talleyrand, dont on sait que les deux Scribans ont reçu la visite. C'est dans leur vignoble de Socola que, avant l'Union avaient lieu les réunions secrètes du Comité unioniste de Moldavie, formé par M. Kogălniceanu, V. Alecsandri, V. Negri, D. Ralet, V. Mălinescu, A. Panu, C. Hurmuzachi etc. Et c'est toujours eux qui ont fait parti du „Divan ad-hoc" (Assemblée déliberante dans les Principautés Roumaines) en tant que représentants du clergé.

logie) pour les cours et les démonstrations, il conservait des animaux pour le musée, il récoltait des exemplaires pour les dissections et, enfin, il élaborait le cours qu'il donnait aux étudiants en sciences naturelles, en géographie, en médecine (l'histologie) et en agronomie (la parasitologie). Dans ses moments de recuillement, il s'avouait n'être qu'un „robaciu", un humble serviteur du laboratoire et du travail.

En tant que professeur universitaire, Ion Scriban inscrit dans l'histoire de l'enseignement roumain des sciences naturelles certaines priorités. Celles-ci tiennent à l'époque où il travaillait à Iassy.

Ion Scriban a fait partie de la première génération de naturalistes de réputation, formés à la jeune Université de Iassy, avec les professeurs Paul Bujor, Nicolae Leon, Leon Cosmovici, Alexandru Popovici et d'autres.

Si ses maîtres ont parachevé leurs études à des universités françaises ou allemandes au XIX^e siècle (Genève, Jena, Sorbonne-Paris, Bonn), où ils ont également passé leurs doctorats, et qu'ils ont mis à leur retour au pays les bases d'un enseignement naturaliste moderne au niveau européen (en fondant des chaires, des laboratoires et des publications scientifiques et en promouvant les recherches autochtones), alors Ion Scriban en représente un résultat, une certitude et marque par sa valeur un moment de maturité de l'enseignement roumain supérieur. *Il est le premier naturaliste roumain qui ait passé son doctorat ès sciences dans son pays*, à l'Université de Iassy, en 1910 (à l'époque du cinquantenaire de celle-ci), avec une thèse sur l'anatomie et l'histologie des Hirudinées („Contributions à l'Anatomie et à l'Histologie des Hirudinées", dans Ann. Sci. Univ. Iassy, 1910) sous la direction et dans le laboratoire du professeur Paul Bujor[2].

Un an plus tard (en 1911), Scriban passe élogieusement son agrégation en histologie. À côte de ses anciens illustres maîtres Paul Bujor, Alexandru Popovici et I. Simionescu, il fait des démarches (en vertu des nouvelles réalisations de la science et de l'apparition de nouvelles disciplines scientifiques) en faveur de la modernisation de l'enseignement roumain des sciences naturelles.

Par une adresse datant du 5 octobre 1911, le doyen Paul Bujor demande au Conseil de la Faculté et au Ministère de l'Instruction publique de créer une section agricole à la Faculté des Sciences, d'organiser un Observatoire astronomique et d'autoriser un cours libre et gratuit d'histologie et d'embryologie[3]. La conférence d'histologie à la Faculté des Sciences de Iassy a reçu assez vite l'aprobation du Ministère (le 1^er novembre 1912)[4] et le conférencier en est nommé Ion Scriban. Le plan du premier cours d'Histologie donné — à ce que nous le savons — pour la première fois dans une université roumaine est

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[2] Contribuţii la istoria dezvoltării Universităţii din Iaşi, 1860—1960, Vol 2, 1960, p. 158.

[3] Les Archives de l'État, Iassy. Les Archives de l'Université. Le Rectorat, Dossier nr. 764.

[4] Les Archives de l'État, Iassy. Les Archives de la Faculté des Sciences, Dossier nr. 78.

celui compris dans le manuscrit de Scriban du 19 novembre 1912, structuré en 17 conférences, manuscrit qui se trouve actuellement aux Archives de l'État à Iassy[5].

C'est ainsi que le cours d'histologie est resté dans l'enseignement biologique roumain comme une priorité due à l'Université de Iassy et qu'il a été, peu de temps après, introduit dans les autres universités roumaines. À Cluj, c'est toujours grâce aux efforts du professeur Scriban que cette discipline est parvenue à être enseignée depuis 1919, tant aux étudiants en sciences naturelles, qu'à ceux qui faissaient des études en médecine.

Outre les responsabilités que lui incubaient la qualité de professeur, Scriban a été un chercheur de laboratoire très passionné et très rigoureux, un véritable spécialiste dans les techniques cytologiques et histologiques[6], en jouissant d'une grande et bien méritée réputation tant à l'intérieur du pays qu'à l'étranger.

Dès 1904, il commence l'étude des Hirudinées („Contributions à la faune des Hirudinées d'eau douce de Roumanie") et il entreprend sur celles-ci des recherches histologiques et anatomiques (1915). Il se penche sur la cytologie de la cellule adipeuse des Hirudinées (1910), et fait la découverte de ce qu'on appelle *„tissu botrioïdale"* — éléments du tissu conjonctif fort ramifiés, formant un réseau vasculaire avec de nombreux sinus que se trouvent en liaison avec les vaisseaux proprement-dits de l'appareil circulatoire du coelome de ces vers (1923); et c'est toujours lui qui, pour la première fois, met en évidence la *chondriosome* de diverses cellules des Hirudinées (1937). Il a fait aussi des recherches sur les myopathies chez l'homme (1916, 1919, 1921), sur la structure des branchies chez les poissons (1931) et sur la structure de l'intestin respiratoire chez la loche (1927)[7].

En tant que spécialiste d'autorité mondiale en Hirudinées, Ion Scriban est sollicité en vue d'une étude monographique de ce groupe d'animaux, étude qu'il a finalement élaborée et publiée en collaboration avec Hansjochem Autrum, zoologiste allemand dans les pages du grand traité intitulé „Handbuch der Zoologie" (Bd. 2, 1932, 234 p., avec 302 figures) sous la direction de Willy Kükenthal et publié chez Walter de Gruyter (Berlin).

La perspective des cinquante ans écoulés depuis la mort du professeur Scriban nous oblige à un jugement objectif et à mettre au jour la travail de pionniérat qu'il a accompli dans la jeune université

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5 Les Archivés de la Faculté des Sciences, 1912—1913, Dossier nr. 83.

6 Le professeur Scriban a formé beaucoup de spécialistes en histologie: Eugen Epure, Acrivo Crustalo, Eduard Benesch, Victor Pop, Vasile Homeiu et d'autres.

7 Voir: *Lista lucrărilor ştiinţifice ale Profesorului I. A. Scriban* dans „Anuarul Universităţii din Cluj", 1936—1937, p. 437—438.

Je rende ma gratitude au Professeur dr. Alexandru T. Balaban de l'Institut Polytechnique de Bucarest, descendant de la famille Scriban, qui a mis à ma disposition avec solicitude des informations et des documents sur la famille et sa généalogie, ainsi qu'au Professeur dr. Corneliu Degan de l'Université de Cluj-Napoca.

roumaine de Transylvanie, où il s-est créé une tradition, une voie pour l'enseignement biologique roumain, voie suivie par de nombreuses générations qui en ont bénéficié, totut en lui augmentant la valeur et en l'enrichissant.

À côté de ses mérites en ce qui concerne le fondement de l'enseignement biologique à l'université roumaine de Cluj, se rangent les priorités auxquelles il a lié son nom dans l'histoire de l'enseignement biologique roumain: le premier doctorat ès sciences naturelles passé dans une université roumaine (1910) et le premier cours d'histologie introduit dans le programme d'enseignement des étudiants en sciences naturelles (Iassy, 1912).

Nous présentons ci-dessous la liste des sources sur la vie et l'activité de I. A. Scriban.

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RECENZII

G. Zarnea, **Tratat de microbiologie generală. III. Genetică moleculară. Ingineria genelor** *(Treatise of General Microbiology. III. Molecular Genetics. Genetic Engineering)*, Editura Academiei R. S. România, Bucureşti, 1986, 639 pages (including 354 figures and 53 tables) and 32 plates with electron micrographs and photographs enclosed.

Volumes I and II of the *Tratat de microbiologie generală* appeared in 1983 and 1984, respectively, and were reviewed in this journal (Stud. Univ. Babeş-Bolyai, Biol., 1985, **30**, 75—76 and 1986, **31** (1), 69—70, respectively).

Volume III is structured into 6 sections.

In Section 1, „Genetic Organization of Bacteria" (pages 13—172), the first topic dealt with is the molecular architecture of nucleic acids (structural components of DNA; primary structure of DNA; secondary structure of DNA — the Watson-Crick model; deviations from the Watson-Crick model; conformations of the double-stranded DNA molecules; Z-DNA and its potential biological significance; physico-chemical properties of DNA and techniques for their determination; functions of DNA as genetic material; arguments concerning the genetic role of nucleic acids).

The next part of Section 1 is devoted to the enzymes modifying the topology of DNA and to the tertiary structure of DNA (topological properties of DNA and the concept of „supercoiling"; topoisomerases; role of the topological modifications of DNA).

Then, the bacterial genome is described by characterizing *a.* the bacterial chromosome (molecular structure; hypotheses concerning the „packing" mode of the bacterial chromosome; genetic structure of bacteria; cryptic genes and their role in the evolution of microorganisms; genetic interactions in the bacterial cell) and *b.* accessory genetic elements, namely the plasmids (classification, molecular structure, genetic structure and functions, replication and segregation of plasmids; relations between plasmids; nature and origin, evolution, biological significance and practical utilizations of plasmids; F plasmids; R plasmids; „Col" plasmids and colicins), and the transposable genetic elements of bacteria (general structural model of the transposable genetic elements — insertion sequences, transposons, phage Mu; general properties of the transposable genetic elements and consequences of their presence; molecular mechanism of transposition; general biological significance, nature and origin of the transposable genetic elements).

The last two parts of Section 1 deal with the genetic maps of bacteria and fine structure of gene, respectively.

Section 2, „Functions of the Genetic Material" (pages 173—301), consists of the following parts: DNA replication (mode of DNA replication; enzymology of DNA replication in bacteria; biochemistry of DNA polymerization; stages of DNA replication; DNA replication models; replication of bacterial chromosome), genetic repair (mechanisms of genetic repair in bacteria; photoreactivation; repair through excision and resynthesis; repair through postreplicational recombination; the „SOS" inducible repair system; adaptive repair response; biological significance and evolution of the DNA repair systems), genetic code (structure and deciphering of the genetic code; influence of code peculiarities on the utilization of genetic information; primitive genetic code), biosynthesis of proteins (transcription of the genetic information; evidencing the genetic transcription — „genes in action"; translation of the genetic information; phases of the genetic translation process; fidelity of the replication, transcription and translation processes).

Section 3, „Variability and Evolution of Bacteria" (pages 303—458), begins with the description of mutations and mutagenesis (types of mutations; molecular mechanisms of the spontaneous mutations; induced mutagenesis; effect of mutations on the translation of genetic information and on the phenotype of bacteria; bacterial tests for detecting the

mutagenic and carcinogenic effect of some substances).

The next topic is the transfer of genes among bacteria. First, the mechanism of DNA transport through membranes of bacterial cell are reviewed, then the different modes of gene transfer are described, *i.e.* the genetic transformation (phases of the genetic transformation process), bacterial conjugation (phases of the conjugation process; genetics and biochemistry of the stages preliminary to the DNA transfer; stages consecutive to the DNA transfer; role of the sexual pheromones; transposon-induced conjugation; mycelial „conjugation"), sexduction, phage transduction (specialized phage transduction; transducing phages lambda; generalized phage transduction; abortive transduction), phage-associated transfer of genes, capsduction, phage conversion, transfection, fusion of bacterial protoplasts.

Other themes in Section 3 are genetic transfusion, genetic transformation of protoplasts, interaction of protoplasts with liposomes, genetic recombination (mechanisms and molecular models of genetic recombination), genetic stability and variability of bacteria in nature, genetic colonization, transgenosis.

The last part of Section 3 is devoted to the evolution of the bacterial genome (modes of growth of the bacterial genome; acquisition of new functions through modification of the existing genes).

Section 4, „Invalidated Dogmas" (pages 459—496), contains the presentation of those discoveries that invalidated some basic concepts in molecular biology. These discoveries are treated under the following headings: The reverse transcriptase and the central dogma of molecular biology (molecular mechanism of the activity of reverse transcriptase); Colinearity of the gene and of its proteic product; „Overlapping" genes; Genes with discontinuous structure (*a.* expression of the „divided" genes in the eukaryotic cell — molecular mechanism of the excision of introns; origin and evolutionary significance of introns; evolutionary significance of the presence of divided genes in archaebacteria; introns as transposable genetic elements; rearrangement of exons; *b.* discovery of the RNA with catalytic activity).

In Section 5, „Genetic Regulation of the Cellular Activities" (pages 497—558), after a general characterization concerning the organization of activities in bacterial cell and the control and integration of cellular functions, the following topics are dealt with: operon; induction of the synthesis of enzymes; repression of the synthesis of enzymes; inhibition of the activity of enzymes; co-ordinated control of cellular activity; catabolite repression; other types of the organization of bacterial operons; concept of the autogenous regulation of gene expression; regIon; diversity of the regulation mechanisms in bacteria; evolution of the regulation mechanisms; importance of the metabolic regulation for the biology of bacteria.

Section 6, „Genetic Engineering" (pages 559—626), consists of three parts. The first is entitled: „Isolation of the *lac* genes".

The second part describes the phenomena of restriction and modification (restriction endonucleases; molecular mechanism of the modification; genetic bases of the restriction and modification; importance of the discovery of the restriction and modification systems for the molecular biology and its applications; biological significance of the restriction and modification systems).

The third part deals with the theoretical and practical bases of genetic engineering and the technology of recombinant DNA (concept of genetic engineering; general principles of the techniques of genetic engineering; obtaining of DNA fragments used for cloning; cloning vectors; molecular cloning and construction of hybrid DNA molecules; conditions of the expression of eukaryetic genes in the bacterial cell; introduction of chimeric DNA molecules into the bacterial cell; selection of the specific recombinant clones; practical applications and achievements of the recombinant DNA technology; potential hazards of the *in vitro* DNA recombination experiments; measures to prevent the accidents produced by recombinant DNA *in vitro*; perspectives of the recombinant DNA technology).

The work ends with a list of selected bibliography comprising 418 titles.

Volume III of the *Tratat de microbiologie generală* manifests the same high qualities as did Volumes I and II: up-to-date and comprehensive scientific content, rich and excellent illustrations, very logical grouping of the described

topics into sections, clarity of descriptions, attractive style.

This volume is an indispensable source of information not only for those working in the field of microbial genetics, but also for every biologist, biochemist and biotechnologist. The work is a useful handbook for agronomists and physicians, too.

Last but not least, I should like to emphasize that, due to its exceptional value, Professor G. Zarnea's *Tratat de microbiologie generală* meets all requirements to be translated and published in world-wide spoken languages, and I am convinced that the translated work will be the same great success abroad as its Romanian original is in our country.

ŞTEFAN KISS

Alexandru Ş. Bologa, **Productivitatea primară marină** *(La productivité primaire marine)*, Editura Ştiinţifică şi Enciclopedică, Bucureşti, 1987, 120 pages avec 18 figures.

Parmi les directions prioritaires vers lesquelles est orientée la recherche biologique contemporaine il compte surtout l'étude de l'efficacité de biosynthèse végétale dans les divers biotopes naturels, ainsi que les possibilités d'augmenter le rendement de la photosynthèse dans le but de réaliser la hausse de la production primaire. Le phytoplancton et, en général, toute la végétation marine représente une importante source de substances organiques obtenues par un processus naturel.

Le livre que nous présentons vient d'accomplir dans la littérature scientifique roumaine la nécessité d'informer le grand public sur ces problèmes d'acute actualité et les spécialistes, sur le niveau de la recherche scientifique mondiale et sur celui de notre recherche, dans ce domaine.

L'auteur, renommé phytophysiologiste-algologiste, expose un matériel consistant — malgré l'espace restreint du livre —, en utilisant l'information la plus actuelle du monde entier, en dehors des résultats de ses propres recherches et de celles obtenus à l'Institut de Recherches Marines de Constanţa (Roumanie).

La culture vaste et le talent littéraire distingué de l'auteur assure le succès du livre et ouvre l'appétit du lecteur pour les problèmes traités, résumés par l'auteur-même: „... la vérification idéale et consciente des ressources biologiques marines existentes et celles possibles d'être obtenues par mariculture suppose l'exploitation raisonnable de ces ressources et la connaissance, le plus intimement possible, de la biologie et de l'écologie des organismes cultivables, c'est-à-dire la consolidation scientifique de l'intérêt pour le milieu marin" (p. 6).

ANA FABIAN

The Biosynthesis and Metabolism of Plant Hormones *(La biosynthèse et le métabolisme des hormones végétales)*, Edited by (Sous la rédaction de) A. Crozier and (et) J. R. Hillman, Cambridge University Press. Cambridge, London, New York, New Rochelle, Melbourne, Sydney, 1986, 288 pages avec 78 figures.

Le volume représente un recueil de 10 ouvrages du domaine indiqué par le titre.

Une recommandation très pertinente du livre nous trouvons opportun de la citer: „The past decade has seen major advances in the field of plant hormones biochemistry. This volume critically assesses the recent developments associated with the biosynthesis and metabolism of plant growth substances, incorporating authoritative accounts of gibberellins, cytokinins, abscisic acid, indole-3-acetic acid and ethylene. An interesting contribution is included on the metabolic fate of synthetic growth regulators that are important in agriculture. The contributors are all internationally eminent scientists who have been closely associated with many of the major advances in the specialised areas of research covered by this volume".

Le livre recommandé est une synthèse à jour de très divers problèmes du domaine des hormones végétales les plus importantes. À part les détails surtout sur le métabolisme de ces produits physiologiques des tissus végétaux y compris les vasculaires inférieurs (les mosses), dans les ouvrages réunis dans ce volume on trouve aussi des idées nouvelles concernant les mécanismes fondamentaux par lesquels ces hormones peuvent influencer et harmoniser le proces-

sus. de croissance et le développement des plantes, suggérant comme une tâche pour la recherche à l'avenir de préciser les sites de l'action des substances de croissance dans les cellules de plantes.

La discussion scientifique abordée par les auteurs est rigoureusement critique et fait référence à une littérature très abondante, constituant en même temps une source d'information précieuse.

ANA FABIAN

J. Burgess, **An Introduction to Plant Cell Development**, Cambridge University Press, Cambridge, 1985, VI + 246 pages with 158 figures and 1 table.

The Cambridge University Press always enriched the literature on biology with valuable, well-documented books on plant physiology. Although plant cytology has only recently escaped from the frame of general botany, it has become so diversified with many disciplines as well as their methodologies, that it was necessary and useful to separate it into independent branches, not only for didactic reasons, but also for scientific ones.

What is much captivating in this book is its comprehensiveness, as it presents each cell constituent in its development and also as a part of the whole, *i.e.* of the cell. The book has 8 chapters which cover the main domains of plant physiology: The plant cell; The plastids; The cell wall and development; Developmental strategies; Hormones and cell differentiation; Patterns and organisation in the whole plant; Polarity and development; The regulation of development.

It is one of the main characteristics of the book that the structures at every level of cell organisation are well connected with their function and biochemical organisation. In this respect, it is instructive to mention the location of Krebs-cycle enzymes in mitochondria, or the role and structure of plasmodesmata, as well as the hormonal regulation of the whole life of plants.

The work is written in a clear, easy English, so it may be understood without any difficulty by foreigners. It is a useful source of information for those who teach and learn botany at a higher level.

CORNELIA DELIU

Harry Garms, **Pflanzen und Tiere Europas. Ein Bestimmungsbuch** (Plants *and Animals of Europe. A Book for Identification)*, 10. Auflage, Deutscher Taschenbuch Verlag, München, 1985, 348 pages including 887 figures in the text.

Despite the fact that the work is specified as being a key for identification of species, in fact it is not a key, not in the classical manner of a key. The species check-list is not arranged on systematic-phylogenetical background, but on ecological basis. Plants and animals are described in the context of habitats, classified as life forms of forest, heath, moor, tundra and steppe, continental waters, marine life zones and seashores, and grasslands and pastures, cultivated fields, gardens and parks, and finally mountain highlands. The logic of this pattern seems to be that the first and most important information one could have about a living plant or animal is the habitat where it dwells. One should identify therefore firstly the life form, and only secondly the species. The identification of species could be done easily then, inside the general physiognomy of the biotic community, thanks to the fine, colour drawings. The work is especially good for tourists with interests in living nature. A professional biologist could object that the whole plant and animal world of all Europe, from the Atlantic to the Ural can hardly be condensed in a paperback. It is only a vademecum which helps us to remember that European flora and fauna is a natural unit which is worth to be studied in the outdoor.

BOGDAN ȘTUGREN

Insekten Mitteleuropas *(Insects of Central Europe)*, Editor: Ulrich Sedlag, Deutscher Taschenbuch Verlag, München und Ferdinand Verlag, Stuttgart, 1984, 408 pages including 962 figures in the text.

This valuable work is not a fundamental monograph but a compendium on the entomofauna of Central Europe, written in the traditional way of world-wide known German booklets of the elder collection „Tierwelt Mitteleuropas" (Animal World of Central Europe), which was published before World War II, since

1935 in Leipzig, and which is known by every zoologist in Europe. The work reviewed here was first printed by Neumann Verlag in Radebeul, GDR, in 1986 and reprinted in the FR of Germany in the same year. The area of the almost 1000 insect species described here comprises not only the GDR, but FRG, Czechoslovakia, Austria, and Switzerland, too. But the Central European entomofauna is not restricted to the above listed countries which belong to the geomorphological unit called Central Europe. Central-European insects extend their ranges far toward the East and the South-East of Europe. Therefore, the work of Sedlag could be of great interest for entomologists of Romania, especially for those working in Transylvania, where a high amount of the entomofauna is of Central-European stock.

The excellent colour drawings of insects, together with short and concise descriptions of species, allow to identify quickly and precisely insect species. The book is provided with a list of selected literature (unfortunately only in German), a subject index and a species index (with scientific and popular names).

BOGDAN STUGREN

B. Stugren, **Grundlagen der allgemeinen Ökologie** *(Principes de l'Écologie générale)*, 4. Auflage (4-ième édition), VEB Gustav Fischer Verlag, Jena, 1986, 356 pages avec 146 figures et 17 tableaux.

Le livre inclut la grande expérience scientifique de l'auteur comme spécialiste en écologie, sa vaste culture, son érudition. Tout au long des quatre éditions apparues jusqu'à présent, l'ouvrage fut perfectionné, ainsi que la dernière apparition éditoriale représente un traité d'une grande valeur scientifique, s'adressant non seulement aux étudiants biologistes, mais aussi aux spécialistes qui y trouvent une riche information scientifique, une abondante source bibliographique (2569 titles), un modèle de rigueur scientifique, de concision stylistique, de conception moderne dans la structure du livre: les définitions sont précises et détachées du texte permettant s'en servir trés facilement; l'illustration est riche et la graphique impécable, non seulement sous rapport estétique, mais aussi comme expressivité. On y trouve tous les problèmes majeurs d'actualité: l'étude de tous les milieux de la Terre, de toutes les formations de la biosphère, avec leur problèmes de bioproductivité, les grands cycles biogéochimiques, les conditions-limites pour la vie, les risques de l'exploitation irrationnelle de la nature; les déséquilibres dans la nature; l'intégration de la nature terrestre dans l'évolution cosmique, etc., etc.

Le livre est achevé par une liste de sujets, un registre des noms des plantes et des animaux; de tous les points de vue, c'est un livre d'envergure européenne.

ANA FABIAN

S. A. Ostroumov, **Vvedenie v biokhimicheskuyu ekologiyu** *(Introduction to Biochemical Ecology)*, Izdatel'stvo Moskovskogo Universiteta, Moskva, 1986, 170 pages with 39 figures and 13 tables in the text.

Modern ecology is largely based on facts and ideas of biochemistry. Interactions between living beings are often interpreted as chemical ones. Biochemical articles dealing with ecological problems are generally ununderstandable for ecologists, who lack special biochemical education. Therefore, synthetic works written by ecologists, who are also specialists in biochemistry, are useful for the whole community of ecologists. The book reviewed here is exactly such a work.

The author is an associate professor at the Moscow University. The book is a valuable source of information about the biochemical aspects of interactions between living beings. Biochemical ecology is defined (Chapter 1) as an interdisciplinary science, situated at the edge between ecology, chemistry and biochemistry, more related to ecology than to biochemistry. Its special research objects are biochemical compounds which mediate trophic and nontrophic interrelations of organisms. The information presented in this work is systematized as follows: ecological-biochemical interactions with the contribution of inferior plants (Chapter 2), of higher plants (allelopathy) (Chapter 3), between higher plants and animals (Chapter 4), and be-

tween animals and animals (Chapter 5). The problem of biocommunication inside the animal kingdom is discussed in this chapter, based on various semantic functions of some organic molecules. Further, it is interesting to note that the author prefers the technical term pheromones, largely used in English language literature, instead the term telergones, used in Russian language literature commonly. In this way, the work of S. A. Ostroumov helps for a better understanding and standardization of nomenclature at international level.

Finally, the author dedicates Chapters 7 and 8 to the ecology of organic compounds which are pollutants of the biosphere.

The work of S. A. Ostroumov looks like a little encyclopedia of biochemical ecology, with high concentration of information in a few pages, almost without redundance. It is a real textbook of the type *„multum in parvo"*. In my opinion, it would be useful to translate it into Romanian.

BOGDAN STUGREN

Lajos Sasvári, **Madárökológia** *(Bird Ecology)*, Akadémiai Kiadó, Budapest, 1986, in two volumes, 329 pages with 47 figures and 21 tables in the text.

There is a lot of textbooks on general ecology in various languages on the book market in Europe and America. But there are only a few works on special ecology of singular animal phyla or classes. Concerning bird ecology, there are innumerable articles dealing with special subjects, published all over the world, buried in countless periodicals, but only a few overviews appeared as parts of general works on ornithology, such as the volume *„Aves"* by E. Stresemann (1932) in *„Kükenthals Handbuch der Zoologie"* or the volume *„Oiseaux"* (ecological overviews by L. Berlioz and A. Portmann) in the *„Traité de Zoologie"*, edited by P.-P. Grassé (1950). A special work dedicated to bird ecology only, was until now never written, neither in the UK and the USA, nor in the USSR, despite the fact that these are leading countries in bird ecology research. Therefore, the work of L. Sasvári, published by the Hungarian Academy of Sciences in the collection *„Korunk tudománya"* (Contemporary Science) is an entirely original premiere, not only for Hungary, but for the world ecological literature, too.

The work is in Hungarian and, unfortunately, without any abstract in English or in another foreign language, even without an English translation of the table of contents. It has no subject index, no species index. So, it is unaccessible to readers not speaking Hungarian. In fact, the work is not written for sale abroad. The author, a well-known ornithologist, also a teacher of ornithology at the Eötvös Loránd University in Budapest, states in the preface that he intented to present ornithology as being based on ecological theory and, conversely, ecology as a mirror of ornithology, in order to help ornithologists of his country for a better understanding of bird life.

Nowadays, ornithologists are not only university graduates in natural sciences, not only scientific research workers on birds, but also a great number of „Friends of Nature", who practice ornithology not as a profession, but as a hobby. It is often uneasy to find the difference between a professional and an amateur ornithologist, because there are no sharp and hard lines between the two categories. The only sharp difference is that the professional ornithologist does while the amateur does not earn his living by bird watching. This is a purely social and economic difference.

This situation is reflected in the work of Sasvári. It is not exactly an ecological monograph, for professional scientists only. Neither is it a typical vulgarization, because it demands from the reader a highly cultured mind in biological sciences. In my opinion, the author selected the optimal formula for a book, useful for both scientific workers and amateurs. The work is written as a beautiful story about bird life, but at the same time, its logical rigour is inexorable. There are no fictions. The author tells about population dynamics like a causerie, but every idea is fundamented on experimental facts.

The first volume (167 pages) comprises 6 chapters.

The first chapter deals with methods and technics of quantitative faunal analyses, the second with regional- and habitat-dependent patterns of bird faunas. The third chapter is dedicated to energe-

tics of birds. Chapters 4, 5 and 6 deal with trophic ecology and ethology, and dynamics of predator-prey systems as revealed by ornithological data; the search image, i.e. the strategy of predator and the optimiaztion of prey selection, and the energy input from the prey into the trophic chain; the defensive strategy of the prey, including an analysis of genetic polymorphism in birds as a survival method.

The second volume (162 pages) comprises 5 chapters.

The first chapter deals with territorial behaviour, the second with learning ethology of juvenile birds. Chapters 3 and 4 are devoted to population dynamics and interspecific relations of birds, respectively. The last chapter discusses such general subjects of ecology as the pattern and structure of bird communities, the niche breadth, overlapping and discrimination.

As a concluding remark on this work, I suggest that it would be worth to translate it into Romanian. Many ecological problems of bird population dynamics and bird conservancy are common for Hungary and Romania. Therefore, the *Bird Ecology* of Sasvári could be helpful for the development of ornithology in our country, owing to the fact that bird watching and bird protection become almost a new profession here, like everywhere in the world.

BOGDAN STUGREN

Ulrich Sedlag, Erich Weinert, **Biogeographie, Artbildung, Evolution** *(Biogeography, Speciation, Evolution)*, VEB Gustav Fischer Verlag, Jena, 1987, 333 pages with 120 figures and 11 tables in the text.

In the last 10 years, the world-wide famous Fischer Publishing House from Jena, GDR, specialized since 1878 in the service of natural sciences, has edited dictionaries of special branches of biology, for instance of behaviour biology, ecology, microbiology, plant physiology, and others, in paperback format. The last one, which is reviewed here, deals with biogeography and the science of evolution. It is the work of a zoologist (Sedlag) and a botanist (Weinert). The authors have conserved the old German tradition for encyclopedias, i.e. to treat comprehensively, especially by brief articles, all concepts and technical terms in the field of evolution, animal and plant geography, as well as of related subjects (population genetics and palaeobiology). So, a synthetic image of the evolutionary process rises as a whole. The dictionary is a typical „Nachschlagewerk" (consultative work), where a biologist, working in related branches would find exact definitions of technical terms and old and new ideas of evolutionary thought.

For the Romanian reader, the dictionary is interesting also by the fact that altitudinal ecological zones of vegetation are illustrated (Fig. 44, p. 128) by a figure of those zones in the Bucegi-Mountains, after the original drawing by the famous plant geographer Meusel, of Halle (GDR).

BOGDAN STUGREN

Transactions of the VIIIth International Symposium „Humus et Planta", *Volumes I and II*, Editor-in-chief Bohumír Novák, Research Institute for Crop Production, Prague-Ruzyně, 1985, XXII + 499 pages with 189 figures and 249 tables.

The volumes comprise the full texts of 138 papers, elaborated by 244 authors and presented at the Symposium specified above, which was held in Prague between August 29 and September 3, 1983. The majority of papers are in English, the rest in Russian.

The papers are grouped into 12 sections: Structure, composition, and physical features of humus substances (35 papers); Geological, geographical, climatic, and earth surface effects on humus conditions (9 papers); Effects of humus on soil fertility (5 papers); Humus properties utilized for soil taxonomy (5 papers); Effects of soil conditioners on soil humus (3 papers); Effects of soil management (11 papers); Humus-plant nutrients relationships (11 papers); Effects of organic manures on soil and the yields of crops (20 papers); Fertilizer effects on soil organic matter transformations (4 papers); Mathematical models in soil humus (3 papers); Biological activity and microflora (17 papers); and Anthropogenic effects on soil (15 papers).

This valuable work reflects the present status of fundamental and applied humus research, and presents much interest for a broad circle of specialists (soil scientists, agronomists, chemists, biochemists, microbiologists, plant physiologists, environmental scientists, etc.).

ȘTEFAN KISS

Lucrările celei de a III-a conferințe de entomologie *(Proceedings of the Third Conference on Entomology)* (Iași, 1983), Comitetul de redacție (Editorial Board): Victoria Șuta, Constantin Pisică, Ionel Andriescu și (and) Gheorghe Mustață, 1986, 672 pages with 196 figures and 156 tables.

Among the most valuable entomology books published in 1986, one notices the Proceedings of the Entomological Conference held in Iași (May 20—22, 1983). This volume comprises 90 papers representing the work of 107 specialists. It has the following structure: „Reviews" (5 papers), Section 1 „Morphology, Fauna, Systematics, Taxonomy, Ecology and Biogeography" (21 papers), Section 2 „Biochemistry, Physiology, Biology, Pathology" (13 papers), Section 3 „Horticultural and Viticultural Entomology" (16 papers), Section 4 „Agricultural Entomology" (12 papers), Section 5 „Silvicultural Entomology" (4 papers), Section 6 „Medical Entomology" (4 papers) and Section 7 „Entomophages from Agroecosystems and Natural Ecosystems" (15 papers).

In the first three reviews some important achievements of the Romanian entomology are mentioned: publishing of over 40 monographs in the series „Fauna Republicii Socialiste România", completion of some great entomological collections (dealt with in the third review) which are to be found in the 22 important museums of our country. It has also been registered the existence, up to now, of approximately 4,500 species of entomophagous insects belonging to the *Hymenoptera* and *Diptera* orders, some of them being extremely important for their use in the strategy of integrated control of some dangerous pest insects. In the penultimate review an approach is made to interpret some biological processes linked to insects from the viewpoint of the theory of relativity. The last review is a very comprehensive evocation of the lepidopterological researches as well as of the philosophical thinking of Aristide Caradja (1861—1955), the founder of the Romanian entomology.

An analysis of the papers included in the volume offers an image of the main directions followed by the Romanian entomological research in its development.

The first course of research regards the fauna, the systematics and the biogeography. In this respect, we remark the contributions concerning the better knowledge of the fauna of *Diptera (Limoniidae, Tipulidae, Ephydridae, Tephritidae), Hymenoptera (Halictidae, Andrenidae), Lepidoptera (Noctuidae, Geometridae)* and *Coleoptera (Curculionidae)*. One of the conclusions drawn from this research refers to the richness of species and the abundance of individuals existing in our country as well as to the fact that the territory of Romania is a zoogeographic crossroad.

The second domain of research refers to the inventory of harmful and useful entomofauna (predatory and parasitic entomophages) from the range of different artificial and natural ecosystems, such as the fauna in the soil of some agroecosystems producing cereals, technical plants and on permanent meadows, the entomofauna in the canopy of a broadleaf forest, the entomofauna from horticultural areas, the pests (spiders and insects) on various natural and cultivated medicinal plants, the entomofauna from cultures of spiked cereals and solanaceae.

The third field of research is dedicated to the biology and ecology of some important species of pest insects: *Ptinus fur* L. (harmful to museum objects), *Ostrinia nubilalis* Hb. (harmful to maize), *Sesia tipuliformis* Clerk (harmful to currants), *Adoxophyes reticulana* Hb. (which defoliates fruit trees), *Eupoecilia ambiguella* Hb. (harmful to grapes), *Peridroma saucia* Hb. (harmful to greenhouse plants), *Thrips tabaci* Lind. (harmful to tobacco), *Sitona flavescens* Marsh. and *S. humeralis* Steph. (harmful to perennial legumes), seminiphagous *Lepidoptera (Laspeyresia pomonella* L. — the main pest of the fruit tree cultures, *Eupista spissicornis* Haw. — harmful to trefoil) and seminiphagous *Curculionidae (Apion apricans* Hbst. and *A. aestivum* Germ. — harmful to trefoil, *Ceutorrhincus macula-alba* Hbst. — harmful to poppy and *Tychius 5-punctatus*. L.

— harmful to pea). We should also mention the research regarding the biology and ecology of insects useful as predators of aphid colonies in the apple-tree cultures (*Adalia bipunctata* L., *Propylaea 14-punctata* L., *Chrysopa vulgaris* Schn. and *Syrphus arcuatus* Fall.), seminiphagous *Lepidoptera* (*Euchloris vulgaris* Gn., *Haliothis sp.*, *Cidaris sp.* etc.), seminiphagous *Curculionidae* (*Larinus carlinae* Ol., *L. jaceae* F., *L. turbinatus* Gyll.), the last two groups having perspectives in the biological control of certain weeds.

Another course of research refers to the control of the pest insects. The papers in this domain refer to the control of the sweetcherry-fly (*Rhagoletis cerasi* L.), the currant borer (*Sesia tipuliformis* Clerk), the grape moth (*Lobesia botrana* Den. et Schiff.), *Myzus persicae* Sulz., the white greenhouse fly (*Trialeurodes vaporariorum* Westw.), fall webworm (*Hyphantria cunea* Drury), synanthrop flies, mainly the housefly (*Musca domestica* L.), onion fly (*Delia antiqua* Meig.), the pest insects of sugar beet (*Bothynoderes punctiventris* Ger., *Tanymecus palliatus* F. and *Lixus ascanii* L.). Regardless of the species studied, in the control problem the stress has been placed upon using a wide variety of methods (chemical, biological and ecological) in order to restrict the population of pest insects under the limit of economical damage. One of the most important tendencies in the control of insects is that of reducing the chemical means which often have a polluting effect and the using, instead, of the non-polluting biological and ecological means. Among the species with which good results have been obtained using insecticides based on *Bacillus thuringiensis*, we should mention *Rhagoletis cerasi* L., *Mamestra brassicae* L. and *Hyphantria cunea* Drury. With another harmful species — *Laspeyresia pomonella* L., sex pheromones have been used with good results, by applying the disorientation method. With *Lobesia botrana* Den. et Schiff., based on traps with sex pheromones, the exact flight of adults by generations has been established and thus the application of treatments has been improved. *Muscidilurax rapator* Gir. et Sand. is used in the control of synanthrop flies.

Closely linked with the integrated control, stress is placed upon studies connected with entomophages from agroecosystems and natural ecosystems. The papers of this volume refer to entomophages which restrict the aphid colonies and other pest insects of the apple-tree cultures, the entomophages of the aphids from the resinous trees, the entomophages of the spruce coccids, the entomophages of the cereal bugs, those of the leaf-eating lepidoptera from forest ecosystems, entomophages harmful to the pests of cabbage and to those of solanaceae.

Connected with the integrated control, we also remark the studies of fundamental and applied importance on the use of sex pheromones for *Mamestra brassicae* L. and *Plusia gamma* or of the aggregation pheromones for *Ips typographus*.

As a result of the application of modern methods of research and interpretation of results, the papers of this volume represent important contributions to the better knowing and understanding of the world of insects and the great majority of these contributions have entered the classical stock of entomological knowledge.

We also mention that each paper is accompanied by an abstract in an internationally used language.

Due to the important volume of information, to the great number of suggestions for further research, the book is extremely useful, mainly for the entomologists of every speciality, but at the same time it is also important for any biologist and specialist in agronomy, horticulture and silviculture, for students and for all those interested in recent developments in the field of entomology.

PANTE GHERGHEL

Natur und Museum, Bericht der Senkenbergischen Naturforschenden Gesellschaft, Frankfurt am Main, BRD, 1985, Band 115 (Hefte 1—12), 396 Seiten mit 249 Fotos und 91 Mappen und Zeichnungen.

„*Natur und Museum*" ist eine Zeitschrift, die monatlich in Heftform erscheint. Jedes dieser Hefte enthält Zeichnungen und zwischen 11 und 41 Fotos und umfasst auch 2—4 Artikel aus verschiedenen Bereichen der Biologie.

So sind einige Artikel und Reiseberichte, welche ökologische, faunistische und botanische Aspekte aus den Vereinigten Staaten, aus Ceylon (Sri Lanka), dem

Sahel-Gebiet, der Sahara-Wüste, aus Polarzonen wie Spitzbergen und Süd-Georgia, aus der Namib-Wüste und der chilenisch-peruanischen Wüste, enthalten.

Vier Artikel stützen sich auf Themen aus der Botanik (europäische Steppen, Meeresalgologie), 6 sind Geologie-Artikel, die manchmal auch geographische Elemente beinhalten (von Skizzen und Karten begleitet), zwei Beiträge handeln über Umweltschutz (Meere und Moore), 4 Artikel befassen sich mit der Zoologie und 4 mit der Paläontologie.

Ich werde mich etwas eingehender mit diesen letzten beiden Themen befassen. Die Zoologiebeiträge sind: zwei entomologische, einer aus der Meereszoologie und einer aus der Herpetologie.

Einer der Entomologie-Beiträge bezieht sich insbesondere auf die Eiablage der Libelle *Cordulegaster* und wird von erklärenden Fotos und Zeichnungen des Legeapparates begleitet. Der andere Entomologie-Beitrag beschäftigt sich mit der Morphologie und Biologie der auf *Gonatopus*-Zikaden parasitierenden Wespen.

Die Meereszoologie wird weitgehend in einem Artikel vertreten, der sich mit einem Phänomen von grosser Tragweite — dem an den peruanischen Küsten auftauchenden „El Niñie" — befasst, und welches in dem Ansammeln von riesigen Mengen Meereslebewesen besteht (Garnelen, Krabben, Kormorane, Seelöwen), Lebewesen, die in grosser Anzahl voraussichtlich wegen der Temperaturänderungen der Wassermasse absterben und an die Küste geworfen werden.

Das Heft mit der Nummer 6 enthält einen Herpetologie-Artikel, der sich auf die Karstgegend Fatima in Portugal bezieht, und der die Variabilität bei *Salamandra salamandra*, aus der Gruppe der Amphibien, bei *Lacerta lepida* (Perleidechse), der in der Gegend charakteristischen Eidechse, sowie auch bei *Elaphe scalaris* (Treppennatter), aus der Gruppe der Schlangen, untersucht.

Die Paläontologie wird in 5 wichtigeren Beiträgen vertreten: der Beitrag aus dem Heft Nr. 2 bezieht sich auf die Entdeckung einer Wasserkäferlarve aus dem mittleren Eozän in der Messel-Grube. Die Serie der Abdrücke der Qualle *Aurelia aurita* (Ohrenqualle) auf Küstensand sind richtiggehende Beispiele des Vorversteinerungsstadiums. Das Juniheft schildert die Entdeckung einiger Hominidenreste in der Fundstelle der südafrikanischen Makapansgat-Limeworks Höhle. Im Heft Nr. 7 taucht als Titel die Frage auf, ob die Rundkörperchen aus dem klassischen Permoskyth der Ostalpen vielleicht Fresskörperchen sind, eine Frage, die am Ende bejaht wird. Ein anderer Beitrag bezieht sich auf die Paläontologie als historische Wissenschaft zwischen Geologie und Biologie.

Ein Heft ist gänzlich dem Studium der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main gewidmet, und enthält die Berichte des Präsidenten der Gesellschaft für das Jahr 1984, des Schatzmeisters, des Direktors und des Wissenschaftlichen Beirates.

Jedes Heft enthält ein Kapitel mit Buchbesprechungen, in welchen einige Werke aus verschiedenen Zweigen der Biologie kurz vorgestellt werden, und ein Kapitel mit Nachrichten über Symposia, öffentliche Vortragsreihen, Themen und Uhrzeiten der Museumsführungen, Ausflüge in die Umgebung usw.

DAN FIOR SÎRBU

Teresa Mrozinska, **Chlorophyta VII, Oedogoniophyceae: Oedogoniales,** in *Süsswasserflora von Mitteleuropa, Band 14 (Fresh Water Flora of Central Europe, Volume 14),* Herausgegeben von (Edited by) H. Ettl, J. Gerloff, H. Heynig und (and) D. Mollenhauer, VEB Gustav Fischer Verlag, Jena, 1985, 624 pages with 1000 figures.

The book, embodying a recent and remarkable achievement of the Polish school of algology, is written by T. Mrozinska from the Institute of Botany of the Polish Academy of Sciences, an experienced specialist in *Oedogoniales.* It is published in the well-known series initiated by A. Pascher and resumed recently in a modern approach, a series intended mainly to deal with the flora of fresh waters in Central Europe. This framework is often enlarged; for instance, in the case of *Oedogoniales,* species from all over the world are presented.

The first part of the book (pages 15—42) describes the general characteristics of the group, a special type of green algae. Cell morphology and structure, such as cell shape, cell wall structure, cell division, formation of the filamentous thalus, chloroplast and nucleus structure are presented. A subchapter con-

centrates on the multiplication (vegetative, asexuate and sexuate) peculiar for *Oedogoniales*. It is worth mentioning that, besides the cytologic characteristics visible in the optical microscope, the book also illustrates briefly the main ultrastructural characteristics of the pyrenoid, flagellar apparatus, egg, etc.

The general part ends with short references to the phenology, ecology and distribution of the species, and to their sampling, conservation and study.

Designed to be used for the identification of genera and species, the special part of the book (about 550 pages) concerns the taxonomy of the order *Oedogoniales*. The dichotomic keys given are clear and can be easily applied. Special keys have been elaborated for the identification of infraspecific taxa (varieties, forms) in polymorphous species.

The taxa, infraspecific ones included, are correctly described, being illustrated with clear thorough figures. For each taxon, the distribution and ecological preferences are mentioned.

A rich bibliography and an index of scientific terms conclude this work.

The book will be extremely valuable to algologists (researchers, teaching staff and students, respectively) and also to those interested in the biology of fresh waters.

LEONTIN Ş. PĂTERFI and
LAURA MOMEU

Joana Z. Kadlubowska, **Conjugatophyceae I, Chlorophyta VIII, Zygnemales**, in *Süsswasserflora von Mitteleuropa, Band 16 (Fresh Water Flora of Central Europe, Volume 16)*, Herausgegeben von (Edited by) H. Ettl, J. Gerloff, H. Heynig und (and) D. Mollenhauer, VEB Gustav Fischer Verlag, Jena, 1984, 532 pages with 798 figures.

The book is part of the new edition of the well-known *Süsswasserflora von Mitteleuropa*, being an important part of our phycological literature. This monograph, describing virtually all the species known so far in the order *Zygnemales*, is to be followed by a second volume on *Desmidiales*.

The first part of the book (pages 11—39) is a general presentation of the green algae, members of the order *Zygnemales*. It deals with the structure of vegetative and generative cells, of the cell wall, chloroplast and nucleus, respectively. The life cycle and the types of multiplication by conjugation are also described. The general part ends with the presentation of the ecology and distribution of algae from the order *Zygnemales*, their collection and introduction into laboratory cultures. The fungi parasiting these algae in nature or laboratory cultures are also presented.

The illustrations accompanying the general part were achieved in the optic microscope, and are drawn clearly and correctly. Nevertheless, we appreciate that certain ultrastructural aspects of the cell wall and the other cell organelles would have been useful.

The special part comprises thorough information on the identification and systematics of *Zygnemales*, covering 473 pages. Dichotomic keys are clearly and correctly set up on genera, sections and species. All species are shortly described, with certain data on their ecology and distribution (where known).

The book is briefly written and illustrated with thorough linear drawings. The book ends with a bibliography comprising 224 titles and an index of taxa. The book is valuable for algologists mainly but also useful to students, teaching staff as well as to those working in applied hydrobiology.

LAURA MOMEU and
LEONTIN Ş. PĂTERFI

Kurt Krammer, Horst Lange-Bertalot, **Bacillariophyceae, 1. Teil: Naviculaceae** *(Bacillariophyceae, Part 1: Naviculaceae)*, in *Süsswasserflora von Mitteleuropa, Band 2 (Fresh Water Flora of Central Europe, Volume 2)*, Herausgegeben von (Edited by) H. Ettl, J. Gerloff, H. Heynig und (and) D. Mollenhauer, VEB Gustav Fischer Verlag, Jena, 1986, 876 pages with 206 plates and 2976 figures.

In the well-known 24-volume series „Süsswasserflora von Mitteleuropa", the first of the three parts belonging to volume 2 (on *Bacillariophyceae*) has been recently published. The book consists of two distinct parts: the first is an introductory part, generally presenting certain

aspects on *Bacillariophyceae*, while the second, special one, is concerned with the family *Naviculaceae* Kützing. The two other parts of the volume (that are to be published) will deal with the other families of the order *Pennales* as well as with the order *Centrales* entirely.

The general part of this book (about 73 pages and 25 plates), briefly and clearly drawn up, starts with a review of the terms used for diatoms (a very useful glossary included). This part further on concentrates on the structure and morphology of the cell wall (frustule), asexuate and sexuate multiplication, cytoplasmic structures and cell wall morphogenesis as well as the ecology of this group (pH, electrolytes, mineralization, organic matter, etc.). A particular feature of the book is the authors' remarkable effort to synthesize, in a logical and convincing whole, older knowledge (still useful) with recent data provided by electron microscope studies, all supporting a clear and modern taxonomy. The general part also provides the methods frequently used in diatomology for identifying both contemporary and fossil species.

The special part, more extensive (about 365 pages and 181 plates), presents the classification of *Bacillariophyceae*, mainly that of the family *Naviculaceae*. After a short review of the concepts in diatom systematics, 22 genera of this family are critically presented. Clear and useful dichotomic keys of families, genera and infrageneric taxa reflect the present-day knowledge concerning this group. Carefully drawn up plates all contain images in the optic microscope and also micrographs (when necessary). In most of the cases the type material was presented.

The volume is on the whole a success, being valuable to a wide range of specialists (algologists, ecologists, paleontologists).

NICOLAE DRAGOŞ and
ANA CHIOREAN

Exkursionsflora für die Gebiete der DDR und der BRD, Band *IV, Kritischer Band*, 6. durchgesehene Auflage, Herausgegeben von R. Schubert und W. Went, Volk und Wissen Volkseigener Verlag, Berlin, 1986, 811 Seiten mit 743 Abbildungen.

Seit der Erstauflage 1963 der wertvollen Rothmalerschen Exkursionsflora, Band IV, unter dem Titel: „Kritischer Ergänzungsband Gefässpflanzen", erscheint nach 23 Jahren die 6. Auflage, welche das besondere Interesse an diesem Werk und seine hohe Wertschätzung beweist. Durch das wachsende Interesse am Bestimmen von „Kleinarten" und infraspezifischen Abstammungsgemeinschaften, lag es im Bemühen der Herausgeber, ihr Werk gemäss den erzielten Fortschritten im Gebiet der Taxonomie, Chorologie und Nomenklatur durchzusehen.

Dem stetigen, kritischen Streben einer besseren Aufschlüsselung und genaueren Charakterisierung der „Kleinarten", im Rahmen der polymorphen „Sammelarten", kann man nur lobend entgegenkommen.

Die Stoffeinteilung und Behandlungsweise der Phytotaxa wurde wie in den früheren Ausgaben bewahrt und wir verfolgten einige zufällige Unterschiede und Verbesserungen gegenüber der 5. Auflage (1982) festzustellen, um sie als Beispiele hervorzuheben. Durch den Vergleich dieser Auflagen bemerkten wir Folgendes:

— einige Autorberechtigungen bei Familiennamen, wie z.B.: *Lycopodiaceae* Beauverd ex Mirbel (früher: Rchb.), *Ophioglossaceae* C. A. Agardh (früher: C. Presl), *Osmudaceae* Bercht et J. Presl (früher: R. Br.), u.a.;

— zahlreiche nomenklatorische Berichtigungen, indem die Nomenklatur insbesondere dem Band II: „Gefässpflanzen" (1984) angeglichen wurde, z.B.: *Lastrea* Bory (anstatt: Oreopteris Holub), *Thelypteris palustris* Schott (anstatt: Th. thelypteroides (Michx.) Holub -auct.), *Spergularia maritima* (All.) Chiov. (anstatt: S. media (L.) C. Presl — auct.), *Viola sepincola* Jord. (anstatt: V. suavis M. Bieb.), *Arabis nemorensis* (Wolf ex Hoffm.) Koch (anstatt: A. planisiliqua (Pers.) Rchb. fil.), *Potentilla neumanniana* Rchb. (anstatt: P. tabernaemontani Aschers.) [Bemerkung hierzu: in der Neuauflage, Seite 279 wird von *P. lindackeri* Tausch erwähnt: „Ist P. tabernaemontani ähnlich", welche auch durch P. neumanniana zu ersetzen ist];

— Aufnahme und Berichtigungen von neueren Verbreitungsangaben: *Asplenium cuneifolium* Viv. — Ost-Thüringen: Greiz (nicht: früher O-Th: Greiz); *Moenchia*

erecta G. M. Sch. — im Süden zerstreut, früher Rheinland-Pfalz, Thüringen, Sachsen-Anhalt, Sachsen, im Norden um Niedersachsen und Brandenburg: Lausitz, Jüterbog, Rathenow (anstatt: zerstreut, im Norden nur früher Brandenburg); *Primula* x *pubescens* Jacq. (früher: P. x hortensis Wettst.): als Wildform selten in den Ammergauer Alpen gemeldet, wo sie auch geschützt ist;

— Ergänzungen hinsichtlich des heutigen Pflanzenschutzes: *Botrychium lunaria* und *B. virginianum*, gegenwärtig in der BRD geschützte Arten, waren vorher nicht als solche vermerkt oder *Arctostaphylos uva-ursi*, war früher in der DDR und BRD nicht als geschützt erklärt.

Für eine spätere stark bearbeitete Auflage, würden wir auch den geehrten Autoren empfehlen die Bastarde kurzbündig zu charakterisieren und eventuell auch ihren klassischen Fundort oder Holotypus anzugeben.

Es ist leicht ersichtlich, dass es nicht die Nachfrage nur, nach einer sehr nützlichen und vergriffenen, älteren Auflage war, welche diese 6. Auflage (1986) notwendigerweise erscheinen liess, sondern auch eine neue kritische, wissenschaftlich berechtigte, durchgesehene Auflage, die mit den neuen Ergebnissen auf diesem Gebiet Schritt hält und die Spezialisten, wie auch alle Interessierte besser informiert, um sie in ihrer Arbeit oder Neigung zur Pflanzenwelt unseres vielbewegten, modernen Kontinents gründlich zu unterstützen.

FERDINAND TĂUBER

INTREPRINDEREA POLIGRAFICĂ CLUJ,
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