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FROM THE LIFE OF THE TISZA-RESEARCH WORKING COMMITTEE
TISZA-RESEARCH CONFERENCE IX

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The ninth programme of the Tisza-Research Conferences, becoming arleady traditional, was organized between 5 and 6 of May 1978. There were delivered 26 lectures, followed by animated discussions. The reports covering a wide field of researches were representing the cross-section of the scientific work in 1977.

The Conference began with the opening speech of Dr. IMRE HORVÁTH, professor and head of the Department of Botany in the University:

Ladies and Gentlemen,

I am opening our Tisza-Research Conference, in rotation the ninth. We are happy to see here the members of the working committee and our guests. I am specially greeting Professor Dr. MIHÁLY MIKES from the Institute of Biology of the State University in Novi Sad. His participation is so much the more welcome because it means that the co-operation in the Tisza-research, started last year, gets on the right way. We trust to bind the contract of co-operation with the State University in Novi Sad as early as in 1978 and thus the Tisza-research will also comprise the Tisza-reaches in Jugoslavia.

A similar co-operation was agreed with the State University in Užhorod (Ungvár). By means of these, the Tisza-Research covers the whole length of the river. Thus, our work becomes international.

In 1977, our Working Committee suffered a heavy loss. Dr. R. VÁMOS, lecturer of the University, one of the foundation members of the Tisza-Research Working Committee, died. (The participants of the Conference rendered homage to his memory by standing up for a minute).

As a preliminary, I should like to call your attention to two problems. These are: the connection between theory and practice, as well as the change of "life" of the Tisza. According to a Cabinet-decision in January, 1978, the material and spiritual resources of the research-development should be concentrated for fulfilling the socially, economically most important tasks. Utmost attention should be given to raising the level of the scientific research works establishing investigating-developmental tasks of direct economic aims and for increasing their effectiveness. This purpose is served by our activity carried out on all the three domains of research, enjoying priority.

The other thing I wish to draw the attention to, as to one of the basic principles

of our research work, is the considerable change taking place in the life of the Tisza. To build reservoirs and follow the effect of their putting into service are important tasks of Tisza-research both in theoretical and practical relations.

We are pleased to be able to establish that the Tisza-researchers are prepared to a complex investigation of problems which are important to the practice, as well. This is proved, inter alia, by lectures, as well, to be delivered in our Conference of this year.

I wish every participant in the Conference a successful deliberation and good work.

After the opening speech of the president, and the exposition of the results of Tisza-research in 1977 and its tasks in 1978, the first part of the programme was continued with the lecture series "investigations performed in the district of the Tisza river barrages and in the nature conservation areas".

(1) ANDÓ, M.:

Climate types of the Tisza flood plain

The author systematizes the peculiar microclimatic fundamentals of the ecosystems of the flood plain on the basis of the microclimatic surveys performed for more than one year. He typifies size and character of the interactions taking place in the single natural-geographical sites. He analyses in detail the surface-climatic states formed in the area of forests, grasslands, mortlakes, dam systems etc, as well as the particular conditions of the heat- and light-climatic relations in the water space (of the mortlake).

The "Tisza flood-plain climate", appearing in the total effect of the single surface-climatic peculiarities — which is sharply separated in the climatic system of the Great Plain — has got a summarizing evaluation.

The microclimatic fundamentals of the single sites are typified by the author from the point of view too, of being utilized for recreational use, settlement, and other anthropogenous purposes.

Contributions to the discussion:

BÁBA, K.: He asks, why the month September is the driest in the Tisza-valley. — Answer: In late Summer, after the Tisza floods had passed as a result of the warm weather the flood pain becomes more and more dry, promoted also by the rainless September weather.

HAMAR, J.: Will the microclimate be changed in the district of Kisköre by the transformation of the macrovegetation? — Answer: A too much transformation cannot be reckoned with.

FARKAS, A.: What temperature conditions have developed in the different depths of the Tisza water? — Answer: As a result of the continuous water movement there did not develop any heat-stratification.

BÁBA, K.: What differences are between the microclimates of the middle-Tisza forests and the flood-plain forests in the environment of Szeged which can possibly exert an influence on the appearance or missing of the *Mollusca* species of montanic character? — Answer: According to the author's opinion the spreading of these Carpathian species cannot be influenced by the microclimatic differences.

ESTÓK, B.: Were there performed any meteorological observations in the recreational area to be developed in the Kisköre district? — Answer: Yes there were. But the direction of wind which is at present dominant n he itdistrict is NNW i.e. disadvantageous. It is most desirable, therefore, to form a convenient protective forest.

HORVÁTH, I.: Have the results of the two functioning meteorological stations shown a satisfying harmony? — Answer: Yes, they are in conformity with each other.

MARIÁN, M.: He is making inquiries concerning the temperature conditions of willow-plantations. — Answer: In case of plantations of closed stand a higher temperature can be observed in the tree stratum.

MIKES, M.: He asks if the investigations into the microclimate in flood plain contribute to develop the most suitable practical agrosystem. — Answer: Yes, they want to give answer to the question, what agricultural growing would be advisable in the flood plains within the comparatively short vegetation period.

(2) FERENCZ, MAGDOLNA:

Zoobenthos investigations in the area of the Tisza II river barrage

We have investigated into qualitative and quantitative changes in the zoobenthos fauna in the bottom samples, taken between 1969 and 1975, in the periods before (1969—1972) and after the impoundment (1973—1975) of the Kisköre Reservoir, from the Tisza (Kisköre and its district, Tiszaörvény, Tiszafüred) The Oligochaeta group was taken into special consideration.

It could be established in the course of evaluating the results that, in the period investigated, the number of Oligochaeta species (15, resp. 17), as well as their average individual numbers, were by and large in accordance with each other in both periods.

The highest average value of the individual number of Oligochaeta was found in the Small Tisza (10.6). The number was high enough in the Tisza Dead-Arm (7.5) and lower in the "living" Tisza at Kisköre (4.5), Tiszaörvény (3.2), Tiszafüred (2.7).

Contributions to the discussion:

BÁBA, K.: As a complement, in his opinion, the Molluscs, representing 28 to 30 per cent of the fauna of the Tisza, produce an equalizing process in this fauna together with the Oligochaeta.

ESTÓK, B.: What was the seasonal appearance of *Tubifex* like in the area investigated? At what a decrease in the dissolved oxygen content present themselves the problems at benthos? — Answer: *Tubifex* occurs in a rather low individual number. Concerning the seasonal changes, we have no data, as yet. He cannot give any answer about the change in oxygen content.

(3) ESTÓK, B.:

The hygienic microbiological investigation in the Tisza between Tiszafüred and Kisköre in 1975—1977

There took place a hygienic microbiological elaboration of profile and point samples between Tiszafüred and Kisköre, in the course of which a special consideration was taken for the pathogenic bacteria.

The performed investigations have unambiguously shown the section at Tiszafüred to be the most polluted *(Salmonella, Clostridium)*, as a result of the wastewater loading of the Tisza-stretch in Borsod. Going forward towards Kisköre, the bacteriological pollution decreases, primarily in the periods of river damming. At present, in these reaches, the manysided utilization of the river water can be solved with suitable technology. The investigational results of the river water, dammed up, give us an information concerning the natural clarification. But on the basis of these, the period after filling up cannot be prognosticated. Apart from preventive measures, the further bacteriological investigations are also necessary, to follow with attention the changes in the state of water.

Simultaneously with developing the recreational district, the regional canalization and water supply are also to be brought about.

Contributions to the discussion:

ANDÓ, M.: With what is to be explained that in the section at Tiszafüred the line of the current of water proved to be the most polluted? — Answer: As a result of the waste-water loading of the Tisza-stretch in Borsod, the most polluted water is forwarded by the line of current.

HAMAR, J.: In his opinion, the cause of the polluted state of the section at Tiszafüred may be the sewage-water of the town Tiszafüred, running into some kms above the section.

KISS, I.: He asks, from what depth the water samples originate — Answer: From a depth of 20 cm below the water surface.

MIKES, M.: How long does the pollution take an effect in the long run and how could it be neutralized? — Answer: Due to the natural water purification, a water scooping plant could be established 5 km below the introduction of the purified sewage-water. In Hungary, the solution of the purification of sewage-water is delayed by certain material problems.

B. TÓTH, MÁRIA: The number of pathogenous bacteria is negligible in the Tisza, as compared with the total bacterial count. Thus, they don't take any prominent part in the natural purification of water. She asks, whether there is any difference between the pathogenous bacteria in the periods of flood and low-water. — Answer: The pathogenous bacterial count of the Tisza is an important parameter. At flood, owing to dilution, a decrease in the number of pathogenic agents could be observed. There is, therefore, a considerable difference between the two periods.

HAMAR, J.: According to him, while at the natural water purifications the pathogens, because of their number, don't take any decisive part, in respect of water quality they are to be considered as a very important parameter.

MARIÁN, M.: Are the data concerning the salmonellosis of mallards the results of their own investigations? — Answer: The investigations were carried out not by themselves. He has primarily referred to literary data.

KISS, I.: How much has the pathogeny of *Salmonella* changed in the longitudinal section of the river? — Answer: They don't know it but in the next future they want to perform investigations of such character, as well.

HEGEDŰS, MÁRIA: As the Tisza water is no culture medium for Salmonella, a large number of them perishes after some time. But there may also occur survival occasionally.

(4) BANCSI, I., HARMAT, J., SZITÓ, A., B. TÓTH, MÁRIA, and VÉGVÁRI, P.: Longitudinal-section investigations in the Tisza (with projection)

Degree and role of the changes in water, and of the various external effects hitting the water body, are followed with attention in the continuous pursuit of a certain water body, i. e., with investigating into the longitudinal section.

From the results we have established that, in the formation of the quality of water bodies passing down the Tisza, a decisive part was played in the first place by the watercourse, the character and geochemical property of the vegetation of the watershed area.

The quality of water body — within this the chemical composition — was influenced primarily by the change in hydrological factors, first of all the decrease or increase in the speed of water flow and, simultaneously, the formation of the alluvial quantity floating in water.

Later on, the chemical and biochemical transofrmations in water, in the proportion of the single components, and the external effects hitting the Tisza (tributaries, sewage disposals, etc.), in their totality, have resulted in a qualitative and quantitative change in the chemical composition of water body.

By means of the investigations into the longitudinal section, the division of the river Tisza in sections, the influence of tributaries and sewage disposals, as well as that of river barrages exerted on the water quality, the temporal course of the biochemical processes inducing the actual trophic state of water, the decisive importance of watercourse and of the speed of water-flow became demonstrable.

In the course of the bacteriological investigations, carried out in the Tisza-stretch in Hungary, we followed with attention the formation of the total bacterial and total germ count of the river.

It is to be established that the bacterial flora of the Tisza, together with the floating matter content, changes in a more or less linear way in the longitudinal section of the river.

The total bacterial count of the Tisza is generaly high but in the single sampling sites the formation of values is highly influenced by the effect of hydrological conditions, tributaries, as well as barrages.

In our days, the river still has a natural purifying capacity to protect itself from the artificial impacts.

With algological investigations, there was evaluated the quantitative and qualitative dynamism in the longitudinal section of the Tisza, with special regard to the watercourse of the river, the change in its sectional character, and the analysation of the effect of tributaries and impoundments.

We offer a survey on the results of the investigations into Rotatoria and Crustacea living in the Tisza. The hydroecological conditions of the Tisza are analysed on the basis of effects exerted by the natural and artificial environmental factors upon the fauna.

In was ascertained by the benthos research performed during the longitudinal-section investigations of 1975 that in July and August the Tisza benthos is poor in Chironomida. The individual number of the mud-dwelling midge larvae increases only from the second half of September.

In 1977, in the course of the longitudinal-section investigation, from the 182 samples, there were only found 63 larvae, belonging to 13 species. Until Tuzsér *Rheocricotopus brunnensis,* till Tiszalök *Stenochironomus fascipennis,* while from Tiszafüred till the frontier of the country *Pseudochironomus albimanus* dominated. There was not found any animal in 95 per cent of the 182 samples.

In the course of elaborating the benthos samples, there came to light some Mollusca species, as well.

Contributions to the discussion:

P. Végvári's lecture:

Estók, B.: What effect will exert the float conditions upon the water quality of the reservoir? What fluctuations on water surface can be expected at operating the resevoir? — Answer: The flood wave, carrying the largest quantity of float, will pass over the reservoir. In the initial period, we shall probably reckon with a minor filling up of the bed. In order to discharge floods sure enough, the reservoir must be emptied previously on more than one occasion. This will later mean 2 to 3 m fluctuations in water surface.

Mrs. Antalffy Anna Bothár: What is the effect of the single tributaries like upon the water quality of the Tisza? — Answer: Depending on, whether the materials dissolved in the water of tributaries are present in a higher or lower concentration than those in the water of the Tisza, they permamently increase or decrease (dilute) the solute concentration of the Tisza.

Mária B. Tóth's lecture:

Estók, B.: Why does the river barrage reduce the number of bacteria in the impounded stretch? — Answer: As a result of impounding, water-speed decreases, the floating matter deposes. The total bacterial content of the river is in a close connection with the floating-matter content.

Mrs. Antalffy Anna Bothár: What influence do the tributaries exert on the bacterial plankton? — Answer: By the Szamos it is considerably increased. The effect of the Sajó and Zagyva can be observed in the time of low water. The Maros, on the other hand, carries bacteria of major quantity into the river in the time of flood.

J. Harmat's lecture:

HORVÁTH, I.: The different organism develop in a different way in the stretches below and above the river barrages. He asks if this phenomenon may be attributed to physical or biological changes. — Answer: In the isolated water of the bay at Abádszalók there was always found a high total algal count. In August, it was superposed by algal bloom. The decrease in oxygen of the water layer near to the bottom was increased by the mass of blue-green algae. After algal blooming, the bacterial count is high.

MRS. ANTALFFY ANNA BOTHÁR: Can the seasonal dynamics of phytoplankton be demonstrated in the impounded stretch of the Kisköre River Barrage? — Answer: It can, but the dynamics of phytoplankton is decisively determined by the floating-matter content, as well. When the floating-matter is no limit, there manifests itself a positive correlation between the total algal count and temperature.

A. Szitó's lecture:

GÁL, D.: Did the larva of the "efflorescence of the Danube" occur in the Tisza, too? — Answer: In the period investigated, I did not find any larva of the Danube algal bloom in the sediment of the Tisza.

(5) SZŰCS, ERZSÉBET:

Water-chemical investigations into the Tisza Dead-Arm at Lakitelek, with respect to the aquatic vegetation.

I performed water-chemical and oxygen-carbon dioxide investigations in the about 6 km long north-eastern stretch of the Tisza Dead-Arm at Lakitelek-Tőserdő, in July and September, 1977, studying the connection of the daily rhythm of O_2—CO_2 flow with the degree of trophity and the aquatic vegetation.

The work was demanded by the regional reconstruction plan to be compiled for this area by the Tisza-Research Working Committee, as well as for supplying data to the Kiskunság National Park.

Sampling lasted for 24 hours each, every 6 hours, in three places of the dead arm.

On the basis of investigations, it is to be established as follows:

1 — In the sampling place, at the north-eastern end of the dead arm (with a completely closed macrovegetation) strong decomposing processes continue. Simultaneously, eutrophication reaches also a high level.

2 — In sampling site 2, in the middle section of the dead arm (with a macrovegetation of 30 to 40 per cent cover) eutrophication and saprobity are of medium value.

3 — In sampling site 3 (open water surface), it is shown by the values measured above the inflow of the water of Tősfürdő that in this part of the dead arm the aquatic ecosystem is still in state of equilibrium.

Contribution to the discussion:

VÉGVÁRI, P.: It was mentioned in the lecture that the dominant ions of the water of the Tisza Dead-Arm at Lakitelek were sodium and magnesium. After flood, however, the calcium ion predominated. Was later on, anyway, the dominance of the sodium ion re-established? — Answer: Analysations in this direction were later, unforunately, not carried out.

B. TÓTH, MÁRIA: In her opinion, the strong morning decrease in the dissolved oxygen content is supposedly a result of the respiration of the rich zooplankton and phytoplankton to which there contributed also the activity of mud. — Answer: He agrees with this completion.

KISS, I.: He explains the increase in the sodium and magnesium content with that sodium, and together with that magnesium, appear in the water of dead arms in a large quantity as a result of chemicals contained in the sandy soil of Kiskunság reaching up to the Tisza. The chemism of water may exert in many cases an influence upon the formation of the aquatic macrovegetation.

(6) BÁBA, K.:

The Mollusca fauna of the Tisza, its research situation and tasks

Mollusks are important water-filtering organisms and fulfill a considerable part in feeding our useful fishes. It is therefore of no minor interest, to study the effect exerted by the reservoirs under construction and that of the inflowing sewage-waters upon mollusks.

The formation of the Mollusca fauna of the Tisza can be understood on the basis of the history of changes in fauna. The climatic change after the Pleistocene Epoch and the river control brought about mainly quantitative changes in the composition of the fauna. The changes of the present induce a slow impoverishment, primarily in the vicinity of the inflow of sewage-water. The Mollusca fauna is transformed quantitatively and qualitatively by the rather intensive paving of riversides and the reservoirs.

There occur 40 per cent of the 67 aquatic mollusk species of Hungary in the Tisza, 55 per cent in the dead arms, 34 per cent in the borrowing pits. The horizontal and vertical distribution of Mollusca is influenced by the vegetation and abiotic factors (light, current speed, quality of the bottom, and the building or destroying activity of the riverside). The dead arms, borrowing pits get supply by the species transported by means of the flood. The upper, middle and lower reaches differ regionally, in the first place, by the dominance relations of Mollusca.

By putting the Tisza II River Barrage into operation there ensue qualitative and quantitative changes. It is to be expected mainly a rapid breeding of species tolerating slower watercourse and silting and of those liking the vegetation along the riverbanks.

The malacological research work should also be extended over the Upper-Tisza and the tributaries which are completely unknown, as well as to the quantitative surveys of energy flow in the district of the Tisza II River Barrage.

Contributions to the discussion:

ANDÓ, M.: Why did the individual, resp. species number of Mollusca decrease so considerably in the area of the "living" Tisza as compared with the regions of flood plain? — Answer: Before river control, the flow of the Tisza was slower, it was richer in food and its translucence was also greater. As a result of the change in the original state, its characteristic changed. This was of a negative influence on the Mollusca fauna of the Tisza.

GALLÉ, L. JR.: Why do snails take place in the reaches overgrown by vegetation? — Answer: They use these primarily as a dwelling-place because they are not specialists in feeding.

BODROGKÖZY, GY.: How varied is the distribution of snails according to plant associations and why? — Answer: It is proved by the investigations in this field that there is possible the formation of as many species comb nations as there are plant associations.

HEGEDŰS, M.: Did the lecturer intend to perform a toxicological investigation into the snails? — Answer: He has not performed, as yet, investigations of this direction.

HAMAR, J.: Does a snail population live in the current line of the Tisza, in the deepest parts of the river? — Answer: *Lithoglyphus* sp. naticoides can probably be found.

B. TÓTH, MÁRIA: She asks with what means the satisfactory sample can be taken in the sections of deeper water. — Answer: A good sample material for the investigation can be collected by diving. But with Eckmann's sampler a good bottom sediment can be obtained even from 6 m depth.

MARIÁN, M.: Dreissena polymorpha has been known as a species damaging other mollusks. How long did it get up in the Tisza and is damaging there? — Answer: At present, it is one of the most wide-spread species of the Tisza. But we are still waiting for its systematic investigation.

(7) BODROGKÖZY, GY. and HORVÁTH, I.:

Succession of marshland associations in the flood plain

The flood plain of the Tisza is systematically covered by spring floods and flood-free years only rarely occur. The continuance of water cover is, however, different.

In case of lasting covering, the composition and zonation system of the meadow associations considerably changes. This can also be observed well in case of the *Lythro (virgatae)-Alopecuretum* stand occurring in the highest places of flood plain, after the long water covering of 1974. As a comparative control, we have chosen the conditions of the for more years comparatively waterfree period of 1952 when, apart from *Alopecurus, Agropyron* repens had the leading role in this stand and the total covering of the other species was insignificant.

In 1974, as a result of the continuous water covering, lasting from the beginning of the year until September, its stand became devested. In 1975, a regeneration began but it was considerably thrown back by a newer flood in the next Spring. In the Summer of 1976, the stand was more and more closed. The hydatophytes *Carex melanostachya* and *C. gracilis* have, however, in respect of the dominance relations and the overground phytomass production, far preceded the hydrophytes, among them *Alopecurus pratensis*. The culmination time of their closing and output curves fell on the middle of July.

During the growing season of 1977, the habitat conditions of the speargrass zone became gradually drier. As a result of this, the competitiveness of the *Carex* species decreased. And the regeneration of *Alopecurus,* the reacquisition of its dominant role was considerably impeded by the fast and considerable spreading of the extremely virulent *Glycyrrhiza* and *Lythrum* species.

From economic point of view, this change is important baceuse, as a result of the lasting water covering, the willowy-speargrassy marshlands become sedgy, followed by the transitional weediness of the grassland.

Contributions to the discussion:

ANDÓ, M.: In his opinion, there are in the first place the surface and sub-surface waters which have an effect on the single associations.

HEGEDŰS, MÁRIA: She wanted to get an answer to the question what differences are, classified by size, in the organic matter productions, between the for a long time water-covered and the less wet areas. — Answer: The organic-matter differences between the associations are not fixed here between associations by the quality of soil but the hydrographical conditions. As a result of being water-covered, the *Carex* species take place even in areas of higher relief and the quantity of organic matter raises In a dry period, *Alupecuretum* can reconquer its original area only after a longer time and this process alters even the size of organicmatter production.

MARIÁN, M.: According to him, the material of lecture is a good basis for those dealing with mollusks and mites. He is suggesting a better co-operation between the investigators of these research fields. It is most desirable to convene even a round-table conference for trying to harmonize their work.

(8) MARGÓCZY, KATALIN:

Plant-ecological investigations into the Tisza Dead-Arm at Lakitelek

The Tisza Dead-Arm, lying on the confines of the village Lakitelep, and its environment forms of the blocks of the Kiskunság National Park. In the forests bordering the dead arm, I performed coenological and ecological investigations in

July and September of 1977. My aims were: a detailed botanical description of this block of the National Park and the promotion of the regional reconstructive plan to be made by the Tisza-Research Working Committee.

The investigations were carried out in there stocks of the gallery forest of flood plain. In the sotck of lowest stratum along the water the dominant species was *Salix alba,* in a higher stratum *Populus alba,* and in the places of highest situation *Quercus robur.*

The coenological recordings — determining covering and height of reliefs of the association — were carried out in 4 to 6 repetitions. The distribution of growth form and floristic components was calculated.

It can be established on the basis of investigations that:

1 — The anthropogenous influence is considerable in all the three stocks. Nevertheless, the natural renewal of *Quercus robur, Ulmus minor, Fraxinus angustifolia* and *Alnus glutinosa* sporadically occurs in the shrub stratum of the young plantations.

2 — The original underwood in the shrub stratum was in many places considerably forced back by *Amorpha fruticosa,* "dense as a brush".

3 — In all the three stocks, in the herb stratum, *Rubus caesius* and *Aristolochia clematitis* are the dominant species. By *Vitis riparia* ,climbing up trees, the whole stock is often woven "jungle-like".

In spite of the cultural effects, Tőserdő often reminds us of the landscape along the ancient Tisza. There occur in it some rather valuable plants like *Leucojum aestivum, Arum maculatum, Urtica kioviensis, Iris pseudacorus,* and even *Fagus silvatica.* Protection is therefore justified by the rich vegetation of the dead arm, as well. The possibilities of recreation and relaxation could also be enlarged by nursing carefully the forests along the dead arm.

Contributions to the discussion:

MRS. F. ANTAL She would like to get answer to, what their proposal about region reconstruction contains; what kind of *Fraxinus* species took place in the lecture; what the closing of oak-plantation was like, and what geophyte species took place both in the poplar- and in the oak-plantations. — Answer: The restitution of macrovegetation should take place by planting species, fitting in the region; it is also necessary to recontsruct the animal kingdom. From among the ash species, *Fraxinus angustifolia* occurred in the area; the closing of oak-plantation must have been 60 per cent. Concerning the geophytes, she can only give an exact information after looking into her Tables.

HAMAR, J.: He regards the reconstruction of the ancient forest stocks of the region as a difficult task, because the execution of plans is aggraveted by the mass distribution of *Amorpha.*

GALLÉ, L., SR.: He makes an objection against that the investigations did not comprise the moss and mushroom strata of the forest. He asks if the lecturer has not observed any major lichen-colonies on the tree-trunks of the forest investigated. — Answer: The investigations have primarily comprised the flowering plants of the herb stratum.

ANDÓ, M.: In his opinion, the region reconstruction is aggravated by missing of a suitable bank of genes. In these areas, the renewal of the ancient forest stocks will not follow. The climatic conditions are not suitable for that, either.

BÁBA, K.: Accordig to him, the picture of fauna indicates that this area became drier. The spreading of *Amorpha* could also be reduced by inducing a higher ground water.

(9) HALASY, KATALIN; CSOKNYA, MÁRIA; STAMMER, ARANKA, and HORVÁTH, I.: Respiration-studies on *Palingenia longicaude* larvae of different developments

The authors have studied the effect of internal and external factors modifying the oxygen consumption of larvae. They have established that the respiratory values

of the larvae of young age are higher, owing to the intesive metabolic processes — particularly to the vivid motion.

From the external factors, they emphasize the underwood and water flow which are factors changing the intensity of respiration, in close connection with the habit of larval life, as well. They support the significance of the underlying soil by the values measured in case of aplying the so-called "ideal substratum".

The Q_2 values are increased in every group by the temperature of water (until about 20 °C).

Owing to the negative phototaxis of larvae, light evokes a strong place-changing motion, increasing by this the intensity of respiration.

Contributions to the discussion:

GALLÉ, L., JR.: As respiration means consumption of energy, we should also know the organic matter content of mud. Can that be measured? — Answer: Investigations in this direction are only planned for the future.

BÁBA, K.: He asks whether the larvae, indicated according to weight classes, were in an uniform state. — Answer: The age of life was determined on the basis of weight classes which meant a well-separable state of development supported also by histological investigations.

MAGYAR, L.: Where were found the may-fly larvae? — Answer: These could be found in a more than one metre depth in the Tisza-stretches below the inflows of the town sewage-waters.

HORVÁTH, I.: It is a tradition of past years that we would greet the lecturing colleagues, delivering their lectures in our Conference on the first occassion. In this way, we are greeting now affectionately our colleagues KATALIN HALASY, KATALIN MARGÓCZY, ERZSÉBET SZŰCS, MÁRIA B. TÓTH, and B. ESTÓK, wishing all of them further successful work.

(10) MAGYAR, L.:

Nutrition-biological investigations in the artificial nesting-box colony of the forests in the flood plain at Mártély-Körtvélyes, *Parus* farmstead

The author is presenting the result of four years long experiences in respect of arranging artificial nesting-box colonies, in particular consideration of the effect of the Tisza water-level.

He has found connections between other factors influencing the density of population.

He makes known the results of the bromatological investigations till then in respect of feeding the youngs of three species of the nesting-box colony, *Parus maior*, *Parus coeruleus*, and *Passer montanus*.

He establishes connections between the quality of the supplied food, the density of next boxes, the tree-stock of the forest, and the water-level of the Tisza.

Contributions to the discussion:

MARIÁN, M.: He asks in connection with the lecture of ornithological subject-matter why the dwarf-acacia (Amorpha fruticosa) insectifuge is and if it is possible to introduce nesting boxes into the *Populus* stands, too, in the future. — Answer: There are, anyway, no literary data about the insectifuge property of *Amorpha* fruticosa but the effect of this is based on his own concrete experiments. It is to be supposed that this shrub may excrete some aromatic, insectifuge matter.

GALLÉ, L., Jr.: What's the wrong in that the tree-sparrow is present in these areas? — Answer: It is to be desired that in the nesting boxes, placed out, tomtits nest because these are forest dwellers during the whole year while sparrows leave the area after nesting. In case of floods, these forests are visited by deers in large numbers. Their hair cast-off serves as an exclusive primary material of the nests of tomtits.

HAMAR, J.: In his opinion, it is wrong, to introduce birds into the natural forest stands. It is right, to place out nesting boxes only into artificially planted stands. — Answer: These forest stands have a very large number of parasites. These, multiplying, swarm into other cultures, as well, and damage these. It is to be wished, therefore, to place out as many nesting boxes as possible. The smooth-trunks and boughs of Canadian poplars are unfavourable for building nests, here it is therefore necessary in an increased degree to place out nesting boxes.

BÁBA, K.: Do floods not influence the introduction of birds? What was like in the area investigated the proportion of appearance of blue tit and tom-tit? — Answer: After the flood of 1977, the nesting boxes became suddenly more populated.

II Investigations carried out in other Tisza-stretches

(11) MRS. KEMENES KLÁRA FÜGEDI, MRS. I. HOVORKA, and MÁRIA MÉSZÁROS: The damaging effect of the water Kurca on horticultural plants

The chemical pollution of our canal system of double utilization may have a damaging effect on the watered cultivated plants.

At our experiments we have applied the water of the river, resp. channel Kurca polluted with chemicals, under natural conditions. We used it as irrigation water in a period when the herbicide agents of Dikonirt: 2.4—D—t (0.16 mg/l and phenol could be demonstrated from it in the highest concentrating. The effect of the water was investigated in the seedling pumpkin. Investigating into the indices of metabolism of the plant (enzyme, protein, etc.), we have established that in this concentration the phenol-induced delayed growth was not damaged by 2.4—D. Applying the same chemical concentration to plants in quadrifoliate state — and performing our observations on the basis of the indices investigated by us — we came to know that the plants were damaged until falling in economic value, resp. even being perished, by both 2.4—D and phenol.

The water of the Kurca, applied to irrigation, damages the plants of soft stalk both in their biological and economic values.

We also endeavoured to establish with experimental method, how long the active constituent of the herbicide remains unchanged, under irrigated conditions. It was ascertained in our growing-vessel experiments that it makes its effects felt for about 70 days, and this is proved by the investigated metabolism indices, as well.

Contribution to the discussion:

BODROGKÖZY, GY.: In the irrigating water, the sodium content proved to be of identical value. At a high value like this it could be expected that even sodium itself is damaging the experimental material. He asks, when these investigations took place and if there is any considerable change in the composition of water. — Answer: In the water of the Kurca, going towards its mouth, the sodium content increases; it is considerably higher than that obtained in the investigation. In these reaches, therefore, the water of the Kurca is no more suitable to be used for irrigation.

HORVÁTH, I.: He has only so much to add that the lecturers have investigated a question which is highly important and well utilizable even for practical purposes.

(12) VÁNCSA, A. L.: Changes in the degree of trophity in the Sajó, between 1965 and 1976

In the water-quality economy of Northern Hungary the Sajó — the changes of which in trophity-degree I have qualified with the results of the algological investigations performed since 1965 — is a water-course of outstanding importance.

From the 869 water samples 727 originate from the river stretches which are suitable for characterizing the changes. The algological investigations were carried out from drawn water samples. The comparative evaluation of these took place on the basis of the total algal litre number. At characterizing these the 1×10^6 ind./lit. value was considered as a limiting value. For characterizing the changes in the degree of trophity, a satisfying possibility is given by the average of the maximum, minimum total values and that of the million values but the incidence of all the algal litre-number values of a million order also proved to be a good index.

It is indicated unambiguously by the changes along the longitudinal section that the trophity of the Sajó in the river section below Miskolc is growing and in the short river section before the mouth this is expressly a sudden change. The causes of this may primarily be the following effects (possibly collectively):

(1) The natural (self-) purification of the Sajó is of a tisfying degree and, therefore, the quantity of the dissolved vegetable nutritive materials is also of increasing extent.

(2) From the sewage farms, functioning at the water system of the Sajó, more dissolved vegetable nutritive materials get into the Sajó and its tributaries respectively.

(3) There is also the amount of the dissolved vegetable nutritive materials — originating from agricultural activity and runoff from the watershed area of the Sajó — in the Sajó and its tributaries, of increasing degree.

Apart from characterizing the water quality of the Sajó, the results of the investigation can be utilized well in protecting the water quality of the Tisza, as well.

Contributions to the discussion:

HAMAR, J.: The Sajó may be considered as a polluted water. The quality of its water is strongly going towards being of saprobic character. Is this supported by the investigations? — Answer: Yes, it is. The algal count in the vicinity of its mouth is uniformly increasing.

VÉGVÁRY, P.: Is it imaginably that coming near to the mouth, the strongly increased trophity degree is also to be explained by the flowing speed being slower as a result of damming? — Answer: It is imaginable, but to decide this it will also be necessary to evaluate the results of investigations in the last years.

HORVÁTH, I.: He asks if the influence of the Sajó could be demonstrated in the Tisza. — Answer: We have had no investigations into this direction, as yet.

(13) HEGEDŰS, MÁRIA and Mrs. L. DOBLER:

The comparative microbiological investigation into the stretches of the Triple-Kőrös and Maros in County Csongrád

The water quality and water type of the rivers Triple-Kőrös and Maros can be distinguished from those of the Tisza by their origins and watershed areas. Both tributaries were systematically sampled since 1975. In the last three years, from the two water spaces about 123 water samples were taken and approximately 1700 investigations were carried out. The Triple-Kőrös was sampled at river-km 2, and the Maros before flowing into the Tisza and in the district of the bridge in Makó. From the water samples, bacteriological and biological investigations were performed.

In the lecture, the results of investigations in the last three years are outlined. Within this, we speak in more details of the change in the hygienic bacteriological parameters, the hygienic water quality. On the other hand, from among the biological investigations only the changes in saprobity and trophity are discussed.

It is to be established on the basis of the results of the complex investigations that in the last three years, the water quality of both rivers deteriorated by one class.

Contributions to the discussion:

SZITÓ, A.: The water of the Maros, owing to its pollution, is therefore not suitable for irrigating vegetables. But what happens if it is none the less used for watering? — Answer: It has, as yet, not been forbidden, to use a water, like this, for watering.

HAMAR, J.: Is the cause of the polluted state of the Maros known or can it be possibly ascertained? — Yes, it is known. The Maros suffers a considerable pollution even in its Hungarian stretch, mainly in the area of Makó.

HORVÁTH, I.: Are the waters getting into the Maros duly purified? — Answer: The sewage-waters getting into the Maros are generally purified but the degree of purification is not always satisfying.

BÁBA, K.: In what degree has the pollution of the Maros an effect on the open-air bath in Szeged? — Answer: The water of this bath is considerably influenced by the Maros. In this the unfavourable localization of the bath has also a part.

KISS, PIROSKA: She considers the exposed results of the bacteriological investigations as highly important. As a complement, she mentions that 5—6 years before the salmonellosis could not be demonstrated from the water of the Tisza. At present, however, as it appears from these facts, it can already be demonstrated from this river, too. The animals in the vicinity were namely infected by foods made of basic materials from abroad with a not proper manufacturing process. Salmonella has got into the sewage-water with the secretion of animals and later on into the "living" waters. Its occurrence being increased, a water like this can endanger human life, as well. — Answer: It is proved by the results of investigations that, as *Salmonella* is present in the waters attached to the floating matter, ofter a single gulp is enough to get infection.

HORVÁTH, I.: We shall inform the proper authorities of our conceptions concerning the investigations in connection with *Salmonella*.

(With this, the first-day programme of the Conference was completed)

On the 6th of May, lectures were resumed according to the programme.

(14) KISS, I.:

Eutrophication of the dead arms at Cibakháza, Csongrád, Tiszaug, and Alpár in the mirror of the algal flora and algal vegetation

The investigation into the algal flora and algal vegetation of the four Tisza Head-arms, carried out in 1975—1976, shows an increasing eutrophication. The number of algal species, being fond of the waters rich in nutritive materials, increases more and more. The "algal blooms" and other algal mass production inducing vegetative colourations become more and more frequent.

There seems to be the most polluted by organic matters the eastern branch of the dead arm at Cibakháza, in some southern sections of which the species of beta and alpha-mesosaprobic character are dominant. The section close to the village is less polluted. Here grows *Ceratium hirundinella* in large numbers, even in the deeper places along the riverside. The "efflorescence of water" of quent particularly in the south-eastern section.

The stretch of the dead arm at Csongrád, close to the town, is also considerably polluted and the mass production of *Microcystis, Anabaena,* and *Anabaenopsis* could also here be observed very frequently. It could be established here in several cases that the trichomata of *Anabaeba* were divided into planococcus-cells, forming clusters of *Microcystis*-character.

The dead arm at Tiszaug is rich enough in phytoplankton and is exploited for fishing, as well.

The part of the dead arm at Alpár close to the village is the most eutrophicated. Among the Euglenophyta speies *Phacus helicoides* also appeared on more occasions. In the muddy sites, *Spirochaeta plicatilis* and some sorts of *Spirillum* occurred, as well. The shallow waters in the places of turf-cutting are less rich in algae.

Contributions to the discussion:

SZITÓ, A.: In fishing waters, 6 to 8 kg fodder is suggested for supplying the single areas. A large amount of maize getting into the water may cause algal bloom. The fish-ponds are supplied with manure, too. As the maize as a food is poorly digested by pigs, this farmyard manure, getting into the water, may continue increasing the algal production.

HEGEDŰS, MÁRIA: The author has not found the sewage-disposal at Cibakháza because in hog-farms drainages are applied. The oozing-through into the dead arms is, therefore, to be supposed. — Answer: Oozing-trhough is, in his opinion, not probable. The invasion of sodium carbonate and bicarbonate, resp. magnesium can be attributed to the surrounding alkali soils. The poor food utilization of pigs may really take part in the increased algal production, mentioned by A. SZITÓ.

(15) Mrs. L. DOBLER and MÁRIA HEGEDŰS:

Data to the water quality of the dead arms along the Tisza. The dead arm at Serházzug and Alpár

We began the complex investigation into the water quality of the dead arms at Alpár and Serházzug in 1976. Water samples were taken monthly, at a site each, from below the surface, and there were carried out 280 investigations. On the basis of the results of the bacteriological investions, the degree of pollution was registered.

The biological investigations comprized the whole of the property groups of the biological water qualities.

At present, we only render an account of changes in saprobity and trophity degrees.

The knowledge of the water quality of the dead arms utilizable in the district of the Water Administration of the Lower Tisza Region, as well as the protection of their present state, continue to be our task of high-top priority.

Contributions to the discussion:

VÉGVÁRY, P.: Which of the two dead arms was inundated by the Tisza in the time of floods? — Answer: None of them, because a breach in the so-called protective summer-dams occurs only rarely.

(16) GÁL, D.:

Effect of waste-waters of the industrial plant in Szolnok on the zooplankton of the Tisza

From the point of view of the quality of water of the Reservoir, to be formed above the planned Tisza III River Barrage, the waste-water getting into the Tisza from the industrial units in Szolnok cannot be indifferent. On the basis of the several years long investigations until now, the zooplankton of the river is considerably changed by the waste-waters flowing in below Szolnok. This effect goes on increasing in the reservoir owing to the slackening of the speed of water-course.

The zooplankton of the water mass getting to Szolnok agrees quantitatively and qualitatively with the zooplankton composition of the similar reaches of the Tisza: in the zooplankton, Rotatoria species are dominating (about 55 per cent of the total zooplankton). The Entomostraca species are forming about 30 per cent, the Protozoa 10 per cent or so of the zooplankton. A few further per cent ages are composed of the representatives of other groups (Nematoda, Tardigrada, larvae,

etc.). The dominant species are characteristic of beta-mesosaprobic waters (about 45 per cent of the zooplankton). The alpha-mesosaprobic organisms generally occur in lower individual number (20—25 per cent).

The Zagyva carries already a considerable quantity of waste-water into the Tisza (in the first place, the waste-water of the sugar-works in Hatvan). Then there flow the waste-waters of different quantity and quality from the town sewage-disposal, the slaughter-house, paper-mill, sugar-works, and chemical-works into the Tisza. Under the joint influence of these, the amount of the total zooplankton is generally reduced to a half, but often to a quarter, of that above Szolnok. At the same time, the qualitative composition also changes: there predominate mainly the alpha-mesosaprobic organisms (about 55 per cent), forcing back the beta-mesosaprobic organisms (about 20 per cent).

The degree of pollution is also shown by that the composition of zooplankton is re-established only below Csongrád (after more than 90 river-km) into its original state which is characteristic of the Tisza.

Contributions to the discussion:

JÓSA, Z.: It turned out of the investigations between 1960 and 1970 that the water of the Zagyva with algal bloom brought about 50 per cent or so change in concentration after the mouth, by which there are touched mainly the Ciliata. The neutralizing equipment of the sulphuric-acid factory is functioning efficiently. It is namely not showing any negative effect at the inflow. The river does not reach even at Vezseny the beta-mesosaprobic degree.

HEGEDŰS, MÁRIA: The water at Szolnok is not suitable for being used as drinking-water. We called the attention to this as early as in 1965. — Answer: He thanks for Z. Józsa's completion and notices that the residents in Szolnok get drinking-water from the river section above the city and it still does not reach the demanded degree of purity. Its saprobiological index is much above 2.

(17) JÓSA, Z.:

The role of protozoological investigations in the Tisza-research

As a result of the more and more increased development of industrialization and urbanization, in more and more countries, one of the most urgent problems is the pollution of river-waters. It is, therefore, one of the most important tasks of the Tisza-research, to investigate into the pollution of the river. The pollutions by chemicals are established in the way of chemical investigations.

From the point of view of getting drinking-water, bathing, as well as from that of the food chain and the stock of fish, the organic-matter and bacterial pollution of the river is important.

A great many Ciliata species are detritus- and bacterium-eaters. Certain Ciliata species are excellent indicator-organisms for ascertaining the saprobia-degree of water. Thus, the appearance of some Ciliata species of polysaprobic or katarobic character in large numbers is definitely indicating the degree of the pollution of water or even its purity. There are particularly important some Ciliata species as bio-indicators, for indicating the Tisza sections with alpha-saprobiontic, as well as oligosaprobiontic and katarobiontic water. The investigation of the Ciliata species is, therefore, important not only from taxonomical, coenological, and physiological points of view but also from ecological and saprobiological aspects.

The bacterial pollution can be ascertained the most decisively just with biological (protozoological, algological, and bacteriological) investigations, and it is advisable to perform these parallel with the chemical investigations.

Contributions to the discussion:

GÁL, D.: The number of species which are characteristic of certain degree of saprophyty is, as a matter of fact, low. This also shows the weak point of the saprophytic system. On the basis of Rotaria alone, the water of the Tisza can be deemed to be of very good quality. This value is counterbalanced by Ciliata.

HORVÁTH, I.: He asks, if there is some microtechnical method to perform nutritionbiological investigations. — Answer: The quality of water is best indicated by bacteria as a meso-zooplankton. It would be difficult to excise and stain the digestive vacuole. This task is made still more difficult by that food is fragmented in vacuoles.

GALLÉ, L., Sr.: What may be the cause of the diurnal changes in pH of the Tisza? — Answer: The cause of pH-changes is not cleared up but it may also be a problem of oxygenation. The morning state is generally re-established at night.

VÉGVÁRY, P.: In his opinion, the pH values are determined by the arriving water bodies. In river stretches of small water it can primarily be influenced by the relation O_2—CO_2. He asks whether the Ciliata fauna—if it is bactericidal — consume the bacteria, too, which decompose organic matter. — Answer: In purifying water, first of all the Ciliata species take a part. Besides this activity of these, the damage caused by consuming even the decomposers is negligible.

KISS, I.: The food chain does not hold in respect of alkali waters. In case of algal bloom, the bacterial and Ciliata planktons are missing. They only appear after the algal blooming. In my opinion, the bacteria exposed out of the digestive vacuole cannot be determined concerning their species because they are already attacked by the digestive enzymes and their character, has, therefore, changed. — Answer: János Horváth has dealt much with micro-operations. The nuclear operations were successful, those of the digestive vacuoles, however, were not. The content of these has immediately mixed, namely, with the cytoplasm. The animal of about 200 μ size is so small that the equipment we have is for this task at present still unsuitable.

(18) STAMMER, ARANKA; HORVÁTH, I.; CSOKNYA, MÁRIA; and HALASY, KATALIN: The differences between the structures of swimming-bladder in Tisza fishes

We have investigated into the light-, scanning-, and electron-microscopic structures of the (in the evolution more ancient) open, and the newer, closed, swimming-bladders, in the species carp *(Carassius carassius)* and pike *(Esox lucius)*, resp. perch *(Perca fluviatilis)* and silky ruff *(Acerina Schraetzer)*.

The difference between the oxygen-producing red corpuscle and the oval opening, ensuring the connection with the external blood circulation, is the most obvious. The red corpuscle is a capillary network, formed from the vasculature of tunica intima, having a larger size and denser structure in species of closed swimming-bladder than in those of open swimming-bladder.

The capillary wall is built of endothelial cells of strongly vacuolic plasm, with pericytes on them of darker plasm and longitudinal nucleus. The capillaries, poor in nerve-fibres, have supposedly a humoral regulation. The smooth-muscle ring of the oval anterior ventricular opening, lying on the descending aorta dorsalis, functions with a rich neural plexus.

As a result of the hydrogen-sulphide pollution, the cells of the closed swimming-bladder are damaged but much later and only at a pollution of stronger concentration than the capillaries of the open swimming-bladder.

Contributions to the discussion:

JÓSA, Z.: He asks, where the gas-production takes place. — Answer: The gas-production is supposed by a number of researches but it is difficult to decide in this question. The capillaries closely adhere to the epithelial cells. The connection, supposed in literature, does not exist but only a simple diffusion. Oxygen gets into the swimming-bladder through capillaries. We have investigated in details even its chemical relations.

MIKES, M.: In the course of evolution, the secondary formation of the terrestrial life is probable — as emphasized by the lecturer, as well.

(19) GASKÓ, B.:
Cerambycides of the southern Tisza-valley

Contributions to the discussion:

GALLÉ, L., Jr.: The fauna-mediatory role of the Tisza at other animal groups is proved. Is there any for where the non-steppe species come from into the Tisza valley. — Answer: A fauna-spreading effect of rivers is imaginable if the necessary food is available. A tree-trunk can, e. g. flat down from the upper river reaches, as well. But apart from the transport by flood, the rai, way transport can also be taken into consideration.

MARIÁN, M.: Are the long-horned beetle species heterophage? — Answer: They are bound to a active ingredient and not to a determined species of trees.

(20) GALLÉ, L., Jr.:
The ecological energetics of *Formica cunicularia* LATR. in herb associations along the Tisza

Formica cunicularia is the most frequent *Formica* species of the Tisza-valley, the density of its nests in the floodfree grasses of the basis-areas of the Tisza-research is of size 10^{-2} nest/sq. m. Applying to the analysis of the flow of energy of nests the formula, proposed by the IBP:

$$C=P+R+FU$$

the flow of energy of an average colony is characterized in percentile terms by the correlation:

$$100=2+79.5+18.5$$

The respiration, taken as a function of temperature, is showing a logistic correlation.

The flow of energy is influenced by the social way of life because:

(1) The value of respiration: 1 mg^{-1} h^{-1} depends upon the individual number in the respirometer:
$y=1.1+10.018+0.67x$;

(2) The consumption of the colony (C) is inversely proportional to the size a colony;
(3) The ratio 2 per cent P/C, obtained in the relation of the colony, is low as compared with another poikilotermic organism. At the level of the individual it is, on the other hand, 24.96 per cent, corresponding to the ecological efficiency of the poikilotermic predators.

The daily consumption of colonies is of size 1—10^2 mg (10^1—10^2 cal). This follows mainly from a secondary consumer-functioning. The key-activity of F. cunicularia in connection with the flow of energy is, as a result of ratio 79 per cent R/C, the release of the energy accumulated in biocoenosis.

Contribution to the discussion:

KISS, I.: He asks if the belief that the ants indicate the approach of raining by their motion in large numbers at the surface of ground is established. Can be the effect be explained by that, in the given space, the animals are near to one another and so their possibility of movement is smaller? — Answer: In Hungary, 85 ant species live. The indication of approaching raining could only be observed at a single species, and even that is not unambiguous. They only move

animatedly at the optimum 25—28 °C at the surface of ground, but there may occur some difference, as well. This depends upon the individual properties of the community. A decrease in motion follows partly owing to the reduction of space, partly due to the fermon- and ethological effect.

B. TÓTH, MÁRIA: What is the effect of pesticides on ants? — Answer: The effect of chemical fertilizers on the ant population is of reducing character. Concerning other fertilizers, we have but a little investigational material. They unreally perish even under the influence of pesticides of small amount.

CZIZMAZIA, GY.: From the rook-colonies, the birds often visit the ant-hills and turn these up, then sit into them. What may be the cause of this? — Answer: It is probable that ants pick out the lice from the feather of rooks. It is imaginable, too, that with ant-bites they bring in formic acid into the body of rooks. This exercises have namely a pleasant, refreshing effect.

MARIÁN, M.: How is possible to calculate the ant population per hectare? — Answer: The colony-density is generally estimated. In case of major colonies the estimation may take place by overlooking the soil surface carefully, in case of minor ones by exploring it.

(21) TÓTH, S.:

Characteristics of the Syrphidae fauna of the Tisza-valley

The collection of Syrphidae has taken place in the framework of the Tisza-Research since 1959. In the course of work, a round 100 species could so far be demonstrated from the Hungarian stretch of the Tisza-valley. This number is supposedly one-third of the Hungarian fauna. On the basis of the experiences until now, in our mountainous areas the Syrphydae fauna is considerably richer. The missing of *Cheilosia* species from the Tisza-valley is particularly striking but this is probably characteristic of the whole Great Plain. At the same time, the fauna is, of course, richer in some species the larvae of which develop in water.

There are 23 among the demonstrated species, the mass participation of which exceeds 1 per cent. These together comprise a total of 70 percent of the whole material. The most frequent species are as follows:

	per cent
Eristalis arbustorum L.	11.73
Spharophoria scripta L.	8.73
Syritta pipiens L.	5.69
Malenostoma mellinum L.	4.52
Episyrphus balteatus DEG.	4.21

In the course of collecting, there were found several interesting, rare species, and even some which are new in the fauna of our country.

(22) FARKAS, Á.:

The role played by the dead arms and borrowing pits in the natural prolification of fishes in the Tisza

It is a decisive factor in the natural prolification of fishes in the Tisza that the flood plain is from time to time inundated by the river. These are in the months March and May the spring-flood, in September and October, owing to the autumnal rainfall, the so-called leafy-flood. At spring and summer floods, the fishes getting to the flood plain can spawn on the branches of trees and bushes in the water getting fast warm, and the hatching young fish finds a safe living in the flood plain.

Together with the receding water, a part of them get back into the river, but another part are bogged in the dead arms and borrowing pits of flood plains. In case of a persistent drought, this means a sure perdition for the young fish.

Our national economy uses every effort for increasing our fish production. We augment the more and more increasing market demand on fish of our country with artificial multiplication and young fish supply, as well as with an intensive piscicultural fish-breeding.

I regard it as necessary, to increase the fish production of our national economy with the help of the organized protection of the young fish in the borrowing pits of the flood plain and the promotion of the natural progeny of the dead arms.

Contributions to the discussion:

SZITÓ, A.: The decrease of the fish stock in the Tisza is not caused by that the young fishes perish in the borrowing pits.

CZIZMAZIA, GY.: An uniform lake-system should be formed out of the borrowing pits where the growing up of the stock would be ensured. — Answer: This would demand an exagrated investment and the food supply would not be ensured even in this case.

MARIÁN, M.: Our fish stock and its output should be increased by protecting the multiplication of fish in this country. — Answer: Fishers are not additinally remunerated for protecting young fish.

HORVÁTH, I.: Can we solve the increase in fish output with domestic fish species? — Answer: There is little demand for the meat of the so-called herbivore fish introduced from the Far East but, at the same time, these increase the output of fish-hatcheries considerably.

VÉGVÁRY, P.: If owing to the decreased water level in the Kisköre Reservoir fishes remain outside, what a danger does this mean just in the time of spawning of the fish? — Answer: In case of recession, the majority of fishes get back, only a small part of them remain outside, in the flood plain.

LEGÁNY, A.: The borrowing pits in the Upper-Tisza Region are already liquidated, filled up. This process is going on in the Lower Tisza Reaches, as well.

(23) LEGÁNY, A.:

Part of the nesting bird colonies in the biotopes of the flood plains in the Upper-Tisza Region

The continually renewed and continuous ecological research work is made necessary by the natural environment changing as a result of human activity. The field of my work — the Tisza flood plain — lying from Tokaj up to Záhony — is also the scene of changes like this. I have regarded as my task, to investigate into the ecological role of nesting bird colonies to be found in this area. As a result of a four years long systemic work of observation and fact-finding, I have investigated into the bird colonies of various biotopes in the flood plain, establishing the quantitative and qualitative parameters of these and endeavouring to draw a conclusion in respect of their part in the biotope.

In the course of these investigations, I have established the following:

(1) The borrowing pits and mixed forests have the richest bird colonies. The value of biomass is here the highest. The minimum was found in the orchards and Canadian poplar plantations.

(2) In respect of the bird live-weight produced by 1 ha, as well, the mixed and borrow-pit forests take the lead. Minimum was found in the orchards. The grasslands, Canadian poplar plantations, and orchards support several bird colonies which only take nourishment there.

(3) The flood plain is mainly favourable for the arboricolous and dendricolous species, although only 10 per cent of the area is a forest.

(4) It can be established on the basis of the consumed food that in the area the

insectivores dominate, followed by herbivores, and — far after these — the mixed eaters and carnivores. Concerning the quantity of food, as well, I came to the conclusion that the sequence is identical with that above, only the dominance of insectivores is still more expressed.

(5) The flood plain is, in spite of its ecological complexity, an independent ecological and zoological unit.

(6) In the Canadian poplar plantations which are poor in species and individuals, the protection of forests can be increased successfully by introducing birds with artificial nesting-boxes. This was also verified by experiments.

Concerning the human activity to be carried out in this area, I have the following suggestions:

(a) At planting new forests, it would be advisable to bring about mixed forests, in harmony with the possibilities of the area.

(b) At logging, it would be necessary to leave untouched some smaller tree-groups and protected forest-parts which would be to a certain extent refuges for the bird kingdom of the flood-plain forests and the basic point of the departure of succession.

(c) In the domain of the field-growing of plants carried out in the flood plain, there are necessary some structural changes, meaning to grow more straws of hay and fewer hoed plants.

Contribution to the discussion:

MARIÁN, M.: He calls the attention of the lecturer to that he should follow with attention the change that began with filling up the Kisköre reservoir with water. He asks what this understood under the expression: functioning bird biomass. And whether the borrowing-pit forest is identical with the mixed forest. — Answer: He undertakes the outlined work. He admits that the "functioning biomass" is a bad Hungarian expression but it designates the number of birds that move, take nourishment in the given area. The borrowing-pit forest is identical with the mixed forest but having a special ecological situation and being more humido, and its stock is different, as well. These mixed forests take place in the highest section of the flood plain and are mostly artificially planted forests, without any underwood.

TRÁZER, GY.: He asks whether the lecturer divided into groups the biotopes and plants, and how the animals move between the single biotopes. — Answer: In any section of the investigated flood plain a survey of data was performed. There is a difference between the single biotopes (plough-land, orchard, acacia grove, river wall) and some motion between the biotopes. However similar the bird fauna of the forests is, on the basis of the single character-species, the single forest types they can be distinguished from one another well.

(24) CSIZMAZIA, GY.:

A contribution to the behaviour of *Talpa europaea,* living in the flood plain, during the flood

I obtained my data, connected with the theme — on the basis of explorations and borings — in the Region Conservation District at Mártély, in the years 1969, 1970, and 1977.

It is unambiguously proved by many hundreds of borings and measurings carried out by the professor's assistant ISTVÁN KONTUR under the leading of ISTVÁN ZSUFFA (1970. ATIVIZIG library, — Tisza-valley sections I, II), as well as by my own excavations in the flood plain after the flood waves had passed (1970, 1977) and by the model sections of borings that the life of mammals on the occasions of the Tisza flood waves, in the water-covered soil, is impossible. In the course of explor-

ing 25 cubic metre earth in sections of research, we did not find any Talpid duct in which the animal could survive even at a flood of onty one week or two.

This aerobic species has a high metabolic value. At a flood, it does not penetrate deeper into the ground but, on the contrary, it strives to reach the dam, the protected area by a rapid escape and often by swimming between the enclosed islands. Gaskó's observations agree with my own data, according to which the humus level of the holms of high relief, enclosed with water, swarms with Talpids (e. g., in June, 1969, at Körtvélyes, on a holm of 6 sq. m, I collected 14 individuals).

After the flood wave had passed, the fresh mole-casts appearing on the surface, drying up with rents, originate from these animals. (Proved with the method of recapturing with marking).

The individuals escaping to the dam return at a very rapid pace. It could be ascertained that the Talpid stock was increasing in the flood plain of the Tisza and on the dam side.

I call the attention to the indicator role of the Talpa. Its biotope is contracting more and more owing to the environmental pollution, the intensive chemical processing. And the dynamical development of the local Tisza populations may have been a consequence of those mentioned above. The mole-casts are indicating the "living" ground that is free from any chemical poison. We should deal in an increased degree with the activity of Talpa on the occasion of the Tisza flood waves because the groundwater-level values, known until now, are changed by our present-day reservoirs and those in process of construction.

An establishment, according to which the mole, escaping from floods, digs its ducts deeper into the ground, is sopposedly caused by an erroneous conclusion. By reason of the results of my investigations I cannot support this. For deciding this question, the local revealing excavations and recapturing methods cannot be omitted.

Contributions to the discussion:

VÉGVÁRY, P.: Do the moles escape from the flood plain one day or two before the flood coming? — Answer: At moles this cannot be observed. As they like dampness, they only escape if they are inundated by water. In case of flood, they assemble on the waterfree holms of the flood plain.

GALLÉ, L., Jr.: Is the method of "recapturing with marking" to be considered as suitable for estimating the population? Has the lecturer studied the ecological role of moles? There were namely, for lack of competition, a great many animals immigrating into the flood-plain areas, which became emptied after the flood, in the R-seceltive phase of re-stocking. — Answer: He has not investigated the latter problem in details, his main aim being to take the stock.

MIKES, M.: The mole-ringing is also probably to be solved and so this method may be suitable to establish the density of stock.

BODROGKÖZY, GY.: The biotope of mole becomes really more constricted. According to his observation, in case of using chemical fertilizers, it escapes even from the week-end smallgardens. — Answer: The materials containing ammonia have an alarm-effect on moles.

MARIÁN, M.: What is the lecturer's establishment that the mole is not attacked by the little owl, based on? — Lendvay's answer: In the course of investigating casts, there could not be found any bodily remain of a mole. In those of tawny owls, however, there could.

(25) ERDEI, M.:

Nutrition-biological investigation of fox-populations living in the flood plain of Tisza—Maros

The fox is our most frequent mammalian species. It is the only one of the fur-bearing predatory animals in this country which was able to adapt itself completely to the changed environmental-natural circumstances.

The aim of the investigation was to get data on what the part of the fox is in the order of biocoenosis, in the flood plain of the Tisza—Maros, i. e. in the biotope that is the most comparable to the ancient natural conditions. What is its economic damage, resp. benefit realized in? How do the inundations exert their effect on the density of population, habit of life, and movement?

From the data, obtained between 1974 and 1977, by analysing and determining the gastric content of 71 foxes, as well as 185 prey-remainders and excerta found on the ground, we can draw the following conclusions:

The fox is an active and useful maker of the order of biocoenosis in the flood plain. It is replacing the activity of the winged and fur-bearing predatory animals that were exterminated resp. depopulated in the meantime, as much as it is possible at all under the changed conditions. The economic damage is expressly of game-economic direction. It causes damage first of all by plundering pheasants. It is to be put to its credit that it destroys small rodents. In the flood plain, however, this is a negligible activity, taking into consideration that there is hardly any agricultural work there any more.

The populations are not hit too hard by inundations. They retire from flood to the protected side. The range of their motion is correspondingly modified. On occasions like this, the density of foxes is greater in the areas bordered by the flood plain. After the retirement of water, foxes return to the covered flood plain which offers a good covert lair.

Contributions to the discussion:

LEGÁNY, A.: How did the lecturer establish that the fox had eaten a carcass? The fox is useful not only in the flood plain nut in other areas, too. In its burrow, it can always be found a considerable amount of the remainders of hamster carcasses. — Answer: The colour of meat of carcass-origin always differs from thet originating from living animals. Under microscope, even maggots are to be seen in it.

MIKES, M.: The fox is the carrier of rabies. In the vovivodeship (Voivodina), it is therefore destroyed. According to his observations, its nourishment consists mainly of mouse-like mammals and only rarely of pheasant or partridge. In the agro-biocoenosis it is, therefore, a helpmate of man.

GALLÉ, L., Jr.: The fox is an important top-level predatory animal, it has, therefore, even in the domain of sorting out the small game, an important part which would be unsolvable in another way. He asks if the lecturer found in the diversity prey-animals any difference between the flood-plain forests and the agricultural areas. He asks, further on, why the fox-stock should be regulated artificially if the predatory population is also regulated by automatic density-dependent factors. — Answer: In the flood plain, the food of fox is more composed. It has no self-regulating mechanism. It is destroyed from time to time by scabies and rabies but not in large numbers.

GASKÓ, B.: The question of rabies must not be minimized. The human number catching this disease can be expressed in an order of magnitude by thousands. It would be right to stop up the fox-holes and asphyxiate foxes.— Answer: It would be the right solution, if the fox population could be held back at low level. Poisoning of them, however, cannot be suggested.

MARIÁN, M.: Concerning Amphibia, there is a very good comparative skeletal material in the Museum of Szeged. The lecturer could use this material very well to his further research work.

(26) KISS KEVE, T.:

Effect of purified waste-water on phytoplankton associations

The waste-water, flowing from the industrial live-mud sewage filtering farm of the integrated Tisza Chemical Works, loaded with communal sewage, as well, gets into an after-purifying lake system. As a function of the live-mud system and the processes taking place in the lakes, there are formed different algal associations

in the lake system. From among these, we are presenting here some characteristic ones: (1) 12. IX. 1975:

The purified waste-water getting to the lakes is poor in organic matter (KOI_{Cr} 35.7 mg/l), rich in phosphorus, nitrogen (Po_4—P 1.1 mg/l). 20—80 per cent of the bottom and watermass of lakes is densely overgrown with *Cladophora*. A small algal association of low individual and species number develops, poor in water (0.22—0.37 mill. ind/l).

(2) 2. II. 1976:

The organic-matter content of the purified waste-water is: KOI_{Cr} 51.1 mg/l. It is well-supplied with phosphorus, nitrogen (Po_4—P 0.26 mg/l). The lakes are covered with brittle ice, the *Cladophora* stock shows decreased vital functions in the cold water. In the water, a plankton-algal association of low species-number and rich in individual number develops, in which *Chryptomonas*, *Cyclotella*, *Chlamydomonas* species (1.3—16 million ind/l) predominate.

(3) 2. VII. 1986:

The organic-matter content of the purified waste-water is high (KOI_{Cr} 74.1 mg/l), it is rich in phosphorus and nitrogen (PO_4—P 1.34 mg/l). Owing to that the internal purifying system was overladen, the lakes got but badly purified waste-water previously. The *Cladophora* stock was destroyed by fungal infection, the degree of autosaprobity rose. Bacteria and fungi proliferated in individual number per a thousand million litres. In this state of high pullulation, although the food supply was abundant, there appeared only a poorish algal association in the water (0.79—1.7 million ind/l).

The organic-matter content of the purified waste-water is high (KOI_{Cr} 108 mg/l), its phosphorus, nitrogen supply is low (PO_4 – P 0.09, total P 0.364 mg/l). In the lakes, a rich, mixed reed-grass stock developed, binding a large part of phosphorus and nitrogen. Apart from the rich reed-grass stock, in contradistinction to those, experienced in 1975, the phytoplankton was also rich in species and individuals (33.6—66 million ind/l).

Contributions to the discussion:

VÉGVÁRY, P.: He asks if the high orthophosphatic value is showing the value of the inflowing or leaving water. — Answer: The orthophosphate was higher in the leaving water. It is regrettable that the lake was planned badly. There would be necessary a bulruch or reedy strip to the fore-part of the algal lakes. Then it could filter out the mud overflowing from the sedimentator. It would be advisable to form out some reed-grass vegetation of large mass and remove it from time to time. With continuous mowing the *Cladophora* stocks could be induced, to produce continually and continuously.

KISS, I.: In how deep water did *Chlamidomonas* grow? — Answer: In a water of 1.5 m depth. The algal production is the result of several external and internal factors. Stimulating matters have a considerable part. The rhythm of the development of algae is a similarly important factor.

B. TÓTH, MÁRIA: Did the high nutritive-matter content incorporate into the macrovegetation? — Answer: It incorporated only partly.

The two days long Conference has terminated with presidential concluding words.

The compiler's special thanks are due to Dr. M. MARIÁN, P. VÉGVÁRY, and Dr. GY. GYŐRFFY for making available to him their lecture notes, rendering him help in this way at compiling the material of the Conference.

Presidential suggestions at Tisza-Research Conference IX

(1) Parallel with filling up the Kisköre Reservoir, the quantitative and qualitative changes in water quality, living world, and in the mesoclimate of the adjacent areas should be followed with increased attention.

(2) The botanical and zoological investigations should be increased in the area of the area of the Tisza III river barrage, the basin at Alpár, fixing the present-day states and indicating the most valuable areas for a possible protection.

(3) It is desirable that in the emphasized Tisza-stretch but primarily in the Region Conservation District at Mártély-Sasér, the botanical and zoological investigations take place jointly.

(4) It is desirable that the ecological and ethological investigations become deeper in any field of the investigation.

(5) The investigations in the Upper-Tisza district should be made more systematical. It is desirable to select a dead arm in the area of the Nature Conservation District at Szatmárbereg, which is characteristic of the Upper Tisza fora possible region reconstruction.

(6) The Tisza-Research Working Committee renders help to the stock-taking of animal and plant species living in the area of the Nature Conservation District at Szatmárbereg and draws up a proposal for the list of the plant and animal species calling for a priority in being protected.

(7) We should strive, to carry out in 1978 the surveys of informative character in the Soviet and Jugoslav Tisza-stretches, in the framework of the co-operation, going on with the Sovietunion and Jugoslavia. As a result of this, the investigation areas getting priority can be marked out in both Tisza-stretches, and the aims of the later scientific research work can be composed.

(8) It is justified that the Tisza-Research Working Committee holds Conferences two times annually, one of these in April, the other in November. The Conference in April should last two days, that in November one day.

(9) Owing to the deterioration of the water quality and the bacteriological characteristics of the Tisza and its tributaries, it is desirable to call the attention of the compoetent organs to the problems emerging in the course of the utilization (e. g., irrigating water). For elaborating the concrete proposals, a round-table Conference should be organized in September, 1978.

(10) It should be initiated by the Tisza-Research Working Committee, towards the, Hungarian Academy of Sciences, to begin publishing a Tisza-monograph, consisting of volumes, to be made continously. The first volume, dealing with physical (natural) geographical and climatological questions, could be prepared until April, 1979. The second volume would summarize the rexults of water-body investigations, performed so far.

(11) It is desirable to extend the botanical investigations with the co-operation of new co-workers and to enlarge these to the plants of lower organization.

(12) The co-operation with the organs of the water-administration and the National Office of Environment and Nature Conservation should go on being increased, in order ot promote the reaization of the planned reconstructions.

(13) It is desirable that the work of the original members who have been active with good results in the Tisza-research, should be acknowledged by the Hungarian Academy of Sciences in an adequate form.