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# FROM THE LIFE OF THE TISZA-RESEARCH WORKING COMMITTEE TISZA-RESEARCH CONFERENCE X (1979)

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The latest session of the annual Tisza-Research Conference took place this year at the Centre of the Committee of the Hungarian Academy of Sciences, between 21 and 22 April, 1979. Besides the members of the Working Committee, several guests, researchers in the fields covered by the lectures, attended the lectures and took active part in the discussion.

In the meantime the Tisza-research has gained an international character by the fact that researchers coming, on the one hand, from the University in Novi Sad, and on the other from the State University in Užhorod (Ungvár), in the Transcarpathian territory of the Soviet Union have joined in the work; on the Yugoslav part Head of Department Prof. Dr. MELANIJA OBRADOVIĆ, on the Soviet part Head of Department Prof. Dr. I. FODOR attended the Conference.

The Conference was opened by the inaugural address of the president, † Prof. Dr. I. HORVÁTH, Head of the Department of Botany in the Attila József University:

Ladies and Gentlemen,

By way of introduction, let me greet the heads of departments of foreign sister universities, who have taken part in our joint research work and are now being present among us, as well as B. SIMÁDI, Director of the Water Conservancy, of the Lower-Tisza Region ZSUZSA DVIHALI and Mrs. A. BALÁZSFALVI, ex officio members of our conference and Prof. Dr. GY. BERENCSI, University Medical School, Szeged, as guests.

Our Conference is confronted with the task of listening to the reports on the results of last year's research work and of discussing the problems involved. As you may see from the items on the agenda printed on the invitation card, the first subject will cover the investigations conducted in the region of the Tisza river barrages; the following subject will be a report on the investigations carried out in Tisza reaches and nature reserves outside the Kisköre river barrage region.

The next speaker was Prof. Dr. MELANIJA OBRADOVIĆ; she greeted those present. She expounded the particular aspects of the Tisza research where she thought cooperation between the researchers of the University of Novi Sad and the Tisza-Research Working Committee possible. She thought it desirable that, in future, as close connections as possible should be developed between their team and the Tisza-Research

Working Committee, suggesting that an exchange of researchers should be organized for the implementation of this project.

Prof. Dr. I. FODOR greeted those present at the Conference in the name of the Biological Departments of the University in Užhorod. He deems it a pleasure — he said — that the results of their Tisza research can be contributed to the Tiscia. As far as they are concerned, they do their best to ensure an undisturbed co-operation. He wished the lecturers and those present at the Conference successful and fruitful work.

Dr. B. SIMÁDY gave an account of the great flood in 1879 and of its implications. In his lecture, he acquainted the audience with what the Tisza floodwaves were like before the river had been controlled, then he talked about the floodwave formation by the river in the last century. He analyzed in detail the situation during the peak flow in 1970 and its impact, forecasted the flood conditions to be expected in future, the possible dangers and the guarantees of how to prevent these dangers.

Dr. M. MARIÁN gave concise information on the results of the Tisza-research in 1978.

The Working Committee operated in 1978 — year 21 of the Tisza research — under the auspices of the Hungarian Academy of Sciences on the subject "A complex research of the flood-plain of the Tisza, with special regard to the river barrages and the nature reserves".

The centre of the investigations was the Lower-Tisza Region and the area of the Kisköre River Barrage. In addition to these areas, investigations continued along the full stretch of the River Tisza in Hungary, and a new test area was marked out in the Upper-Tisza Region.

On the results of the research reports are given by the lectures of Tisza-Research Conference X of 1979. Here only the most important events of the year 1978, some characteristic data of the research are mentioned.

In May, the two-day Tisza-Research Conference IX, held in Szeged, where several institutions had representatives was closed with good results. 28 lectures in all were delivered by approximately two-thirds of the members of our Working Committee. About 50 researchers took part in the discussion.

Several research fellows of our Committee and of the institutions involved attended the Tisza-Research Working Conference organized by the Water Conservancy of the Middle-Tisza Region at Kisköre, in September. At this conference, the results of research relevant to this district and future tasks were discussed, with special reference to practical considerations.

The Tisza-Research Working Committee, the State University in Novi Sad and the State University in Užhorod came to an agreement to co-operate. In this way, an investigation into the life of the River Tisza can be carried out on an international basis, all along the river.

Vol. XIII of the journal Tiscia and supplement 1 were published.

The Tisza-research was made by 53 researchers, the work being voluntary and unpaid; the distribution of the subjects were: water chemistry 2, physical geography 1, hydrobiology 14, botany 10, zoology 26. In the course of the year five additional research fellows joined our programme. Our results were published in 43 papers, contributed to the journal Tiscia and to other scientific publications. 46 lectures were delivered on the subject of our researches by the members of our Working Committee at various scientific meetings. Seven of our researchers went on study-tours in Hungary, and one abroad. Three of our researchers took their doctor's degree at the university during the year.

The outposts (buildings) at Körtvélyes and Tőserdő, the mesoclimate measuring stations at Körtvélyes, Sarud and Tiszaszöllős, the light-trap at Körtvélyes have functioned well. Our small ship "Kolokán" served our voyages well.

Our researchers can find in our library including hundreds of volumes not only biological works and publications on nature conservation and environment protection, but also data of a climatological character collected by our meteorological observation posts and datum series relevant to the chemistry and quality of the water in the Lower-Tisza Region (going back to several years past).

The most typical characteristic of the climatic conditions in the area is a natural tendency of the climate to turn warm, arid and hot in summer, when this tendency is manifested by the temperature avarages as well as by the frequent high rises in temperature. In the Southern Tisza valley, at Körtvélyes, our meteorological observation post has functioned for more than half a decade. The datum series based on our observations allow us to evaluate the deviations in terms of the experiments carried out in the river bed and in the flood-plain and inundation areas.

The river and the surface formations of the flood-plains covered with varying vegetation have somewhat differing microclimatic temperature conditions. In the flood-plains, the influence of the climate characteristic of the closed forest associations does not allow the microclimate characteristic of the Tisza valley system to have its influence felt beyond strict limits. The mass of water in the river, with its peculiar climatic influence, is similarly supposed to be a limiting substratum bringing certain characteristics into relief.

In summer, in clear, windless weather, the interplay between the substrata of the Tisza valley (heat- and humidity-circulation) system can be strongly felt. By this interplay a lowland, flood-plain microclimate (that of the inundation area) is formed. Besides, this interplay creates a macroclimate which, in its outer manifestations, differs from the climate of the surrounding lowland areas.

Thereafter, the lecturing began.

**Investigations conducted in the district of the Tisza river barrages**

(1) ANDÓ, M.:
Investigations conducted in the district of the Tisza river barrages

Contributions to the discussion:

MARIÁN, M.: Does the high vapour content of the flood-plain originate in an evaporation sent forth by the meadow plants or has it some other cause?
Answer: The conditions of humidity are governed by the influence of the forest. In the flood-plain, the temperature of the air will fall if the grass is high, and will rise, if the grass is close to the ground.

GALLÉ, L., Sr.: (Completion) In the forest at Adorján we have found lichens of large thalli wich generally do not live outside forests covering high mountains. We found the lichens in each case growing on that side of the tree-trunk which faced the river Tisza. By this, it is proved that humidity, coming from the Tisza, undoubtadly took part in their settling down. He met a similar case in Tiszafüred: mountainous lichens lived similarly on the side of stones from the Tisza. The mentioned cases also indicate the accomodation to the microclimatic conditions.
Answer: The lecturer thanks for the completion.

BÁBA, K.: How much are the microclimatic conditions affected by the presence of forests in the flood plain?
Answer: The vapour content of the air is considerably affected, determined by forests. Further on he notes that the Tisza-monograph in which he gives an account on the climatic relations of the Tisza flood-plain, is being made.

(2) BANCSI, I. and P. VÉGVÁRI:

## Importance of the research of the matter curent of the Tisza in the management of water-supplies

It is characteristic of the river water that therein "water bodies" of different qualities and sizes pass which — in respect of their chemical and biological character differ from one another. These manifold natural and artificial effects continually change, as the concomitants of the chemical and biological processes, taking place in them.

In the up-to-date water conservancy system of the Tisza valley, it is a basic requirement to make an effective use of the water supply of limited quantity. Of late decades, the acceleration of the social circulation of water makes urgent a more effective solution of the water quality regulation in the Tisza.

The lecture is dealing with the elements of the peculiarities — among them with the connection between water level, water output, water speed — which affect the quality of water. It also touches upon the regularities of the transport of the floated river deposit, the problems of the content and yield of mineral materials and the oxygen supply, as well as upon the possibilities of affecting these.

Contributions to the discussion:

BERENCSI, GY.: Did any case occur in which mercuric caustics could be demonstrated from water?

SIMÁDY, B.: In his opinion the water quality control on a large territory can only be solved satifyingly with international co-operation. In respect of the Tisza, the formation of a five-sided co-operation would be desirable. At any rate, everything is to be done for preventing the further deterioration of water quality. This cannot be solved with efforts in Hungary alone.

KISS, K.: In connection with the indication of "P", he would approve of indicating with "mg/l".

BALÁZSFALVI, Mrs. A.: She asks, what is meant by the expression "aim-state". — She would consider proper to draw into the work also the co-workers of the Kisköre already asa laboratory, who have already so far acquired great experiences, into the preliminary investigations preceding the planning of the Csongrád river barrage.

Answer: In respect of mercuric caustics, there are no metric data, as yet. — It is desirable to carry out the proper technological changes in order to ensure the least sewage damage. The imposition of fines because of causing pollution cannot assure any satisfying solution. Already in case of the Hungarian rivers of low yield, the estimation of the given aim-states should be begun.

(3) HAMAR, J.:

## Differentiation of habitats in the Kisköre Reservoir

The five-year period of the damming of the river bed came to an end in 1978. The damming level was raised by about one and half m, thus the largest part of the area of reservoir got under water.

Depending upon the data of terrain and water movement, various habitats were formed from the marsh-land to the open water. In the shallow enough parts, the marsh and hair-weed vegetation grew up, meadows of large extent are formed by the filamentous algae; in the open water plankton organisms (e.g., Cyanobacteria) have a decisive role.

The quality of water is likewise characterized by the mosaic-like structure. The present-day situation confirms the earlier opinion of experts that the removal of the land-vegetation from the reservoir, the arrangement of the terrain and the assurance of the proper water depth are fundamental requirements of the protection of water quality.

Contributions to the discussion:

BERENCSI, GY.: What gnat density is observed in this area? What species composition may be esteblished?

MARIÁN, M.: Are the unfavourable hydrographical conditions effective in the river bed of the Tisza?

VÖLGYES, GY.: Could the algal masses be utilized for the aims of foraging?

BALÁZSFALVI, Mrs. A.: In the area of the community Poroszló, the nutritive material could be extracted with polyelectrolytical treatment.

HORVÁTH, I.: He raises the questions of applying the possibility of modelling.

Answer: Black flies (*Simulium* sp.) begin to appear. — The alluvial content of the Tisza is rather high, the microvegetation promotes siltation and, in addition, the development of the anaerobic processes. It may be established that in our area, siltation is one of the most dangerous processes. The free water motion is, namely, retarded by the plant mass that remained there after arranging the terrain of the reservoir. — Modelling of the area was tried but the results have not been satisfying, as yet.

(4) B. TÓTH, MÁRIA:

## Bacteriological investigations in the Kisköre Reservoir

The water surface of the Kisköre Reservoir was raised in April, 1978, to National Level 89.00 m, corresponding to the second pace of building. In this way, more than one standingly water-covered area was induced in the area of the reservoir.

In the area of the Kisköre Reservoir, complex hydroecological investigations were carried out. The water bacteorological investigations formed a part of these. The selected and systematically investigated water surfaces were: the dammed up stretch of the Tisza, falling into the space of reservoir, the bay at Abádszalók, the meadow at Sarudi, the flat before Poroszló, as well as the brook Eger and the water course of the Tisza.

In the course of the investigation we followed with attention the count of bacteria and the formation of the quantity of these. By the raised water level a considerable quantitative change was induced in the bacterio-plankton of the water getting out in to the area of reservoir.

Contributions to the discussion:

BERENCSI, GY.: He asks if *Salmonella* species were found in the course of investigations. He calls the attention of the researchers of the Station of Public Hygiene and Epidemiology to Leptospirosis.

BALÁZSFALVI, Mrs. A.: She asks if they succeeded in cultivating the strain of *Clostridia.*

ESTÓK, B.: In the lower sector of the Kisköre Reservoir there are accordingly no *Salmonella,* at the same time, the Leptospira-induced diseases are known. The decrease in germinal count is lower owing to settling down but this sediment may be rich in anaerobic spore masses. Therefore, the sediments should be examined, as well.

HEGEDŰS, MÁRIA: She asks if a connection was found between the direct bacterial count and the number of cultivated germs.

Answer: Clostridium has not been cultivated. — Between the direct and cultivated germ counts hardly any difference could be found.

(5) BANCSI, I.:

## Intensive investigations in the bay of the Kisköre Reservoir at Abádszalók

One of the ways to recognize the peculiarities of the water ecosystems is the elaboration of the data received in the course of intensive investigations. On the basis of investigations performed between 21 and 24 August, 1978, in three, physiognomically different places of the bay at Abádszalók (open water, fringe of reeds,

place full of hair-weed), for 72 hours, with a frequency of four, resp. eight hours, the occurring processes were followed. On the site in every eight hours the full chemical examinations, in every four hours the measuring of the components necessary for studying the oxygen and carbon dioxide were carried out.

There followed no considerable change in the quantity of the main anions and kations but the diurnal fluctuation of the carbonate and magnesium content could be observed. Some outward forms of the vegetable nutritive materials ($PO_4$-P, $NH_4$-N, $NO_3$-N) could be measured in diurnally different concentrations. For the interpretation of the diurnal changes in the oxygen — carbon dioxide flow and the different components, we have performed the bacteriological, algological and zooplancton examinations, too, at the beginning and end of the intensive investigations, at all the three places.

The diurnal change in oxygen, carbon dioxide and hydrocarbonate refers to the occurrence of processes of different intensity at the indicated three places of examination. In the surface water layer of the open water carbonate and at the same time, in the region close to the bottom, free carbon dioxide was to be found continuously. The comparatively weak diurnal fluctuation of the carbonate content referred to a strong planktonic activity, being nevertheless in state of equilibrium with its environment. The processes taking place in the fringe of reeds are considerably more vigorous than those in the open water: the carbonate content changes within wide limits; here and there it can be demonstrated from the water layer close to the bottom, as well. The most dynamical changes were registered in the hair-weed: in the surface water layer at night free carbon dioxide, in the daytime carbonate was measured, the concentration of the free carbone dioxide fluctuated between 0 and 6 mg/l and that of the carbonate content between 0 and 12 mg/l.

It is verified by the intensive investigations that a considerably larger role must be attributed to the diurnal convectional currents in the uniform distribution of the dissolved materials of shallow standing waters than it was until now.

Contributions to the discussion:

SZITÓ, A.: He asks if in the bay of the Tisza at Abádszalók $H_2S$ formation can be observed. —
Answer: There was observed something like, only that not there but in other Tisza-reaches

ESTÓK, B.: He asks what is the cause of the strong Ph-fluctuation. —
Answer: This fluctuation is to be regarded as quite moderate.

DVIHALLY, ZSUZSA: She raised a question in connection with the proportion of the primary production and O-respiration. —
Answer: They are (by and large) the same.

(6) SZITÓ, A.:

Midge species (Chironomidae) of the Kisköre Reservoir in the in the year of filling up

The filling up of the reservoir began in April, 1978, and in the deeper parts, as e.g. in the bay at Abádszalók, there existed a standing water-covered biotope already for years. In 1978, samples were taken on five occasions (12 May, 20 June, 29 August, 23 September, 10 October). These were taken from the open water with a boat, and in places of shallow water cover without any boat the environments of Poroszló, Tiszafüred). The larvae living on the hair-weed vegetation were collected by singling.

On the basis of the obtained data, it was established that in the bay at Abádszalók, from among the species forming the endobenthos, *Chironomus plumosus* is dominant and a *Camtochironomus* species is subdominant. In the parts at Poroszló and Tiszafüred, a permanent, strong hydrogen sulphide formation was observed.

Here we have not found any mud-dwelling larvae. On the submergible vegetation we have found the mining and coat-dwelling *Cricotopus bicinctus, Cricotopus silvestris,* as well as other *Cricotopus* species, in every month and at all the sampling sites. From the area of the bay at Abádszalók, we have also systematically collected the larvae of the *Cryptochironomus* species which is predacious and generally feeds with Oligochaetae. It is obvious, however, that Oligochaetae were found in none of our samples.

Contributions to the discussion:

BALÁZSFALVI, Mrs. A.: She asks if the lecturer has dealt with ascertaining the number of swarming and if the swarm can be foretold. —
Answer: A number of their generations could be established: in the course of April-May, September-October swarmings of high individual number could be observed. In connection with prognostification, no up-to-date forecast could be given because the number of swarming is considerably affected by temperature and the length of daytime. — She asks, too, what number of them flew out, as compared with the whole nutritive-material chain. —
Answer: At the Balaton, this is generally given in calorie. Here the number which flew out was low, as compared with the whole nutritive-material chain.

VÉGVÁRI, P.: He asks if the Chyronomidae get back into the same systems after their taking flight. —
Answer: This has not been investigated, as yet. It would, anyway, be desirous to ascertain this, he thinks, if the place is proper.

HAMAR, J.: What states, aerobian or anaerobian conditions are reflected by that?
Answer: Primarily, the formation of $H_2S$ may mean a danger.

BÁBA, K.: He asks, to what extent the restocking of Chironomida can be affected by the Tisza dead-arms.
Answer: The dead-arms support their stocking.

(7) VÉGVÁRI, P.:

## Trophity of the standing and river waters

The survival and development of several conceptions depend upon, in what degree they can be applied in practice.

The concept of trophity was elaborated, as is well-known, for lakes, mainly deep lakes. It is proved by the practice of past years that the conclusions drawn from the results of the investigations into the deep sees are valid not in every case for the aquatic ecosystems of another type (rivers, shallow lakes, reservoirs, etc.).

In the interest of being able to evaluate the trophity of standing and flowing waters, we have regarded as necessary to elaborate a conception which will have a more general validity than the present ones. In the special literature, we have more than once met the idea that — in the interest of the evaluability of the nutritive material content and the primary organic-matter production of the aquatic system — we must differentiate between the "trophity state" and "type" of the aquatic ecosystem. As this opinion was also supported by our investigations into the Tisza and the Kisköre Reservoir, in our idea we have separated the definitions connected with the stockpile of the vegetable nutritive material of the aquatic ecosystem and with its change and flow (trophic=nutritional) from the category dealing with the functions of the photo-autotrophic living beings, the possibility, process and consequences of the primary organic-matter production (Gr. trophos=feeder, trophity=productivity). The lecture is treating the problems of the nutritive-matter flow of the aquatic ecosystem, as well as the role of water trophity in the nutritive-matter flow.

B) **Investigations performed in other Tisza reaches and nature conservation areas**

(8) BANCSI, I., HAMAR, J. and HEGEDŰS, MÁRIA:
On the hygienic water quality and water-qualification of surface waters

The system of the biological water-qualification was elaborated by FELFÖLDY (1974), in his book: "A biologiai vízminősítés" (Biological water-qualification), on the basis of the known four groups of characteristics.

In case of water-utilizations, demanding hygienic supervision, the examination of the hygienic state of our surface waters is not dispensable. At present, the investigated bacteriological parameters are suitable for "estimating first of all the faecal pollution on surface waters and thus the potential danger of the contaminations, spreading by means of water" (DEÁK, 1977, Módszertani útmutató = Methodological guide-book).

As it is known, the physical, chemical and biological properties of surface waters produce favourable conditions of living, not only for saprophytic but also for parasitic micro-organisms. In case of water qualifications, performed from hygienic point of view, apart from the four known biological parameters, the contamination of water is therefore also to be taken into consideration in any case.

The authors suggest, in case of water-utilizations demanding the hygienic qualification of the surface waters, to take into increased consideration the hygienic parameters.

They propose to introduce the concept of hygienity for the designation of this characteristic property-group.

This general concept, the hygienity of surface waters, may give information about the possibility of the human and veterinary utilization, as well.

A declaration:

Mrs. A. NAGY: The flood plain at Tiszabercel (780 ha) was declared, and the flatland at Szatmár bereg (56 000 ha) will in the near future also be declared a nature reserve.

Contributions to the discussion:

BERENCSI, GY.: He recommends to use only water of drinking-water qualification for vaporizing plants. An absolute co-operation is needed between the organs of hygieny and water-conservancy. It would be advisable, as well, to extend water-supervision to the investigation into trace elements, too, in the future.
Answer: The Station of Public Hygiene and Epidemics in County Csongrád is in close co-operation with the Water Conservancy of the Lower-Tisza Region; its water-chemical investigations are carried out by the Laboratory of this Conservancy.

GALLÉ, L., Sr.: May the water of the Maros be drunk at present? Leaving Szeged, after how long flowing will the Tisza be clear water?
Answer: The Maros is, unfortunately, no more of "drinking-water" quality. After leaving great cities, like Szeged, the process of natural purification is of slower and slower tempo. It takes place in a longer stretch than in the years before.

ESTÓK, B.: He emphasized the importance of drawing water conservancy and hygienic work nearer one another, to in order to make, in this way, both works more effective and manifold.
Answer: The lecturer thanks for the contribution with which he considerably agrees.

(9) VÁNCSA, A.:

Biological water-quality of the Tisza between Tokaj and Tiszafüred, on the basis of the investigations carried out in 1969–1978.

Of the about 1000 km length of the Tisza 600 km lie on the territory of Hungary. To the area of the Water Conservancy of the Northern Tisza Region, a Tisza stretch of about 100 km length belongs.

On the Tisza-stretch between Tokaj and Tiszafüred, on the basis of the results of the investigations performed in the period between 1969 and 1978, beyond the evaluation of the human (communal, industrial and agricultural) water-utilizations, there is a possibility for evaluating the property-groups of the biological water-quality (halobity, trophity, saprobity and toxicity) concerning a longer period, as well.

The characteristic values of the physical-chemical-biological properties of the Tisza (maximum, standard, minimum), compared in time and space, enable us to characterize:

(1) the changes taking place in the single sectors,
(2) the differences to be observed in the longitudinal sector,
(3) the effects of polluters in the area of the main tributaries (Bodrog, Sajó) and
(4) in the area of Leninváros, exerting changes in water-quality.

The reaches of the Tisza river bed between Tokaj and Tiszafüred practically form the background of the Kisköre Reservoir. The evaluation of the results of investigations carried out for ten years may, therefore, afford some data for giving an expert opinion on the biological water-quality of the Tisza. In addition to this, the present compilation may also furnish basic data of additional character for the comparative evaluation of the changes in water quality in the period before damming.

(10) Mrs. HORVÁTH MÁRIA MÉSZÁROS and Mrs. KISS IBOLYA BALOGH:

Effect of the irrigating water, loaded with chemicals, exerted on the grown plants

Our experiments were performed in order to utilize the river and channel waters as irrigating water. The effects of engine-oil pollution and salt content were examined. (In 1978, the water of the Lower Tisza Region comprised 10 mg/l engine-oil on two occasions).

We have worked both pre-emergently and postemergently with two kinds of engine-oil concentration, water of high salt content, and control.

Seeds of capsicum, bean, pumpkin, horse-bean *(Vicia faba)*, mustard, wheat and maize were caused to germinate at the pre-emergent treatment. At postemergent treatment the same plants were treated, 4–5 days old.

The germination of seeds was not checked by oil and salt. In growth and development some differences manifested themselves. Accumulation of dry matter, growth, ascorbic-acid content and enzyme activity were measured. At treating 4–5 days old seedlings postemergently, we could observe that growth and development of the plants were checked both by oil and salt. The plants became bastard and perished. The degree of damage and the occurence of perdition were designated by the indices of the examined metabolism, as well.

Contributions to the discussion:

MARIÁN, M.: What was the origin of the oil-pollution of samples. Was the oil administered or did it get into the samples from the surface of the Tisza water?

Answer: In the experiments, discussed in the lecture, engine-oil was used. But the water of the Tisza was used, as well.

KISS, I.: The water of the Kurca is polluted with herbicides. Some of our rivers, thus the Sajó, as well, are strongly polluted. It would be necessary to moderate the pollution with vigorous measures.

VÉGVÁRI, P.: As to the oil content, it is not all the same, from where the water sample originates, from the streamline or from the neighbourhood of the river-side. It is questionable, from which water layer the sample was taken. —

Answer: The oil was artificially carried into the water of the Tisza.

(11) SZABÓ, A.:

Changes in water quality in the Eastern Main Channel, 1973–1978. Zooplankton investigations.

The close following of the water quality of the Eastern Main Channel is first of all important from the point of view of the drinking-water supply of the town Debrecen.

It is shown by the investigations between 1973 and 1978, that the water quality of the Tisza exerts a great influence on the annual and seasonal changes in the water-quality of the Channel. According to the results (concerning primarily the summer small-water period), in the sector at the mouth of the river (in the area of Tiszavasvár) the species and individual counts are still high (6–10.000 ind. 100 l). After going in the direction of Balmazújváros, this decreases more and more (4–800 ind. 100 l). The zooplankton composition and the ratio of the participation of species also change along the course of the river. The plankton is above all dominated by Rotatoria; occasionally — like in July, 1975 and 1976 — by Cladocera (*Bosmina* sp., *Daphnia* sp.), resp. the number of Copepoda also increases (thus in August, 1976 and 1977).

The members of *Brachionus* sp., *Keratella* sp., as well as the *Bosmina longirostris* and *Daphnia* species may be considered as characteristic.

On the basis of the zooplankton, between 1973 and 1978, the water quality of the Eastern Main Channel manifested itself — apart from minor differences — as uniform (beta-mesosaprobic); although in the year 1978, due to the continuous floods (high floating-matter content, large KOI values), in this relation a certain deterioration could be experienced.

(12) GÁL, D.:

Zooplankton of the Tisza-reaches between Szolnok and Szeged

The character of the lower Tisza reaches and together with this the quality and quantity of the zooplankton developing in the Tisza will in future be considerably changed by the river barrages, built and planned in the lower Tisza reaches (Tiszabecs, Csongrád). I have investigated for a year, with monthly samplings (at 11 sites), the zooplankton of the Tisza-reaches between Szolnok and Szeged, as well as in the parts near the mouth of tributaries.

It may be established from the investigations that in the zooplankton generally the Rotatoria species dominate both in species and in individual numbers (about 55 percent of the total zooplankton). The Entomostraca species are forming 30 to 35 percent, the Protozoa about 10 percent of the zooplankton.

A considerable pollution can be observed in the reaches below Szolnok (a considerable amount of sewage water is already carried by the Zagyva, too) and in those below Szeged. Here the amount of the zooplankton strongly decreases. Primarily the number of the beta-mesosaprobic organisms sinks from 45 to 20–25 percent. On

the other hand, the number of the alpha-mesosaprobic organisms rises on about 55 percent.

From among the tributaries, the Zagyva pollutes the Tisza strongly, by carrying a considerable amount of sewage water. The zooplankton of the Körös considerably differs from that of the Tisza. It carries new species into the Tisza, a number of which survive there, too. The quantitative and qualitative composition of the zooplankton of the Maros differs from that of the Tisza only in minimum.

Contributions to the discussion:

HAMAR, J.: According to his experience, the two-peaked maximum of the zooplankton becomes blurred as a result of being stored. He asks, in what direction the pollution affects the quality of water. And how the zooplankton, qualified on the basis of the saprobic system, will modify as a result of being stored. He asks, too, whether the Maros exerts no stronger effect on the zooplankton of the Tisza. —

Answer: The saprobic system is, unfortunately, not perfect. The quality of water is deteriorated by the pollution. According to his observation, the two-peaked maximum originating from the phenological rhythm of the zooplankton does not become blurred. 70 to 75 percent of the species of the Maros are common with those in the Tisza.

MARIÁN, M.: He asks what the cause is that the results of the hygienic and zooplankton investigation of the Tisza-reaches at Csongrád do not agree entirely with one another. —

Answer: The error must probably be looked for in the applied system of qualification.

Andó, M. (a completion): The Tisza is considerably affected by the Maros, in microclimatic relation, as well. —

Answer: The lecturer thanks for the completion.

JÓZSA, Z.: The investigation into the microplankton is very cumbersome. It is not easy to give an unambiguous qualification on the basis of the microplankton organisms. His question is: what is characteristic of the quantitative composition of the microplankton organisms of the Maros. —

Answer: The number of organisms is very low.

(13) BODROGKÖZY, GY. and † HORVÁTH, I.:

## Effect of light conditions on the plant associations of marshy meadows

The white poplar groups formed in the marshy meadow of Körtvélyes island enables the investigation of the different daily rhythmical changes in the illumination intensity and of the effect of shading under field conditions. It is known from the investigations carried out in a phytotrone that illumination-intensity and its daily rhythmic change are important factors of the vegetable organic-matter production.

The nearly circular tree-groups have a diameter of 40 to 60 m. They are 15 to 20 m high and the marshy-meadow association round them may be regarded as identical.

Between June and September, 1978, we performed stand-climatic investigations round a tree-group like this. The stand structure exposed to different cardinal points, as well as the amount of the sub- and supersurface phytomasses were determined.

The marshy meadow round the tree group is *Lythro-(virgatae)-Alopecuretum pratensis,* which in 1978, owing to the floods in 1977–1978, changed into *Carici (melanostachyae)-Alopecuretum pratensis.*

In the stand-climate, as a function of being exposed to different cardinal points, the difference is of considerable degree. In north-south exposition, for instance, in a height of 10 cm over the ground, the difference of temperature can even reach 6–7 °C.

Exposed to west, the shade before noon increased the ratio of *Alopecurus pratensis* and excluded *Glycyrrhisa echinata.* In northern exposition, the effect of the contin-

uous shading is also similar. In southern exposition, the ratio of the two species has changed inversely.

In the morning, the amount of phytomass was increased by the higher intensity of illumination, as well as by the continuous shade effect. In northern exposition, this effect was 25 percent higher than in the southern one.

Contributions to the discussion:

KISS, I.: His question was, whether there are any data in the literature on the subject, concerning how the amount and composition of the amino acid, as well as the amount of other materials formed in the plant, are affected by the light effect at noon and in the afternoon, depending upon the composition. —
Answer: The investigation into the distribution of the light effect is methodologically difficult. It is therefore very difficult to elaborate the most suitable procedure.

ANDÓ, M.: The lecture has been an object-lesson of how important it is to calculate the production. His question is whether the temperature gradients between the given shaded areas can be explained and separated. —
Answer: It is planned to perform investigations into the internal content of the organic matters.

TÖLGYESI, GY.: He speaks with appreciation of the lecture and offers his co-operation. His question is whether the difference of the amount of $CO_2$ was examined, as compared with the plants in the dry land. —
Answer: The authors are indebted for a possible co-operation of GY. TÖLGYESY and count on it.

DÓSA, J.: He asks, how the amount of phytomass can be increased by the maximum exploitation of the light conditions. He expounds that the leaves of coniferous woods in lower regions use more water in less light than those being in the upper level but they produce only few assimilata.
Answer: At the beginning of illumination the light energy is high and the production (density of individuals, size, quality of the produced organic matter) is increased by this.

MARIÁN, M.: This lecture has a connection concerning the multiplication of invertebrata, as well. Owing to the increase in plant production the individual number of animals increases, too.

TÖLGYESI, GY.: The quantity of assimilata is strongly affected by shade and light. He repeats offering his willingness to co-operate.

GYŐRFFY, GY.: He asks whether the amount of organic matter produced in different phases of illumination was investigated. —
Answer: The climate-examinations of the stand are more detailed than it could be exposed shortly in the lecture. — On the basis of the general exposition, there is no difference either in temperatures or in vapour contents. This is understandable due to the small area.

(14) KOZMA, A. and TÖLGYESI, GY.:
Plant associations of the Middle-Tisza flood-plains and inundation areas and the agricultural utilization of these

Between the years 1975 and 1977 we carried out investigations in several flood-plains and inundation areas along the river Tisza, on the basis of considerations indicated by the title. The plant association that is dominant in the investigated areas is Salicetum albae-fragilis. Consequently, the most important economic factor predominating in the inundation areas of the Tisza is sylviculture. We can also draw a distinction zonally between the mesohygrophilous, semi-ruderal plant associations on the river banks, as well as between the levee and the soft-wood gallery forest. The plant associations on the river sides are also semi-ruderal. The underwood of the soft-wood gallery forest is composed of dry-stalked weeds and poisonous plants. This area is not good for grazing. The secondary flood-plains are partially covered with widespreading grass pastures and, in places, over a large area, the arable land is tilled.

The mineral content of the plants growing in the investigated flood-plain and inundation area was measured, repeatedly two times, relating to six macro- (K, Ca, Mg, P, S, Na) and seven microelements (Al, Fe, Mn, Zn, Cu, B, Mo). It was found

that the plants growing in the areas bordering the Tisza had accumulated a much larger amount of minerals in their tissues than the meadow hays and the vegetation of the flood-plains along the river Danube, where we had also conducted investigations. On the evidence of the soil analysis made by us, the soil in the inundated areas along the Tisza has everywhere a slightly acid reaction. Not more than 8 to 10 p.c. of the area can be turned into pasture or hay-field.

Contributions to the discussion:

BODROGKÖZY, GY.: The investigation fits very well into the material of the monograph begun by him at present. The mentioned *Bolboschoenetum* association may have been something else than the association designated by him. There can occur no *Artemisio-Festucetum* association in the flood plain. He asks to designate the site exactly. He has observed an increasing alkalization in the flood plain. He expresses his thanks for the good lecture.

DÓZSA, GY.: We must not speak of a *Rubus caesius* infection, says he, because this species has an importance here, for instance, from the point of view of sustaining the stock of game. — Answer: The expression "infection" in connection with Rubus caesius was only a slip of the tongue.

HORVÁTH, I.: He considers the investigations as conclusive.

ANDÓ, M.: The high iron and sulphuric content of the soil of the Kisköre Reservoir may later raise considerable problems as a result of the hydrogen sulphide formation. — Answer: Tse cause of the large amount of iron anii sulplur found in the Ktsköre Reservoir ts unknown. In the water of the Tisz5 dtssolved iron occurs but tn a very samall amouni.

ANDÓ, M.: The high iron and sulphuric content of the soil of the Kisköre Reservoir may later raise considerable problems as a result of the hydrogen sulphide formation. — Answer: The cause of the large amount of iron occurs but in a very samall amount.

KISS, I.: He regards as considerable that the areas along the Tisza, however deficient in lime they are, contain more of manganese. This ís an essential datum from the point of view of plant physiology.

(15) TÖLGYESI, GY.:

## Some regularities of the intake of mineral matters by the different plant species in the Upper-Tisza flood-plains

I have analysed the flood-plain vegetation in the Upper-Tisza Region, between Tivadar and Tiszaszalka, in five habitats, concerning 13 macro- and microelements. In the course of elaborating the data, in connection with the different plant species living in the same habitat, the following could be established.

The standard deviation of the microelement content of the plant species collected from a smaller sector of the flood-plain, within a distance of 50 to 100 m, is larger than that of the macroelements. In this way, iron can be characterized with the variation coefficient of 82–84, zinc of 45–140, molybdenum of 69–150 percent value. The same value was in case of magnesium only 33–59, at phosphorus 19–38, and at potassium only 18–35 p.c.

In the composition of the different plant species of a habitat in respect of 13 elements 77 correlations may be taken into consideration. From among these, four element-pairs were significant in every habitat. The calcium and magnesium, calcium and boron, aluminium and iron contents of the plant species, living in the same habitat, as well as their readiness to intake are parallel.

From the result of the survey taxological and ecological conclusions can be drawn.

Contributions to the discussion:

KISS, I.: The lecture has enriched our botanical knowledge. The quantity of macroelements is phylogenetically determined. It is therefore that of monocotyledons the low, of dicotyledons the high cobalt quantity is characteristic.

HORVÁTH, I.: How much is the environment for the quantity of microelements determinative?
BODROGKÖZY, GY.: How much does the quantity of macro- and microelements depend upon the hydrographical conditions of the inundation area? The accumulation of iron takes place under anaerobic conditions. He regards as necessary to continue the investigations in order to learn why just in this place the given plant association developed. —
Answer: The inorganic matters are suitable for demonstrating the phylogenetic evolution, relationship of the living world.

OBRADOVIĆ' MELANIJA:

(Her lecture was published in the Tiscia, vol. 1979)

Contributions to the discussion:

KOZMA, A.: He is glad of the lecture because he deals with this subject, too.
HORVÁTH, I.: He took pleasure in the interesting floristic lecture.
BODROGKÖZY, GY.: This lecture is good also because it indicates the exact date of distribution, as well. *Echinocystis* and *Typha laxmanii* occur in this country already in large numbers. In the rice-fields the latter is a furrow-weed.
GALLÉ, L., Sr.: When he was a boy, he lived in the mentioned area. He knows it well. It was therefore interesting for him to hear about the changes having taken place since that time. —
Answer: Until 1960–1966, the floristic research was slower in the Voivodeship because there were no research workers for this purpose. Since then, the research work has accelerated. *Echinocystis lobata* is a furrow-weed in the Voivodeship, as well. *T. laxmanii* is already very frequent in Syrmia, too. It can be found even in the licks. The Tisza has no part in its distribution.

(17) KISS, I.:

## Problems of the environmental and nature conservation of dead-arms and tributaries in the Upper-Tisza Region

The dead-arms of the Tisza have also a bearing on its living world. This can be said even more so of the tributaries which increase trophity, saprobity and toxicity more and more frequently. In the Summer of 1978, in the Upper-Tisza Region, we investigated four dead-arms and four tributaries from algological point of view. The water of the dead-arm at Tiszadob could be described as comparatively clean in which Chlorococcales frequently appeared. The foggy marshland at Tiszaluc and its small dammed western part, the so-called Takta-Reservoir, are already strongly eutrophicated.

From among the tributaries, the Sajó at Putnok was very strongly polluted. Its water was dark brown in a long stretch, plankton algae occurred in it only exceptionally. The water becomes more polluted at Putnok, as well. The Bodrog reaches Sárospatak already polluted and its pollution continues increasing. The Takta, increased with the Szerencs brook, is also polluted, and is poor in phytoplankton. The Eastern Main Channel is of slow flow on the confines of Tiszavasvár, its algal population is rather rich.

From the point of view of nature conservation the dead-arm at Rakamaz is to be mentioned. In the riverside zone of this, opposite to the community, the white water-lily *(Nymphaea alba* L.*)* grows in dense stands. Its occurrence in large numbers is a less-known sight of the community, it demands, therefore, an increased attention in the nature conservation work. The lake Fehérszik-tó on the eastern confines of Tiszavasvár is already a nature reserve, getting also Tisza water, its alkalinity has considerably decreased.

Contributions to the discussion:

BALÁZSFALVI, Mrs. A.: She thanks for the lecture and is glad that it called the attention to the mistakes made by the environmental and nature conservancy. She asks the lecturer and others, too, for help in order to perform their duties always better.
Answer: The lecturer offers his services to the Environmental and Nature Conservation Office.

MARIÁN, M.: He asks if in the course of his investigations he met any dead-arm in which a saligot (Trapa natans) stand of large extent could be observed. —
Answer: He has not found any well-developed thalli of saligot.
By what is the brown discolouration of the Sajó induced? — asks M. MARIÁN — Is it perhaps a pollution caused by a factory? He calls the attention of the Station of Public Hygiene and Epidemics to that much gargabe, oil is taken in the water by ships.

HEGEDŰS, M.: She asks if the lecturer found in her collecting sites the Sphaerotilus natans species, indicating a pollution caused by the sugar-works. —
Answer: She has not found the *Sphaerotilus natans* species.

GALLÉ, L., Sr.: Why is the stand of saligot forced back? Does the Nymphaea alba not annihilate itself as a result of the alluvial deposit? —
Answer: The Stratiotes stand is forced back as compared with the earlier states. — He has not found *Nymphaea alba* elsewhere in such a large stand.

B. TÓTH, M.: About ten years ago, the dead-arm at Végaldó was full of saligot. But after raising the water surface and setting up a duck-farm it became extinct.

JÓSA, Z.: The coloured pollution of waters is caused by the leather factories, e.g. in the Bodrog. The mesoplankton and the stock of fish become extinct. —
Answer: In the Bodrog many oil stains were found. It is not known exactly, where they originate from.

I. FODOR: The filtering of pollution should be solved by means of the vegetation.

## (18) BÁBA, K.:
## Stocking of the flood-plain with mollusc species and some lessons of succession

In my investigations I have looked for an answer to whether in the flood-plains, disturbed by water, the succession of gasteropoda is parallel with phytocoenoses, as well as what kinds of structural changes take place.

It can be demonstrated on the basis of TW values established for the snail species — like for plants — that the standard deviations of the TW average values of plants and snails refer in the course of succession mathematically significantly to ecological parallels. In the course of the primary succession, species of 8 to 10 W values settle down. These are in a low flood-plain: Succinea oblonga, *Perforatella rubiginosa;* on a higher site, at the border of the river bed, besides the former ones, the snails preferring W 5 (fresh) degree: *Cochlicopa lubrica, Vallonia pulchella* are frequent species. At a still higher level of the terrain, some species preferring fresh-half-dry humidity occur. The snail communities of the gallery forests disturbed by water may only periodically have originated from the willow-plantations, their constant-dominant species are less hygrophytic. The ground has rising tendency, lower and higher levels alternate. The snail communities are, therefore, mosaic-like.

In the clay, on a "cold soil", the frequent species are more hygrophytic on higher terrains, as well.

In the shrub-willow beds and willow poplars, there are only two species that show a higher affinity than 0.5. (With Kendall's method and with a significance examination suggested by I. PRÉCSÉNYI). These are highly hygrophilic, owing to the constant water-disturbance of the flood-plain. These two species are: *Succinea oblonga* and *Perforatella rubiginosa.*

Contributions to the discussion:

GALLÉ, L., Jr.: The lecturer has grasped the problem very well. On the basis of what did he choose the TW values? In his opinion, the principle of higher diversity, higher stability cannot be true.
KISS, I.: He takes with joy the tendency to reckon diversity on mathematical basis.
FARKAS, Á.: Do the snail species indicate the degree of pollution?
MARIÁN, M.: It is necessary to make clear some notions of plant association.
His questions are: Has the lecturer any experience in respect of how the snail species living in the flood-plain survive a long-lasting flood like that in 1979?
Lecturer's answers: He agrees with the opinion of GALLÉ, Jr.
The different species of snails and shall-fishes, as well, indicate the pollutions of different strength with decrease in their individual numbers.

(19) GALLÉ, L., JR.:

## Niche analysis of ants (Hymenoptera: Formicoidea), with special regard to the grass associations along the Tisza

The author, in the course of his analysis carried out on 40, mainly lowland grasses, has investigated 30 grasslands along the Tisza, studying the following dimensions: macrohabitat, size, parasitism, microhabitat, and activity.

On the basis of their niche width, the investigated species can be classified into three (generalist, specialist, and "xen") groups in the dimension of the macrohabitat. In the macrohabitat dimension, primarily the compulsory physical conditions are responsible for the separation of niches. In the open field, the correlation measured in the relation of the compulsory physical condition and density does not reflect the real, fundamental niche centre in every case. The populations are mostly constrained to deviate from that in their realized niche and are in a sub-optimum situation under the pressure of their dominant competitor. The niche overlap of the macrohabitat dimension ($H_T$—$H_B$) is the least. By this, the correctness of Gause's hypothesis is proved on ants, Separation may be considerable in the microhabitat and activity dimensions, as well.

On the basis of the niche analysis, two competing basic strategies can be demonstrated at the ants of grasses: (1) interspecifically dominant species: their intraspecific aggressivity threshold is often low, owing to polygynia or the polycalic colony formation; (2) intraspecifically subordinated species of an intraspecific contest-competition which — under their conditions close to Gause's situation — can only avoid extinction by means of a niche separation which is disadvantageous to them.

Contribution to the discussion:

KISS, I.: He deems the evaluation carried out on mathematical basis as very good.
BÁBA, K.: What is expressed with "agressivity" in this case? —
Answer: If the diversity of coenosis increases and it is stabilized, the niches are more separated from one another and competition increases. The aggressivity between the different ant species was studied in a laboratory.
MARIÁN, M.: Can the animals live in different biotopes but belonging to the same species be in competition with one another? —
Answer: Competition can only come into question if the niches overlap one another but only if there is a poverty in food. If there is plenty of food, there is no competition.
BODROGKÖZY, GY.: Some species live on a given territory because they have no other choice but to live there. For him this has been very important in the lecture.

(20) TANÁCS, L.:

Regeneration of the Apoidea insect fauna in Körtvélyes island, taken as a function of the flood-waves

The investigations were carried out in Körtvélyes island in 1975, 1976, and 1977. The observed area was divided into zones. The dike slope surrounding the island had a part in fauna control.

In the inundation areas, the Apoidea insect regeneration is a function of the duration resp. dates of the flood waves. The vegetation regenerates one and half to two months after passing of the flood-waves. After summer floods, there cannot be formed any continuous plant associations any more. On the other hand, the result of late-spring floods is a continuous vegetation.

The structure of the Apoidea insect population is primarily determined by the nutritive plant connections.

In the investigated area, the factors determining the regeneration, resp. structure of the Apoidea population are: the climatic conditions, the poverty in the species combination of the vegetation, the effects of culture, the distance from the dikes.

Contributions to the discussion:

BÁBA, K.: Is there any correlation between the individual and species numbers of bees and the number of flowers? —
Ans wer: Yes, there is.
Is there induced any change in the species and individual numbers by the mowing of levees? —
Answer: Mowing takes place in sections. The bees should, therefore, not fly far away.

(21) FARKAS, Á.:

Multiplication and growing circumstances of the pike

The annual floods of the Tisza enable the fishes to get into the borrowing pits and dead-arms of the flood-plain. After the spawning following the spring flood, the young fish, having gathered strength in the course of Summer, can again get back into the living river from the dead-arms and borrows with the autumn flood.

I have established, in the course of investigating into the spawning, multiplication and alimentary conditions of the single fish species, that in the dead-arm at Körtvélyes the quantity of the stock of carp, silure and pike-perch annually considerably changed while the number of the caught pikes has shown a comparative stability. In the north-western section of the dead-arm, owing to the water vegetation and the low water (1 m), fishing could not be carried out with the method of large tools (fishing sweeps). In this area, therefore, there have always remained enough pikes for the further multiplication.

According to my experience, the pikes did not leave the dead-arm with the autumn flood, either. Their spawning takes undisturbedly place in the bordering waters of the dead-arm grown with water plants. On 20 February 1978, the fishers. caught fully spawned individuals and in 1979 spawning began only in mid-March.

In May, 1978, the length of the young pike was 35 to 45 mm. They grew till September to 160 mm and 100–150 g weight. The spawners that are not much older than one year, till May–June reach even 1000 g body weight.

The alimentary and growing conditions are, therefore, favourable for the multiplication of pikes.

Among the dissected specimens I have found *Abramis brama, Rutilus rutilus, Alburnus alburnus* individuals.

Contributions to the dissection:

CSIZMAZIA, Gy.: To his knowledge, "Razbora" appeared — sometimes in large numbers — in some waters of Hungary. He asks if it is known from the Tisza. —
Answer: The mentioned fish belongs to the ablets *(Alburnus alburnus)*. In fish-ponds it has already really occurred in large numbers but he has no information on its occurrence in the Tisza.

BALÁZSFALVI, Mrs. A.: She asks why the individual number of the pike is unchanged in the investigated dead-arms —
Answer: The pike, in contradistinction to the pike-perch, does not leave its biotope on the occasion of the Tisza floods — it is attached to the area with saligot.

BÁBA, K.: Is the appearance of Lota lota in the lower reaches of the Tisza frequent? —
Answer: It is rare in the mentioned reaches.

MARIÁN, M.: How was the age of fishes established? —
Answer: In this case, it took place on the basis of fish-scales.

(22) WOLLEMANN, MÁRIA:

## Sonogram analysis of the sounds of the night heron *(Nycticorax* L.) in the heronry at Labodár

The sound of night herons in the heronry at Labodár was followed with sonogram analysis from the formation of pairs till the raising of nestlings, from early April till mid-July, 1978.

In the heronry 60 pair nested. Still in the time of carrying the matter to the nest, we observed a new, characteristic sound which we considered as calling the fellow bird. This was, as opposed to the characteristic "quak"-sound of the night heron, a melodious, sound repeated 3–5-times, emitted by solitary birds perching on a tree. The frequency of the sound culminated at the end of April. Later it was only emitted in the morning and evening hours and in the second half of June it entirely ceased to be heard.

I have first perceived the sounds of young birds in the middle of May. These became stronger from week to week. In mid-June, the young birds already left their nests and perched on the adjacent trees.

Contributions to the discussion:

SZITÓ, A.: Is there any difference between the sounds of the different sexes? —
Answer: She has no knowledge of that.

GALLÉ, L., Jr.: Did the individual number of the birds of the heronry changed lately? —
Answer: The stock became rarer, in fact, owing to the decrease in the forest areas.

(23) CSIZMAZIA, GY.:

## Effect of the back areas on the mammalian fauna

The extension of the continuous ecological researches is made necessary by the environment of the Tisza changing by leaps as a result of the human activity. In some basic areas of the Tisza research, in the biotopes not only in the flood-plains but also on the protected side, the trappings of small mammalia and analyses of casts were continued. On the course of these, new ecological effects and connections were brought to light.

The large-scale change, which was a result of the river control, has induced an intensive quantitative decrease in the mammalian stock. In the past one and half decades — in connection with the effect of inundation — the horizontal and vertical distribution of mammalia in the single flood-plain biotopes was established.

On the basis of coenological characteristics some mammalogical units of independent ecological and dynamical structures developed in the flood-plain — in spite of its mosaic complex biotopes. Of late years, the changes that followed in the Tisza valley (river barrages, high and lasting flood waves, the intensive agriculture of the protected side) brought about a considerable quantitative and qualitative transformation, the impoverishment in the mammalian fauna in the investigated reaches. In connection with this it may be ascertained:

(1) The ecological change of anthropogenous root in the areas outside the dike prevails more and more intensively in the life of the mammalia in the flood-plain.
(2) In the investigated reaches where there is no "mirror" biotope (as it was destroyed), similar to that in the flood-plain, on the protected side: the quantitative and qualitative destruction of the mammalian fauna is 50 to 90 percent. (Period between 1963–1978).
(3) The quantitative decrease in the mammalian stock (Chiroptera, Carnivora, Insectivora) can also be registered in case of the mosaic-complex (mirror) biotopes on the protected side.
(4) The cast analysis cannot be used for the comparative coenological investigation- and description of the small-mammalian populations of the flood-plain biotopes and protected areas. The methods of parallel and quadratic trappings may be applied.
(5) In the inundation area of the Tisza, the purposes of nature conservation and game management could not be achieved if we don't pay attention to protecting and managing the protected areas from ecological point of view.
(6) After terminating the agricultural system of detached farms with its bush and tree vegetation in the Great Hungarian Plain, some problems of game management and epidemiology have appeared. *(Capreolus capreolus, Lepus europaeus, Vulpes vulpes).*
(7) It is advisable to extend the research work into mammalia in future still more, even over the biotopes on the protected side of the Tisza valley and on carrying out investigations into the energy flow.

Contributions to the discussion:

BALÁZSFALVI, Mrs. A.: The National Office of Environmental and Nature Conservancy is opposed to clearing an area of beasts of prey by means of egg poisoning.

GALLÉ, L., Jr.: The use of poisoned eggs is an ecological scandal.

BÁBA, K.: He is of similar opinion and remarks that a great many useful and protected animals were exterminated as a result of this practice, mainly if used in the time of brid migrations.

TANÁCS, L.: The growing of lucerne is decreased by the fosdrin treatment because the pollinating bees perish for fosdrin. How general is the use of this drug in the investigated area? — Answer: It is general in the form of poisoned eggs and it is also used by agrochemistry.

ERDEI, M.: The stock of games, mainly of hares, partridges and pheasants, decreases owing to the technique of lucerne-mowing, as well.

MARIÁN, M.: How was the size of the area of motion of the mentioned mammalia established? — Answer: The simplest way is to dig bottles with wide orifice in the ground and mark the mammalia getting into these.

(24) ERDEI, M.:

Game-sustainig capacity of some forest types in the Region Conservation District at Mártély
(No lecture-abstract received)

Contributions to the discussion:

FODOR, J.: In the Upper-Tisza Region a new adventitious plant became general, the "American sunflower", driving back the Sălicaceae. This is Helianthus rigidus. Has it already appeared in Hungary, too? —
Answer: It has not, as yet.

(26) STAMMER, ARANKA, HORVÁTH, I., and CSOKNYA, MÁRIA:
Chromatophores of fishes in the Tisza in connection with the change of environment

The morphological bases of the constand changing patches of colour of our fishes in the Tisza are ensured by the chromatophores of the skin. The ramifying processes of the cells of connective tissues transformed into choloured plastids are very different in the investigated species. The forms of extension are determinants not only for the major taxonomic categories but for species, as well.

It is a matter of curiosity that the chromophores immigrate from the corium between the epidermal cells, too. This is the most obvious in the skin of the pike and silure, in respect of the part of the body: in the visceral zone of the head and along the lateral line. The tiny granules of the plasmatic pigment are electron-microscopically electron dense granules of different length. At plasmatic contraction occurring under hormonic activity the size of pigments strongly changes, by the aggromelation of granuls a considerable difference in colour may take place.

Differences in colour of the matter of granules, resp. an occasional stratification of chromophores cannot be supposed in fishes. In the basal layer of the epidermis there are no pigments. In the waters polluted with paint the plasm of the epidermis cells becomes granular. This can be connected with the destruction of cell organella, mainly mitochondria, with an increase in the number of lysosomes and the induction of skin wounds. At the hormonal effects of the multiplication period no essential morphological change was found.

Contributions to the discussion:

MARIÁN, M.: The migration of chromatophores takes place as a result of hormonal effects. How fast is this? —
Answer: It is very fast. At frogs it can even be a few minutes.

(26) CSOKNYA, MÁRIA, HALASY KATALIN, and STAMMER, ARANKA:
Morphological studies on the intestinal canal of some water larvae Zygoptera

The authors have carried out their observations on the alimentary tract of the larvae of may-flies, Isoptera, as well as Anisoptera dragon-flies. The straight, tube-shaped intestinal canal of the larvae is divided on the basis of the histological structure into anterior, medial and posterior intestines. Besides discussing the histological structure of the single sectors of the intestinal canal, the authors also refer to the functions of these. Thus the anterior intestine carries out mainly the storage of food, the medial intestine the digestion and absorption, and the posterior intestine the removal of waste material and decomposition products. This is shown by the rectal papillae, the epithelial cells which participate in the ion and water transport and the intestinal branchiae even in the performance of the respiratory metabolism. The structure of the different cell types of the intestinal branchiae is also outlined.

Contributions to the discussion:

GALLÉ, L., Jr.: How much are the osmoregulative cells affected by the salt concentration of the environment? —
Answer: It is sure that the number of the osmoregulative cells is higher in a thinner solution.