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PERSPECTIVELE CERCETĂRII BIOLOGICE ÎN LUMINA DOCUMENTELOR CONGRESULUI AL XIII-LEA AL PARTIDULUI COMUNIST ROMÂN

Documentele programatice care au premers, au însoţit şi urmat marelui forum al Partidului Comunist Român, Congresul al XIII-lea, au reliefat măreţele realizări ale poporului nostru sub conducerea înţeleaptă a partidului în domeniul economic, social, al cercetării ştiinţifice şi cultural. Aceste măreţe succese concretizate în creşterea fără precedent, în milenara istorie a poporului român, a nivelului de trai şi civilizaţie, poartă amprenta contribuţiei secretarului general al partidului, tovarăşul Nicolae Ceauşescu, la programarea şi realizarea sarcinilor istoric determinate şi menite să ridice România pe culmile civilizaţiei socialiste şi comuniste.

Construcţia societăţii socialiste multilateral dezvoltate, operă a întregului popor, se realizează pe baza celor mai noi cuceriri ale ştiinţei şi tehnicii contemporane. Dezvoltarea actuală a societăţii este de neconceput fără aportul ştiinţei. Ştiinţa a devenit o forţă de producţie decisivă pusă în slujba asigurării confortului de viaţă al omului modern şi în special al omului noii societăţi socialiste. Din această cauză, partidul şi statul oamenilor muncii aşază cuceririle ştiinţei la baza programelor de dezvoltare a societăţii. Directivele Congresului al XIII-lea ne arată că „intrarea patriei noastre într-o fază nouă, superioară a progresului său economico-social este marcată de creşterea rolului ştiinţei şi tehnologiei în toate domeniile de activitate". Se ştie că ştiinţele fundamentale ale naturii deschid calea progresului tehnologic.

Cercetării ştiinţifice din domeniul ştiinţelor naturii îi revine sarcina descoperirii unor noi surse de materii prime şi a utilizării cu randament maxim a celor existente, precum şi sarcina de a contribui la dezvoltarea unei agriculturi moderne, prin recuperarea terenurilor şi punerea la punct a unor tehnologii care să asigure producţii stabile şi superioare calitativ, participînd cu toate forţele la creşterea calităţii vieţii.

Documentele elaborate şi aprobate de Congres se adresează tuturor cercetătorilor din institutele de profil, cît şi celor din învăţămîntul superior, cu îndemnul de a-şi spori efortul în direcţia rezolvării problemelor imediate şi de perspectivă în domeniul economic şi social prin optimizarea tehnologiilor şi proceselor implicate în dezvoltarea pe mai departe a societăţii socialiste şi înaintarea ei spre comunism.

Sarcini importante revin cercetătorilor din domeniul biologiei în lumina prevederilor înscrise în *Directive* şi *Raportul* prezentat la Congres. În directive se arată: „Concomitent cu intensificarea cercetărilor aplicative şi a dezvoltării tehnologice, vor fi amplificate cercetările fundamentale — din domeniul matematicii, fizicii, chimiei, biologiei —, ştiinţa românească urmînd să asigure rezerva de soluţii pentru dezvoltarea în perspectivă a economiei şi întregii societăţi, să participe activ la

progresul creației tehnico-științifice mondiale". Această pevedere din *Directive* incumbă perspicacitate, seriozitate și îndrăzneală în abordarea problemelor de vîrf și profunzime ale cercetării în domeniul biologiei. Este știut că cercetarea fundamentală din diferitele ramuri ale biologiei se implică în soluții ca cele legate de starea de sănătate a oamenilor, de cunoașterea și dirijarea corespunzătoare a valorificării hranei pentru animale domestice, de găsirea unor tehnologii care să ducă la obținerea unor noi soiuri de plante și rase de animale. În *Raport* se arată că „numai pe baza biologiei aplicate și a ingineriei genetice pot fi create noi soiuri de plante și rase de animale, rezistente și productive". În cuvîntul său la Congres, tovarășa Elena Ceaușescu arată: „Cercetarea științifică trebuie să se angajeze cu toate forțele, folosind larg cuceririle biologiei moderne și geneticii, în realizarea unei agriculturi de înaltă productivitate". Revine deci ca sarcină cercetătorilor din domeniul biologiei și al agronomiei de a pune la dispoziția lucrătorilor din agricultură descoperiri noi care, utilizate în practică, să contribuie la realizarea obiectivelor revoluției agrare în curs de desfășurare în țara noastră.

Cercetarea biologică actuală obține rezultate la care generațiile anterioare de cercetători nici nu au visat că pot fi abordate, cum sînt cele din domeniul prelungirii vieții, al creșterii perioadei active, al transplantului de organe, al obținerii de produși biologic activi prin intervenții genetice la nivelul aparatului genetic bacterian. Această vastă problematică este, cel puțin în unele cazuri, abia prefigurată. Drept urmare, un cîmp nemărginit se deschide inventivității cercetătorilor din cele mai diverse ramuri ale biologiei cum sînt: microbiologia, virologia, biofizica, biochimia, fiziologia plantelor și animalelor, citologia și altele. Totodată, protecția mediului ambiant deschide larg orizont de cercetare celor care activează pe tărîmul ecologiei, botanicii, zoologiei și hidrobiologiei aplicate. Toate aceste domenii au fost vizate de documentele recentului Congres al partidului. Abordarea cu curaj și angajarea fermă în realizarea sarcinilor puse de partid constituie totodată și un prilej de mîndrie patriotică și respect față de cei care au cinstit cu fapte poziția cercetării biologice românești în cadrul științei universale.

Organizarea actuală a cercetării biologice din universități și institute specializate, cît și baza materială actuală și de perspectivă asigurată de o industrie tot mai modernă, alături de voința tuturor biologilor de a urma neabătut îndemnul conducerii de partid de a face totul pentru creșterea bunăstării poporului, constituie chezășia obținerii în anii ce vin a unor rezultate care să situeze știința biologică românească pe cele mai înalte trepte ale cunoașterii.

IOAN OROS

STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXX, 1985

ECOLOGICAL BEHAVIOUR OF *MALLOMONAS* SPECIES *(SYNURACEAE, CHRYSOPHYCEAE)* IN ROMANIA

LAURA MOMEU and LEONTIN ŞTEFAN PÉTERFI

The use of statistics in the study of algal communities [5—8] created not only the possibility to obtain important information concerning the association between stands or species, but it also proved to be a helpful implement to establish their sociological (coenotic) and ecological fidelity [6, 7]. The occurrence of algal populations is mainly affected by general environmental conditions (trophicity, temperature, light, pH, salinity etc.), acting in high complexity, therefore, community types — established by similarity analysis — may be correlated with the common ecological features of their particular habitats. Each community type (an assemblage of floristically and ecologically similar communities) is characterized by a group of faithful species, occurring mostly together, possessing therefore strong sociological and ecological fidelity [6—8].

The aim of the present assay was the fidelity testing of the *Mallomonas* species, namely to weigh whether the presence of a particular species or group of species may give indirect but reliable indications on the conditions of a certain habitat. The use of *Mallomonas* species as indicators in water quality assays is very scarce, mainly because of the great difficulties in recognizing them in routine work, and without special technics (*i.e.* electron microscopy), the fine structure of scales and bristles being the only criterion in their identification. Recently, a few *Mallomonas* species have been used in paleoecological observations as indicators of anthropic influences on aquatic habitats [1, 12].

Material and Methods. Twenty five stand samples (floristic lists) have been tested for similarity, proceeded from an equal number of habitats, spanning over a wide range of trophic conditions (oligotrophic, mesotrophic, eutrophic, dystrophic), located in Transylvania and the surrounding Romanian Carpathians [4, 9—11].

The 25 stand samples were collected from the following sites: 1. *Sphagnum* bog at „Vinderele", the Maramureş Mountains, pH=4.0; 2. raised peat bog „Tău lui Dumitru" in the Maramureş Mountains, pH=4.5—5.0; 3. peat bog at „Vinderele", pH=5.0; 4. peat bog near the „Pietrosul Mare" peak in the Rodna Mountains, pH=5.5; 5. peat bog at the „Prislop Pass" in the Rodna Mountains, pH=5.5; 6. transitional bog „Tău cu Rogoz", Sălicea, Cluj-Napoca, pH=6.5—7.0; 7. marginal pit in the transitional peat bog „Tău Mare", Sălicea, pH=7.5; 8—10. transitional *Sphagnum* bog „Tău cu Mesteceni", Sălicea, pH=5.5—6.0; 11,12. two fish ponds at Ciurila, Cluj-Napoca, pH=8,5; 13. fish pond at Cătina, Gherla, pH=8,5; 14. fish pond at Cefa, Salonta, pH = 9.0; 15. small moor in the natural reservation „Mestecănişu de la Reci", Sf. Gheorghe, pH = 5.5; 16. small moor in the „Mestecănişu de la Reci", pH=5.5—6.0; 17. eutrophic pool, remnant of an old river bed near Ozun, Sf. Gheorghe, pH = 7.5; 18. *Sphagnum* bog in the „Mestecănişu de la Reci", pH = 5.5—6.0; 19. small bog in the „Mestecănişu de la Reci", pH = 6.0; 20. *Sphagnum* bog in the „Mestecănişu de la Reci", pH = 5.5—6.0; 21. transitional bog in the „Mestecănişu de la Reci", pH = 5.5; 22. eutrophic bog in the „Mestecănişu de la

Reci", pH = 5.5—6.0; 23, 24. eutrophic pools, remnants of old river beds, Ozun, pH = 7.0—7.5, 7.8—8.0; 25. pool strongly polluted by water fowls near Orşova, pH = 8.5—9.0.

Results and Discussion. The overall floristic affinities (matrix of similarities) between the 25 communities involved are given diagrammatically (Figs. 1 and 2). In the trellis diagram (Fig. 1) four clearly distinct groups appear as triangles of high index values. The same pattern, with four main aggregates is more evident in the dendrogram (Fig. 2).

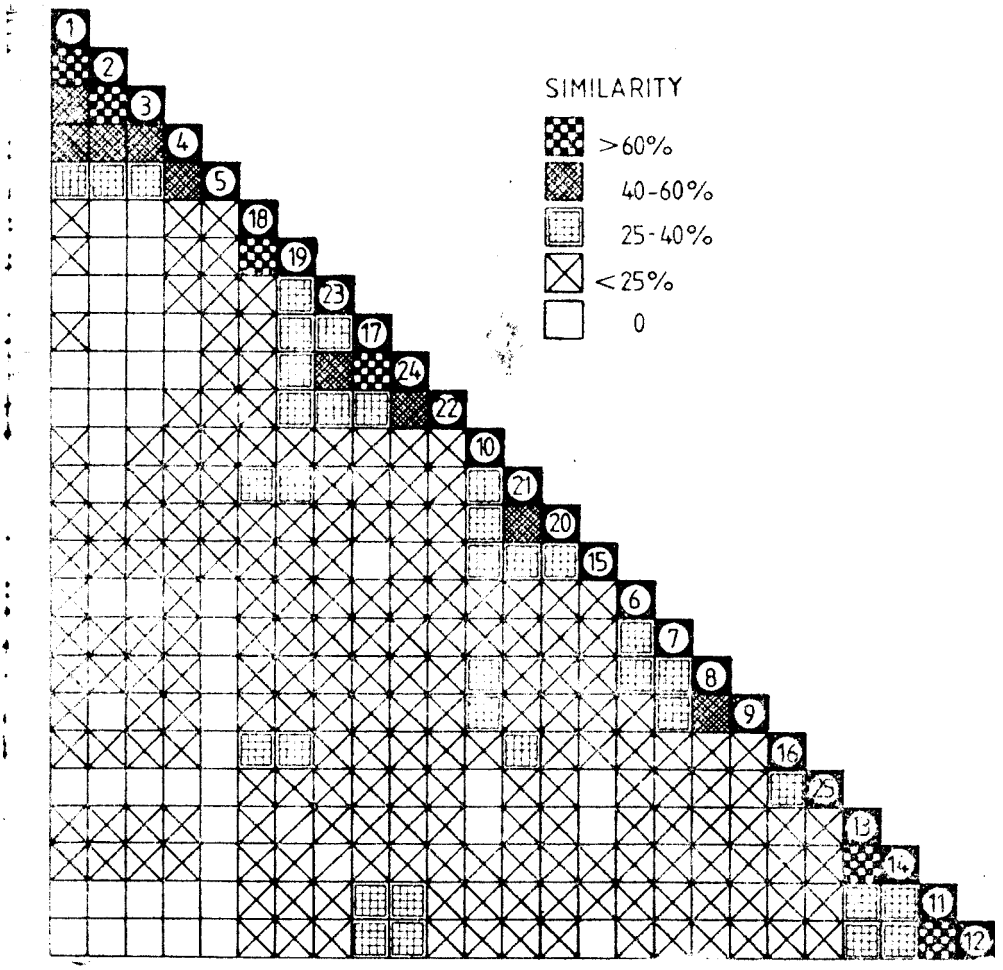

Fig. 1. *Trellis diagram showing the orderly matrix of floristic similarity indices between 25 stand samples.*
Communities with great floristic and ecological affinity appear as triangles of high values. For explanation of the collection sites see the text.

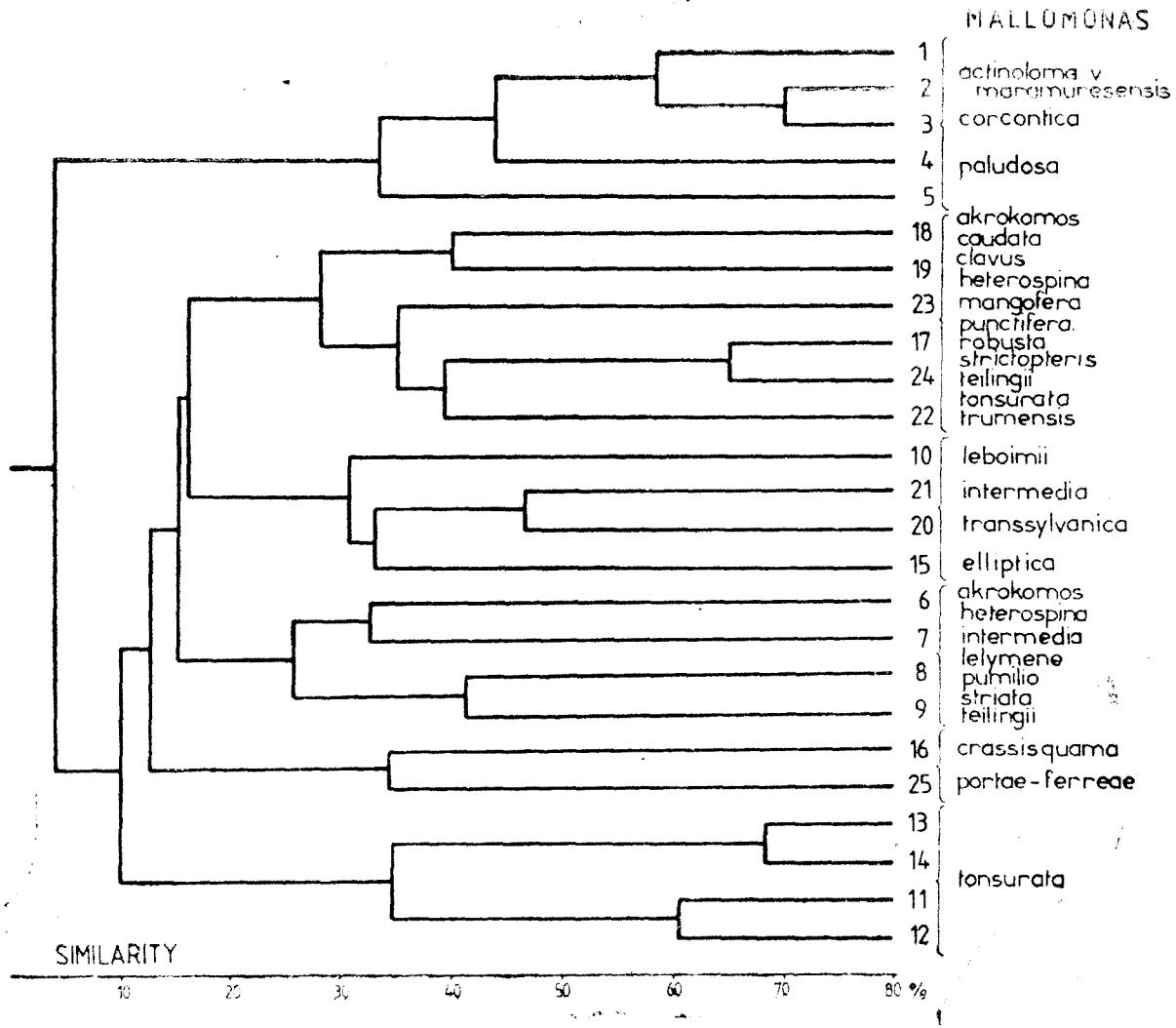

Fig. 2. *Dendrogram exhibiting the overall similarities between 25 algal communities containing* **Mallomonas** *species.* For each grouping of stand samples, the *Mallomonas* species faithful to the given community types are indicated in the right of the diagram.

A first grouping contains the algal communities of the oligo-dystrophic habitats (peat bogs and raised peat bogs), from the Rodna and Maramureş Mountains (sites 1—5). These may be easily recognized, based on a particular group of species, mostly acidophilous desmids, like *Actinotaenium cucurbita, Arthrodesmus incus, Cylindrocystis brébissonii, C. crassa, Penium polymorphum, Staurastrum spinosum* etc. [8]. The *Mallomonas* species recorded *(M. actinoloma* var. *maramuresensis, M. corcontica* and *M. paludosa)* seem to be acidobiontic sphagnophils. Unlike most members of the genus, they usually occur in July or August, when temperature is seemingly optimal (about 10°C) in such high mountain peat bogs.

The second, fairly homogeneous aggregate (sites 10, 15, 20 and 21) is given by the communities whose distribution is restricted to mesotrophic habitats (transition peat bogs with or without living *Sphagnum).* The faithful species, especially large desmids *(Micrasterias, Euastrum, Pleurotaenium, Penium* etc.) have been repeatedly found, growing together, in spring, with certain forms of *Mallomonas,* like *M.leboimei, M.intermedia* var. *salicensis, M.transsylvanica* and *M.elliptica.*

Algal communities with eutrophic requirements, forming a distinct grouping in the diagrams (sites 6—9, 17—19, 22—24) show the highest species number and diversity. The *Mallomonas* species recorded in such habitats are ecologically tolerant *(M.tonsurata)* or preferentially eutrophic *(M.caudata, M. trummensis, M.teilingii, M.punctifera* etc.). In this aggregate one may distinguish two secondary groupings of stands (Fig. 2), slightly separated, showing marked floristic similarities inside each cluster. Such secondary clustering is probably due to slight regional (geographic) variations or to ecological peculiarities.

The last aggregate, readily isolated from the above mentioned ones, includes floristic lists from fish ponds with high degree of saprobicity. In such stands, with usual estival cyanophycean waterblooms, the only *Mallomonas* species recorded was the most tolerant one — *M.tonsurata.* According to recent observations populations of this species have been found, with fairly high frequency, in a very wide range of hydrogen ion concentration (pH = 5.5—9.0) and temperature (3.5—25°C) conditions.

Two communities, from Eselniţa (site 25) and Reci (site 16) exhibit relatively low floristic similarity (34%), each having only a single *Mallomonas* species *(M.portae-ferreae* and *M.crassisquama,* respectively). It ought to be mentioned that *M.portae-ferreae* seems to be typically thermophilous, being repeatedly recorded from subtropical or tropical areas (Africa, Bangladesh, Greece), occurring in slightly or moderately alkaline waters [2, 3, 13]. For the time being, Romania is its most northern area.

Conclusions. The factor analyses, carried out on 25 stand samples (containing *Mallomonas),* suggest that some of the *Mallomonas* species, especially those with narrow ecological tolerance may be considered reliable indicators in aquatic habitats, at least in a defined geographical area.

As such, *Mallomonas actinoloma*, *M.corcontica* and *M.paludosa* are acidophilous, preferentially oligotrophic species. The presence of *M. transsylvanica*, *M. elliptica*, *M. leboimei* and *M.intermedia* var. *salicensis* indicates mesotrophic conditions. The occurrence of *Mallomonas caudata*, *M. trummensis*, *M.teilingii* and *M.punctifera* is restricted mostly to alkaline or circumneutral waters, with higher nutrient content (eutrophy).

Knowing that silica scales and bristles of *Mallomonas* are very well preserved in peat or lake deposits, and that the identification at species level can be achieved with routine electron microscopy, based even on single scales, the use of *Mallomonas* species as paleoindicators is not only possible, but recommended. According to the frequency of scales in successive sediment layers, not only the changes in the algal community may be followed, but it is also possible to obtain important information on the ecological history of a given collection site.

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COMPORTAMENTUL ECOLOGIC AL SPECIILOR DE *MALLOMONAS (SYNURACEAE, CHRYSOPHYCEAE)* DIN ROMÂNIA

(Rezumat)

Lucrarea prezintă informaţii cu privire la valoarea indicatoare a speciilor de *Mallomonas*, obţinute pe baza analizelor de afinitate floristică, efectuate la 25 de comunităţi algale, provenite dintr-un număr egal de habitate acvatice, cu regim trofic diversificat. S-a constatat că pe lîngă speciile euritrope, genul *Mallomonas* cuprinde o serie de specii cu toleranţă ecologică îngustă care, la rîndul lor, pot fi încadrate în categoria speciilor indicatoare.

Cunoscînd că scvamele de *Mallomonas* sînt bine conservate în depozite turboase şi lacustre şi avînd în vedere posibilitatea identificării riguroase a speciilor, prin microscopie electronică, chiar pe baza unor scvame izolate, schimbările în frecvenţa acestora, în straturile succesive ale coloanelor microstratigrafice, ne permit să tragem anumite concluzii asupra evoluţiei biotopurilor acvatice. Astfel, considerăm că speciile stenotrope ale genului sînt valoroase paleoindicatoare.

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CONTRIBUTIONS TO THE STUDY OF THE NITROPHILOUS ASSOCIATIONS *CORONOPO-POLYGONETUM AVICULARIS* Oberd. (1949, 1957) 1971 AND *ALOPECURETUM AEQUALIS* (Soó 1947) Burrichter 1960

IOAN POP

For three consecutive years (1981—1983) we have carried out systematic observations on the appearance and evolution of the nitrophilous associations made up by *Coronopus squamatus* and *Alopecurus aequalis*, a topic which has not been intensely studied up to the present.

1.Coronopo-Polygonetum avicularis Oberd. (1949, 1957) 1971 (al. *Polygonion avicularis* Br.-Bl. 1931, Tx. 1950, ord. *Plantaginetalia majoris* Tx. (1947) 1950, class *Plantaginetea majoris* Tx. et Prsg. 1950).

Coronopus squamatus is a mesophilous, heliophilous, nitrophilous, lime-loving and weakly halophilous therophyte growing in initially barren depressions, with hardened soil, excessively wet in spring and dry in summer. In the absence of competitive species, *Coronopus squamatus* makes up more or less dense populations in small clusters usually covering some square meters. Besides the main species, there are only few other plants which are generally nitrophilous and have the same ecological requirements.

The *Coronopus squamatus* phytocoenoses have been grouped by different authors into the following five associations: *Coronopo-Polygonetum avicularis* Oberd. (1949, 1957) 1971 [15], *Coronopo-Matricarietum* Sissingh (1966) 1969 [10, 17], *Poo-Coronopetum squamati* (Oberd. 1957) Gutte 1966 [4, 5, 7, 8], *Schlerochloo durae-Coronopetum squamati (procumbentis)* Br.-Bl. (1931) 1936 [1, 11] and *Coronopo squamati (procumbentis)-Plantaginetum coronopi* Kuhnholtz-Lordat 1928 [20]. Soó [18] has subordinated the *Coronopus squamatus* phytocoenoses to the *Sclerochloo-Polygonetum avicularis* association (Gams 1927) Soó 1940 as its *-coronopetosum squamati* Soó 1961 subassociation.

From the analysis of the floristic elements and the growing conditions of the above mentioned 5 associations it results that they are much alike, for which reason some of them have been considered synonymous.

Among all, the associations most disputed in the literature (as attested by their synonymies) are the following three:

— *Coronopo-Polygonetum avicularis* Oberd. (1949, 1957) 1971 (syn.: *Coronopus squamatus* ass. Oberd. 1949 n.n.; *Lolio-Plantaginetum majoris* (Linkola 1921) Beger 1930 *coronopetosum squamati* Oberd. 1957, Sissingh 1969; *Coronopo-Matricarietum* Sissingh (1966) 1969 *coronopetosum squamati* Sissingh 1969);

— *Poo-Coronopetum squamati* (Oberd. 1957) Gutte 1966 (syn.: *Lolio-Plantaginetum majoris* (Linkola 1921) Beger 1930 *coronopetosum squamati* Oberd. 1957; *Coronopo-Polygonetum avicularis* Oberd. 1971);

— *Coronopo-Matricarietum* Sissingh (1966) 1969 (with 3 subassociations: *typicum* Sissingh 1969 without *Coronopus squamatus; lepidietosum ruderale* Sissingh 1969 in which *Coronopus squamatus* and *C.didymus* are scarce or lacking; *coronopetosum* Sissingh 1969).

The distinction between the above mentioned associations lies mainly in their name given by the coupling of the species *Polygonum aviculare, Poa annua* and *Matricaria matricarioides* with *Coronopus squamatus*.

By comparing the published phytocoenological tables [4, 5, 7, 8, 10, 15, 17] one can establish that the species mentioned are present in various proportions in all the three associations, while the differential plants are very few and insignificant or are even lacking. Therefore, we think that the three cenotaxa must be subordinated to a single association, namely to *Coronopo-Polygonetum avicularis* Oberd. (1949, 1957) 1971 (syn.: *Coronopus squamatus* ass. Oberd. 1949 n.n.; *Lolio-Plantaginetum majoris* (Linkola 1921) Beger 1930 *coronopetosum squamati* Oberd. 1957; *Poo-Coronopetum squamati* (Oberd. 1957) Gutte 1966; *Coronopo-Matricarietum* Sissingh (1966) 1969 *coronopetosum* Sissingh 1969; *Sclerochloo-Polygonetum avicularis* (Gams 1927) Soó 1940 *coronopetosum squamati* Soó 1961) with its two subassociations — *poëtosum annuae* and *matricarietosum* — having as synonyms their two subordinated associations. This denomination is necessary because the most favoured association among all the component species of the analysed phytocoenoses was established between *Coronopus squamatus* and *Polygonum aviculare* as they have the highest constancy and sociability, similar ecological requirements and belong to the same biological form, being characterized by creeping stems resistant to hardened soils with weakly acid, neutral and basic reaction.

The association *Sclerochloo durae-Coronopetum squamati (procumbentis)* Br.-Bl. (1931) 1936 (syn.: *Sclerochloetum durae* Br.-Bl. 1931) is spread in certain areas of Southern Europe with a submediterranean and mediterranean climate, including in its floristic structure meridional, thermophilous differential species.

Coronopo squamati-Plantaginetum coronopi Kuhnholtz-Lordat 1928 (syn.: *Coronopus squamatus (procumbens)-Plantago coronopus* Kuhnholtz-Lordat 1928) is a nitrophilous and weakly halophilous association identified on the western coastline of France with seaweed deposits [20].

In Romania the *Coronopus squamatus* phytocoenoses described from Moldavia, Dobrogea and Banat have been integrated either into the association ***Sclerochloo durae-Coronopetum squamati*** Br.-Bl. (1931) 1936 [12—14, 19] still requiring a thorough study, or have been subordinated as a subassociation to *Sclerochloo-Polygonetum avicularis* (Gams 1927) Soó 1940, — *coronopetosum squamati* Soó 1961 [3, 6] that corresponds in fact to the association *Coronopo-Polygonetum avicularis*.

We have identified phytocoenoses of *Coronopo-Polygonetum avicularis* in the north of the village Marţihaz (Bihor) district) on the way to the Rădvani forest (Cefa). They grow in clusters of about 0.5—25 m², on wet microdepressions, flooded in spring and dry in summer, on the border of the country roads and paths initially without vegetation. The phytocoenoses of *Coronopus squamatus* grow in the vicinity of agricultural lands or of ruderal meadows of *Polygonetum avicularis, Lolio-Plantaginetum majoris* and *Trifolio-Lolietum perennis*.

These phytocoenoses are generally poor in plants, containing about 30 species. On a surface of 1 m² only 6—14 species of cormophytes grow covering about 30—80% of the ground (Table 1). In the nitrophilous

Table 1

Coronopo-Polygonetum avicularis

Date of the relevé	3.VIII.1981					6.VIII.1982						2.V.1983	
Coverage (%)	30	40	60	70	30	35	40	60	60	60	80	50	50
Number of the relevé	1	2	3	4	5	6	7	8	9	10	11	12	13
Coronopus squamatus	2	2	3	3	2	2	2	3	3	3	4	3	3
Polygonum aviculare	+	+	1	+	+	+	1	1	1	1	1	1	1
Sclerochloa dura	—	+	—	—	—	—	—	—	—	—	—	+	+
Lepidium ruderale	—	—	—	—	+	+	—	—	—	—	—	—	—
Digitaria sanguinalis	—	—	—	—	+	—	—	+	—	—	—	—	—
Lolium perenne	+	+	—	—	—	+	—	—	+	+	+	—	+
Plantago major	+	+	—	+	—	—	—	—	—	—	+	—	—
Ranunculus sardous	+	+	+	+	—	—	—	—	—	—	—	—	—
Amarantus retroflexus	—	+	+	+	—	—	—	—	+	—	—	—	+
Capsella bursa-pastoris	—	—	+	—	—	—	+	—	—	—	—	+	—
Chenopodium album	—	—	—	+	—	—	—	—	—	—	—	—	—
Convolvulus arvensis	—	—	—	—	—	—	—	+	—	—	+	—	—
Daucus carota	—	—	—	—	—	+	+	—	—	—	—	—	—
Hibiscus trionum	+	+	+	1	—	—	+	—	—	+	—	—	—
Matricaria chamomilla	+	—	—	—	+	—	—	—	—	—	—	—	+
Polygonum lapathifolium	—	+	—	+	—	—	—	—	—	—	—	—	—
Polygonum mite	—	—	—	+	+	—	—	—	—	—	—	—	—
Xanthium strumarium	—	+	—	+	—	+	—	+	—	+	+	—	—
Echinochloa crus-galli	+	1	1	2	+	1	—	—	+	1	—	—	—
Heleochloa alopecuroides	+	+	—	—	—	—	—	—	—	—	—	—	—
Helochloa schoenoides	+	+	—	—	—	—	—	—	—	—	—	—	—
Hordeum hystrix	+	—	—	+	—	+	—	—	+	—	—	—	—
Puccinellia limosa	—	—	+	+	—	—	—	—	—	—	—	—	—
Achillea millefolium	—	—	—	—	—	—	—	+	+	+	—	—	—
Lotus tenuis	+	1	—	—	—	—	+	+	—	—	—	—	—
Lythrum hyssopifolia	—	+	+	—	—	+	—	—	—	—	—	—	—
Mentha pulegium	—	—	—	+	+	—	—	—	—	—	—	—	—
Pulicaria vulgaris	—	—	—	—	—	+	—	+	—	—	—	—	—
Taraxacum officinale	—	—	—	—	—	—	—	+	+	+	—	—	—
Trifolium repens	+	+	—	+	+	+	1	—	+	+	+	—	—

phytocoenoses developing on weakly saline soils some halophytes *(Hordeum hystrix, Puccinellia limosa, Lotus tenuis)* also grow. The analysis of the main ecological indices (Table 2) shows that the studied phytocoe-

Table 2

Analysis of the main ecological indices

Association		Ecological indices (number and percentage of species)											
		1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	0
Coronopo-Polygonetum	U*	—	1	2	5	8	4	5	3	1	—	—	1
		—	3.3	6.7	16.7	26.7	13.3	16.7	10.0	3.3	—	—	3.3
	T	—	—	—	—	13	3	4	—	—	—	—	10
		—	—	—	—	43.4	10.0	13.3	—	—	—	—	33.3
	R	—	—	—	—	6	—	8	—	4	—	—	12
		—	—	—	—	20.0	—	26.7	—	13.3	—	—	40.0
Alopecuretum aequalis	U	—	—	—	1	4	5	9	3	12	—	2	2
		—	—	—	2.6	10.5	13.1	23.7	7.9	31.6	—	5.3	5.3
	T	—	—	1	—	21	1	2	—	—	—	—	13
		—	—	2.6	—	55.3	2.6	5.2	—	—	—	—	34.3
	R	—	—	—	—	4	—	12	—	1	—	—	21
		—	—	—	—	10.5	—	31.6	—	2.6	—	—	55.3

* U — Humidity, T — Temperature, R — Chemical reaction of the soil.

noses are annual and have a mesophilous (40%), micromesothermal (53,4%), euryionic (40%) and nitrophilous character. *Coronopo-Polygonetum avicularis* develops towards *Lolio-Plantaginetum majoris* or towards *Trifolio-Lolietum perennis* whose components are already present in the analysed phytocoenoses.

Spectrum of bioforms: H 30.0%, T 70.0% (Th 63.3%; TH 6.7%).

Spectrum of geoelements: Cosm. 26.7%, Cp 3.3%, Eua 50.1%, E 6.7%, sM 3.3%, M 3.3%, Pp 3.3%, Adv. 3.3%.

2. **Alopecuretum aequalis** (Soó 1947) Burrichter 1960 (syn.: *Rumici-Alopecuretum aequalis* Cîrțu 1972) belongs to the nitrophilous groups harboured by the wet and marshy soils from the neighbourhood of human settlements (*Bidentetea tripartitae* Tx., Lohm., Prsg. 1950, *Bidentetalia tripartiti* Br.-Bl. et Tx. 1943, *Bidention tripartiti* Nordhagen 1940 [9, 16]).

Alopecurus aequalis is a Eurasiatic therophyte covering the permanently wet flood plains and also the marshy depressions, contributing to the making up of some typical nitrophilous phytocoenoses together with other mesohygrophytes and hygrophytes [16]. At first Soó integrated the phytocoenoses from our country made up by this graminea into the association *Alopecuretum aequalis* Soó 1947, 1949 n.n., then he considered them synonymous with *Rumici-Alopecuretum geniculati* Tx. (1937), 1950 [18, vol. I], and later on he did not even mention them [18, vol. V]. Vicol mentions the presence of the association *Alopecuretum aequalis* in the Timiș district [21]. In Oltenia, Cîrțu describes a new association — *Rumici-Alopecuretum aequalis* Cîrțu 1972 — whose flo-

ristic composition is almost identical with that of the association *Alopecuretum aequalis*, wich has a nomenclature priority [2].

We have identified phytocoenoses of *Alopecuretum aequalis* in Cluj-Napoca, along the river meadow of the Someşul Mic, between the Garibaldi bridge and the sporting grounds, not only on its flat surfaces but also on its slightly sloping right bank (5 degrees), with wet temporarily flooded alluvial soil. The flora of the phytocoenoses is poor in cormophytes totalizing about 38 species of which 8 are characteristic of the cenotaxa belonging to the *Bidentetea* class, 12 species belong to *Plantaginetea* and *Agropyro-Rumicion crispi*, 8 species to *Phragmitetea* etc. (Table 3).

Table 3

Alopecuretum aequalis

Date of the relevé	20.VIII.1981			5.VI.1982		8.VII.1983	
Coverage (%)	85	100	70	70	80	100	100
Number of the relevé	1	2	3	4	5	6	7
Alopecurus aequalis	4	4	3	4	4	5	5
Catabrosa aquatica	—	+	+	—	—	—	—
Bidens tripartita	+	+	+	+	—	+	+
Polygonum hydropiper	1	2	2	+	—	1	1
P. lapathifolium	—	+	+	—	—	—	—
P. mite	+	+	—	+	—	—	—
Rorippa silvestris	+	+	+	—	+	—	—
Veronica anagallis-aquatica	1	+	+	+	+	+	+
Agropyron repens	+	1	+	+	—	—	—
Poa annua	+	+	+	+	—	—	—
Juncus bufonius	—	+	+	—	—	—	—
J. tenuis	—	—	—	+	+	—	—
Plantago major	+	+	+	+	+	—	—
Potentilla anserina	—	—	+	—	+	—	—
Polygonum aviculare	—	+	+	—	—	—	—
Ranunculus repens	+	+	+	+	1	+	+
Rumex conglomeratus	—	+	—	+	—	—	—
R. crispus	+	+	+	+	+	+	+
R. obtusifolius	+	+	—	—	—	—	—
Chenopodium glaucum	+	+	—	—	—	—	—
Ch. polyspermum	—	+	+	—	—	—	—
Calystegia sepium	+	+	—	—	—	—	—
Xanthium strumarium	+	+	—	—	—	—	—
Agrostis stolonifera	—	+	+	+	—	—	+
Glyceria plicata	—	—	—	+	—	+	+
Poa pratensis	+	+	—	—	+	—	—
P. trivialis	—	—	—	—	+	+	—
Carex hirta	—	—	—	—	1	+	—
Heleocharis palustris	—	+	—	—	—	+	—
Alisma plantago-aquatica	—	+	+	—	—	+	+
Typha angustifolia	—	—	—	—	—	+	+
Epilobium roseum	—	+	—	+	—	—	—
Lycopus europaeus	—	—	—	—	+	—	+
Myosotis palustris	+	—	—	—	—	—	+
Achillea millefolium	+	+	—	—	—	—	—
Salix alba	—	—	—	—	—	+	+
S. fragilis	—	+	+	—	—	—	—
S. triandra	—	—	—	—	—	+	+

Alopecuretum aequalis grows in the vicinity of, and develops towards, the meadows of *Rorippo-Agrostietum stoloniferae* (Moor 1958) Oberd. et Müller 1961 and of *Rorippo austriacae-Agropyretum repentis* (Timár 1947) Tx. 1950.

From the analysis of the main ecological indices (Table 2) one can deduce that *Alopecuretum aequalis* is an annual, nitrophilous association dominated by mesohygrophilous (31.6%), hygrophilous (31.6%), micro-mesothermal (55.3%) and euryionic (55.3%) cormophytes.

Spectrum of bioforms: H 36.9%, G 7.9%, T 28.9%, Hh 18.4%, mPh 7.9%.

Spectrum of geoelements: Cosm. 23.7%, Cp 21.0%, Eua 39.5%, E 13.2%, Adv. 2.6%.

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CONTRIBUȚII LA STUDIEREA ASOCIAȚIILOR NITROFILE *CORONOPO-POLYGONETUM AVICULARIS* Oberd. (1949, 1957) 1971 ȘI *ALOPECURETUM AEQUALIS* (Soó 1947) Burrichter 1960

(Rezumat)

S-a studiat pe teren, timp de 3 ani consecutiv, evoluția fitocenozelor nitrofile edificate de *Coronopus squamatus* și *Alopecurus aequalis*.

Fitocenozele asociației *Coronopo-Polygonetum avicularis* Oberd. (1949, 1957) 1971 (sin.: *Coronopus squamatus* ass. Oberd. 1949 n.n.; *Lolio-Plantaginetum majoris* (Linkola 1921) Beger 1930 *coronopetosum squamati* Oberd. 1957; *Poo-Coronopetum squamati* (Oberd. 1957) Gutte 1966; *Coronopo-Matricarietum* Sissingh (1966) 1969 *coronopetosum* Sissingh 1969; *Sclerochloo-Polygonetum avicularis* (Gams 1927) Soó 1940 *coronopetosum squamati* Soó 1961) au fost identificate în vestul județului Bihor, în microdepresiuni reavene, inundate primăvara, uscate vara, la marginea drumurilor și cărărilor sub formă de pîlcuri cu suprafața de pînă la 25 m², constituite din puține specii de plante. Fitocenozele analizate au un caracter mezofil (U 3—3,5 = 40,0%), micromezoterm (T 3—3,5 = 53,4%), euriionic (R 0 = 40,0%) și nitrofil evoluînd spre *Lolio-Plantaginetum majoris* și *Trifolio-Lolietum perennis*.

Fitocenozele de *Alopecuretum aequalis* (Soó 1947) Burrichter 1960 (sin.: *Rumici-Alopecuretum aequalis* Cirțu 1972) au fost identificate în lunca Someșului Mic Cluj-Napoca, pe sol aluvionar, umed pînă la mlăștinos. Ele sînt dominate de cormofitele mezohigrofile (U 4—4,5 = 31,6%) și higrofile (U 5—5,5 = 31,6%), micromezoterme (T 3—3,5 = 55 3%) și euriionice (R 0 = 55,3%). Aceste fitocenoze nitrofile evoluează spre *Rorippo silvestri-Agrostietum stoloniferae* (Moor 1958) Oberd. et Müller 1961.

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L'INFLUENCE DES EAUX RÉSIDUELLES SUR LA CROISSANCE ET LE POTENTIEL PHOTOSYNTHÉTIQUE DE *LYCOPERSICUM ESCULENTUM* MILL.

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L'utilisation des engrais chimiques liquides en agriculture, bien que présentée, par B e n a r i, comme ayant beaucoup d'avantages [2], ne connaît pas une extension proportionnelle aux ressources potentielles. Il y a peu d'études sur l'utilisation de certaines eaux résiduelles riches en nutrients, telles les eaux riches en azotates, sels d'ammonium et phosphates provenant des fabriques d'engrais chimiques. Dans les recherches concernant l'utilisation du potentiel nutritif des eaux résiduelles, on a obtenu pour les plantes de culture une augmentation de la croissance végétative, du contenu en pigments photoassimilateurs [9] et de la production [1, 3—7, 9]. Dans ce contexte, nous avons abordé l'étude de l'action des eaux résiduelles provenues du Combinat d'engrais chimiques „Azomureş", dans la culture des tomates en tant que plantes irrigables.

Matériel et Méthodes. Les recherches ont été effectuées sur *Lycopersicum esculentum* Mill., la variété Someşan et l'hybride Argeş 1, ensemencés en conditions de serre, repiqués en couche et transplantés en champ expérimental. Les eaux résiduelles du Combinat d'engrais chimiques ont été prélevées de trois sources: du bassin de mélange (Batal), de la section urée et de la section azotates. Les traitements ont été appliqués dans les variantes de dilution suivantes: 1 : 50, 1 : 100, 1 : 200 et 1 : 400. On a travaillé avec des eaux sédimentées et non-sédimentées. Les solutions ont été administrées en plusieurs phases: à l'ensemencement, à l'apparition des premières vraies feuilles, à la transplantation en champ, au commencement de la nouaison de fleurs et au moment où les fruits commencent à mûrir. Pendant la période de végétation, on a effectué tous les travaux d'entretien.

La récolte des feuilles et la détermination quantitative des pigments photoassimilateurs ont été faites suivant la méthode décrite par S t i r b a n et F r e c u s [8].

Résultats. L'analyse chimique des eaux résiduelles, pour les principaux nutrients, atteste un contenu de 99.000 mg/l azotates, 33,25 mg/l azote ammoniacal, 687 mg/l phosphates, 125 mg/l azotites, pour l'assortiment de mélange (Batal-B), avec un pH=6,4, les eaux provenues de la section urée (U) contiennent de l'urée 11.200 mg/l et des azotites, 212,5 mg/l, pour un pH = 10,9, et les eaux de la section azotates (A) contiennent des azotates en quantités significatives (340 mg/l) et des azotites en très petites quantités. Le contenu en cations est relativement équilibré pour les macroéléments et les microéléments nécessaires aux plantes, mais avec les éléments existant dans le sol, il peut engendrer des rapports antagoniques ou additifs (Tableau 1).

De l'analyse des résultats obtenus, il s'ensuit que les eaux utilisées dans les couches avant la germination des graines ont produit des effets différenciés en fonction de la variété et de l'hybride testé ainsi que des concentrations et des sources d'eaux d'expérimentation (Tableau 2). L'hybride Argeş 1 n'a réagi de manière significative au contenu en anions

Tableau 1

Le contenu en cations des eaux résiduelles

Élément	Concentration (mg/l)	Élément	Concentration (mg/l)
Cadmium	<0,1	Magnésium	4,4
Calcium	104,0	Manganèse	<0,1
Cobalt	<0,5	Nickel	<0,5
Chrome	<0,1	Potassium	31,0
Cuivre	<0,05	Sodium	100,0
Fer	<0,1	Strontium	7,6
Lithium	<0,05		

Tableau 2

Les données phénologiques pour les tomates

Variantes		% des plantes germées		L'intervalle en jours jusque :					
				Commencement de la germination		Germination totale		L'apparition des premières feuilles	
		Argeş 1	Someşan	Argeş 1	Someşan	Argeş 1	Someşan	Argeş 1	Someşan
Témoin		78,5	82,5	8	8	20	20	28	28
Batal, eau non-séd.	1 : 100	80,0	69,0	6	6	15	15	25	25
,,	1 : 200	72,5	63,0	6	6	15	15	26	26
,,	1 : 400	70,5	69,0	6	6	15	15	27	27
Urée, eau non-séd.	1 : 100	76,0	78,5	5	5	15	15	25	25
,,	1 : 200	83,0	82,0	5	5	15	15	25	25
,,	1 : 400	82,5	75,5	5	5	15	15	26	26
Azotates, eau	1 : 25	67,5	50,0	18	18	27	27	37	37
,,	1 : 50	58,5	48,0	18	18	30	30	37	37
,,	1 : 100	77,5	95,0	8	8	17	17	25	25
Batal, eau séd.	1 : 200	65,0	87,5	18	18	27	27	36	36
Urée, eau séd.	1 : 200	72,0	82,0	6	6	15	15	26	26

et en cations de l'eau de mélange que pour la variante des eaux sédimentées (Bs), où le taux des graines germées a été plus réduit. Les eaux uréiques utilisées en grandes dilutions, suivant des tâtonnements préliminaires, n'ont produit de modifications significatives de la faculté et de l'énergie germinatives que pour la variante des eaux sédimentées (s). Les eaux azotées se sont avérées inhibitrices en dilutions inférieures à 1 : 50, et pour la faculté germinative et pour l'énergie germinative. C'est à dire que l'hybride Argeş 1 se révèle sensible aussi bien au rapport entre la source azotée et la source de phosphore, qu'au rapport des cations, car, par sédimentation, les composants ayant une solubilité plus réduite ont été diminués (0,02 mg/l azotites, 143 mg/l azotates).

La variété Someşan a réagi différemment par rapport à l'hybride Argeş 1, se révélant généralement plus sensible aux eaux nonéquilibrées, en tant que sources unilatérales en nutrients, mais surtout par faible

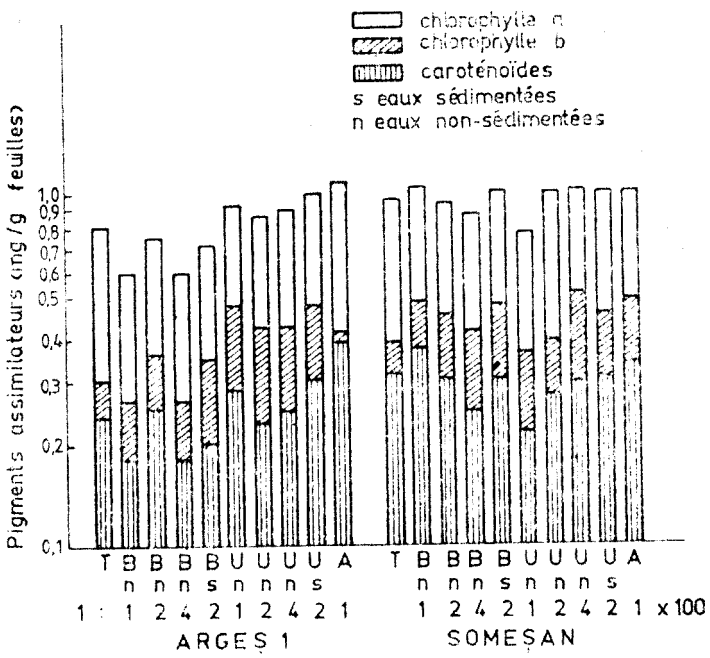

Fig. 1. *Le contenu en pigments assimilateurs chez* **Lycopersicum esculentum** *Mill., l'hybride Argeş 1 et la variété Someşan, après l'application des eaux résiduelles sédimentées et non-sédimentées.*
T — Témoin. B — Eaux du bassin de mélange (Batal).
U — Eaux de la section urée. A — Eaux de la section azotates.

dilution des eaux de la section azotates. La faculté germinative en est influencée de manière différenciée par rapport à l'hybride Arges 1, tandis que l'influence sur l'énergie germinative en a été similaire.

Le contenu en pigments photoassimilateurs est également influencé de manière différente pour la variété Someşan et pour l'hybride Argeş 1, surtout en ce qui concerne le contenu en chlorophylles (Fig. 1.) Ainsi, pour l'hybride Argeş 1, les eaux de mélange non-sédimentées (Bn) n'ont eu d'influence significative sur la synthèse et l'accumulation des pigments assimilateurs ni en ce qui concerne leur composition et leur rapport, ni en ce qui concerne leur quantité.

Par leur contenu total, les pigments se situent au-dessous des valeurs de la variante témoin, sans qu'on puisse mettre en évidence une relation dilution-effet. La variante avec des eaux de mélange sédimentées présente un rapport favorable aux chlorophylles vis-à-vis des pigments caroténoïdiques, situation favorable qui s'est reflétée dans la production des fruits.

Le contenu en pigments assimilateurs ainsi que le potentiel photosynthétique des plantes ont été favorablement influencés par l'utilisation des eaux uréiques et surtout des eaux azotées. C'est la synthèse des

chlorophylles dans toutes les dilutions qui a été positivement influencée par les eaux uréiques. Avec les eaux non-sédimentées on a obtenu des stimulations moins significatives; on a obtenu des valeurs plus élevées de stimulation avec l'eau uréique sédimentée en dilution de 1 : 200. L'eau provenant de la section azotates, en dilution de 1 : 100, a déterminé le contenu le plus riche en pigments assimilateurs totaux, mais on y remarque la biosynthèse et l'accumulation réduites de la chlorophylle *b* et des chlorophylles en général, par rapport aux pigments caroténoïdiques. Cette influence a déterminé une augmentation de la masse végétative, ce qui n'a pas eu d'effets favorables sur la production des fruits, comme ce fut le cas des stimulations obtenues par les eaux de mélange sédimentées ou par les eaux uréiques.

La variété Someşan, du point de vue du contenu en pigments photo-assimilateurs, n'est pas dépendante de la source d'azote et des dilutions utilisées. On a relevé une diminution du contenu en pigments totaux dans le cas de l'eau uréique en faibles dilutions qui favorise les chlorophylles par rapport aux pigments caroténoïdiques, ce qui s'est positivement reflété dans la production même de fruits.

La précocité et la production de fruits ont été de même différemment influencées pour l'hybride Argeş 1 et pour la variété Someşan. Ainsi, de l'analyse des données obtenues et portées sur le Tableau 3, on remarque que l'influence de l'arrosage avec des eaux provenant des différentes sources est conditionnée également par les particularités biologiques de l'hybride Argeş 1 par rapport à la variété Someşan. C'est ainsi qu'on remarque que pour l'hybride Argeş 1, très productif et précoce en climat optimal, dans les conditions d'un climat humide et froid, semblable au climat où l'on a effectué les expériences, le contenu accru en nutrients azotés n'a pas déterminé une élévation du potentiel photosynthétique et de production égale à leur augmentation pour la variété Someşan, plus acclimatée. Bien que l'hybride Argeş 1 ait réalisé des productions supérieures en valeurs absolues, le taux des stimulations par variantes y a été inférieur au taux obtenu dans le cas de la variété Someşan. De même, l'indice de la précocité s'est avéré défavorable pour l'hybride Argeş 1, bien qu'on s'attendit à ce que ce fût cet hybride qui réalisât des performances biologiques. On remarque, de la sorte, que pour l'hybride Argeş 1, bien qu'il ait totalisé un grand nombre de fruits par plante, jusqu'au 2 octobre, le taux des fruits mûrs a été inférieur au taux réalisé par la variété Someşan. On peut estimer que l'utilisation des eaux avec des sources non-équilibrées en nutrients determine des influences différenciées, en fonction des particularités biologiques des plantes. Ainsi, par l'utilisation des eaux résiduelles testées, on favorise les variétés bien acclimatées et on diminue les performances potentielles des variétés qui ne parviennent pas à s'acclimater harmonieusement aux conditions de microclimat (Tableau 3).

Les données phénologiques, ainsi que les données obtenues par les analyses biochimiques des produits primaires de la photosynthèse de l'appareil foliaire, corroborées avec les données de production, plaident en faveur de la détermination des technologies d'application de la stimu-

Tableau 3

Indicateurs de précocité et de production

Variantes	L'intervalle de maturation physiologique des fruits (en jours)								Poids moyen des fruits (g/pièce)
	163 (1 sept.)		185 (22 sept.)		195 (2 oct.)		209 (16 oct.)		
	pièces	kg	pièces	kg	pièces	kg	pièces	kg	
ARGEŞ 1									
Témoin	3	0,69	9	1,75	29	6,55	78	6,10	126,8
Batal, eau non-sédimentée 1 : 100	3	0,69	10	1,76	27	4,70	51	6,70	152,2
Batal, eau non-sédimentée 1 : 200	—	—	7	1,75	19	4,10	55	8,00	170,9
Batal, eau non-sédimentée 1 : 400	1	0,12	9	1,45	7	1,60	74	11,80	164,5
Batal, eau sédimentée 1 : 200	9	1,57	16	2,36	28	5,10	108	12,20	131,8
Urée, eau non-sédimentée 1 : 100	—	—	16	2,73	11	2,30	94	15,20	167,1
Urée, eau non-sédimentée 1 : 200	13	1,44	12	2,13	23	4,30	71	11,30	161,1
Urée, eau non-sédimentée 1 : 400	1	0,14	12	1,95	15	3,10	100	11,90	133,5
Urée, eau sédimentée 1 : 200	—	—	19	3,49	13	2,80	74	13,90	190,5
Azotates, eau 1 : 100	5	0,80	23	4,80	20	3,70	69	9,00	156,4
Azotates, eau 1 : 50	—	—	13	1,73	14	1,70	49	5,20	113,5
SOMEŞAN									
Témoin	26	3,17	6	0,75	13	1,14	57	5,40	102,6
Batal, eau non-sédimentée 1 : 100	20	2,85	20	2,32	7	0,70	70	4,75	90,7
Batal, eau non-sédimentée 1 : 200	22	3,42	17	2,24	4	0,40	67	4,20	93,3
Batal, eau non-sédimentée 1 : 400	19	2,73	14	2,50	16	1,35	70	6,70	113,5
Batal, eau sédimentée 1 : 200	22	3,05	32	4,85	17	2,05	123	9,60	100,7
Urée, eau non-sédimentée 1 : 100	16	2,76	42	6,65	12	2,10	87	7,50	121,8
Urée, eau non-sédimentée 1 : 200	20	3,12	29	4,29	14	2,10	67	8,20	136,2
Urée, eau non-sédimentée 1 : 400	2	0,22	18	3,63	20	3,15	82	12,60	160,6
Urée, eau sédimentée 1 : 200	23	3,15	40	5,15	34	3,75	53	4,60	111,0
Azotates, eau 1 : 100	11	1,82	30	4,77	10	1,50	77	8,00	125,7
Azotates, eau 1 : 50	7	0,76	28	3,79	13	1,70	31	5,10	101,1

lation par eaux résiduelles riches en nutrients, après une période de vieillissement chimique et de sédimentation de ces eaux. La sédimentation est déjà réalisée dans le bassin de mélange (Batal), ce qui rend propre

l'utilisation de cette eau telle quelle pour la fertilisation chimique du sol. Ces résultats nous ont autorisés à effectuer des expériences s'étendant sur une période minimale de 3 ans et sur un sortiment plus riche de plantes de culture, ce qui nous permettra d'étudier l'influence de l'administration répétée de ces eaux sur la faune, la microfaune, la microflore et le chimisme du sol.

Conclusions. Conformément à l'étude de la technologie d'application du système de fertilisation, on peut formuler les conclusions suivantes.

Pendant la première période, à commencer par la germination et jusqu'à l'apparition des vraies feuilles, l'emploi de ces eaux n'est pas relevant.

Ces eaux ayant aussi un taux uréique, il est recommandé de ne s'en servir que deux semaines avant les semailles tout au plus.

Le potentiel photosynthétique et celui de production ont été stimulés surtout par l'utilisation de ces eaux dans les périodes de croissance végétative intense.

Le calcul de l'économie réalisée par les effets favorables dûs à l'emploi de ces eaux comme fertilisateurs montre que, sur un rayon de 100 km, le transport et l'utilisation de ces eaux, surtout pour les plantes irrigables, sont entièrement justifiés à condition d'une étude préalable pour chaque type de culture et de sol. Les réserves d'eau existantes ainsi que les réserves qui peuvent naître à l'avenir justifient nos recherches dans ce sens.

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INFLUENȚA APELOR REZIDUALE ASUPRA CREȘTERII ȘI POTENȚIALULUI FOTOSINTETIC LA *LYCOPERSICUM ESCULENTUM* MILL.

(Rezumat)

S-a studiat influența apelor reziduale provenite de la fabricarea îngrășămintelor chimice asupra solului Someșan și hibridului Argeș 1 de tomate. Rezultatele obținute arată că apele reziduale cu o încărcătură preponderentă de azotați, uree și săruri de amoniu, produc inhibiții cînd sînt administrate în primele faze ale germinării și stimulări în creștere și conținutul pigmenților fotoasimilatori cînd sînt folosite în faze de creștere și în doze adecvate. Apa obținută în urma amestecării surselor de azotați, uree, săruri de amoniu și fosfați a produs acțiuni mai favorabile asupra plantelor testate. Apele sedimentate au dat rezultate mai bune decît cele nesedimentate.

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TESTACEA *(PROTOZOA: RHIZOPODA TESTACEA)* IN FOREST LITTERS OF THE BUCEGI MOUNTAINS (ROMANIA)

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In the well-developed forests, the undecomposed or differently decomposed leaves, needles, fruits, bark, small branches etc. form a non-hydromorphic organic horizon at the soil surface — the litter.

As an essential link between vegetation and soil, the litter is the main primary source of raw material in the forming of the most specific and fundamental soil contituent, the humus.

The litter determines the intensity and the way of evolution in the soil forming process, with a direct influence on the soil properties (water-holding capacity, pH, biocycling, thickness of the humus horizon, humus type etc.) and on its peculiarities.

This paper presents the results of our investigations concerning the *Testacea* in the litter of different forest types in the Bucegi Mountains.

Material and Methods. The forest zone in the Bucegi Mountains has a vertical extent of 1,330 m (from the altitude of 520 m at the confluence of the Ialomiţa Valley with the Ialomicioara Valley to the altitude of 1,850 m in the Cocora Valley).

This zone comprises the whole territory occupied by the well-developed forests (including the forest glades as transitions towards the alpine zone) and is divided into two subzones: the beech and the spruce ones [1].

According to the specific composition of the forests and to the altitudinal succession of species, in the *beech subzone* two vegetation belts are distinguished:

— the inferior mountain belt (mean superior limit: 650 m), on a relatively small surface, formed of pure beech forests or of forests of beech mixed with other deciduous trees: *Carpinus betulus, Acer platanoides, Ulmus scabra, Fraxinus excelsior, Tilia cordata* (shrubs: *Crataegus monogyna, Sambucus nigra, Lonicera xylosteum, Cornus sanguinea, Corylus avellana, Viburnum opulus, V. lantana* etc.);

— the middle mountain belt (mean superior limit: 1,400 m) formed of mixed beech and coniferous (fir, spruce or fir with spruce) forests, pure fir forests and beech forests, where we usually find *Acer pseudoplatanus, Ulmus scabra, Sorbus aucuparia, Sambucus racemosa, Salix silesiaca, Spiraea ulmifolia, Rubus idaeus, R. hirtus, Lonicera xylosteum;* as it is the belt in which the fir tree reaches its superior limit (1,200—1,350 m) one may distinguish the fir sub-belt and the spruce sub-belt.

The *spruce subzone* has also two belts:

— the superior mountain belt (1,600—1,800 m) formed of spruce with the sporadic presence of *Acer pseudoplatanus, Sorbus aucuparia* and of *Sambucus racemosa, Salix silesiaca, Spiraea ultmifolia, Rosa pendulina, Ribes petraeum;*

— the subalpine belt (superior limit up to 2,000 m) with the limit glades of spruce, European larch *(Larix decidua)* or of spruce with larch, seldom of larch with stone pine *(Pinus cembra).*

The gross quantity of litter depends on the station conditions and the age of trees, and it is of 6—15 g/dm^2 in beech forests and of 10—30 g/dm^2 in spruce forests; for the fir forests it is close to that of the beech forests (9—16 g/m^2) [5].

The pH value of the different litter types oscillates between quite wide limits [4], being considerably influenced by the lithological substratum (Table 1).

Table 1

Some characteristics of the investigated litters

Litter	Number of the investigated stations	pH (H_2O)			Humus type
		minimum	usual	maximum	
Fagetum	19	4.56	4.48–5.95	7.75	mull (moder)
Fageto-Abietum	12	4.69	5.35–6.15	7.40	mull (moder)
Abieto-Fagetum	10	4.67	5.32–6.15	6.88	mull
Abietum	7	5.05	5.50–6.10	6.80	mull
Abieto-Piceetum	1		4.47		mull-moder
Piceetum	20	3.35	4.33–5.69	6.15	moder (mull)
Laricetum	1		6.43		moder

In the beech litter the best humus type, the mull (sometimes the mull-moder) is prevailing. The mull prevails in the fir and in the mixed beech-fir litters, too. But in the spruce litter the prevailing humus type is the moder (mull on limestone substratum) [3].

The sampling of *Testacea* was performed by using an original method of microseparation through flotation [2].

The number of the investigated stations was proportional to the forest areas in the Bucegi Mountains.

Results. The results are shown in Tables 2 and 3. In the litter of different forest types 93 testacean systematic units (69 species, 22 varieties and 2 forms) belonging to 22 genera were identified. The characteristic medium (aquatic, muscicolous, sphagnicolous, terricolous) was specified for each systematic unit.

Table 2

List of the litter Testacea

No	Name	Characteristic medium*	Litter**						
			F	FA	AF	A	AP	P	L
1	Centropyxis constricta	A	+					+	
2	Centropyxis constricta var. minima	A	+	+	+	+		+	
3	Cyphoderia ampulla	A						+	
4	Euglypha rotunda var. obliqua	A						+	
5	Nebela penardiana	A				+			
6	Nebela vitraea	A						+	
7	Arcella arenaria	M	+			+		+	
8	Assulina muscorum	M	+	+		+		+	
9	Centropyxis aerophila	M	+	+	+	+	+	+	+
10	Centropyxis aerophila var. sphagnicola	M	+	+	+	+	+	+	+
11	Corythion dubium var. orbicularis	M	+					+	
12	Heleopera sylvatica	M	+	+	+	+	+	+	
13	Microcorycia flava	M				+			
14	Nebela speciosa	M		+					
15	Trinema complanatum var. aerophila	M	+	+					
16	Heleopera rosea	S				+			
17	Heleopera sphagni	S	+		+		+	+	
18	Phryganella paradoxa	S			+			+	

Table 2 (continued)

No.	Name	Characteristic medium*	Litter**						
			F	FA	AF	A	AP	P	L
19	Centropyxis platystoma	AM	+		+			+	+
20	Nebela dentistoma	AM	+	+					
21	Heleopera petricola	AS	+		+		+	+	
22	Corythion pulchellum	MS				+			
23	Difflugia bryophilla	MS				+			
24	Euglypha strigosa	MS	+	+	+	+	+	+	
25	Nebela collaris	MS	+	+	+	+	+		
26	Nebela parvula	MS	+		+		+		
27	Nebela tincta	MS	+	+	+	+		+	
28	Nebela wailesi	MS	+	+	+	+	+	+	
29	Centropyxis laevigata	AMS						+	
30	Centropyxis orbicularis	AMS	+	+	+	+	+	+	+
31	Centropyxis sylvatica	AMS	+	+	+	+	+	+	+
32	Corythion dubium	AMS		+		+	+	+	+
33	Cyclopyxis arcelloides	AMS			+	+		+	
34	Difflugia lucida	AMS			+				
35	Euglypha filifera	AMS			+	+			
36	Euglypha tuberculata	AMS	+		+				
37	Trinema enchelys	AMS	+	+	+	+	+	+	+
38	Centropyxis minuta	AMT	+	+	+	+			
39	Cyclopyxis kahli	AMT	+	+	+	+		+	
40	Phryganella acropodia	AMT	+	+	+		+	+	
41	Phryganella acropodia var. penardi	AMT	+	+	+	+	+	+	
42	Euglypha denticulata	MST	+	+	+	+			
43	Euglypha rotunda	MST	+	+	+	+	+	+	+
44	Euglypha strigosa var. glabra	MST	+	+		+	+	+	
45	Nebela militaris	MST	+		+			+	+
46	Trinema complanatum	MST	+	+	+	+	+	+	+
47	Diffugiella oviformis	AMST				+		+	
48	Euglypha laevis	AMST	+	+	+	+	+	+	
49	Plagiopyxis callida	AMST	+	+	+	+	+	+	
50	Trinema lineare	AMST	+	+	+	+	+	+	+
51	Centropyxis sylvatica var. minor	ST	+	+	+	+	+	+	+
52	Plagiopyxis declivis	ST	+	+		+			
53	Bullinularia indica	MT	+			+		+	
54	Centropyxis elongata	MT			+	+		+	
55	Cyclopyxis eurystoma	MT		+	+	+		+	
56	Cyclopyxis eurystoma var. parvula	MT	+	+	+			+	
57	Euglypha laevis f. lanceolata	MT	+		+		+	+	
58	Plagiopyxis minuta	MT	+	+	+	+		+	+
59	Trigonopyxis arcula	MT			+			+	
60	Trinema galeata	MT						+	
61	Plagiopyxis penardi	AT				+			
62	Bullinularia pulchella	T						+	
63	Centropyxis cryptostoma	T			+				
64	Centropyxis plagiostoma	T	+	+	+	+		+	
65	Centropyxis plagiostoma var. terricola	T	+	+		+		+	
66	Corythion delamarei	T		+		+			
67	Corythion dubium var. terricola	T	+						
68	Cyclopyxis ambigua	T	+	+	+	+		+	
69	Cyclopyxis eurystoma var. stenostoma	T						+	
70	Cyclopyxis kahli var. cyclostoma	T	+	+		+		+	
71	Cyclopyxis pateus	T	+			+		+	

Table 2 (continued)

No.	Name	Characteristic medium*	Litter**						
			F	FA	AF	A	AP	P	L
72	Difflugiella saccifus var. penardi	T	+						
73	Euglypha anodonta	T	+	+		+			
74	Euglypha anodonta var. magna	T	+	+				+	+
75	Euglypha cuspidata	T	+	+	+	+	+	+	
76	Euglypha dolioliformis	T	+			+		+	
77	Euglypha polylepis	T	+		+	+		+	
78	Euglyphella elegans	T	+	+		+			
79	Geopyxella sylvicola	T	+	+	+	+		+	
80	Heleopera petricola var. humicola	T	+		+	+		+	
81	Heleopera sylvatica var. inflata	T				+		+	
82	Phryganella acropodia var. penardi f. alta	T						+	
83	Plagiopyxis callida var. grandis	T	+		+				+
84	Plagiopyxis callida var. pusilla	T	+	+		+		+	
85	Plagiopyxis intermedia	T		+		+		+	
86	Plagiopyxis minuta var. oblonga	T	+	+	+	+			
87	Plagiopyxis oblonga	T	+	+	+			+	
88	Pseudodifflugia gracilis var. terricola	T	+		+			+	
89	Pseudawerintzewia calcicola	T			+			+	
90	Schwabia terricola	T	+		+	+		+	
91	Schwabia terricola var. thomasi	T			+	+		+	+
92	Tracheleuglypha acolla	T	+	+	+	+	+	+	+
93	Tracheleuglypha acolla var. stenostoma	T	+					+	

* A — Aquatic. M — Muscicolous. S — Sphagnicolous. T — Terricolous.
** F — Fagetum. FA — Fageto-Abietum. AF — Abieto-Fagetum. A — Abietum. AP — Abieto-Piceetum. P — Piceetum. L — Laricetum.

Table 3

Number of the testacean systematic units in different litters in dependence on their characteristic media

Characteristic medium* of Testacea	Number of the testacean systematic units							
	Litter**							
	Total	F	FA	AF	A	AP	P	L
A	6	1	1	1	2	—	4	—
M	9	7	6	3	6	3	6	2
S	3	1	—	2	1	1	2	—
AM	2	2	1	1	—	—	—	1
AS	1	1	—	1	—	1	1	—
MS	7	5	4	5	6	4	3	—
AMS	9	4	4	7	6	4	6	4
Total	37	21	16	20	21	13	22	7
AMT	4	4	4	4	3	2	3	—
MST	5	5	4	4	4	4	3	2
AMST	4	3	3	3	4	3	4	1
ST	2	2	2	1	2	1	1	1
MT	8	4	3	6	4	1	8	1
AT	1	—	—	—	1	—	—	—
Total	24	18	16	18	18	11	19	5
T Total	32	23	15	15	20	2	24	3
TOTAL	93	62	47	53	59	26	65	15

*** For explanation of the abbreviations see the footnote to Table 2.

We think that the differentiation of the testacean microfaune, from a litter type to another, is due to the chemical composition of litters (which is influenced by the nature of the lithological substratum and by the stage of their mineralization), to warmth deficit, dryness etc.

Conclusions. In the forest litters of the Bucegi Mountains a rich and varied fauna of *Testacea* was identified.

The pure beech, fir and spruce litters are richer in systematic units of *Testacea* than the litter of the mixed forests *(Fageto-Abietum, Abieto-Fagetum, Abieto-Piceetum).*

The highest number of testacean systematic units was found in the spruce litter. This can be explained by the preference of these populations for media with acid pH.

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TESTACEELE *(PROTOZOA: RHIZOPODA TESTACEA)* DIN LITIERA PĂDURILOR MUNȚILOR BUCEGI (ROMÂNIA)

(Rezumat)

În litiera pădurilor din Munții Bucegi a fost identificată o faună bogată și variată de Testacee.

Litierele de făgete, brădete și molidișuri pure sînt mai bogate în unități sistematice de Testacee decît litierele pădurilor de amestec *(Fageto-Abietum, Abieto-Fagetum, Abieto-Piceetum).*

Litiera de molidișuri cuprinde cel mai mare număr de unități sistematice de Testacee, aspect explicabil prin preferințele acestora pentru mediile cu reacție (pH) cît mai acidă.

STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXX, 1985

TESTING OF COMPOSTS BY USING EARTHWORMS

VICTOR V. POP

The contemporary agriculture uses to a large extent new mineral and organic fertilizers, among which the composts of different organic wastes occupy an important place. The aim of the composting is to obtain organic manures compatible with soil life, having properties close to those of the „classical" natural organic manures such as rotted farmyard manure or old manure.

As the wastes originate from very different sources and the composting methods are also different (most of them do not use earthworms as composting agents), one can presume that the various composts should have different biological qualities. Some composts, especially those obtained from unconventional wastes such as garbage, sludges from biogas production, pig manure sludges from large animal-breeding farms may be of a poor quality or inadequate for agricultural use.

The testing of quality and agricultural efficiency of the composts is usually performed through lengthy laboratory and field experiments. It would be an economy of time and money to know rapidly the suitability of a composted waste to be applied in agriculture.

The paper presents a rapid test of those composts processed without earthworms.

The earthworms are considered the main incorporators of the organic residues into the soil and important agents creating favourable aero-hydro-thermo-trophic conditions for the development of decomposing and humus-forming microorganisms in soil. The mechanical and chemical effect of the activity of earthworms situates them on a very important place in the trophic chain of matter recycling in the ecosystem, between the group of primary producers (green plants) and the decomposers (microorganisms).

In farming lands, the long-term management practices and fertilization brought about the impoverishment of Lumbricidae fauna as compared to that of natural ecosystems. Here, a part of the earthworm activity, namely the incorporation of the organic residues into the soil, is partially substituted by ploughing. Nevertheless, the role of earthworms remains important in the intimate mixing of the organic and mineral materials in soil as well as in creating complexes available as food for the small soil-inhabiting organisms, in starting the recycling of matter in the agroecosystem.

The trophic chain allowing the release of nutrients for higher plants is, in fact, a chain providing food for a multitude of primary and secondary consumers as well as for the decomposers. This explains the first requirement for a good compost, namely to be accepted as food,

to be easily and preferably consumed, i.e. to be palatable for a wide range of edaphic invertebrates.

Taking into account that the first consumer of the organic residues at the soil surface is represented by the group of earthworms, we must admit that a compost with satisfactory biological qualities is accepted by earthworms as food which proves the biodegradation of the compost and its integration into the trophic circuit of soil. Otherwise the product would be left at the soil surface or among the clods of the furrows and the release of nutrients would be much slowed down.

Based on these reasons, we suggest that a compost processed for use as agricultural fertilizer should be also tested from the point of view of its palatability for earthworms.

The quality of the compost is estimated by the speed and degree of its incorporation into the soil by the earthworms. If they accept and burry it into the soil, the compost should be considered good for field crops. If the compost is not consumed by the earthworms, this indicates, probably, some shortcomings in its processing.

Material and Methods. The test may be quite simple or more sophisticated, according to the researcher's aim. Therefore, a dozen earthworms placed in a wooden box containing soil and a 1—2-cm thick layer of compost should answer the question. However, for scientific investigations elaborated experiments should be designed.

The experimental cages must assure a vital space corresponding to the size and number of individuals from a determined earthworm species.

There are different types of culture vessels for earthworms. In laboratory experiments on earthworm nutrition, different models of glass terraria were used [2, 4, 7]. In field experiments, G r a f f 's frame method [3] seems to be more adequate.

For our purpose, the most convenient cages are those with removable glass walls, which allow the morphological study of the soil profile and of the covering compost layer. Such cages were used by J e a n s o n [4] for studying the effects of earthworms on the soil. But to avoid the margin effect, we used wider cages (Fig. 1) of two types:

— cylindrical glass cages of 25 cm height, with a diameter of 11.5 cm (104 cm^2 surface, approximately half-filled with soil);

— parallelepipedic cages with sheets of glass and plexiglass walls in two variants. For large earthworms the sizes of the cages are: 25×25×7 cm (a surface of 160 cm^2, 2/3 filled with about 3.75 kg soil). For small earthworms, the terraria are of 25×25×5 cm (a surface of 115 cm^2, 2/3 filled with about 2.75 kg soil). The larger walls are of 0,3 cm thin sheets of glass; the smaller side walls are of 1 cm thick plexiglass. The assembling was performed by aid of rubber rings (1 cm wide rings, cut from tires).

Both the cylindrical and parallelepipedic cages have bottoms made of plastic net with meshes of about 0.1 cm. A similar net covers the cages to prevent the escaping of the earthworms.

The soil is passed through a 0.2-cm sieve. The thickness of the compost layer is established in accordance to the dose recommended for the surface unity, usually 1—2-cm.

The soil in cages is moistened up to saturation through capillarity. The cages are put in plastic trays containing an approximately 1—2-cm water layer.

Taking into account the negative phototropism of the earthworms, the test is set up in a dark room. The best results were obtained when the experiment was carried out in a cellar, where the darkness, temperature and humidity were rather constant and close to the conditions in the natural soil.

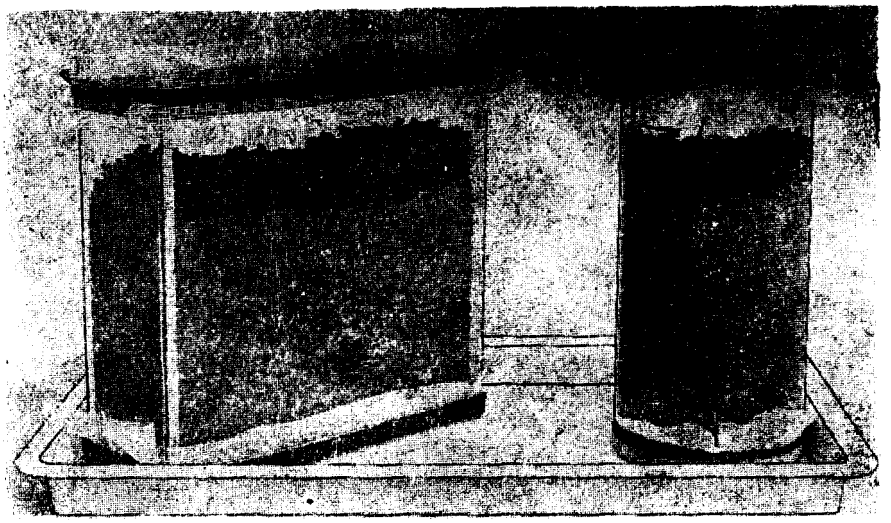

Fig. 1. *Cages for studying compost palatability for earthworms.*

The earthworm species used for the test are preferably those inhabiting the soils of the zone where the compost will de applied.

As a general rule, an experiment on the compost quality testing should be carried out with more species of earthworms, belonging to three ecological types, named after Bouché [1] as follows:

— epiendogeic species (generally red or reddish earthworms living in the upper layers of soil) such as the Lumbricidae *Dendrobaena rubida, Lumbricus rubellus, Allolobophora caliginosa, A. rosea;*

— endogeic species (generally gray or whitish worms inhabiting deeper soil horizons) such as *Allolobophora dugesi, A. leoni, Octolasium lacteum, Octodrilus eracystis, O. gradinescui;*

— vertically migrating earthworms such as *Lumbricus terrestris.*

The experimental earthworms are sampled either by digging and hand sorting or with formalin [6]. An earthworm-breeding farm, with well determined species at hand all over the year, would provide the best zoological material. On what concerns the breeding methods, a good synthesis is presented by Minnich [5].

The number of individuals for each cage is established in dependence on their size and on the size of compost particles. Good results were obtained with 5—7 large individuals per cage, and with 10—15 small worms per cage.

The testing time is about 2—3 weeks, usually not longer than 4 weeks.

Results. The quality of the tested compost is evaluated by the morphological study of the traces of earthworm activity in the soil and compost layer in terraria and, if so, also by establishing the mortality rate of the test species.

The soil and compost morphology comprises, according to Jeanson's terminology: 1. the *surface morphology* (the surface aspect of soil and compost, the quantity and kind of wormcasts); 2. the *peripheral morphology* (the aspect of the soil profile as seen through the glass wall, allowing the study of the changes in the thickness of compost layer, the quantity and aspect of burrows) and 3. the *inner morphology* (showing the

degree of the incorporation of compost into the soil and the intensity of the activity of earthworms).

For exemplification we present in Fig. 2 the images of surface, peripheral and inner morphologies obtained in an experiment for testing

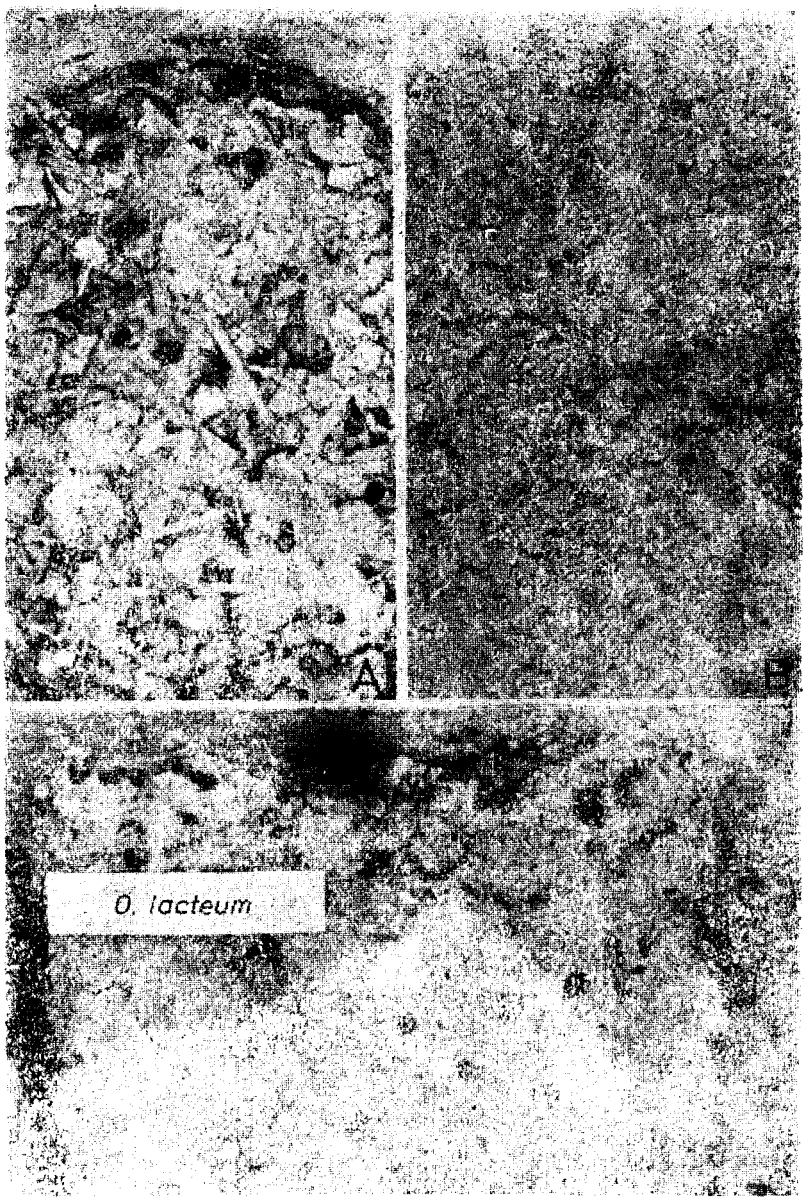

Fig. 2. *Incorporation of a pig sludge compost into the soil by* **Octolasium lacteum.** A — Surface morphology. B — Peripheral morphology. C — Inner morphology.

of a pig sludge compost. They obviously demonstrate that this compost is accepted as food by the lumbricids, it is well incorporated into the soil, so that we appreciate that it is of a high quality and integrable into the normal circuit of matter in agroecosystems with soil and lumbricid fauna similar to the experimented ones.

Conclusion. An earthworm test was worked out which allows the rapid estimation of the biological qualities of the composts to be used for manuring soils.

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TESTAREA COMPOSTURILOR CU AJUTORUL RÎMELOR

(Rezumat)

Se prezintă o metodă rapidă de testare a calităților biologice ale composturilor destinate fertilizării solurilor agricole. Se apreciază că un compost este potrivit ca îngrășămînt organic dacă este acceptat ca hrană și înglobat în sol de către rîme. În esență este un test de palatabilitate a compostului pentru rîme. Avînd în vedere că rîmele sînt principalii consumatori secundari și incorporatori în sol ai resturilor organice, avem dovada integrabilității compostului în circuitul de eliberare în sol a nutrienților plantelor superioare. Refuzarea lui de către rîme indică un compost cu calități biologice nesatisfăcătoare uzului agricol, datorate, probabil, unei tehnici de compostare neadecvate sau, eventual, prezenței unor substanțe nocive incompatibile cu viața solului.

Se discută premisele pedobiologice, se descrie metoda cu indicarea speciilor de lumbricide potrivite, cît și modul de interpretare a rezultatelor.

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DIPLOPODES NOUVEAUX DANS LA FAUNE DE LA ROUMANIE *(DIPLOPODA — ASCOSPERMOPHORA)*

TRAIAN CEUCA

Dans ce qui suit sont presentées trois nouvelles espèces des diplopodes de la faune de la Roumanie, dont l'une représente un sous-genre nouveau: toutes ces formes sont aussi nouvelles pour la science.

Fam. **Pseudocleididae**
Sous-genre **Moldavobielzia** n. sg.

C'est une forme bien distincte de genre (sous-genre) *Entomobielzia* décrit par V e r h o e f f in 1897 [7] et qui comprend jusqu'à présent deux espèces [2], celle que nous décrivons ici en étant la troisième. Le nouveau sous-genre peut être caractérisé par: le corps à 28 segments, de couleur café-au-lait avec des taches marbrées. Les gonopodes antérieurs ont les télopodites du syncoxite graciles et un peu dans la partie postérieure courbés. Les chéiroïdes de la partie distale des télopodites sont rudimentaires à peine esqissés, mais la plaque postérieure a seulement deux apophyses, qui sont restées dans le même plan. Les gonopodes postérieurs sont comme d'habitude.

Entomobielzia (Moldavobielzia) varvarai n.sp.

Longueur = 8 mm; largeur = 1 mm. Le corps avec 28 segments, de couleur café-au-lait avec des taches marbrées, a les expansions latérales des métazonites peu marqées. Les ocelles sont situés, comme d'habitude, de chaque côté de la tête, occupant une surface triangulaire en rangées de 5—4—2—1. Les antennes sont longues et grêles, ayant les segments 3 et 5 les plus longs. Le bouclier cervical est plus étroit que la tête, mais les segments suivants 2—6 sont de plus en plus larges, jusqu'aux dimensions normales du corps.

Chez le mâle, à partir de la 3-ème paire et jusqu'à la 7-ème paire, les pattes sont évidemment plus grosses, mais non modifiées. La huitième et la neuvième paires de pattes ont des sachets coxaux évidents; la neuvième a aussi une paire de petites cornes courbées dans la partie médiale.

Les gonopodes antérieurs se caractérisent par deux coxites, bien délimités antérieurement, mais soudés dans leur région proximale (syncoxite), où ils ne s'écartent qu'en apparence, en laissant entre eux une excavation cordiforme (renversée). Leur base externe proémine latéralement, ayant dans cette zone un groupe de 4—6 settes sensitives. La partie distale des télopodites courbée postérieurement a en sens médio-distal un court éperon aiguillé, qui représente, probablement, un rest du chéiroïde; ensuite, en position sous-terminale, sur sa face postéro-externe, se trouve une zone ovale papillaire-poilue, précédée d'une lame aiguë fine. La plaque postérieure des gonopodes est sudée sur presque toute

sa longueur avec la face postérieure du syncoxite. Cette plaque, rélativement épaisse, a une forme à peu près rectangulaire, étant pourvu de deux paires d'apophyses: la paire distale se présente comme deux lobes qui dépassent latéralement les portions distales des télopodites, y imprimant à cette plaque un aspect bilobé; la deuxième paire d'apophyses est courte, en forme d'éperons latéraux, situés immédiatement sous les deux lobes qui représentent la première paire d'apophyses (Fig. 1.).

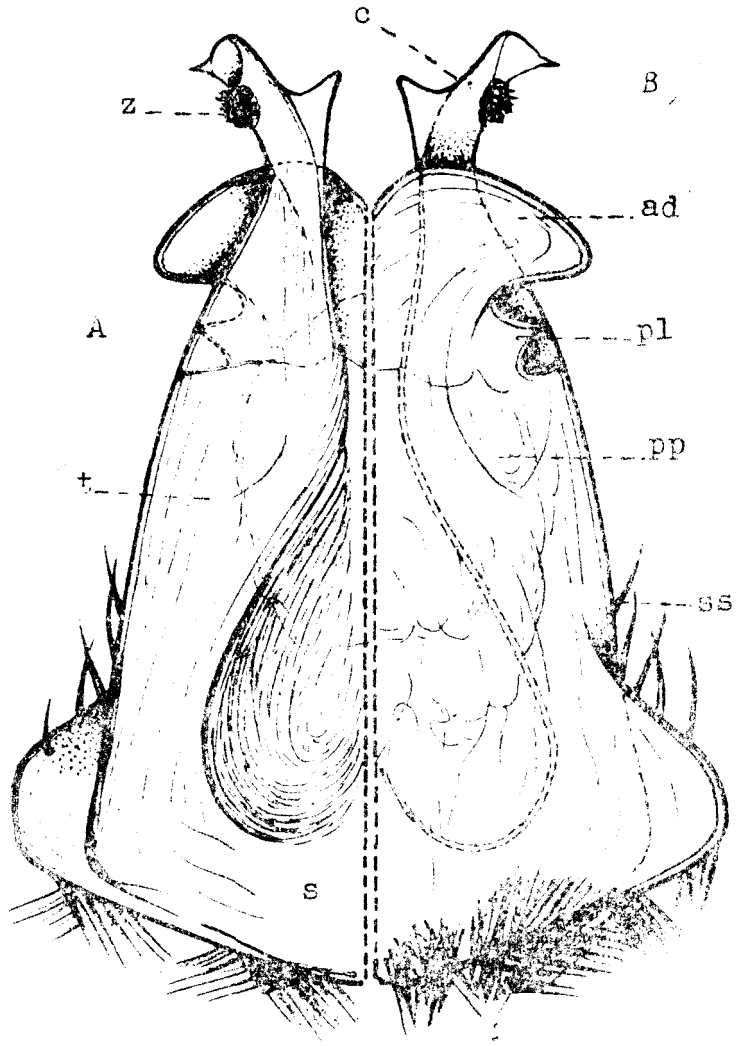

Fig. 1. **Entomobielzia (M). varvaral** *n. sp. A — Le gonopode antérieur gauche, vu antérieurement. B — Le même gonopode vu postérieurement. c* — Chéiroïde. *z* — Zone ovale. *ad* — Apophyse distale. *pl* — Éperon latéral. *t* — Télopodite. *pp* — Plaque postérieure. *ss* — Settes sensitives. *s* — Syncoxite.

Les gonopodes postérieurs ont une constitution très simple, comme d'habitude chez cette famille; ils sont très semblables aux pattes ambulatoires, étant formés de cinq articles, dont les deux premiers sont très allongés, tandis que les autres sont courts et courbés comme un crochet. Sur la face médiale du premier segment (coxe) de ces pattes il y a un long éperon, à extrémité rugueuse (Fig. 2).

Provenance: 30 ♂♂ + 16 ♀♀ et 2 juv. ont été collectés, par Mircea Varvara dans la forêt de Slătioara, située au nord de notre pays. Cette espèce montagnarde préfère la litière des bois de conifères et des forêts à feuilles caduques, parfois mélangées avec du gravier.

Moldavobielzia étant le deuxième sous-genre du genre *Entomobielzia*, nous donnons une courte comparaison entre ceux-ci:

Entomobielzia	*Moldavobielzia*
— les chéiroïdes des télopodites des gonopodes antérieurs sont bien développés;	— les chéiroïdes des télopodites des gonopodes antérieurs ne sont représentés que par des rudiments;
— la plaque postérieure des gonopodes antérieurs est pourvue de 4 ou 3 paires d'apophyses, dont quelques unes sont toujours courbées antérieurement et passent entre et à côté des télopodites.	— la plaque postérieure des gonopodes antérieurs n'est pourvue que de 2 paires d'apophyses — une très réduite — restées dans le même plan, ne dépassant pas antérieurement les télopodites.

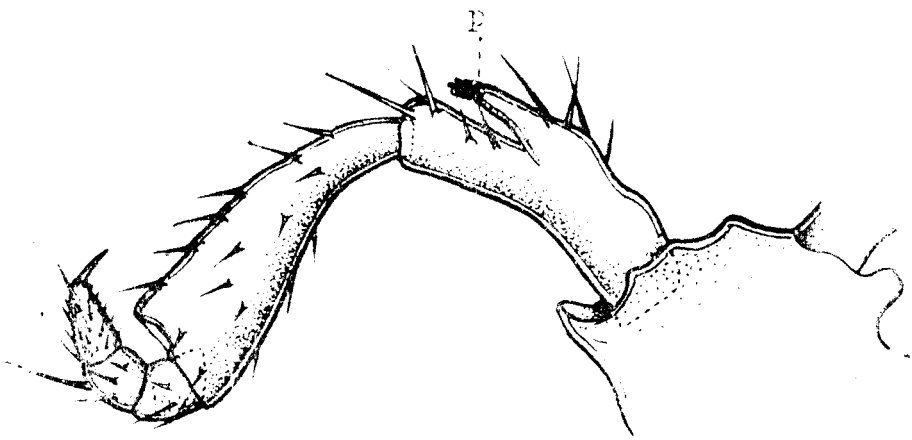

Fig. 2. **Entomobielzia (M.) varvarai** *n. sp. Le gonopode postérieur, vu postérieurement.* *p* — Éperon.

Fam. **Mastigophorophyllidae** [1, 4, 5]

Mastigophorophyllon (Pa.) aberratum n.sp.

Longueur = 20 mm; largeur = 2 mm. Les 30 segments du corps ont la couleur brun-clair, avec des taches marbrées sur les côtes. L'espace entre les deux champs océllaires a un aspect plus clair. Les antennes sont grêles, avec les articles 3 et 5 les plus longs. Les ocelles, en nombre de 19 sont situés sur une surface triangulaire, de chaque côté de la tête. Le bouclier cervical est plus étroit que la tête, ayant la bordure antérieure convexe. Les expansions latérales des métazonites sont évidentes; les trois paires de macrochètes qu'elles portent sont longues, étant situées comme il suit: la plus externe se trouve sur le bord postérieur de l'expansion latérale, la suivante est située un peu plus en avant et vers l'intérieur, tandis que la troisième est fixée à la moitié de la distance d'entre la deuxième et la ligne médiane dorsale du corps. Sur les dernières métazonites, où les expansions latérales sont effacées, toutes les trois paires de macrochètes apparaissent sur la même ligne et sont un peu plus longues que celles de la partie antérieure du corps. Les clapets anaux ont sur les bords médiaux trois longues settes et le bouclier sousanal a lui aussi deux settes. Les deux filières sont, bien entendu, présentes sous la petite queue du telson.

Chez le mâle, les paires 3—7 de pattes sont, comme d'habitude, plus épaisses; les paires 3—4 ont le dernier article tarsal court et gros, tandis que chez les paires 5, 6 et 7 celui-ci est long et grêle. Comme d'habitude la huitième et la neuvième paire de pattes ont des sachets coxaux (la neuvième a aussi une paire de petites cornes coxales).

Les gonopodes antérieurs (Fig. 3—4) ont, comme d'habitude, les télopodites larges, mais la partie distale de ceux-ci est particulièrement atténuée: leurs pointes sont courbées postérieurement, tant au dessus qu'au dessous existant un fort éperon, avec le sommet dirigé vers l'extérieur (les inférieures pourraient être les extrémites des pseudoflagelles cachés), si habituel chez ce genre. À la moitié du bord médial de chaque télopodite se trouve une „épaule" qui n'existe pour aucune des autres espèces du genre. Les rameaux plumeux situés sur les parties postérieures des télopodites sont représentés ici seulement par l'axe (le rahis) bien développé, au moins aussi gros que les pseudoflagelles cachés, mais sans ramifications latérales, tel qu'il apparait chez toutes les espèces du sous-genre *Paramastigophorophyllon.*

Un autre caractère particulier est le fait que, à la place des lobules médiaux des télopodites, toujours présents chez ce genre, existent des formations fines, hyalines et frangées dont la forme en pinceau est assez difficile à observer d'autant plus que juste au dessous d'elles se continuent les excroissances très ramifiées — extraordinairement developpées ici — situées sur la partie proximale antérieure des télopodites. Les pseudoflagelles libres sont, comme d'habitude, courts. Les éperons coxaux des faces postérieures, sont ici absents.

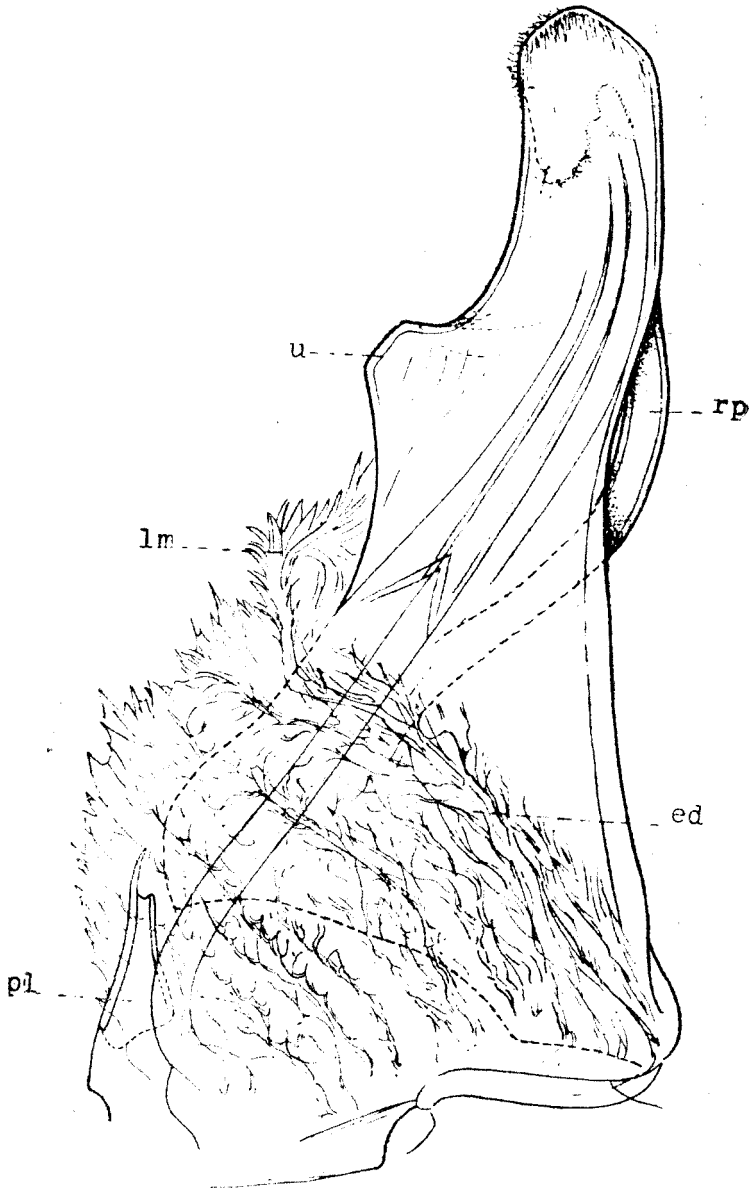

Fig. 3. Mastigophorophyllon (P.) aberratum *n. sp. Le gonopode antérieur droit, vu antérieurement.*

pl — Pseudoflagelle libre. *ed* — Excrescences dendriformes. *lm* — Lobe médial. *rp* — Rameau plumeux. *u* — „Épaule".

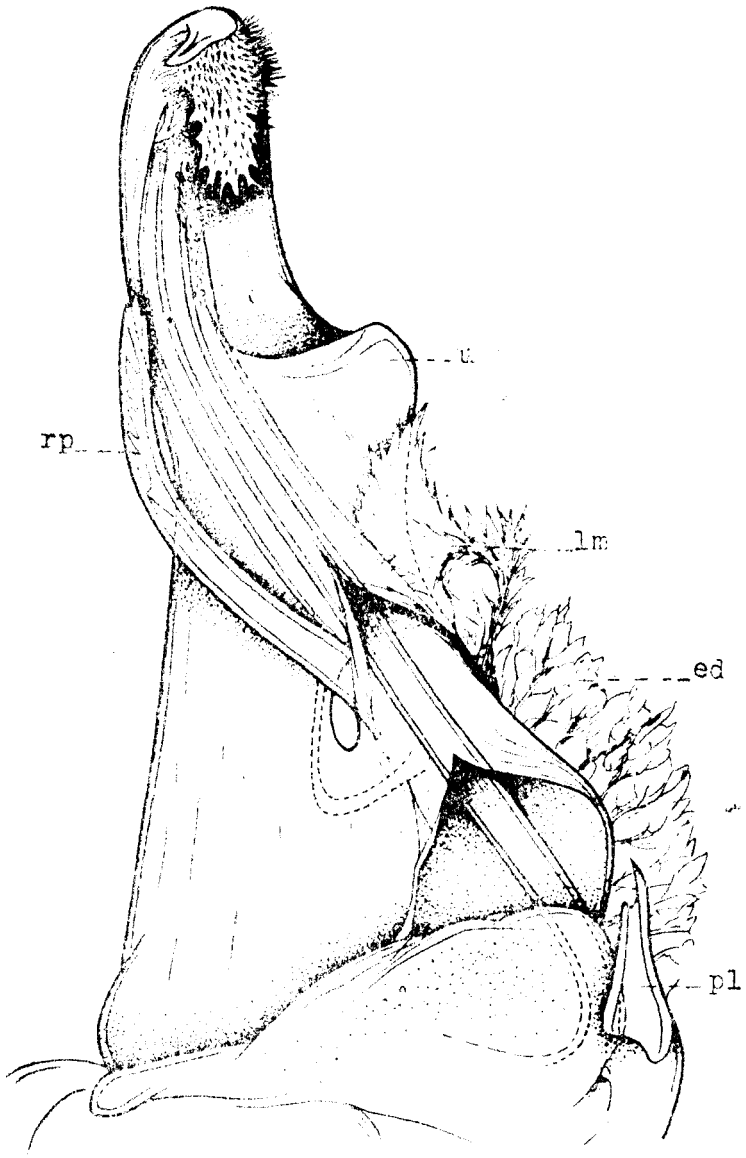

Fig. 4. **Mastigophorophyllon (P.) aberratum** *n. sp. Le gonopode antérieur droit, vu postérieurement.*
Explications comme chez la Fig. 3.

Les gonopodes postérieurs (Fig. 5—6) sont plus courts que les antérieurs. Les rameaux externes sont gros, relativement longs et courbés en sens médial, étant pourvus dans leur tiers distal de bâtonnets dont un est plus fort, plus long et courbé; tous ces bâtonnets sont situés

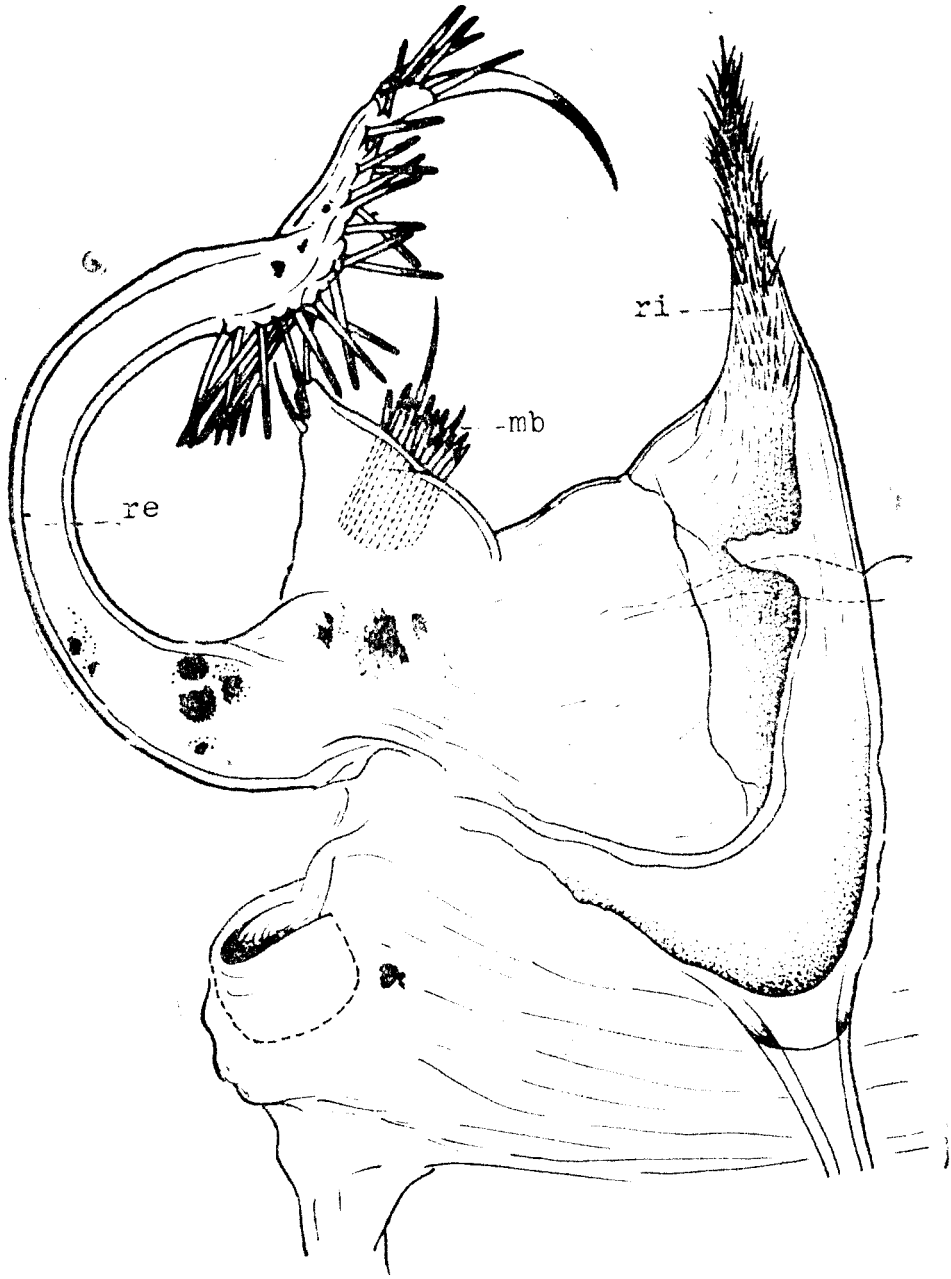

Fig. 5. **Mastigophorophyllon (P.) aberratum** *n. sp. Le gonopode postérieur gauche, vu antérieurement.*

re — Rameau externe. *ri* — Rameau interne. *mb* — Touffe de bâtonnets.

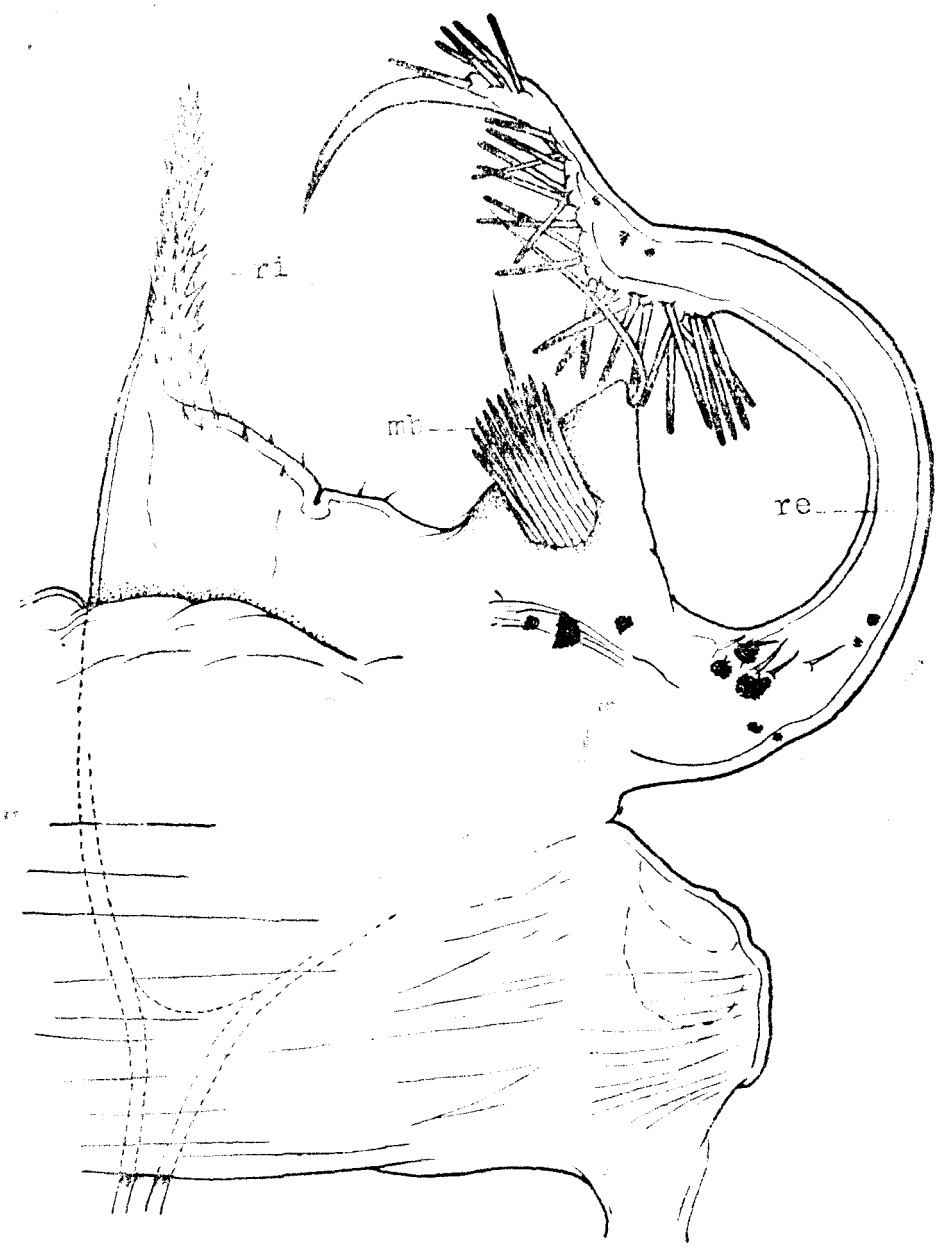

Fig. 6. **Mastigophorophyllon (P.) aberratum** *n. sp. Le gonopode postérieur gauche, vu postérieurement.*

Explications comme chez la Fig. 5.

seulement sur les faces médiales. Les rameaux internes sont simples, droits et poilus, ayant à la base, sur les bords antérieurs médiaux un large éperon horizontal, orienté vers l'extérieur. Entre ces rameaux, plus proche de celui externe, proémine une formation conique pourvue sur sa face postérieure d'un „bouquet" des bâtonnets disposés obliquement, dont un est plus grêle. De même toujours sur cette proéminence, il y a un seul bâtonnet grêle, courbé médialement, à origine sous apical externe.

La femelle est de couleur évidemment plus sombre que le mâle. Parmi toutes les espèces du genre *Mastigophorophyllon*, celle avec la quelle *M. aberratum* a plus d'affinité est peut-être *M. penicilligerum* [3], une autre espèce endémique chez nous (monts de Rodna), qui a elle aussi les télopodites des gonopodes antérieurs beaucoup rétrécis distalement et les rameaux plumeux sont gros et avec de très courts rameaux latéraux De même, les formations fines, à aspect de rameaux de la base des faces antérieures des télopodites gonopodiaux antérieurs, sont ici aussi développées. Relativement, aux télopodites des gonopodes postérieurs, chez *M. penicilligerum* également les rameaux externes sont longs, étant pourvus eux aussi de nombreuses épines dans leur tiers distal; ici aussi les rameaux internes sont effilés et poilus sur leurs bords médiaux. Mais la nouvelle espèce se distingue nettement de toutes les autres espèces du genre par l'aspect spécifique des gonopodes, tant antérieurs que postérieurs; par l'existence des mêmes „épaules" sur les bords internes des télopodites gonopodiaux antérieurs et par le „remplacement" des lobules médiaux de ces télopodites (qui sont présents chez toutes les espèces du genre) par des formations fines en forme de pinceau à contour difficile à observer, raison pour laquelle l'espèce a été nommée *aberratum*.

Provenance: Deux exemplaires (1 ♂ + 1 ♀) ont été collectés du feuillage de la lisière d'une forêt de conifères, proche de l'entrée de la grotte de Tăușoare, située au nord du village de Parva, district de Bistrița-Năsăud. La récolte a été faite par deux étudiantes en biologie: M. Cristian et E. Rușdea, le 7-X-1979.

Karpatophyllon carpaticum n.sp.

Longueur = 19—21 mm; largeur = 2 mm. La couleur du corps est brune marbrée, brillante. Les antennes sont grêles, avec les segments 3 et 5 les plus longs. Les ocelles occupent, comme d'habitude, les mêmes champs triangulaires des côtes de la tête. Les expansions latérales des métazonites sont faiblement développées, mais évidentes; les trois paires de macrochètes qu'elles portent sont relativement grêles. Chez le mâle, le front est applatisé. Les pattes, à partir de la deuxième jusqu'à la septième paire, sont évidemment plus grosses que celle qui suivent.

Les gonopodes antérieurs (Fig. 7) ont les coxites courts et modifiés. Les télopodites allongés et larges ont les pointes bien courbées postérieurement. Sur les faces antérieures, dans leurs moitiés médio-basales, existent les rangées de soies hyalines ramifiées, qui sont présentes chez d'autres espèces aussi. Sur les faces postérieures de ces gonopodes sont

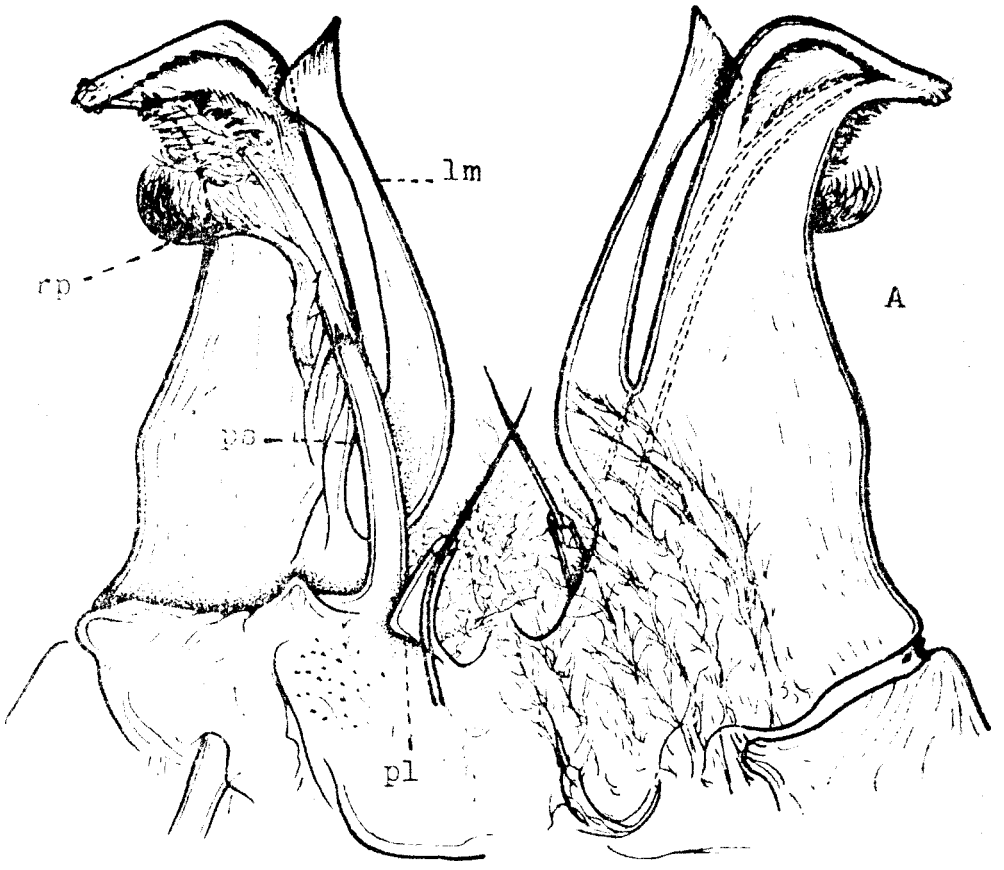

Fig. 7. **Karpatophyllon carpaticum** *n. sp. A — Le gonopode antérieur droit, vu antérieurement. B — Le même gonopode vu postérieurement. lm* — Lobe médial. *rp* — Rameau plumeux. *ps* — Pseudoflagelle caché. *pl* — Pseudoflagelle libre.

présents les éperons coxaux, peu évidents. Dans la même region, mais en position médiale, on peut observer les pseudoflagelles libres, courts; ceux cachés sont situés dans leurs gouttières seminales qui traversent les télopodites gonopodiaux en sens distal, jusque près de leurs pointes. Les rameaux plumeux ont les „axes" gros dans leur moitié basale. Ils se détachent latéralement des télopodites gonopodiaux, ayant leur moitié distale très ramifiée, comme une touffe, mais seulement distalement. Les apophyses médiales des télopodites (les lobes médiaux) sont longues et faiblement courbées dans leur moitié terminale, avec les pointes évidemment élargies à aspect de lame de hache.

Les gonopodes postérieurs (Fig. 8) ont les télopodites courts, ovales pourvus d'un rameau médial à pointe faiblement courbée et d'un rameau externe, large, disposé obliquement et peu courbé vers l'intérieur. Sur

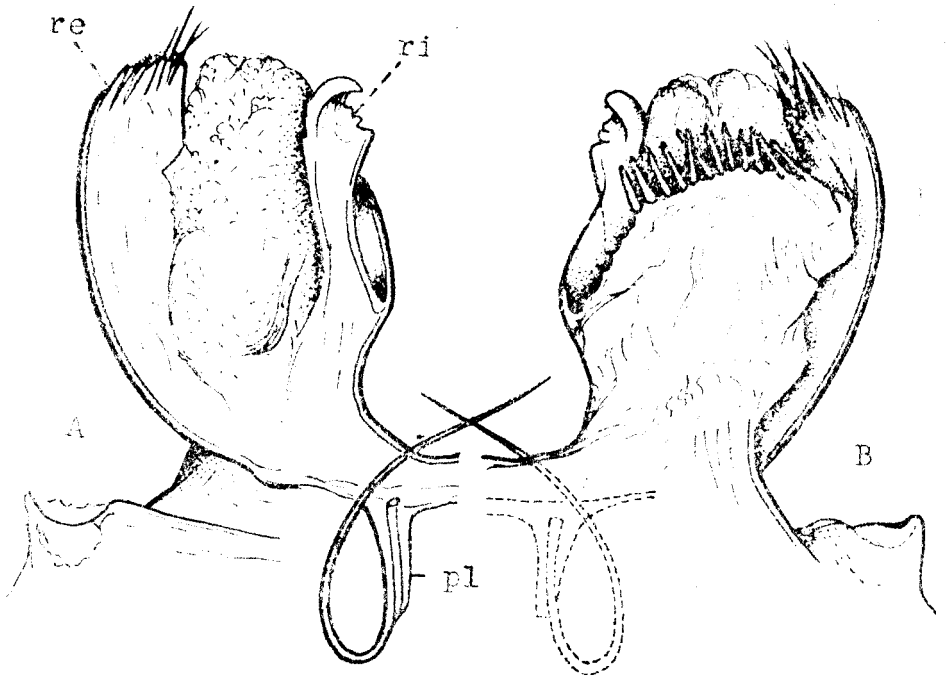

Fig. 8. **Karpatophyllon carpaticum** *n. sp. A — Le gonopode postérieur gauche, vu antérieurement. B — Le même gonopode vu postérieurement. re* — Rameau externe. *ri* — Rameau interne. *pl* — Pseudoflagelle libre.

les pointes de ces rameaux externes, ainsi que sur leurs faces postérieures il y a quelques settes grêles. Sur les faces postérieures de ces gonopodes, entre leurs rameaux disposés transversalement comme les dents d'une peigne se trouve une rangée d'épines relativement courtes et grosses. Sur la face antérieure du syncoxite gonopodial on peut observer les pseudoflagelles libres, bien développés.

La femelle a, comme d'habitude, la deuxième paire des pattes très reduite, sur les coxites étant représenté un rest du télopodite formé seulement d'un petit article.

Provenance: ont été collectés 3 ♂♂ et 4 ♀♀ par Radu Călăuz en juillet—octobre 1979, dans une forêt de Buteasa située au nord de notre pays, près de la ville Şomcuta-Mare, district de Maramureş. L'altitude est basse, d'approximative 500 m.

La nouvelle espèce *K. carpaticum*, la troisième du genre, endémique dans les Carpates, s'approche, par son aspect morphologique mais surtout par la conformation des gonopodes, bien plus de *K. dacicus* [2] des Monts Apuseni, que de *K. polinskii* [6], qoique géographiquement, est plus voisine de cette dernière.

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DIPLOPODE NOI ÎN FAUNA ROMÂNIEI

(Rezumat)

Cele trei specii noi sînt: *Entomobielzia (Moldavobielzia) varvarai*, care reprezintă şi un subgen nou, este caracterizată prin conformaţia gonopodelor anterioare care nu au decît rudimente de cheiroide şi prin placa posterioară care nu are decît două apofize. Este răspîndită în pădurea Slătioara din nordul ţării.

A doua specie este *Mastigophorophyllon (Paramastigophorophyllon) aberratum*, numit astfel pentru că gonopodele anterioare au pe telopodite nişte „epoleţi", iar lobii mediali au o formă de pensulă; ramurile plumoase nu au „barbe" fiind prezent numai „rahisul". Aceste caractere nu se întîlnesc la celelalte specii ale subgenului. Şi aceasta este răspîndită în nordul României.

A treia specie este *Karpatophyllon carpaticum*, ce se caracterizează prin vîrfurile telopoditelor gonopodelor anterioare lăţite şi îndoite posterior, iar ramurile plumoase ale acestora sînt groase, în jumătatea lor bazală, iar distal se desprind lateral, ramificîndu-se ca un smoc. Apofizele mediale au vîrfurile lăţite ca o lamă de topor. Şi această specie este răspîndită în pădurile de fag (Buteasa) de lîngă Şomcuta-Mare.

STUDIUL ECOLOGIC AL POPULAŢIEI DE CHILOPODE *(CHILOPODA)* DIN PĂDUREA CODRIŞOR-BISTRIŢA, JUDEŢUL BISTRIŢA-NĂSĂUD

ZACHIU MATIC şi ALEXANDRU HODOROGA

Pădurea Codrişor este situată în S-E muncipiului Bistriţa, la o altitudine de 360—500 m, avînd aspectul unei păduri degradate. Vegetaţia este reprezentată de un gorunet cu floră de mull. Litiera prezintă o acoperire de 100%, cu grosimea variind între 0,5—3 cm. Solul este brun gălbui, slab podzolit cu textură nisipo-lutoasă, pH = 5. În ceea ce priveşte regimul termic, media anuală este de 8,5°C; cantităţile de precipitaţii variază în jur de 600—650 mm.

Metoda de lucru. Pentru colectare s-au folosit capcanele Barber, borcane cu o înălţime de 12 cm şi o deschidere de 5,5 mm. Acestea au fost instalate în 9 staţii amplasate perpendicular pe liziera pădurii la o distanţă de 10 m una de cealaltă, astfel că între prima capcană şi ultima a existat o distanţă de cca 70 m şi o diferenţă de nivel de 20—25 m.

Cercetarea a durat doi ani (mai 1980—aprilie 1982). Colectarea indivizilor căzuţi în capcane s-a făcut lunar.

Rezultate şi discuţii. În cei doi ani au fost capturaţi un număr de 246 indivizi (tabel 1) care aparţin la 3 familii *(Geophilidae, Cryptopidae, Lithobiidae)*, 6 genuri şi 13 specii [1, 2].

Tabel 1

Lista speciilor identificate

Specia	Abundenţa			Total	Densitatea (%)	Element zoogeografic
Clinopodes flavidus C. Koch	3	1	—	4	1,63	palearctic
Strigamia crassipes C. Koch	2	7	—	9	3,66	,,
Strigamia acuminata (Leach)	11	32	—	43	17,48	,,
Cryptops hortensis Leach	—	1	—	1	0,41	european
Harpolithobius anodus (Latz.)	—	1	—	1	0,41	central — european
Lithobius matici Prun	1	1	—	2	0,81	endemic
Lithobius forficatus (L.)	39	54	1	94	38,21	palearctic
Lithobius melanops Newp.	2	4	—	6	2,44	european
Lithobius dentatus C. Koch	2	2	—	4	1,63	central — european
Lithobius mutabilis C. Koch	17	34	3	54	21,95	european
Lithobius muticus C. Koch	6	7	—	13	5,28	central — european
Monotarsobius aeruginosus C. Koch	1	1	—	2	0,81	,,
Monotarsobius burzenlandicus Verh.	10	2	1	13	5,28	carpatic

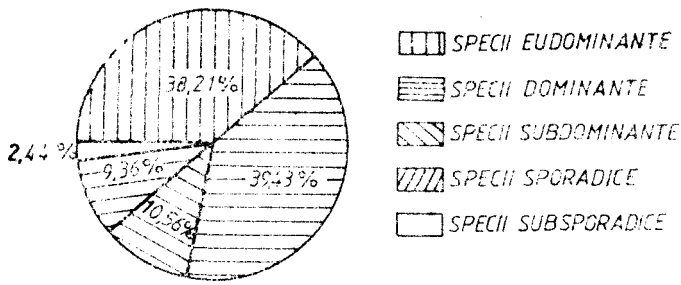

Fig. 1. *Ciclograma dominanței speciilor de chilopode.*

În aprecierea mărimii dominanței s-au folosit categoriile de dominanță propuse de Haydemann [3]. Se constată că în populația de chilopode o singură specie este eudominantă (*Lithobius forficatus*, 38,21%) și numai două specii sînt dominante (*Lithobius mutabilis*, 21,95% și *Strigamia acuminata*, 17,48%); celelalte specii sînt subdominante, sporadice și subsporadice (fig. 1).

Conform principiului lui Thiehnemann, pădurea cercetată prezintă diversitate ecologică mică, dar oferă condiții favorabile pentru un număr mare de indivizi carnivori în exclusivitate (fig. 2).

În ceea ce privește dinamica populațiilor de chilopode, ea prezintă variații în funcție de factorii abiotici, de fluctuațiile acestora și de ciclul biologic al fiecărei specii. Cu excepția lunii ianuarie, în toate celelalte luni ale celor doi ani s-au colectat indivizi din diverse specii. Cel mai

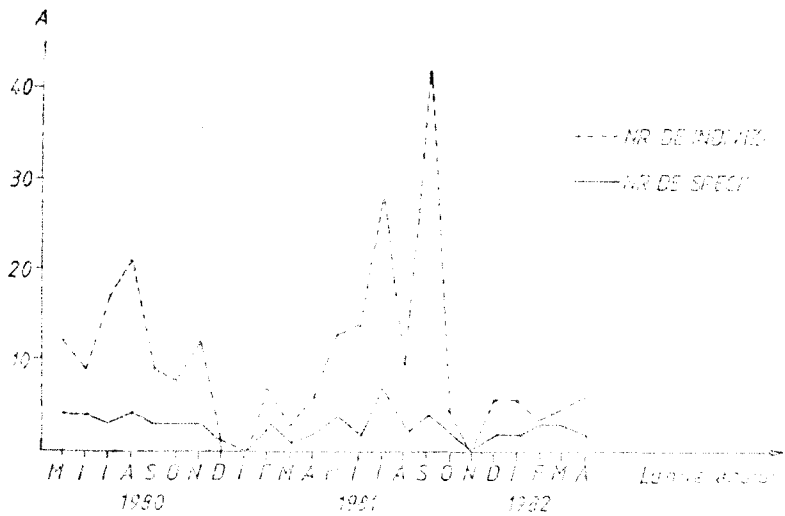

Fig. 2. *Raportul dintre numărul de indivizi și numărul de specii.*

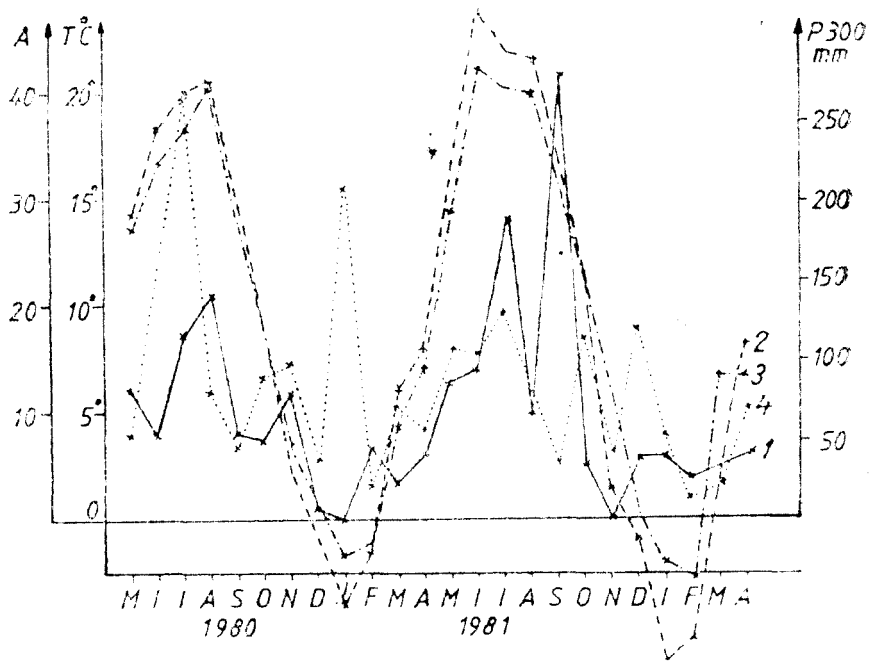

Fig. 3. *Dinamica populațiilor de chilopode.*
1 — Variația numărului de indivizi.
2 — Temperatura la suprafața solului.
3 — Temperatura la 5 cm în sol.
4 — Procentul speciilor pe familii.

mare număr de indivizi au fost colectați primăvara și toamna cînd apar larve și juvenili ceea ce arată că acestea sînt anotimpurile anului cînd ele se reproduc (fig. 3).

Familia cea mai abundentă în specii, litobiidele sînt prezente cu un număr de 9 specii și 189 indivizi (76,83%), urmată de geofilide cu 3 specii și un număr de 56 indivizi (22,76%). Criptopidele sînt reprezentate de un singur individ al unei specii comune (0,41%). Acest fapt este explicabil, ele fiind în majoritate forme mediteraneene și exotice (fig. 4).

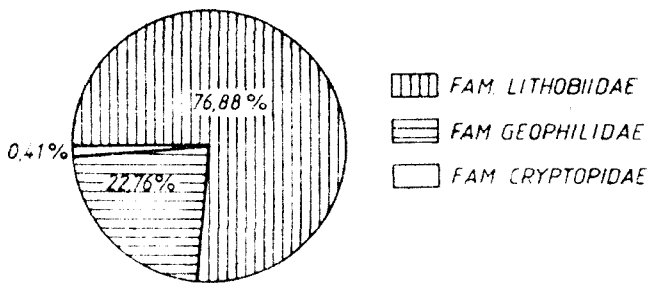

Fig. 4. *Ciclograma dominanței speciilor de chilopode pe familii.*

Din analiza spectrului zoogeografic reiese că 4 specii sînt palearctice, 3 europene, 4 central-europene și o specie endemică (tabel 1).

Concluzii. Se constată că numărul indivizilor și al speciilor variază fiind influențat de numeroși factori din ecosistem. Specia dominantă *Lithobius forficatus* este prezentă în aproape toate probele ceea ce demonstrează că este o specie euriecă. Diversitatea ecologică este mică, deși numărul de indivizi este destul de mare.

Prin identificarea celor 13 specii, unele din ele destul de rare (*Harpolithobius anodus, Lithobius matici, Monotarsobius aeruginosus* etc.), se poate cunoaște mai bine arealul lor de răspîndire. Pădurea Codrișor nu a fost cercetată din acest punct de vedere, chilopodele fiind prețioase în combaterea și distrugerea mai ales a larvelor și omizilor defoliatoare.

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ÉTUDE ÉCOLOGIQUE DE LA POPULATION DE CHILOPODES (*CHILOPODA*) DE LA FORÊT DE CODRIȘOR-BISTRIȚA, DÉPARTEMENT DE BISTRIȚA-NĂSĂUD

(Résumé)

Les recherches entreprises dans la forêt de Codrișor-Bistrița, durant deux années, sur la population de Chilopodes, ont mené à l'identification de 13 espèces, dont certaines sont rares pour la faune de la Roumanie. L'espèce eudominante *Lithobius forficatus* est largement répandue non seulement dans notre pays. La diversité écologique est faible, quoique le nombre d'individus este assez grand. Les captures ont été faites à l'aide des pièges de Barber. La dynamique de la population se trouve en concordance avec les facteurs abiotiques.

STUDIA UNIV. BABEŞ-BOLYAI, BIOLOGIA, XXX, 1985

PSOCOPTÈRES *(INSECTA, PSOCOPTERA)* DU PARC NATIONAL DE RETEZAT

ION BECHET

Dans cet article nous présentons quelques résultats des recherches concernant un matériel de psocoptères des Monts de Retezat, pour la plupart de la réserve du Parc National. L'absence de toute référence sur ces insectes du massif mentionné a incité notre curiosité. La zone est protégée et en conséquence elle n'est pas troublée par les activités humaines. Les recherches floristiques intenses montrent que dans cette région il y a un centre important de genèse, de formation d'espèces de plantes, ce qui a constitué un argument de plus pour aborder ce sujet.

Des preuves de matériel entomologique, relevées par nous, à partir de Gura Zlata jusqu'aux genévriers des alentours de la cabane-laboratoire et de Tăul Negru, c'est-à-dire entre 800 et 2 000 m altitude, nous avons identifié jusqu'à présent 23 espèces de Psocoptères ce qui représente à peu près un tiers de la faune de psocoptères de la Roumanie connue jusqu'à présent.

A peu d'exceptions près, aussi bien dans la forêt feuillue que dans la forêt de conifères, nous avons identifié les mêmes espèces que dans d'autres zones montagneuses de la Roumanie.

Le matériel examiné et identifié [1—4] (920 individus présentés ci-dessous) a été collecté le 20 août 1966 (I) (442 individus) et le 8 juillet 1982 (II) (478 individus). Tout le matériel a été collecté par le secouement des branches dans un filet au diamètre de 75 cm, sans pouvoir différencier les espèces corticoles de celles qui sont foliacées.

Fam. **Caeciliidae**

1. *Caecilius fuscopterus* (Latreille 1799). 1 ♀ a été collectée (II) dans les arbres feuillus, à Gura Zlata. Espèce rare.

2. *Caecilius flavidus* (Stephens 1836). Espèce collectée (I, II) dans les arbres feuillus, entre 800 m et 1 500 m altitude. Représentée seulement par des femelles.

3. *Caecilius piceus* Kolbe 1882. Collecté (I, II, ♂♂ et ♀♀) dans les conifères, entre 800 m et 1 000 m altitude.

La sous-espèces *C. piceus brevipennis* Enderlein 1903 a été collectée aux mêmes endroits, représentée seulement par des femelles.

Caecilius sp., 101 exemplaires non-déterminés, matériel collecté dans les épicéas, à Gura Zlata (II).

Fam. **Stenopsocidae**

4. *Stenopsocus immaculatus* (Stephens 1836), ♂♂ et ♀♀, matériel collecté (I, II) autant dans les arbres feuillus que dans les conifères, entre 800 m et 1 800 m altitude.

5. *Stenopsocus lachlani* Kolbe 1880. ♂♂ et ♀♀, collectés (II) dans des épicéas à 800 m altitude (Gura Zlata). Espèce nouvelle pour la faune de la Roumanie.

Fam. **Elipsocidae**

6. *Elipsocus westwoodi* McLachlan 1867. 1 ♂ et ♀♀, collectés à (I) 1 000 m altitude dans les arbres feuillus et dans les conifères.

Fam. **Philotarsidae**

7. *Philotarsus picicornis* (Fabricius 1793). 2 ♂♂ et 105 ♀♀ (I), collectés dans les arbres feuillus et dans les conifères à partir de 800 m jusqu'à 1 800 m altitude.

Fam. **Mesopsocidae**

8. *Mesopsocus laticeps* (Kolbe 1880). 1 ♂ et 2 ♀♀, collectés (I) dans les arbres feuillus, à 800 m altitude.

9. *Mesopsocus unipunctatus* (Müller 1764). Nombreux exemplaire ♂♂ et ♀♀, collectés (I, II) dans les conifères, à partir de 800 m jusqu'à 2 000 m altitude. Espèces très fréquente dans les forêts d'épicéas, jusqu'à la limite de la zone alpine.

Fam. **Reuterellidae**

10. *Reuterella helvimacula* (Enderlein 1901). ♂♂ et ♀♀ collectés (I, II) dans les arbres feuillus et dans des conifères, à partir de 800 m jusqu'à 1 500 m altitude. Un grand nombre d'exemplaires a été collecté dans les épicéas, aux alentours de la cabane-laboratoire. Espèces nouvelle pour la faune de la Roumaine.

Fam. **Peripsocidae**

11. *Peripsocus phaeopterus* (Stephens 1836). ♂♂ et ♀♀ (I, II). Espèce très fréquente dans les arbres feuillus et dans les conifères, jusqu'à 1 000 m altitude.

12. *Peripsocus subfasciatus* (Rambur 1842). Seulement des ♀♀ (I, II), dans les mêmes endroits que l'espèce précédente, mais moins fréquente. On n'a pas trouvé des mâles.

Fam. **Lachesillidae**

13. *Lachesilla pedicularia* (Linnaeus 1758). ♂♂ et ♀♀. Espèce commune à cette période (I) dans les arbres feuillus, jusqu'à 800 m altitude

14. *Lachesilla quercus* (Kolbe 1880). ♂♂ et ♀♀ (I). Trouvée dans les mêmes endroits que l'espèce précédente, mais plus rare.

Fam. **Psocidae**

15. *Amphigerontia contaminata* (Stephens 1836). 1 ♂ (II), dans les conifères à 800 m altitude.

16. *Amphigerontia bifasciata* (Latreille 1799), 2 ♂♂ (I), dans les arbres feuillus à 1 500 m altitude.

17. *Psococerastis gibbosa* (Sulzer 1776). ♂♂ et ♀♀ (I), collectés dans les conifères, jusqu'à 1 500 m altitude.

18. *Metylophorus nebulosus* (Stephens 1836). 2 ♀♀ (I), dans les conifères à 1 500 m altitude. Rare dans ces endroits.

19. *Loensia fasciata* (Fabricius 1787). 1 ♀ à 1 500 m altitude dans les conifères (I) et 1 ♀ à 800 m (II) aussi dans les conifères.

20. *Loensia variegata* (Latreille 1799). ♂♂ et ♀♀ (I), collectés dans les arbres feuillus et dans les conifère, jusqu'à 1 500 m altitude.

21. *Trichadenotecnum sexpunctatum* (Linnaeus 1761). ♂♂ et ♀♀ (I), dans les conifères, à 1 500 m altitude.

22. *Trichadenotecnum majus* (Kolbe 1880). 1 ♂ (I) à 800 m, collecté dans les arbres feuillus.

23. *Oreopsocus montanus* (Kolbe 1884). 2 ♂♂ (I), collectés dans les conifères à 1 500 m altitude.

Conclusions. De l'analyse du matériel déterminé et présenté ci-dessus, dès 23 espèces, à deux exceptions près (no. 5 et 10) qui sont nouvelles pour la faune de la Roumanie, les autres 21 sont connues dans notre pays, mais aucune d'entre elles n'a encore été signalée jusqu'à présent dans les Monts de Retezat.

Du matériel collecté, 7 espèces (no. 3, 4, 7, 9, 10, 11 et 13) ont été trouvées dans cette zone, dans la première décade du mois de juillet (II) et dans la deuxième moitié du mois d'août (I), avec des populations riches en individus, autant dans les arbres feuillus que dans les conifères ou dans les zones de forêts de mélange. Nous donnons en pourcentage les valeurs approximatives suivantes: 40% dans les conifères, 30% dans les arbres feuillus et 30% dans les deux catégories. La fréquence plus grande dans les conifères, en particulier dans les épicéas, que dans les arbres feuillus est un règle générale pour ces insectes. Compte tenu du caractère corticole de la plupart des espèces, le microbiotope de l'écorce des troncs et des branches des épicéas à nourriture suffisante et abri efficace, semble avoir un rôle important dans la biologie d'un grand nombre de psocoptères. Ainsi s'explique la présence de quelques espèces dans les épicéas autant dans les forêts montagneuses compactes que dans les arbres isolés ou ornamentaux, à basse altitude. Cette présomption nous autorise à croire que, quelques-uns des principes écologiques de dynamique et de densité des populations de la microfaune, sur la verticale et sur l'horizontale, ont chez les psocoptères une valeur limitée ou avec certaines corrections.

Nous relevons la présence de l'espèce *Mesopsocus unipunctatus* à partir de 800 m jusqu'à la limite supérieure des forêts d'épicéas.

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PSOCOPTERE *(INSECTA, PSOCOPTERA)* DIN PARCUL NAȚIONAL RETEZAT

(Rezumat)

Lucrarea cuprinde observații faunistice și ecologice asupra a 23 specii de insecte psocoptere în Munții Retezat. Două specii (nr. 5 și 10) sînt noi pentru fauna României, iar celelalte sînt noi pentru regiunea cercetată. Se remarcă populații mai bogate în indivizi și specii mai multe pe conifere decît pe alți arbori. Specia *Mesopsocus unipunctatus* a fost găsită pînă în zona alpină (2 000 m altitudine).

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DYNAMICS OF THE CONTENT OF TOTAL PROTEINS, LIPIDS, CARBOHYDRATES AND OF THE GLYCOGEN IN ORGANS OF THE COLORADO BEETLE *(LEPTINOTARSA DECEMLINEATA)*

PANTE GHERGHEL

Since the results obtained on the whole organism of the Colorado beetle, with respect to the total protein content, total lipids and glycogen [5] do not reflect the metabolic peculiarities of the different organs, an analysis of the dynamics of these substances in the main organs (fatty body, intestine, tegument and haemolymph) must be considered. As far as we know, there is no systematic study on any insect dealing with several biochemical parameters and concomitantly with several organs during the developmental cycle. Most often the work has been done on haemolymph [9, 11, 15, 16, 22, 23, 27] but there are also studies on the fatty body [2, 3]. The most complex studies that we know are those of Janda [12, 13] and of Sidhu *et al.* [20].

Material and Methods. Data referring to the biological material and the methods employed have been previously described [5]. The organs were collected at the moments indicated in Tables 1—3. For this purpose, the insects were anesthetized with CO_2. The haemolymph was collected in a Pasteur pipette, following a puncture on the lateral side of the abdomen made with the aid of a fine needle. To insure haemolymph draining, a slight pressure was applied on the anterior and posterior part of the body. The haemolymph thus collected, from 2 to 20 individuals (depending on age), was homogenised by vigorous shaking and used for biochemical determinations. The other organs studied (fatty body, tegument, intestine) were harvested on ice, weighed and properly homogenised according to the biochemical determination intended.

Results and Discussions. The results obtained are presented in Tables 1—3. Among the three types of substances (total proteins, total lipids and glycogen) proteins are present in the greatest proportion in any of the organs studied. Glycogen is next, in the fatty body of larval stage, followed by lipids, and in the other organs lipids are next to proteins. In the adult stage lipids are followed by glycogen.

As regarding the proteins, the highest content was recorded in the body wall, a fact which surprised us since we had expected to find it in the fatty body considering the important role played by this in the intermediate metabolism and the fact that it stores the majority of reserve substances [6, 19, 25]. The explanation resides in the fact that the body wall has the highest content of dry substance among the organs studied. On the other hand, we can see that the dynamics of the protein content in the fatty body and intestine go in parallel, and in the larval stage the correlation with the body wall proteins is more clear in the sense that the massive accumulations of proteins in the body wall are accompanied by decreases in the fatty body and intestine, which suggests that the source of the tegument proteins is in part the fatty body and the intestine.

Table 1

Dynamics of the content of total proteins, in organs, of the Colorado beetle *(Leptinotarsa decemlineata)*

Stage of development	Content of total proteins			
	Fatty body (µg/mg)	Tegument (µg/mg)	Intestine (µg/mg)	Haemolymph (µg/µl)
3rd instar larvae, 4th day	205±11.97	236±38.24	136±23.49	36±2.22
4th instar larvae, 1st day	200±14.82	225±16.09	139±21.30	38±3.74
4th instar larvae, 5th day	162±12.61	254±14.84	107±10.43	64±2.72
4th instar larvae, 8th day	190±26.99	280±22.17	180±23.34	69±1.71
Pupae, 1st day	214±30.93	188±32.29	—	63±2.97
Pupae, 8th day	196±24.44	208±36.71	—	58±5.89
Adult, 1st day	197±12.50	253±23.43	149±15.30	41±7.38
Adult, 25th day	221±29.51	382±20.77	153±1.97	95±2.61

Table 2

Dynamics of the content of total lipids, in organs, of the Colorado beetle *(Leptinotarsa decemlineata)*

Stage of development	Content of total lipids			
	Fatty body (µg/mg)	Tegument (µg/mg)	Intestine (µg/mg)	Haemolymph (µg/µl)
3rd instar larvae, 4th day	22.71±5.73	22.70±0.67	13.69±0.67	2.99±0.99
4th instar larvae, 1st day	16.15±7.46	15.97± 5.84	26.39± 10.24	2.47±0,97
4th instar larvae, 5th day	20.52±1.77	12.96±2.80	25.08±4.41	3.92±0.69
4th instar larvae, 8th day	29.91±2.71	11.29±3.30	31.85± 2.38	5.23±0.62
Pupae, 1st day	22.47±1.36	41.00±0.89	—	8.84±1.94
Pupae, 8th day	40.26±1.05	20.43±1.15	—	7.02±0.33
Adult, 1st day	42.04±2.41	26.99±5.54	31.78±5.73	7.68±1.96
Adult, 25th day	123±10.37	81.65±21.50	53.51±8.28	21.42±6.63

Table 3

Dynamics of glycogen content and of total carbohydrates, in organs, of Colorado beetle *(Leptinotarsa decemlineata)*

Stage of development	Content in glycogen of the fatty body (μg/mg)	Content in total carbohydrates of the haemolymph (μg/μl)
3rd instar larvae, 4th day	6.68±1.56	3.90±0.20
4th instar larvae, 1st day	1.08±0.13	3.67±0.19
4th instar larvae, 5th day	100.00±6.12	3.80±0.13
4th instar larvae, 8th day	66.00±5.70	5.10±0.24
Pupae, 1st day	56.00±4.02	4.40±0.10
Pupae, 8th day	10.00±0.27	3.91±0.10
Adult, 1st day	8.00±0.80	3.73±0.80
Adult, 25th day	7.00±0.16	5.00±0.29

In the pupal stage the total protein content is reduced in all the organs studied, with the exception of the body wall. Related to this aspect we have to mention the fact the pupa functions as a „closed" system without changing substances with the environment. Thus we can understand why the only organ in which the protein content increases in the pupal stage is the tegument. It is the time when a new cuticle is formed which is very rich in proteins.

In the adult stage, the total protein content in the tegument is much larger than in the larval stage. This surely represents an important adaptation, since the higher content of proteins contributes to the fulfilment of the important protective role against the noxious external agents which is performed by this organ especially during the diapause period of the adult individuals.

The protein content of the fatty body and intestine of adult individuals is close to that of the larvae approaching the pupation or of the one day old pupae.

In the adult stage the total protein content in the haemolymph increases as compared to the larval stage. This proves that in the adult stage the haemolymph has a much more important role in vehiculating the proteins than in the larval or pupal stage.

The total lipid content of the fatty body decreases on the occasion of the last two larval moultings. This suggest that the lipids are involved in this process as an energy source or as building material. In the pupal stage the total lipid content of the fatty body increases. This increase can be explained, among other things, on the basis of a striking reduction in the glycogen content that can be partly converted into lipids.

With regard to the main energy source of the last age larvae and of the adult individuals we find that the larvae accumulate in the first

place the glycogen whereas the adults accumulate lipids. The accumulation of lipids as the main energy source for adult individuals is understood by taking into account the biology of the Colorado beetle which passes through a long diapause period (about 8 months, from September until April) and by the fact that the lipids are the most energetic substances and at the same time they furnish the largest quantity of metabolic water [7].

The total lipid content of the intestine follows a continuously ascending line beginning with the last day of the 3rd age until the adult stage. Because the total lipid content is higher in the adults than in larvae, we consider that the intestine also functions as a storage place of the reserve lipids for the critical periods of the individual. In fact there are data which prove that the intestine participates along with the fatty body in the intermediate metabolism, although to a lesser extent [25].

The lipids in the body wall reach two maxima, the first at the beginning of the larval stage, the second in the adult stage. Taking into account the role played by lipids in the body wall (that of the forming of a water proof barrier) we find it understandable that the larval cuticle accumulates less lipids than in the adult stage. While the larval cuticle has a short existence, it is lost on the occasion of each moulting, the cuticle of adult individuals is not lost by moulting and therefore the organism invests more lipids in it to insure at the maximum all the positive qualities that result from the deposition of lipids in the tegument.

With regards to the lipid content of haemolymph we observe a gradual increase from the first day of the last larval age till the adult stage, when it reaches the highest lipid content of the whole cycle. From the point of view of lipid vehiculation, as in the case of protein, the haemolymph of adult individuals is much more loaded.

A peculiar evolution is followed by the glycogen content of the fatty body. In the first place, one can observe that it decreases on the occasion of each moulting, proving that it is implicated in this process. In the second place, it is found that contrary to what happens in the case of the lipids and proteins, the glycogen reaches the highest level at the end of the larval stage, after which it diminishes as abruptly as it increased in the last larval age, being present, however, in the fatty body of adult individuals.

With respect to the glycogen content of the fatty body we mention that in *Locusta migratoria* it is highest in the penultimate larval age, the 4th, and it decreases in the last one (Hill and Goldsworthy [10]). Trying to explain this situation, these authors [10] start from the idea that in the 4th larval age the content of juvenile hormone is much higher than in the 5th (the last stage). According to these authors the high concentrations of juvenile hormone would stimulate the glycogen biosynthesis. But in the case of the Colorado beetle we see that the glycogen content is highest when the concentration of juvenile hormone is lowest, that is at the end of the larval stage, whereas when the content

of juvenile hormone is high, that is in the 3rd larval stage and in the adult stage, the glycogen content is decreased.

Concerning the total carbohydrates in the haemolymph we observe an almost constant level (4.2 μg/μl) in all the moments studied. This leads to the idea that there should be certain mechanisms that control the carbohydrate concentration in the haemolymph. Related to the total carbohydrates in the haemolymph we mention that in the great majority of the insect species they are represented in the first place by trehalose [26].

With regard to the constant maintenance of total carbohydrate concentration in the haemolymph, S t e e l e [21] observed in the corpora cardiaca of *Periplaneta americana* a polypeptidic factor with hyperglycaemic action, stimulating the glycogenophosphorylase activity and thus raising the concentration of haemolymph carbohydrates. Later the existence of the hyperglycaemic factor was also demonstrated in other species of hemimetabolic insects [1, 8, 14, 24, 28] as well as certain holometabolic species [4, 18].

A hypoglycaemic factor was demonstrated in *Phormia regina*. It causes the reduction in the concentration of haemolymph carbohydrates, facilitates the glucose transport through cell membranes and promotes the glycogen synthesis [17]. By an interplay of the two hormonal factors, the hyperglycaemic and hypoglycaemic hormones, the concentration of total carbohydrates in haemolymph is kept constant.

Up to the present time we do not know of any proof regarding the existence of the two hormonal factors in *Leptinotarsa decemlineata* but the hypothesis of their existence seems plausible to us and the dynamics of the glycogen content in the fatty body could be determinend by such factors rather than the juvenile hormone.

Conclusions. 1. Regardless of the organ studied, the total proteins are predominant, among the investigated substances. In the fatty body of the last age larvae, the proteins are followed by glycogen and then lipids, whereas in the other organs the glycogen is either absent or present in small amounts. In the adult stage, the total proteins are followed by total lipids and then glycogen.

2. In the last larval age and in the pupal stage, the glycogen is the main energy source whereas in the adult stage this role is played by lipids.

3. The concentration of total carbohydrates in the haemolymph is maintained to a constant level throughout the entire cycle of the insect development.

4. With the exception of the glycogen, the largest accumulations of substances are made in the adult stage, the glycogen accumulates in the largest amount at the end of the last larval stage.

5. The greatest accumulations of substances occur in the fatty body and tegument.

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DINAMICA CONȚINUTULUI ÎN PROTEINE TOTALE, LIPIDE TOTALE, GLUCIDE TOTALE ȘI GLICOGEN, PE ORGANE, LA GÎNDACUL DE COLORADO *(LEPTINOTARSA DECEMLINEATA)*

(Rezumat)

Studiind dinamica conținutului în proteine totale, lipide totale, glucide totale și glicogen, pe organe (corp gras, tegument, intestin și hemolimfă), la *Leptinotarsa decemlineata*, autorul a constatat că oricare ar fi organul cercetat, dintre substanțele investigate predomină proteinele totale. În corpul gras al larvelor de ultima vîrstă, proteinele sînt urmate de glicogen și lipide totale, iar în celelalte organe glicogenul este absent sau prezent în cantități mici. În stadiul adult proteinele totale sînt urmate de lipide totale și apoi de glicogen.

În ultima vîrstă larvară și stadiul pupal, glicogenul este principala sursă de energie, pe cînd în stadiul adult lipidele.

Concentrația glucidelor totale din hemolimfă se menține la un nivel constant pe tot parcursul ciclului de dezvoltare.

Cu excepția glicogenului, cele mai mari acumulări de substanțe se fac în stadiul adult, glicogenul se acumulează în cantitatea cea mai mare la sfîrșitul ultimei vîrste larvare.

Cele mai mari acumulări de substanțe se fac în corpul gras și tegument.

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LES MOUSTIQUES DE KISANGANI (ZAÏRE)

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Les premières observations concernant les moustiques des environs de Kisangani sont celles de Mouchet [11] et de Schwetz [13]; depuis ces études, aucun travail, à notre connaissance, n'a été publié sur ces insectes de cette zone. Tirant argument de cette lacune, nous nous efforçons de continuer cette étude, dans le premier temps sur le plan systématique et écologique; dans le deuxième temps, chercher les voies et moyens d'une lutte efficace contre ces insectes nuisibles et vecteurs des maladies tropicales (malaria, filariose et de virus africains) [5].

Sur le plan systématique, deux espèces sont nouvelles pour la zone de Kisangani: *Aëdes (Aedimorphus) cumminsii* et *Aëdes (St.) simpsoni*. Une nouvelle espèce pour la faune culicienne du Zaïre: *Eretmapodites hamoni* Grj., dont la description est donnée par l'auteur [6] qui l'a découverte pour la première fois au Congo-Brazzaville.

La situation géographique sommaire de cette zone a déjà été décrite [12]. Dans le présent travail, nous présentons la composition taxonomique des espèces récoltées à Kisangani en fonction de leur fréquence; par suite les observations faites sur l'abondance des espèces et la fluctuation saisonnière de la biomasse et de la fréquence de ces insectes au cours de la période d'étude, de février 1978 à avril 1979.

Matériel et Méthode. 8874 moustiques ont été capturés directement à l'aide des filets entomologiques dans la végétation basse, les petites formations forestières et aux abords des habitations, dans la zone de Kisangani, entre février 1978 à avril 1979. 8 stations de récolte, dont chacune limitée à une superficie de 400 m^2, ont été retenues. La récolte a été organisée mensuellement à raison de deux fois par station, pendant les heures d'activité intense des moustiques adultes, c'est-à-dire de 4 h à 6 h du matin et de 17 h à 19 h du soir.

L'abondance en a été exprimée par la densité (raport de nombre de spécimens à la surface totale de 8 stations de récolte). Le coefficient de la fréquence des espèces est établi d'après les auteurs [2, 15]. Quant à la biomasse des moustiques, nous l'avons obtenue par le poids sec. L'animal fraîchement tué (flacon à chloroforme) est placé dans une étuve à 95° pendant trois jours, par suite, pesé à l'aide d'une balance électronique. La biomasse d'une espèce est calculée en faisant le produit de l'abondance des individus par le poids sec de l'espèce (à l'état adulte). La somme des biomasses spécifiques constituent la biomasse du peuplement de moustiques à un instant donné. Elle est exprimée en mg de matière sèche.

Resultats. 18 espèces de moustiques communs sont à ce jour inventoriées dans la zone de Kisangai (Zaïre). Elles représentent les principales sous-familles de *Culicidae* afrotropicales: *Anophelinae, Culicinae* et *Toxorhynchitinae* [3—5, 14]. Leur richesse spécifique est voisine de celle qui existe dans la région de Brazzaville sur l'île M'Bamou [7] et dans la région forestière de Buamba en Uganda [8].

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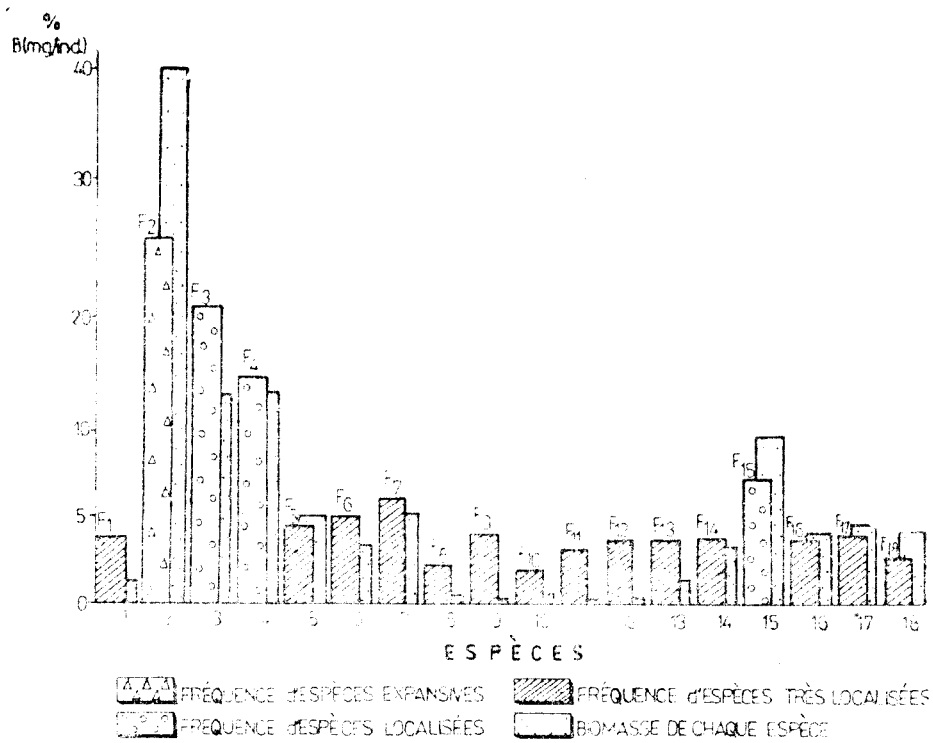

Fig. 1. *Fréquence et biomasse de chaque espèce de moustique recoltée dans la zone de Kisangani.* La numérotation des espèces correspond au Tableau 2.

Les espèces sont réparties en catégories, suivant leur fréquence [15] et les résultats en sont exposés dans la Fig. 1.

Les espèces expansives sont celles dont le coefficient de fréquence est supérieur à 15% et possédent une large répartition géographique dans la zone. Dans cette catégorie on notera une seule espèce: *Culex pipiens quinquefasciatus* Say. (31,5%). Cette espèce est présente toute l'année et fut trouvée pendant toute la période d'étude.

Chez *les espèces localisées* le coefficient de fréquence varie entre 5—15%. Les espèces suivantes sont dans cette catégorie; *Culex moucheti* (11,5%), *Culex schwetzi* (13,5%) et *Aëdes cumminsii* (6,4%).

Les espèces très localisées sont celles dont le coefficient de fréquence est inférieure à 5%. On notera les espèces telles que: *Anopheles gambiae; Eretmapodites quinquevittatus, Eretm. hamoni, Eretm. chrysogaster; Aëdes aegypti, Aëd. africanus, Aëd. congolensis, Aëd. vittatus, Aëd. circumluteolus, Aëd. simpsoni; Mansonia africanus, M. uniformis; Toxorhynchites brevipalpis.*

La dynamique des moustiques de cette zone (Tableau 1) montre que les espèces du genre *Culex* tiennent une place très importante quant à

Tableau 1

Variation saisonnière de l'abondance, de la biomasse et de la fréquence des moustiques au cours de la période d'étude (février 1978-avril 1979)

Mois	Abondance absolue	Biomasse	Fréquence
F_{78}	365	186,00	4,1
M_{78}	582	296,00	6,5
A_{78}	1083	552,33	12,5
M_{78}	836	426,36	9,4
J_{78}	474	241,70	5,3
J_{78}	460	234,60	5,2
A_{78}	546	278,40	6,2
S_{78}	599	308,40	6,8
O_{78}	863	440,00	9,7
N_{78}	785	400,30	8,8
D_{78}	325	165,70	3,6
J_{79}	281	143,31	3,2
F_{79}	309	157,59	3,4
M_{79}	415	211,65	4,7
A_{79}	951	485,01	10,7

leur abondance et à leur fréquence. *Culex pipiens quinquefasciatus* a 0,87 ind./m², *C. schwetzi* 0,37 ind./m² et *C. moucheti* 0,31 ind./m². L'*Aëdes (Aedim.) congolensis* est l'espèce la moins abondante, avec 0,04 ind./m². Les autres espèces du même genre ou de genres différents ont une abondance relative oscillant entre 0,05 et 0,17 ind./m².

Cependant, les résultats obtenus concernant les moustiques de Mauritanie montrent que l'*Anopheles dthali* présente une abondance et une fréquence très élevées [10]. Au Mali [9], l'*Anopheles rufipes* est l'espèce la plus répandue (1,45%). En Afrique Centrale, au Congo Populaire les études menées sur les moustiques à l'île M'Bamou montrent que les espèces des genres *Culex* et *Mansonia* sont fréquentes [7]. L'humidité tropicale a une influence sur le préférendum des différents genres et espèces d'animaux dans les choix des biotopes favorables à leur développement.

La biomasse moyenne obtenue pendant toute la période d'étude est de 0,51 mg/ind. Les individus de *Culex p. quinquefasciatus* présentent une biomasse très élevée, de 1817,4 mg ou 40,15% par rapport à la biomasse totale des moustiques récoltés. Pendant que les individus d'*Aëdes (St.) aegypti* ont une biomasse relativement faible, donc 17,82 mg ou 0,39% (Tabl. 1). Le % de biomasse, comparé à leur fréquence dans la Fig. 1, montre que les espèces à faible fréquence ont aussi une faible biomasse.

La biomasse des moustiques subit la variation saisonnière de cette zone [1]. Les résultats de la variation saisonnière de la biomasse sont présentés dans le Tableau 2. Les mois d'avril et octobre 1978 présentent

Tableau 2

Dynamique des moustiques au cours de la période d'étude (février 1978 – avril 1979)

Espèce	Nr. individus	Abondance (ind./m²)	Fréquence (%)	Biomasse (mg/ind.)*	Biomasse totale	Biomasse (%)
1. Anopheles gambiae	251	0,07	2,8	0,23	57,73	1,27
2. Culex p. quinquefasciatus	2796	0,87	31,5	0,65	1817,40	40,15
3. Culex (c.) schwetzi	1202	0,37	13,5	0,32	384,64	8,49
4. Culex (c.) moucheti	1021	0,31	11,5	0,43	439,03	9,69
5. Eretmapodites quinquevittatus	281	0,08	3,1	0,65	182,65	4,03
6. Eretmapodites hamoni	280	0,08	3,1	0,42	117,60	2,59
7. Eretmapodites chrysogaster	357	0,11	4,0	0,46	164,22	3,62
8. Aédes aegypti	162	0,05	1,8	0,11	17,82	0,39
9. A. africanus	252	0,07	2,8	0,23	57,96	1,28
10. A. congolensis	143	0,04	1,6	0,18	25,74	0,56
11. A. circumluteolus	180	0,05	2,0	0,41	73,80	1,63
12. A. domesticus	226	0,07	2,5	0,16	36,16	0,70
13. A. vittatus	223	0,06	2,5	0,22	49,06	1,08
14. A. simpsoni	224	0,07	2,5	0,50	112,00	2,47
15. A. cumminsii	573	0,17	6,4	0,90	515,70	11,39
16. Mansonia africanus	258	0,08	2,9	0,59	152,22	3,36
17. Mansonia uniformis	269	0,08	3,0	0,61	164,09	3,60
18. Toxorhynchites brevipalpis	176	0,05	1,9	0,89	156,64	3,46
Total	8874	2,6 ind/m²	—	—	4526,46	—
Moyenne	—	—	—	0,5 mg/ind	1,3 mg/m²	—

* mg/ind. — Poids moyen par individus.

respectivement une biomasse très élevée, 552,33 mg et 440 mg; alors que les mois de décembre 1978 et janvier 1979 ont une faible biomasse, 165,7 mg et 143,4 mg (Fig. 2). Pour apprécier le poids d'un moustique, la croissance numérique doit être d'environ 2000 moustiques soit 1,02 g.

Conclusions. 8 microbiotopes ont été prospectés d'une manière qualitative. Ils constituent les divers milieux de Kisangani favorables au développement des moustiques.

1. La faune culicienne présente aussi de grandes variations selon les différentes formations écologiques, en fonction des pluies, d'une part, et du régime des crues du fleuve Zaïre et des rivières Tshopo et Lindi, d'autre part. *Culex pipiens quinquefasciatus* Say. est une espèce dominante de Kisangani par sa population. Elle présente une fréquence de 31,5%.

2. La biomasse moyenne obtenue pendant toute la période d'étude est de 0,51 mg/ind. Les individus de *Culex p. quinquefasciatus* présentent une biomasse très élevée, donc 40,15% par rapport à la biomasse totale des moustiques récoltés.

Fig. 2. *Variation de la biomasse et de la densité moyennes mensuelles des moustiques, de février* 1978 *à avril* 1979.
Traits pleines — Biomasse. En noir — Densité.

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CULICIDELE DIN KISANGANI (ZAIR)

(Rezumat)

În perioada februarie 1978—aprilie 1979 s-au efectuat cercetări asupra abundenței, frecvenței și variației sezoniere a culicidelor din zona Kisangani (Zair). S-au identificat 18 specii de culicide, dintre care două sînt noi pentru zona studiată: *Aëdes (Aedimorphus) cumminsii* și *Aëdes (St.) simpsoni*, și una nouă pentru fauna culicidelor din Zair: *Eretmapodites hamoni* Grj.

Culex pipiens quinquefasciatus este specia cea mai răspîndită în zona ecuatorială.

Neexistînd date privind biomasa culicidelor în general și a celor din zona afrotropicală în special, autorul stabilește că biomasa medie a unui țînțar este de 0,51 mg (substanță uscată).

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URMĂRIREA UNOR FACTORI DE RECUPERARE DUPĂ EFORT FIZIC PRIN ELECTROENCEFALOGRAFIE

GAVRIL ARDELEAN şi VIRGIL ENĂTESCU

Importanţa practică deosebită a recuperării după efortul fizic justifică lărgirea ariei investigaţiei din acest domeniu. Abordarea problemei din incidenţa analizei activităţii nervoase superioare este mai puţin cunoscută, deşi rolul ei asupra troficităţii, motricităţii etc. este pe deplin demonstrat. În aprecierea participării sistemului nervos la susţinerea efortului fizic am pornit de la considerentul că electroencefalografia este singura metodă obiectivă accesibilă practicii pentru urmărirea activităţii nervoase superioare [12]. Efortul fizic şi mai ales recuperarea este de presupus a fi influenţate de o mulţime de factori fiziologici (antrenamentul fizic), de antrenament nervos (biofeedback-ul alfa cerebral), biochimici (apilarnil) şi electromagnetici (cîmpurile induse de magnetodiaflux). Rolul antrenamentului fizic este amplu investigat în medicina sportivă [3, 5, 9] şi poate deveni un factor de comparaţie, un sistem de referinţă obiectiv. Tehnicile de feedback alfa cerebral, de dată relativ recentă, sînt folosite pentru relaxarea sistemului nervos, îndeosebi în ameliorarea stării psihice, iar în sport, pentru obţinerea pe cale psihologică a mobilizării resurselor pentru performanţă [2, 7, 10, 11], dar utilizarea lor pentru recuperarea după efortul fizic a fost neglijată. Avînd în vedere conţinutul apilarnilului — produs farmaceutic românesc aflat în faza de testare — în aminoacizi, substanţe hormonale şi biotone [8], presupunem implicarea sa în secvenţele metabolice ce însoţesc efortul fizic şi refacerea. Rolul cunoscut al biopotenţialelor de membrană, al mecanismelor pompelor ionice în depolarizările din starea de oboseală [13], cu înrîuriri asupra transmiterii impulsului nervos, influenţabile de cîmpurile electromagnetice [6], ne conduce la presupunerea că acestea pot modifica, într-un sens sau altul, refacerea după oboseală.

Material şi metodă. Lotul experimental a fost constituit din 31 subiecţi voluntari, de 16—18 ani, sex masculin, cu greutate medie 64,5 kg, clinic perfect sănătoşi (din lotul iniţial s-au exclus 43 subiecţi asupra cărora au intervenit factori perturbatori sau care nu au respectat întocmai normele privind antrenamentul). Antrenamentul fizic a fost studiat pe un lot antrenat, constituit din 5 sportivi de performanţă, comparativ cu un lot neantrenat. Învăţarea şi antrenarea biofeedback-ului alfa cerebral s-a efectuat pe 5 subiecţi în 8 şedinţe a 20 minute. Pe un lot de 6 subiecţi s-a urmărit efectul terapeutic al cîmpurilor induse de un magnetodiaflux la o frecvenţă de 50 Hz, în 10 şedinţe a 5 minute fiecare. Efectul apilarnilului, administrat în decurs de o lună într-o doză zilnică de 0,03 g (3 drageuri), s-a testat pe un lot neantrenat şi altul antrenat, de 5 persoane fiecare.

Obosirea subiecţilor s-a realizat prin 20 genoflexiuni efectuate sub o povară de 10 kg pentru a spori severitatea efortului. Metoda de apreciere a efectului tehnicilor promovate a constat în înregistrarea electroencefalogramei standard înainte şi după terminarea efortului, precum şi după 15 minute de odihnă, urmată de analiza clinică globală, susţinută obiectiv de analiza statistică a traseelor occipitale, cu frecvenţă, amplitudine şi grad de sincronizare.

Rezultate și discuții. Întrucît datele privind amplitudinea și gradul de sincronizare sînt nemodificate din punct de vedere statistic, ne-am limitat la analiza frecvenței undelor EEG. Rezultatele obținute de noi sînt redate în fig. 1—5.

Antrenamentul fizic determină (fig. 1) diminuarea nesemnificativă ($p>0,1$) a frecvenței medii a undelor EEG în repaus pe seama reducerii frecvenței undelor beta și mai ales delta; o creștere semnificativă a frecvenței medii a undelor EEG la terminarea efortului ($p<0,001$) ca urmare a ridicării semnificative a frecvenței apariției undelor alfa și nesemnificative a undelor beta; o creștere semnificativă a frecvenței undelor EEG după refacere ($p<0,05$), mai ales prin creșterea susținută a frecvenței undelor alfa. Date similare au fost descrise la sportivi și de alți autori [3, 5, 9]. Este de reținut că, spre deosebire de neantrenați care prezintă un traseu EEG mixt, cu index alfa relativ redus (sub 45%), la antrenați am obținut un traseu alfa subdominant (peste 50%, iar în refacere peste 80%). Interpretarea acestor trasee s-a făcut ținînd seama de contextul fiziologic în care s-au desfășurat experiențele și de rezultatele celorlalte metode de investigație paraclinică [1]. Astfel, întrucît subiecții sînt tineri, caracterizați prin sensibilitate ridicată la efort, apariția undelor theta și delta trebuie interpretată mai degrabă ca expresia acestei vîrste, decît ca o suferință cerebrală. Testînd atenția concentrată, reiese că antrenamentul fizic are un efect pozitiv în sensul reducerii acesteia imediat după efort mai mult la neantrenați (— 36,6%) decît la antrenați (— 7,8%), în raport cu valorile corespunzătoare de repaus. Antrenații dispun de mecanisme care mențin pulsul și tensiunea mai puțin modificate decît la neantrenați, în acord cu abaterile mai reduse ale frecvenței medii a undelor EEG. Rezultatele obținute de noi întăresc părerea [4] că antrenamentul crește rezistența electrogenezei corticale la efort și hipoglicemie, dovedindu-se eficient în special ca o metodă de refacere după oboseală.

Deși nesemnificativ sub aspect statistic ($p>0,1$), efectul antrenamentului de biofeedback alfa cerebral se manifestă prin reducerea frecvenței medii a undelor EEG spre zonele specifice stării de relaxare (fig. 2), aspect interpretat ca pozitiv față de nivelul prea ridicat al acesteia înainte de exersare. Dar, rezultatele obținute au sens nu într-o interpretare globală. În cadrul lotului am putut distinge două tipuri de manifestări, exprimate prin EEG. Unii nu obțin progrese pe planul terapiei informaționale, din care cauză efectul pe total lot este diminuat sau chiar anulat și alții care obțin efecte apreciabile, traduse prin creșterea frecvenței undelor alfa. Corelînd acest „insucces" global cu tabloul EEG inițial al subiecților supuși terapiei prin biofeedback alfa cerebral, constatăm că tocmai subiecții din prima categorie au o pondere redusă a undelor alfa. Acest fapt ne permite să tragem concluzia că terapia, prin biofeedback alfa cerebral se pretează doar la persoanele cu frecvență relativ mare de apariție a undelor alfa în stare de repaus, care, se pare, au o capacitate mai mare, de sensibilizare în imaginar. Apariția „stării alfa" la aceste persoane este corelată, în unele lucrări [4], cu scăderea lacticemiei în efort ca urmare a orientării mai facile a metabolismului general spre aerobioză. În timpul acestei stări se produce o prevalență a sistemului

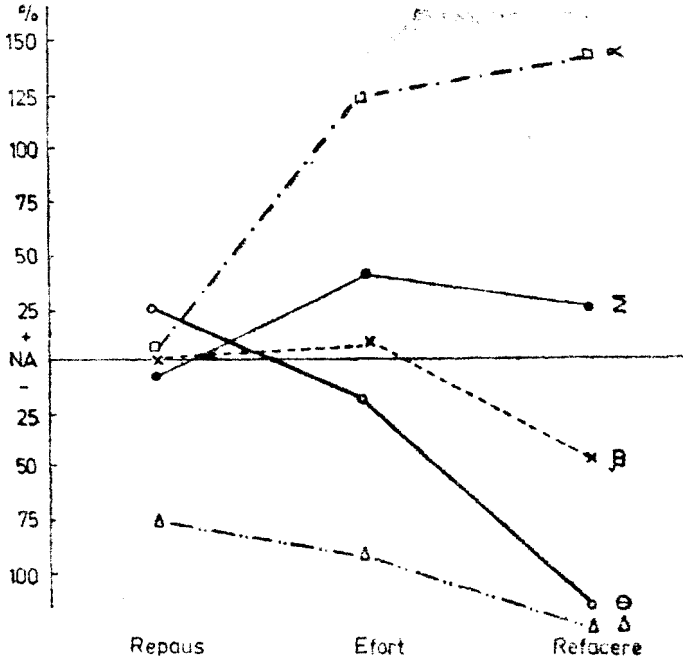

Fig. 1. *Abaterile procentuale ale frecvenței undelor EEG la lotul antrenat, față de lotul neantrenat.*

NA — Lotul neantrenat. Σ — Frecvența medie a undelor α, β, θ, Δ — Frecvența tipurilor respective de unde.

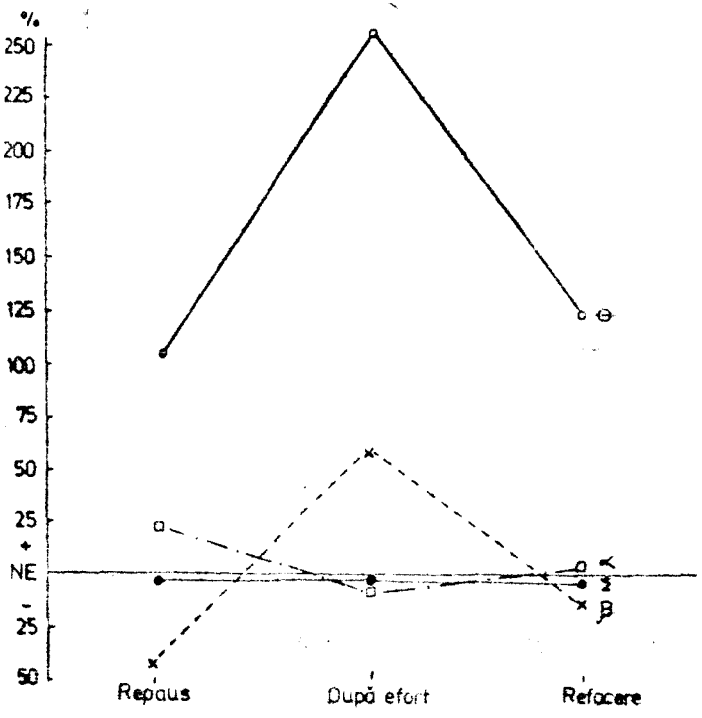

Fig. 2. *Abaterile procentuale ale frecvenței undelor EEG la subiecții antrenați prin biofeedback alfa cerebral, față de valorile aceluiași lot înainte de exersare.*

Restul explicațiilor ca în fig. 1.

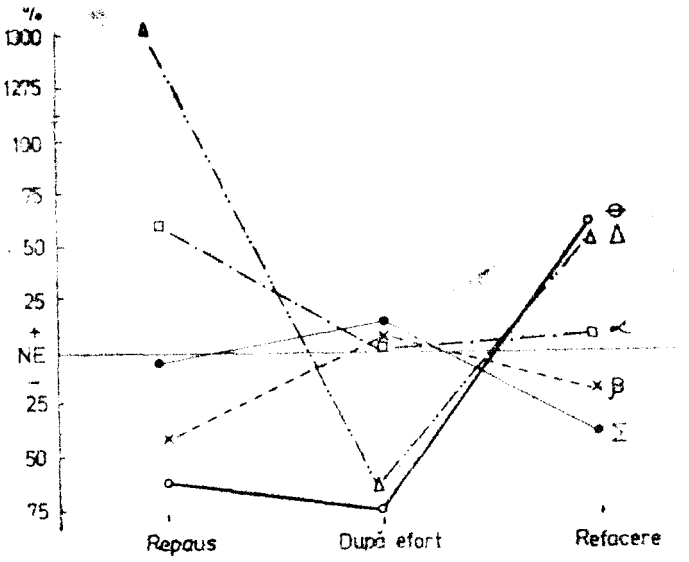

Fig. 3. *Abaterile procentuale ale frecvenței undelor EEG la subiecții supuși ședințelor de magnetodiaflux, față de valorile aceluiași lot înainte de exersare.*

parasimpatic față de cel simpatic, însoțită de scăderea catecolaminelor din sînge. În acest caz, considerăm că biofeedback-ul poate fi o metodă de relaxare, cu condiția ca numărul ședințelor de exersare să crească substanțial.

Deși ședințele de magnetodiaflux determină modificări nesemnificative ale frecvenței medii de apariție a undelor EEG (fig. 3), concluzia care se detașează net este că cîmpurile electromagnetice induse cresc frecvența de apariție a undelor alfa atît înainte cît și după efort. Mecanismele implicate sînt legate de caracterul simpaticolitic al cîmpurilor electromagnetice continue de joasă frecvență [6], care înrîuresc pozitiv unele procese neuro-endocrine sedative ce acționează asupra substanței reticulate. La acest nivel, cîmpurile induse se presupune că modifică dinamica ionilor, a schimburilor de membrană, fie prin accelerarea unor procese enzimatice sau influențarea transmiterii impulsului nervos, fie prin refacerea și normalizarea funcției neuro-endocrine. Mecanismele enunțate nu pot fi însă precizate în detaliu. Sub rezerva efectuării unui antrenament de durată, metoda magnetodiafluxului poate fi recomandată ca o terapie antifatigantă reală pentru efortul fizic.

Administrarea de apilarnil provoacă modificarea aproape semnificativă a EEG înainte și după efort ($p<0,1$) la antrenați (fig. 5), dar îndeosebi la neantrenați (fig. 4). La ambele loturi efectul benefic al apilarnilului constă în generalizarea „stării alfa" și reducerea substanțială a celorlalte tipuri de unde EEG. Probabil, apilarnilul, prin factorii biostimulatori naturali conținuți, bogați în precursori ai hormonilor sexuali, in-

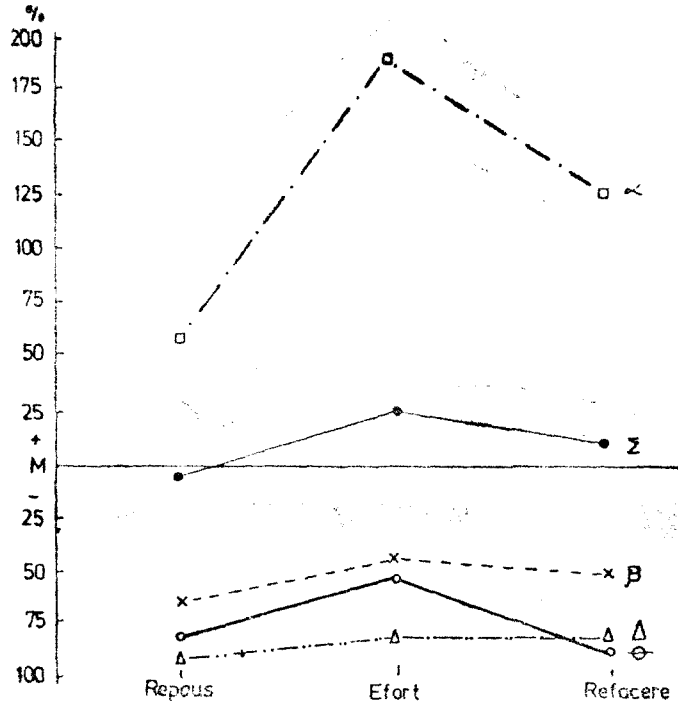

Fig. 4. *Abaterile procentuale ale frecvenței undelor EEG la lotul tratat după administrare de apilarnil, față de martor* (M).

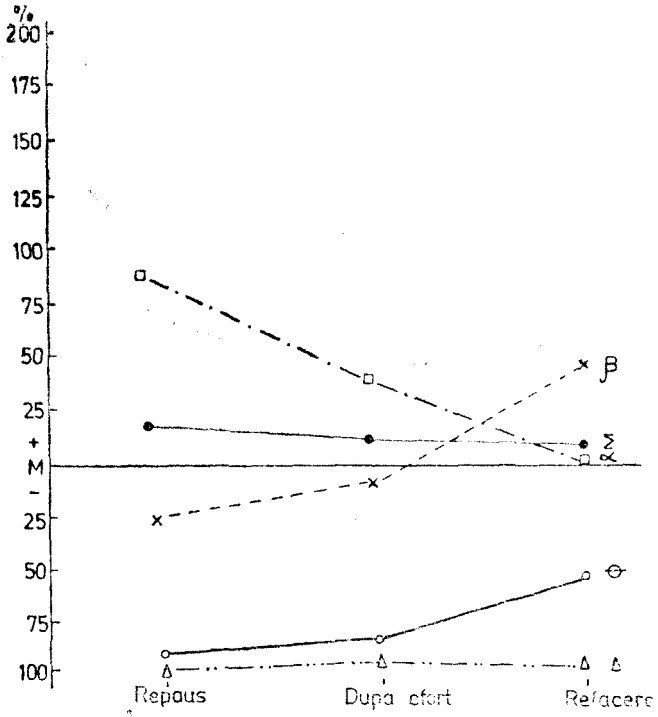

Fig. 5. *Abaterile procentuale ale frecvenței* ***undelor*** *EEG la lotul antrenat după administrare de apilarnil, față de martor.*

tervine în procesele enzimatice de degradare dar mai ales de sinteză, în formarea *de novo* a unor hormoni care exercită un rol important în activitatea sistemelor neuro-endocrino-metabolice. Acest aspect se cere, însă, aprofundat în cercetări viitoare.

Concluzii. 1. Rezultatele obținute impun prudență în interpretare prin faptul că în literatura cercetată nu s-a găsit un termen de comparație și ne obligă la o investigare *in extenso* a aspectelor constatate.

2. Analiza traseului EEG numai pe canalele occipitale oferă o imagine parțială a fenomenului investigat, care ar putea fi întregită printr-o analiză automată globală.

3. Creșterea sau scăderea frecvenței medii de apariție a undelor EEG are o semnificație relativă în funcție de nivelul acesteia la martor, fapt ce ne conduce la concluzia practică, anume că interpretarea tendințelor de modificare a EEG trebuie făcută în contextul fiziologic dat și în corelație cu celelate probe paraclinice.

4. În raport cu gradul de instalare a „stării alfa", se poate stabili o strategie a promovării metodelor analizate în terapia generală. În experimentul nostru, antrenamentul fizic și administrarea apilarnilului s-au dovedit a fi metode terapeutice cu efect bine exprimat, pe cînd magnetodiafluxul și biofeedback-ul alfa cerebral au provocat efecte abia schițate, care credem că pot fi amplificate prin exersare mai îndelungată.

5. Întrucît efectul terapeutic este mai bine evidențiat în perioada de refacere, se pare că majoritatea metodelor pot fi utilizate mai degrabă ca metode de relaxare decît de creștere a rezistenței subiecților la efort.

6. Experiențele efectuate confirmă participarea, într-un anumit grad, a activității corticale la îndeplinirea efortului fizic.

7. Obiectivizarea activității nervoase superioare prin EEG poate fi perfecționată prin îmbogățirea cu noi parametri de analiză informațională calitativă și cantitativă.

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A STUDY OF SOME FACTORS OF RECOVERY AFTER PHYSICAL EFFORT, THROUGH ELECTROENCEPHALOGRAPHY

(Summary)

The extent to which the cortical nervous activity participates in supporting a given physical effort was estimated by the electroencephalographic method. The problems studied include the role of various factors in the recovery from fatigue, such as physical training, alfa cerebral biofeedback training, administration of apilarnil and magnetodiaflux-induced fields. Due to the limitation of the method, it was used primarily for establishing the role of the above mentioned factors in the recovery from fatigue rather than their role in the increase of endurance to effort. The effects obtained in the recovery after physical effort are statistically significant, especially for the administration of apilarnil and for physical training. The authors argue for the cumulative effect of such methods by their concomitant application.

RECENZII

G. Zarnea, **Tratat de microbiologie generală. I. Virologie generală. Anatomie bacteriană** *(Treatise of General Microbiology. I. General Virology. Bacterial Anatomy)*, Editura Academiei R. S. România, Bucureşti, 1983, 426 pages (including 171 figures and 28 tables) and 115 plates with electron micrographs and photographs enclosed.

First of all, we present the content of the volume.

In the Preface (pp. 9—10), Professor G. Zarnea emphasizes, in connection with the scientific and social importance of the achievements of microbiological research in the last decades, that it was microbiology that opened the way to a new revolution in biology, the bioindustrial (biotechnological) revolution. The Preface is followed by „The history of microbiology" (pp. 11—25) in which the contribution of Romanian investigators to the development of microbiological sciences is also reviewed.

The first part of the volume, „General Virology", comprises pages 27—281 and plates 1—39. The concept of virus is defined, then the following chapters and subchapters are presented:

— anatomy of viruses (structural peculiarities of viral constituents, molecular architecture of viruses);

— cultivation of viruses (utilization of experimentally infected laboratory animals, cultivation on tissues of the embryonated hen's eggs, cell cultures);

— replication of viruses (replication of DNA viruses, replication of RNA viruses);

— relationships between viruses and host cell;

— pathology of cells infected with viruses;

— relationships between viruses and host organism (tropism of viruses, types of viral infections);

— interferons (nomenclature and classification, way of the formation of interferon, molecular bases of interferon activity, biological effects of interferon);

— viral oncogenesis (malignant transformation and tumour cell, oncogenic viruses);

— plant viruses (mechanism of transmission, evolution of viral infection in plants);

— viroids (molecular structure, replication, pathogenicity, origin);

— bacteriophages (molecular anatomy of the T-even phages, structure and topology of phage genome, infection of bacterial cell and replication of phage, phage taxonomy, importance of bacteriophages, transfection, lambda phage, RNA phages, filamentous phages, cyanophages, mycoviruses);

— nature, origin and evolution of viruses (viruses as primordial molecules, viruses as the result of a regressive evolution, origin of viruses from cellular genetic material, viral origin of some viruses, origin of RNA viruses, origin of retroviruses, way of the appearance of viruses);

— classification and nomenclature of viruses.

In the second part of the volume, „Bacterial Anatomy" (pp. 283—426 and plates 40—115), the definition of the concept of bacterium is given and the position of the microorganisms in the living world is discussed, followed by 4 chapters divided into many subchapters:

— anatomy of bacteria (morphology, physical properties);

— ultrastructure of bacterial cell (cell wall, protoplasts and spheroplasts, periplasmic space, plasma membrane, mesosomes, cytoplasm, „nucleus", ribosomes, photosynthetic apparatus, inclusions, vacuoles, spore, rhapidosomes, magnetosomes, capsule and slime layer, glycocalyx, flagella, pili and fimbriae, „spinae");

— characteristics of some peculiar groups of bacteria (rickettsiae, mycoplasmas, „L" forms, chlamydiae, spirochetes, myxobacteria, actinomycetes, cyanobacteria);

— cell differentiation in bacteria.

This book is the first volume of the first Romanian Treatise of General Mi-

crobiology. Due to its priority and valuable and up-to-date scientific content and iconography, its severely logical structure and excellent style, its appearance constituted a remarkable event in the history of general microbiology in our country. At the same time, this work is a very useful source of information not only for our students and specialists, but it would be the same for students and specialists all over the world. This is why its translation into world-wide spoken languages is warmly recommended. Undoubtedly, the same conclusions and recommendations will also be valid for the other volumes of the *Tratatul de microbiologie generală* (volumes 2—4) which are under press.

Lucrările celui de al treilea simpozion de microbiologie industrială *(Proceedings of the Third Symposium on Industrial Microbiology)* (București, 1981), Institutul Central de Biologie, București and Întreprinderea de Antibiotice, Iași, 1982, 716 pages with 298 figures and 230 tables, and

Lucrările celui de al patrulea simpozion de microbiologie industrială *(Proceedings of the Fourth Symposium on Industrial Microbiology)* (Galați, 1983), Întreprinderea de Antibiotice, Iași and Universitatea, Galați, 1984, 720 pages with 234 figures and 239 tables.

The two volumes, like the Proceedings of the First and Second Symposia on Industrial Microbiology (*cf.* the review in Studia Univ. Babeș-Bolyai, Biologia, 1981, 26 (2), 73—74), were edited by Professor N. D. Topală. They comprise 206 papers.

Some of the papers are reviews: „Microorganisms, gene engineering and the future of biotechnologies" (G. Zarnea); „Methylotrophic microorganisms and their importance for the biosynthesis industry" (N. D. Topală); „Taxonomical delimitations in the group of methanol-assimilating bacteria" (N. Olăreșcu and V. Bilbie); „Automation of processes in the biosynthesis industry" (G. Muscă and R. Giurcă); „Present status and perspective of the microbial technologies for production and recovery of fuels" (I. Lazăr); „Perspective of the microbial enhanced oil recovery technologies" (I. Lazăr); „Production of bacterial exopolysaccharides. Present status and perspective of their use for enhanced oil recovery" (I. Lazăr and A. Grigoriu); „Use of some microbial products for enhanced oil recovery processes" (I. Lazăr *et al.*); „Status of the investigations concerning the production of the Romanian xanthan-type biopolymer for enhanced oil recovery" (I. Lazăr *et al.*); „Some aspects of the bacterial corrosion in the oil-extracting industry" (M. Suciu); „Fusion of protoplasts and genetic recombination of the industrial microorganisms" (E. Săsărman *et al.*); „Limits and perspectives in the control of microbial deterioration of products and materials" (T. Beșchea and S. I. Ionescu-Homoroceanu).

The majority of the papers (134) describe original fundamental and applied researches, carried out under laboratory, pilot station and industrial production conditions. The investigated topics cover almost all chapters of the industrial microbiology.

A great number of papers deal with the bacteria, streptomycetes and fungi producing antibiotics (their isolation from soil, cultivation and nutrition, colonial and cell morphology, biochemistry, including enzyme activities of these microorganisms, use of mutagenic agents for obtaining highly productive strains), with the isolation and identification of antibiotics, with the mechanism, technology and yield of their biosynthesis. Besides the antibiotics used in human and veterinary medicine, some antibiotics used as fodder additives due to their stimulating effect on the growth of animals were also studied. The possibility of using antibiotics for controlling some plant diseases was also dealt with. One paper summarizes the hygienic requirements of good manufacturing practice in the antibiotic factories and describes methods to check how the manufacturing practice meets these requirements.

The number of papers on the microbial enzymes utilizable in medicine, animal husbandry, chemical, drug, food, textile industries etc. is also great. The papers deal with the isolation of enzyme-producing bacteria, actinomycetes and fungi from soil and other natural sources, with the multilateral study of the biology of their different strains,

including the highly productive mutants as well as with the technology of obtaining pure enzyme preparations. The investigated microbial enzymes comprise different hydrolases (amylases, cellulases, proteinases — including some milk-clotting enzymes —, lipases, inulinase, pectinolytic enzymes, lactase, invertase, amyloglucosidase, penicillinase), oxidoreductases (catalase, glucose oxidase) and an isomerase (glucose isomerase).

Other papers deal with the bacterial synthesis of L-lysine, L-valine, L-glutamic acid and L-tryptophan, these amino acids being used as fodder additives or for other purposes. Highly productive mutant strains were obtained and used. The biosynthesis of vitamin B_{12}, ergosterol and ergotic alkaloids was also investigated. The topics of many papers are related to the technology of preparation or to the microbiological control of cheeses, sausages, bread, ethanol and higher alcohols, wine, beer, tomato juice, pickled vegetables.

Numerous studies are devoted to the methylotrophic bacteria and yeasts utilizable for obtaining single cell proteins on nutrient media containing methanol as sole carbon and energy source. The preparation of fodder yeasts on other media than methanol as well as the methods for preparing yeast extracts were also dealt with.

Three major problems of petroleum microbiology, namely *a*) the use of microorganisms or *b*) of xanthan-type bacterial exopolysaccharides for enhanced oil recovery and *c*) control of bacterial corrosion in the oil-extracting industry, were multilaterally studied.

The bacterial removal of sulphur from coals and the bacterial solubilization of manganese from ores, respectively, were the topics of two papers. Another topic also related to the geomicrobiology, namely the enzymatic activity of salt lake sediments was also studied.

Many papers deal with the methanogenic bacteria and the production of biogas by using sludges originating from industrial swine-, cattle- and poultry-breeding complexes, sugar or petrochemical industry and municipal waste waters, and by using *Pistia stratiotes* biomass. One paper studies the bacterial formation of methane from CO_2 and H_2. The authors of some papers studied the possibility of using fermented sludges from the petrochemical industry as organic fertilizers.

Methods for the immobilization and preservation of industrial microorganisms or enzymes, as well as new bioreactors and mathematical modellings of some biosynthetic processes are also described.

The biodeterioration and its control are dealt with in the case of many products and materials such as timbers, petroleum bitumens, emulsions used in metal workings or in manufacturing of polyesteric fibres.

The topic of some papers is the microbial degradation of pollutants in waste waters from the coal-mining and chemical industries and of the oil polluting the sea water.

Some studies are devoted to the fungi pathogenic for termites.

The results of the investigations described in these two volumes are very valuable from both fundamental and practical viewpoints. At the same time, they prove the significant progress registered in the development of the Romanian industrial microbiology and its contribution to the general development of the national economy of our country.

The two volumes constitute an important and valuable source of information for a wide range of specialists (biologists and microbiologists, chemists and biochemists, technologists of chemical, drug, food, textile, oil-extracting and mining industries, environmental engineers).

Soil Biology and Conservation of the Biosphere, *Volumes 1 and 2,* Edited by J. Szegi, Akadémiai Kiadó, Budapest, 1984, XV+XI+902 pages, with 194 figures and 212 tables.

The work comprises the Proceedings of the 8th Meeting of the Soil Biology Section of the Hungarian Society for Soil Science (Gödöllő, 26—28 August 1981). It consists of: Foreword, 87 papers grouped into 6 chapters, Final speech, Subject index and List of contributors.

In the first chapter, „The effect of fertilization on soil biological processes", 17 papers deal with the effect of applying different mineral and organic fertilizers on the enzymatic activity, N-cy-

cling, decomposition of cellulose and plant residues, total microflora, physiological groups of bacteria, microscopic fungi in arable, grassland or forest soils.

The authors of 13 papers in chapter 2, „Interactions between pesticides and soil microorganisms", studied the effect of different herbicides and insecticides on the organic matter, enzymatic activity, total microflora, actinomycetes, *Azotobacter*, N_2-fixing blue-green algae as well as the microbial decomposition of some herbicides in the soil. The authors of another study describe the application of laboratory cultures of oil-degrading bacteria to render oil-polluted soils suitable for agricultural utilization.

Chapter 3, formed of 14 papers, is devoted to different aspects of „The role of soil organisms in the decomposition and synthesis of organic matter". Besides the decomposition and synthesis of native soil organic compounds, the decomposition of different plant residues, manure proteins, cellulose, lignocellulose, sewage sludges was also studied. Other topics are: the effect of clays on the degradation of plant residues; phytotoxic substances associated with the decomposition of plant residues.

Chapter 4, „Importance of biological nitrogen fixation in soil fertility", consists of 12 papers. Most of them deal with the root-nodule bacteria and symbiotic N_2-fixation in legumes. The N_2-fixing associative symbioses and aerobic nonsymbiotic N_2-fixation in soils as well as the N_2-fixing microorganisms in phyllosphere were also dealt with.

Twenty papers are grouped into chapter 5, „Soil organisms and their role in the soil ecosystem". The microbial coenoses in different soil ecosystems are the main topics in this chapter. Some microbial groups or species (prosthecobacteria, slime bacteria, *Pseudomonas* and *Arthrobacter*, soil-borne phytopathogenic fungi: fusaria and *Verticillium dahliae*) and animals (enchytraeids and earthworms) were also studied.

In the last chapter, „The role of soil organisms in the soil-forming processes", 9 papers are devoted to the microbiology and enzymology of the recultivation of technogenous areas and one paper deals with the soil-enzymological effect of conditioners.

As a whole the work shows that the environmental problems attract the interest of soil biologists. This is understandable because soil is not only the primary source of food for the mankind but, due to its biological, chemical and physical buffering capacity, the soil plays a decisive role also in the transformation, neutralization and fixation of all natural or xenobiotic substances that have entered it. It should also be emphasized that the work offers methods and proposals for direct use in the economy.

Soil Biology and Conservation of the Biosphere is a valuable source of information for specialists in biology, agronomy and environmental sciences.

ȘTEFAN KISS

R. Gorenflot, **Biologie végétale. Plantes supérieures. 2. Appareil reproducteur**, Éd. Masson, Paris, 1983, 240 pages, avec 177 figures et 6 tableaux.

Dans le présent travail, l'auteur traite systématiquement des principaux caractères de l'appareil végétatif et reproducteur des Thallophytes et des Cormophytes, ainsi que de leur ligne d'évolution, en les grouppant en 12 chapitres.

Pour continuer les problèmes présentés dans le premier tome *(Les Protocaryotes et les Thallophytes eucaryotes*, Éd. Doin, 1975), le présent tome fait l'analyse comparative des caractères morphoanatomiques du thalle et du cormus, ainsi que des organes reproducteurs asexués — des sporocytes et des sporanges — et sexués — des gamétocystes et des gamétanges (chap. 1).

L'alternance entre le gamétophyte et le sporophyte chez les Bryophytes et les Ptéridophytes, est traitée comparativement avec le déroulement du cycle digénétique hétéromorphe et diplophasique, constaté aussi chez les Thallophytes (chap. 2).

L'analyse de l'organisation des fleurs des Angiospermes (c'est-à-dire les particularités morphologiques de la fleur, la formule et le diagramme floral, la symmétrie florale, la disposition, le nombre et le polymorphisme des éléments floraux etc.) conduit l'auteur à la conclusion que le polymorphisme floral présente de grandes différences suivant la famille, ainsi que du point de vue de la morphologie générale de la fleur, de nos

jours, une définition convenable ne pouvant en être formulée (chap. 3).

L'étude faite sur le développement et la nature des fleurs des Angiospermes (chap. 4), sur l'inflorescence des Angiospermes (chap. 5), sur le sporophyte et le gamétophyte des Cormophytes (chap. 6) prouve l'opposition entre la théorie classique de la métamorphose et la théorie moderne (les étamines et les pistils étant des organes *sui generis*). D'autre part, l'analyse du cycle de développement des Cormophytes prouve la réduction progressive du gamétophyte et des gamétanges. Cette évolution simplificatrice est accompagnée par l'apparition de la hétérosporie, de l'angiosporie et de l'angioprothallie (chap. 7).

La phylogenèse des organes reproducteurs (chap. 8) et la biologie de la reproduction sont traitées avec une attention toute particulière et l'on indique les théories concernant ces problèmes.

La dissemination des espèces par les graines et par multiplication végétative des Cormophytes est corrélée avec la nature morphoanatomique des germes de la dissemination et avec leur capacité d'accumulation de substances de réserve (chap. 10).

Pour présenter les grands groupes de Cormophytes et le système phylogénétique, l'auteur indique les méthodes synthétiques de la botanique systématique, ainsi que les classifications horizontales et verticales (chap. 11), en caractérisant brièvement les embranchements des Bryophytes, Ptéridophytes et des Spermophytes (Gymnospermes, Chlamydospermes et les Angiospermes).

Le dernier chapitre (chap. 12) comprend l'analyse de l'origine et les grandes tendances évolutives des Cormophytes.

Le travail est clos par une bibliographie et un index alphabétique des dénominations scientifiques. L'illustration y est bien choisie et exécutée avec soin.

Le travail s'adresse à tous les biologues s'occupant avec l'étude de la nature des plantes.

IOAN HODIȘAN

Ioan Bobeș, **Atlas de fitopatologie și protecția integrată a agroecosistemelor** *(Atlas of Phytopathology and Integrated Protection of the Agroecosystems)*, Editura Ceres, București, 1983, 696 pages comprising 418 pages of text, 228 plates (of which 45 are colour ones), 34 tables, 14 schemes, 12 maps, a list of selective bibliography with 63 titles and an index of about 2,500 scientific terms.

Based on a long didactic, research and productive activity in agricultural phytopathology, the Author presents, in an original synthetic and suggestive conception, this work of both a theoretical and a practical, applied character which proves to be useful for agronomy and horticulture engineers and biologists working in the fields of education, research and production, for specialists from the plant protection network, for students in agronomy and biology as well as for all those wishing to deepen their knowledge about the agents, prevention and control of plant diseases.

The work consists of four chapters.

In Chapter 1, *Illustrated notions on the phytopathogenic agents*, the specific characteristics of the phytopathogenic viruses, mycoplasmas and other bacteria, fungi and anthophytes are given on 42 pages of text, in 28 plates and 9 tables.

In Chapter 2, *the pathography and etiology of plant diseases* are presented for the different phytotechnical groups: cereals, forage plants, tuber and root plants, etherical oil and medicinal plants, fibre plants, legumes (for seeds), leguminicolous plants, fruit trees and shrubs, vine and ornamental plants. Totally, 300 diseases are dealt with on 102 pages of text and illustrated with 150 plates. The way of presentation — the explicative text on the left page and the illustration of the disease and the microscopic image of the pathogenic agent on the right page — makes possible the easy intuition and recognition, in nature, of the plant-parasite complex and of the submicroscopic structures of the sporiferous bodies and pathogenic agents.

In Chapter 3, *Evolutive cycles of the pathogenic agents and the specific measures for their control*, the Author presents — in an original, suggestively illustrated manner — the annual biological cycles of 50 species of phytopathogenic agents and describes their pathogenic effects and control. This chapter comprises 50 pages of text and 50 plates.

Chapter 4, *Ecology, prophylaxis and therapy of plant diseases* (145 pages of text, 25 tables, 14 schemes and 12 maps), deals with the fundamental problems of the agricultural phytopathology: ecological zonality of the plant diseases (illustrated with the phytosanitary maps of their distribution); damages caused by diseases to the crop production; integrated control of the plant diseases (a modern concept of the rational protection of agroecosystems, organization of the control measures and the phytosanitary legislation, integrated control technologies of the diseases of various cultivated plants, economical aspects of the plant protection).

Due to its structure, the work makes it possible to determine operatively the phytopathogenic agents, to study thoroughly the plant diseases, to understand easily the descriptions, schemes and maps. The work is well documented and constitutes a valuable and important source of scientific information.

MARIA BECHET

Cercetări experimentale şi clinice cu extracte de timus *(Recherches expérimentales et cliniques aves extraits thymiques)*, Sous la rédaction de D. Rădulescu et Z. Uray, Academia Republicii Socialiste România, Filiala Cluj-Napoca, 1984, 114 pages, avec 21 tableaux et 10 figures.

Sous les auspices des Sous-commissions de biochimie et radiologie de cet organisme académique, ont eu lieu à Cluj-Napoca les travaux du symposium sur ces thèmes (le 15 IV 1983) dont le volume vient de paraître.

L'étape suivant les années '60 peut être considérée comme „l'âge d'or" dans l'histoire de la thymologie, elle fait sortir de l'inconnu cette glande et lui confère le rang d'organe lymphatique central, responsable de la défense immunocellulaire de l'organisme. Mais des modèles expérimentaux, d'une élegance et d'une ingéniosité remarquables, démontraient que les fonctions endocriniennes du thymus ne peuvent être omises, *même pas dans le contexte immunobiologique*. En conséquence, le paradigme immunoendocrinien du thymus réunit les directions de la recherche actuelle et celle de l'avenir dans la thymologie (Toma et Crivii, 1984).

C'est dans ce climat que le symposium s'est développé présentant 14 travaux effectués avec des extraits thymiques, en premier lieu avec Leucotrofina (Elkem — Milano).

Sans doute les exposés scientifiques se caractérisent-ils par leur originalité en conception, par l'interprétation basée sur des investigations rigoureuses. Ce mérite devient d'autant plus évident aujourd'hui quand, sur le plan mondial, nous assistons à une véritable explosion informationnelle en ce qui concerne l'investigation thymique.

La ligne directrice des recherches exposées peut être considérée l'action protectrice des extraits thymiques dans les conditions de l'irradiation des organismes, ayant comme point de départ une base expérimentale concernant les influences thymiques sur l'hématopoèse chez les animaux irradiés ou l'intéraction avec les corticosurrénales etc., puis l'utilisation des substances radioprotectrices en clinique. On remarque le rôle de la Leucotrofina dans la radiothérapie du cancère mammaire et dans d'autres processus de dégénerescence malignes, dans la chirurgie des os etc.

Ce volume-ci reflète les conceptions biomédicales de l'école de médecine de Cluj-Napoca en ce qui concerne la corroboration des éléments théoriques fondamentaux et des éléments expérimentaux, leur valorisation pratique. Ce volume met aussi en évidence nos traditions en thymologie et sa continuité ascendente.

VIRGIL TOMA

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