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# FROM THE LIFE OF THE TISZA-RESEARCH WORKING COMMITTEE
# TISZA-RESEARCH CONFERENCE VIII

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The Tisza Conference, arranged annually by the Tisza-Research Working Committee, took place this year on 22 and 23 April. In the course of this, there were delivered twenty-two lectures and brief accounts, respectively, followed by questions, contributions, addenda, resp. lecturers' replies.

The Conference began with the inaugural address of Dr. IMRE HORVÁTH, Professor and Head of the Department of Botany. He greeted Dr. PÁL GULYÁS, appearing on behalf of the Scientific Research Institute of water Management, Academian Dr. AMBRUS ÁBRAHÁM, and Head Physician Dr. PIROSKA KISS. He surveyed the subject-matter of the accounts to be lectured, arranged around two research projects: (1) investigations performed in the district of the Tisza river barrage and the nature conservation areas, (2) those in other Tisza reaches.

## Lectures of domain I

(1) HAMAR, J.:

### On the natural purification of the Tisza

Conceptual sphere of the natural purification. Biotic, abiotic factors, taking part in the purification of the river, carrying it out, resp. influencing it. On the role of the water course and suspended matter content of the river. Analysation of the oxygen household. Biomass and production of the bacterioplankton, its importance in the natural purification. Dynamism of the eutrophication processes.

On the characteristic purification mechanism of the Tisza. Changes to be expected in the capacity of natural purification of the river.

Contributions to the discussion:

HORVÁTH, I.: It turned out of the lecture that there are many bacteria to be demonstrated in the water of the river. It is, however, questionable whether we can talk of the active production of bacteria. — Answer: Yes, there was measured a production like this and proved with investigations that these bacterial masses were active.

SZITÓ, A.: The co-operation of what factors is the smaller floating-matter content in Autumn attributed to by the lecturer? — Answer: The floating-matter content, released by snow and ice in the winter period, is drifted by the water mass of the spring flood. This surpasses in quantity the amount demonstrable in the autumnal period.

GÁL, D.: According to his establishment, in the Tisza stretch below and above Szolnok, i the field of $O_2$-consumption, there can be observed no considerable difference. It is, however, questionable if there is any difference in the appearance of the phyto- and zooplankton stocks. — Answer: Yes, there can be demonstrated a considerable difference from biological point of view.

GULYÁS, P.: What is the quality of Tisza water on the basis of evaluating the results of investigations into the longitudinal section? — Answer: On the basis of the classical parameters (primarily from chemical point of view) it is to be considered as pure. At the same time, on the basis of N and P quantities, some difference can already be demonstrated. The absolute quantity of Na milligramme is also showing a rising tendency.

(2) VÉGVÁRI, P.:

Problems of regulating water quality at the Kisköre Reservoir

Before filling up the Kisköre Reservoir, he is analysing the possibilities by means of which the chemical composition of the water masses stored becomes regulable and the formation of a healthy water system and the most favourable state for promoting its optimum utilization can be promoted.

He is investigating into the solutions on the basis of which the formation of the deposits in the reservoir can be influenced. He renders account of the elaboration of the correlations between salt and water outputs with the help of which we can get continuous informations on the salt circulation of the water supplying the resenvoir.

Contributions to the discussion:

ANDÓ, M.: It is well-known that at low water the salt concentration of water is high, at high water on the other hand, the floating matter content is high. The question is, of what kind of water it is planned to fill up the reservoir. — Answer: The descending branch of floods is the most suitable for filling the reservoir.

(3) BANCSI, I.:

Results of investigations carried out with Reglone and Gramoxone herbicides in the Kisköre Reservoir

Before using herbicides to protect water quality, we had to evaluate the results of a wide range of experimental data. The literary data have given sufficient information in several connections. The missing ones were substituted for under laboratory and field conditions in 1976, resp. the existing data were checked up.

The results of the toxicological investigations can be considered as favourable. — The effect of chemicals was analysed under field conditions in small basins ($25 \times 25$ m); in respect of bacterio-, phyto-, and zooplankton. The incorporation of chemicals in fishes and the possible morphological changes were followed with attention. — Our investigations included ascertaining the phytotoxic effect of "Regolone" and "Gramoxone", the decomposition and accumulation of chemicals.

The results of investigations are favourable for the majority of cases (plants, soil, water, sediment, water organisms). In the lecture his results are exposed.

Contributions to the discussion:

KERESZTES, T.: Whether in the water-plant stock the lecturer measured any herbicide concentration. — Answer: He did not.

GULYÁS, P.: How do they plan to remove the remains after burning the wood stock in the stocking area? — Answer: They try to burn it fully. He remarks that the woods are largely not under the management of the Water Administration, he cannot give, therefore, any definite answer in this relation.

(4) Mrs. LÁSZLÓ DOBLER and MÁRIA HEGEDŰS:

## Data on the water quality of the Tisza dead-arms in the region conservation district at Mártély—Sasér

The research work in the dead-arm at Körtvélyes and Atka began in 1976. Water samples were generally taken with monthly frequency.

The analysis of water areas was justified primarily as a continuation of investigations having begun in this district (Mártély dead-arm) in 1975 and, on the other hand, in the interest of a complex research. The water as living-space is namely inseparable from the terrestrial ecosystem, the knowledge of that is, therefore, indispensable.

The dead-arms were investigated into in a complex way, applying bacteriological and hydrobiological methods.

On the basis of the results obtained, we could conclude the external effects reaching the water spaces in question. At the same time, we could follow with attention the seasonal change of the aquatic ecosystems, as well. By means of the bacteriological investigations, we could register the degree of pollution, resp. the change in it.

As the water claims increase, apart from the lack of water, water quality will be the minimum factor. In this relation, the water quality of dead-arms has, therefore, a great importance.

Contributions to the discussion:

MARIÁN, M.: Does the water taken out of the dead-arms for irrigation get later back again into the dead arm? From where do coliform bacteria gain access to the water in such a large mass? — Answer: A part of the water taken out gets back. The coliform bacteria don't get into the dead-arms but they proliferate there if having adequate food. At any rate, they can also get into casually, together with refuse water.

HAMAR, J.: Could there be observed the occurrence of a major Cryptomonas invasion in the waters investigated? — Answer: There was observed none.

(5) KISS, I.:

## Algological investigation of the Tisza dead-arm at Lakitelek Tőserdő

The northern larger part of the dead-arm, together with the recreation area, has belonged to the Kiskunság National Park since 1976. The southern smaller part is an unprotected area, playing a part of the planned Alpár Reservoir. By these conditions, the algological investigation into the two parts of the dead-arm is sufficiently justified.

Water samples were taken, in the preceding years, but in the district of the recreation area at Tőserdő. From 1976 on, we have been sampling from the southern stretch, as well, at least in every season. The protected part at Tőserdő, resp. the district of the recreation area, has proved to be so far the richest in algae.

I have till now observed more than one species in the alga flora that may be considered as a rarity. There are like this, e. g., *Desmatractum indutum, Desmatractum bipyramidatum, Dictyosphaerum pulchellum, Centritractus africanus,* and *C. belenophorus, Fusola* spec. These occur but rather sporadically. *Ceratium hirundinella* has appeared in large numbers, mostly in every water sample, with a considerably variety of

forms. Those belonging to the genus *Scenedesmus* have presented themselves in a large variety of forms, as well. *Microcystis aeruginosa* has also appeared here and there, in large numbers, mostly in the neighbourhood of the bridge — what is indicative of the eutrophication of water. There have so far been found all in all nearly 100 algal taxons.

This mass-production colouring which stained the water surface, resp. the upper 0.5 cm layer of that, brownish-green in the part et Tőserdő, particularly in the area of the landing-stage, on 29 September, 1976, is worth mentioning from the point of view of vegetation. In this, *Ceratium hirundinella* also occurred in mass. On 23 September, the water was poor in phytoplankton, as yet. In this change, weather may have had a considerable part, as well.

Contributions to the discussion:

HAMAR, J.: Ceratium hirundinella was also found in more than one dead-arm along the Tisza Occurring in moving waters in a very wide range of qualities, it cannot be considered unequivocally as an indicator of quality.

GÁL, D.: He similarly confirmed that this species was to be found, also in large numbers, in the dead-arms at Körtvélyes and Alpár.

(6) HEGEDŰS, MÁRIA and Mrs. LÁSZLÓ DOBLER:
Microbiological investigations into the Tisza reaches in County Csongrád, in 1975 and 1976

A satisfying answer to the problems raised by water utilization and environmental protection, as well as by the protection of water quality can only be given on the basis of the results of complex water examinations. We have, therefore, conducted a survey, comprizing both the bacteriological and biological parameters.

In the years 1975 and 1976, in the Tisza reaches in County Csongrád, we took, together with the laboratory of the Water Management of the Lower Tisza Region, 196 water samples, and elaborated these. Parallel with this work, we have also analysed the water of two considerable tributaries, the Hármas- (Triple) Kőrös and the Maros, on the basis of water samples taken from above the river mouths.

The applied bacteriological and biological methods enabled us to follow with attention the changes taking place in water quality.

Contributions to the discussion:

GÁL, D.: What kind of limiting values are meant by the waters belonging to category four? — Answer: This is a hygienic water qualification, performed in the National Water Office, on the basis of a sectoral standard project.

HAMAR, J.: Has the total germ count got a valuable dynamism? — Answer: Yes, for instance, the germ count cultivated at 20 °C is generally higher then that cultivated at 37 °C.

Could the total germ count be established in the swelling at Óbecse and was a change in the algal composition? — Answer: In relation of the germ count, the number of those, bred at 37 °C has increased. There was some change in the algal associaiton to be observed, as well, because the Chlorococcales species also appear in large numbers.

What kind of larger changes were caused by the coliform bacterium in the water-body? — Answer: It promotes, on the first hand, purification and, on the second hand, it has the indicating part at the installations of refuse water.

KISS, I.: At evaluating averages, was the algal number evaluated by the lecturer? — Answer: The algal number was not evaluated.

KISS, PIROSKA: Calls the attention to that, at investigating into subject-matters like this, an answer must always be looked for to problems of hygiene.

(7) GÁL, D.:

Some characteristics of the zooplankton of the Tisza dead-arm at Körtvélyes

In the period between 1971 and 1976, on the basis of investigations performed by the month, the most important characteristics of the quantitative and qualitative changes in the zooplankton of the Tisza dead-arm at Körtvélyes are as follows.

In the zooplankton, there are mostly the Rotatoria species which dominate both in species and individual numbers.

The change in the total individual number of zooplankton generally shows two maxima annually: a larger one in Spring (generally in May) and a smaller one in Autumn (mostly in September—October).

The change in the total individual number is highly influenced by the seasonal formation of temperature. On the basis of data obtained so far, for the zooplankton association developed in the Tisza dead-arm at Körtvélyes, the water temperature between 15—25 °C is the optimum. In case of a water temperature higher or lower than this the total individual number of the zooplankton considerably decreases.

The quantitative and qualitative composition of the zooplankton is considerably modified by the floods inundating the dead-arm. At high water, the amount of zooplankton strongly decreases. But after the flood had passed, the original balance returns to normal in a short time.

In the course of the year, the saprobiologic quality of the water in the dead-arm considerably changes. In the winter months, until about May, the oligobeta- and beta-mesosprobic organisms predominate (o.-b.: 43 per cent, b. 38.9 p. c.). the beta-alpha mesosprobic species are present but in a low percentage (13.9 p. c). In the summer months, the water quality more and more deteriorates, the number of beta-alpha-mesosaprobic organisms and their individual number increases (37.8 p. c.), and at the same time, the percentage of the oligo-beta- and beta-mesosaprobic organisms considerably decreases 32.7 p. c.).

Contributions to the discussion:

GULYÁS, P.: He asked what species in the zooplankton pullulated in August and meant a – b mesosaprobity. — Answer: In this period the number of species is about two hundred. He can reply to the question only after studying the list of species.

MAGYAR, L.: Has the lecturer observed any difference between the material of the samples collected from both ends, resp. the middle of the dead-arm? — Answer: There are differences to be observed but these are not characteristic.

HAMAR, J.: It is to be taken into consideration that, on the occasion of floods, the zooplankton drifts from the dead-arm into the Tisza.

(8) SZITÓ, A.:

Bentnos investigations into the Tisza stretch between Tiszafüred and Kisköre

He has continued the investigations begun in 1971 in the dead-arm at Tiszaüfred and in the Tisza stretch between Tiszafüred and Kisköre. Sampling sites were: the dead-arm close to the sands and, in the Tisza, above Tiszafüred—Örvény (428 river km) and Kisköre (406 river km).

Date of sampling: 27 May, 16 September, 28 October. In the period before May, sampling was impeded by high water. Due to the flood, the parts of river-bed,

watter-covered in the Autumn, could not be found. On the right, as well as left banks of the dead-arm and the Tisza, ten-ten samples were taken, on every occasion, on the side of the river, in different distances from the riverside covered with water. From these, the Chironomida species were determined.

On the basis of investigations it was established that in the samples taken from the depths of 0.5 to to 6.0 m there could be observed no close connection between the individual number of animals and water depth. The individual number of Oligochaetae increased, as compared with that in the earlier years. From among the Chirinomidae the dominant species are: *Chirinomus plumosus, Ch. fluvietalis, Tanypus punctipennis.*

In October, the body of Oligochaetae was full of cocoons, and a large number of these was also found in the samples, as well.

(9) BODROGKÖZY, GY. and HORVÁTH, I.:

Connection between stock structure and organic matter production in the marshlands of the flood-plain at Körtvélyes

By availing themselves of three plant associations in the flood-plain of the Tisza at Körtvélyes, they have dealt with the question, what kind of connection is in case of these considerably homogeneous associations between stock structure and organic matter production. There were performed coenological investigations in all the three plant associations in the course of the growing season, determining the weight of the underground and surface phytomasses.

From among the three stocks, in respect of the species composition, *Baldingeretum arundinaceae* was the most homogeneous.

The most organic matter was given by *Baldingeretum arundinaceae* and the least by *Caricetum gracilis nutantis alopecuretosum.* The phytomass below surface is very high at all the three coennoses.

The close linear connection between the surface phytomass stock structure is proved by that the higher participation-proportion of dominant species — that is to say, the more homogeneous plant stock — produces a larger dry-matter quantity in case of a nearly identical closeness and plant-height. It is likely that this is connected with the alolopathic effects, too.

Contributions to the discussion:

MARIÁN, M.: The investigation into the plant stocks and their productivity is important in zoologica relation, as well. These are namely — according to the investigations, so far — in a close connection with the insect fauna. — Answer: Habitats should always be examined in a complex from, following the formation of food-chain to the very end.

BELICZAY, I.: How much is the level difference between the single investigated meadow-caenoses? — Answer: The existing level-difference were determined by estimation. There were given differences of about 10—30 cm.

How strong is the accomodation of the species Typhoides arundinacea and *Alopecurus pratensis* to the flood? — Answer: The adaptability of the latter one is better than expected: it tolerates even 2 to 3 m high flood for a longer time than the first one. *Typhoides* can only regenerate injury after high water in a longer time.

VÉGVÁRI, P.: Can alkalization be demonstrated in the marshlands of the flood-plain and what is its degree? — Answer: At present, the initial stage of alkalization can be demonstrated from the soil of these marsh-plains. This, however, has no influence, as yet, on the plant species to be found.

(10) MARGÓCZI, KATALIN:

## Botanical investigations in the Tőserdő

Tőserdő, lying beside the dead-arm at Lalitelek, is an interesting area in botanical relation, as well. Its most known part is the alder plantation which has already for a long time been a conservation area.

In the course of the foundation of Kiskunság National Park, in 1975, the about 5 km long dead-arm and the gallery forest encircling that became protected in their entirety, constituting a part of the National Park.

The full botanical exploration of this Tisza stretch is an important task so much the more, because this area is undisturbed and therefore suitable to be reconstructed. The initiated investigations would like to promote primarily this region-reconstruction.

In the foregoing, the botanical mapping of three different forest associations took place. The investigations into stock, climate, and production enable us to designate the areas which are the most suitable for the plantation of different forest types.

Contributions to the discussion:

HAMAR, J.: How has the degree of frequentation an effect on the plant stocks discussed? — Answer: An effect like this cannot be observed, the frequentation being but of small degree.
What could be established concerning the spreading of *Amorpha* abd *Vitis* — Answer: *Amorpha fruticosa* spreads in the investigated area at the fringes of forests the most intensively. *Vitis riparia* as a vine species grown wild, is already a characteristic lianeous plant of the forests along the Tisza.

BODROGKÖZY, GY.: He recommends the lecturer to lean on wider references in ocnnection with his subject-matter. He is missing the elaboration of a literary material of knowledge.

(11) FARKAS, Á.:

## Experiences of the fish destruction at Körtvélyes; the appearance of the herbivorous fishes and the ecological relations of their role

In the last week of May, 1976, he observed a considerable fish perdition in the Tisza dead-arm at Körtvélyes. This may have been caused by a pesticide getting in from the adjacent rice-fields or possibly the *Salmonella* infection demonstrated from the water with a bacteriological test. Since the date mentioned, ha has not observed any fish perdition in the dead-arm.

He is presenting the colour slides taken of the fish carcasses washed to the riverside.

He saw first *Ctenopharingodon idella* individuals of 200—250 g weight and *Hypothalmichthys molitrix* individuals of 350—400 g weight in the Tisza dead-arm at Körtvélyes in the Summer of 1974. While the occurrence of both fish species, caught in 1974 was accidental, in 1976 they already belonged to the main profit-fishes of fishers.

According to his supposition on the basis of his experience, which is supported by the opinion of fishers, as well, these species spawn in the dead-arms.

The disappearance of the worms, insects, living on the water-plant coenoses exterminated by *Ctenopharingodon idella* from the dead-arm results in the interruption of the food-chain, leading thus possibly to the depopulation of our autochthonous fish stock.

Contributions to the discussion:

SZITÓ, A.: He is calling the attention to that instead of the designation "herbivorous fishes" it would be more precise to use the expression "far-eastern fish species". He does not agree with that these fish species cannot be regulated in the Tisza dead-arms. By being caught, they can be extirpated from the endangered waters. — Answer: This is true only theoretically, practically their radical extirpation is impossible.

MARIÁN, M.: In the protected Tisza dead-arm at Körtvélyes, as a result of the rapid breeding of the far-eastern fish species, the aquatic vegetation has entirely perished.

HAMAR, J.: Why is the water in the nature conservation areas, resp. region conservation districts not protected? — The answer was given by Mrs. Balázsfalvi Attila, the representative of the National Nature Conervation Office: It is impossible to protect the Tisza in its whole length. And the problem of the dead-arms is insoluble owing to their role as inland reservoirs.

MAGYAR, L.: It is possible that fishes gollop the grains of poplars of the gallery forests around the dead-arms falling into the water, what may contribute to their perdition. — Answer: It is possible that the poplar grains supplied with a parachute outfit contribute to the periodical fish perditions.

GULYÁS, P.: The Scientific Research Institute of Water Management does not propose to introduce fish species like these into the dead-arms.

(12) MARIÁN, M.:

## Some ecological characteristics of the bird stock of the Tőserdő

An eight-member research team, formed of the Tisza-Research Working Committee for this purpose, in 1976 began a systematic ornithological fact-finding investigation, planned for two years, in the Tőserdő lying in the flood-plain of the Tisza and belonging to the Kiskunság National Park. The members of the team are: ATTILA BANKOVICH, ISTVÁN BOGDÁN, ISTVÁN LŐRINCZ, Dr. LEVENTE MAGYAR, GYULA MOLNÁR, LAJOS PUSKÁS, LÁSZLÓ SALAMON, and the lecturer.

While in 1976 the aim was to collect and evaluate the faunal, ecological and phenological data — and the lecture renders an account of the ecological factors considered to be the most important ones from among these — in 1977, however the programme is the quantitative survey of the bird stock.

49 from the 81 bird species observed in the investigated area hatched in this area. The lecture is analysing the effect of the environmental factors regulating the vital conditions of nesting species. It takes into account in any case also the anthropogenous effects.

From among the aquatic ecosystems, the small forest bog has the least attraction and feeding capacity (its characteristic species is *Gallinula choropus*). The so-called age-worn ox-bow lake of the Dead Tisza has a more important role. It is characterized by: *Ixobrichus minutus, Acrocephalus arundinaceus,* and *Acrocephalus schoenobaenus*. To the living-space of large extension of the Tisza dead-arm at Lakitelek, and to its organic-matter base, a large number of aquatic birds are bound. (It is characterized by: *Anas platyrhynchos, Aythya nyroca, Fulica atra*).

Investigating into the living possibilities of the species living in the terrestrial ecosystem according to the forest levels, he established that the life of terricolous species is influenced by floods.

The nest-placing of 26 bird species was investigated on 14 different plant species (together in 83 cases). In respect of nest-placing, there could not be ascertained any specialization in plant species or plant associations.

Contributions to the discussion:

MAGYAR, L.: Is there a regular system in the localization of nesting-box investigated, e. g. placing them according to the quarter of the heavens? — Answer: A system like this has not been applied.

ÁBRAHÁM, A.: Why is the investigated forest section called "Tőserdő"? — Answer: It is a contracted popular designation instead of oak-forest (Tölgyeserdő).

## II Investigations performed in other Tisza stretches

### (13) STAMMER, ARANKA, HORVÁTH, I., CSOKNYA, MÁRIA, and HALASY, KATALIN: Structural investigation into the oblong medulla of Tisza fishes

The structure of medulla oblongata, being at a lower level of development as compared with that of the higher vertebrata, differs between silver carp *(Carassius auratus gibelio* BLOCH) and pike *(Esox lucius* L.*)*. In the fish of prey, the projection tracts, the formatio reticularis, and the spinobulbar nuclei are stronger developed. The nuclei of the spinobulbar nerves, mainly the groupings of the sensory ganglia are different. The nuclear group eliciting the respiratory and circulatory rhythms of fishes is not circumscribed.

An environment poor in oxygen, elicited artificielly, induced a much stronger change in the mitochondrial and membrane structure of the nerve cells of the pike than in the silver carp.

### (14) CSOKNYA, MÁRIA, HORVÁTH, I., STAMMER, ARANKA, and HALASI, KATALIN: Mitochondria in transformation, being in the thoracal ganglion cells of the may-flower larva

The most important characteristic of the abdominal ganglionic nervous system of the may-fly larvae is the fusion of ganglia. In the structure of thoracic ganglia, the nerve cells are of peripheric, while in the fibre substance of central localization. The sizes and plasmatic organella of the nerve cells show various differences.

Their most characteristic cell-organelles are the mitochondria, a part of them is — apart from the structural changes — also transformed. The transformation takes place with the interpolation of the so-called paracrystelline bodies.

The authors think possible that the altering mitochondria have a part in the material and energy flow of nerve cells as reserve (depot) materials.

Contributions to the discussion:

ÁBRAHÁM, A.: The injuries in the nervous system can be followed less than in the branchia. It is probable, at any rate, that the moment when the injury took place, could not be registered.
WOLEMANN, MÁRIA: The biochemical (enzymological) change precedes the morphological one.

### (15) VÁNCSA, A. L.: The tychoplanktonic algal associations of the Sajó

The qualitative and quantitative composition of the tychoplanktonic algal vegetation of the Sajó, on the basis of the 885 water samples investigated between 1965 and 1976, may be characterized with the rule of diatoms (Bacillariophyceae). The algal associations of heterogeneous composition (of rheon-, rheoplankton- and plankton-charakter) feel well the water-using, water-polluting activities of the man, as well as casually the influence of the more important tributaries in the Sajó. The peculiar forms of the algal population maxima are the following: these coming from beyond the frontiers, from the tributaries, being formed primarily or secondarily in the Sajó. Their recognition makes more effective the characterization of the state

of water quality and the estimation of the possibilities of the use of water, aiding in this way the practical water-qualifying activity.

In the Sajó, apart from the tychoplanktonic algal associations of average composition and medium population, we can distinguish algal associations of various composition and rich population, of various composition and thin population, of poor composition and rich population, of poor composition and thin populaltion which characterize particular conditions.

For presenting the tychoplanktonic algal associations of the Sajó, the results of seven characteristic longitudinal-section investigations are used.

Contributions to the discussion:

MARIÁN, M.: Will take place any riverbed regulation in the Sajó? With what kind of materials is it polluted? — Answer: He does not know about any plan of rivercontrol. The pollution of the Sajó water is mainly induced by the Integrated Chemical Works of Borsod and the Lenin Metallurgy Works with introducing materials of sulphuric content, although the pollutions coming from agricultural areas are also considerable.

(16) VÁNCSA, A. L.:

## Results of the algological investigations performed in the bed-section of the Sajó below Miskolc

The Sajó reaches the district of Miskolc with a considerable amount of pollution and the quality of its water is here fundamentally changed by the activity of man using and polluting it. The river stretch below Miskolc, apart from the basic load, is only loaded by the sewage-water of some minor settlements, resp. by the pollutions coming from agricultural water usages and run-offs from land. The double mouth of the Hernád occasionally considerably deteriorates the conditions of pollution and self-purification but it may have a favourable effect, as well.

It follows from this that, in the river stretch between the mouths of the Szinva and the Hernád, there may develop favourable conditions from the point of view of self-purification and some realization of these processes can be observed, free from any disturbing effects.

The double mouth of the Hernad, apart from the existing similarities, can be characterized with considerable qualitative and quantitative differences.

Corresponding to the experiences of the earlier years (1965 to 1975), also definitely presents itself in 1976 the effect of the double mouth of the Hernád in the Sajó — in the short river stretch before discharging into the Tisza — and that is illustrated well by the comparison of the characteristic results of the longitudinal-section investigation on 19 and 20 July, 1976.

The results are useful for the water-quality investigation of the Tisza.

Contributions to the discussion:

HORVÁTH, I.: What is the effect of the polluting materials on the algal organisms? — Answer The effect of the polluting materials manifests itself mainly in the quantitative indices of algae.

Of what degree and how extended is the polluting effect of the Sajó on the Tisza? — Answer: The polluting effect of the Sajó water on the Tisza can be observed well but he has not investigated, as yet, the range of pollution there.

Is there a possibility to reduce the polluting materials considerably? — Answer: The possibilities of this do exist.

KISS, K. T.: Why did the lecturer call the algal associations living in the Sajó tychoplanktonic algal organisms? — Answer: He made the tychoplankton denomination appear as a collective term.

HAMAR, J.: Are there heterotrophic algae? — Answer: The lecturer has not given any positive answer.

(17) TANÁCS L.:

## Contributions to the dominance and abundance relations of the Apoideae living in the flood-plain and on the dams of the Tisza

He performed abundance and dominance investigations in 1975, for 26 days, on the dam and flood-plain along the reaches between Tiszasziget and Tiszacsege. In the collection carried out for ascertaining the structural composition of the flower-frequenting hymenopteric insect population, the individual number of Hymenoptera was above 1100, that of the determined wild bees 993.

The most important flower-frequenter proved to be *Halictus eurygnatus* (18.83 per cent). The dominance of *Lasioglossum malachurum* (6.45 p. c.), the *Lythrum*-visiting *Melitta nigricans* (9.56 p. c.), *Tetralonia salicariae* (5.34 p. c.), *Tetralonia ruficornis* (4.23 p. c.) can be regarded as considerable. The dominance of more than one swarm of wild bees is remarkable like that of the *Andrena flavipes, Lasioglossum morbillosum, Tetralonia, Eucera,* and *Bombus* species which can be found in most habitats.

The density of the wild bee population increased more and more in the course of Spring. The abundance of the flower-frequenting Apoidea-group revealed the greatest value in midsummer on the basis of measuring (680 widl bee ind./ha). The Apoidea stock density was considerably influenced by mowing. Abundance rapidly decreased in the course of September.

The abundance value of the domestic honeybee changed during the observations between lo and 970 individuals/ha.

The wild bee population showed a changing composition, taken as a function of the flowering aspects, during the flying time. In Spring, the first generation of *Andrena* and *Halictus* genera, as well as the *Bombus* species; in the course of May and June *Eucera,* later on the *Megachile* species were considerable stock-makers. In midsummer, the second generation of the species of the *Halictus* and *Andrena* genera, as well as the individuals of *Melitta nigricans, Tetralonia ruficornis,* and *Tetralonia salicariae,* visiting the *Mythrum* species, appeared as the most important representatives of the population. These species not only represented a considerable proportion of the wild bee population but also considerably increased abundance.

As evaluated according to flight-time, the species of two generations with a long swarming and the semisocial species are the most considerable.

Contributions to the discussion:

GALLÉ, L.: Did the lecturer find hylophilous Apoidea species in the course of his investigations? — Answer: He did.

HEGEDŰS, MÁRIA: Are mosquitocides used on dams and in flood-plains? — Answer: According to the information obtained from the Water Managements of the different Tisza Regions, there are used no insecticides like this at all; the areas have only got fertilizer treatment.

BELICZAY, I.: Was there made any proposal to influence the phytocoenoses of the areas investigated by the lecturer for making them more favourable from apicultural point of view? — Answer: Taking into consideration the points of view of dam protection and mowing, there was pre-

sented a suggestion for controlling, transforming the phytocoenoses, developed here, reasonably in this direction. This could have satisfied, to a certain extent, also the demands of apiculturists. The presented proposal was, however, not realized. (The proposals promising to be useful in apicultural respect are contained in the conclusion of the Conference).

(18) BÁBA, K.:

The water-carried mollusks of our rivers and the analysis of the fauna of the deposit

Since the publication by CZÓGLER and ROTARIDES in 1938 on the fauna of the deposit of the Tisza in the environment of Szeged, the problem of analysing the deposit was not dealt with by malacologues. The investigation into the drifted fauna became timely again when the part of snails carried by the river water in the primary stocking of the flood-plain and in the further succession of snail associations after stocking arose.

The author has carried out the analysis of together 19 deposit samples coming from the Tisza, the Danube the Maros, the brook Szalajka, and five from the upper Pleistocene, concerning land snails, on the basis of approximately 30,000 indibiduals.

He has analysed the samples collected with casual sampling by investigating into the interval of the frequency proportion confidence. From the deposit samples there were found 99 species.

It is to be established on the basis of samples that the 27 common species of the 19 samples, in respect of their dominance and the range of their being carried, is different in the single rivers. The recent samples differ from those in the upper Pleistocene, even in respect of the sequence hierarchy of the carried snails. The single rivers have a certain "individuality" from the point of view of the qualitative composition of the carried material.

On the basis of the experiences, the composition of the drift fauna is determined by the climatic potentialities. The difference between the recent alluvial composition and that from the Pleistocene is also to be ascribed to the different climates.

Contribution to the discussion:

GALLÉ, L.: Is the survival of the snail population influenced by the competitive interactions between the populations? It would be very important, to continue analysing the drift fauna of the Maros — Answer: An influence like this could not be demonstrated in the course of investigations.

MARIÁN, M.: What species are classified by the lecturer into the drift species? — Answer: Drift species are generally called those drifted from the mountainous districts or from other farther regions of the Plain.

MAGYAR, L.: How broad is the stripe of current? — Answer: It is changing but this is only limited to the low mountainous zone.

(19) ANTAL, Z.:

Hydrobiological investigation into the after-purifying systems. I Chemical investigations

The waste-water of the active-silt equipment of the Tisza Integrated Chemical Works, purifying the process-waters of the new olefinic and paint works is conducted down into a lake system consisting of six lakes. In the lakes, the daily 4000

to 4500 cubic metre purified waste water undergoes a fifty-day long biological after-purification and passes after this into the Tisza.

From the point of view of estimating the after-purifying effect, we considered the following components as essential: pH, dissolved $O_2$, $BOI_5$, $KOI_{Cr}$, $Ca^{2+}$, $Mg^{2+}K^+$, $So^{-2}/_4$, $HCO_3^-$, P and N-forms.

The solute $O_2$ content, oxygen saturation of the waste-water inflow alternated between 5—6 mg/l (45 to 50 per cent). And the oxygen saturation of the lakes was formed between 50 to 100 per cent mean values, meaning a considerable decrease as compared with that of the last year.

From the potassium-dichromate oxygen consumption we have concluded the quantity of the oxidizable organic matter. The KOI -value of the running waste-water rose from the average value 70 mg/l to 83 mg/l which corresponds to a rise of 15 per cent. On the other hand, the $KOI_{Cr}$-value of the running waste-water rose from the average value 70 mg/l to 83 mg/l which corresponds to a rise of 15 per cent. On the other hand, the $KOI_{Cr}$-value of the waste-water, lifted over to the Tisza and so flowing away, rose by 35 per cent as compared with that in the last year (on the average 62 mg/l).

The increased loading of lakes is shown by the results of measuring of conductivity, as well. A s compared with the last year, an increase of 70 to 100 per cent is to be observed. This is referred to by the measurement results of the total dry-matter content, too, showing similarely an increase of 70 to 100 per cent.

We consider as essential, to investigate into the M, P forms inducing eutrophication. As compared to the years gone, the binding of P in lakes has decreased. That nevertheless some favourable total P resp. orthophosphate left the lakes for the Tisza, that can be attributed to the decrease in the total phosphorus content of the waste-water inflow. The total phosphorus content of the purified waste-water, lifted over to the Tisza, changes between the values 0.1 and 0.3 mg/l, and the orthophosphate content between 0.05 and 0.15 mg/l.

The total mineral N average value of the waste-water inflow fluctuated between 2 and 4 mg/l. This decreased in the lakes to a much lesser extent than in the past year. The total mineral N content of the waste-water flowing away changed between the values 1.5 and 3 mg/l.

It is shown by the metric data that the lakes are overburdened and the water quality is deteriorated in its entirety.

(20) Kiss, K. T.:

Hydrobiological investigation into the after-purifying lake systems. II Algological investigations

In the after-purifying lakes, the binding of the decomposed polluting materials, vegetable nutritive materials, their extraction out of the water is "carried out" first of all by algae, hair-weeds, reed-grasses.

The algal population of the purified waste-water getting to the lakes was, taking into consideration both the species and the individual numbers, poor, without influencing the water quality considerably.

In February and March, 1976, following the thaw of ice, in the lakes, a plankton-algal stock of 20—30 million ind./l pullulated, dominated by *Cyclotella* and *Chrypto-monas* species. The same was characteristic of the early Spring of 1977. In Summer,

in the first two pairs of lakes the plankton-algal population was thin, in the last one, however, it was rich.

In 1975, in every lake, enormous *Cladophora* grases overgrew the bottom of lakes and later on also the water mass and surface. The heavy filamentous algal mass (in dry weight approximately 5 tons) considerably diminished the quantity of P and N salts in the water lifted over into the Tisza. Because of the omission of the optimum thinning, in Summer 1976, this filamentous algal mass perished. This was promoted by a fungal infection and by the overloading of lakes, as well. Thus the organic matter weighing a lot of quintals has induced a serious self-pollution and the till then favourable after-purifying effect of the lake system considerably deteriorated.

This effect must have been mitigated by that in the middle pair of lakes bulrush was introduced in the year before. The bulrush stock itself and the living coating, developing on the bulrush stalks exerted, by binding the material, a favourable purifying effect. As the bulrush stock is but 10 per cent of the surface of the full lake system, the purifying effect could not be of the same extent that could have been expected from the lake system.

We are convinced that, applied with a suitable technology, the lakes could exert the optimum purifying effect, sparing in this way the Tisza and the Kisköre Reservoir the considerable amount of "polluting material".

Contributions to the discussion:

HORVÁTH, I.: Is there any opportunity to employ profitably the organic matter *Cladophora* — Answer: It is probably possible to make use of it but there has not been carried out any investigation in this direction.

VÉGVÁRI, P.: How can reed be introduced into the lake systems? What is the solution of this problem?—Answer: This is a difficultly solvable problem. It is more successful to introduce, instead of this, bulrush and lake-clubrush.

HAMAR, J.: By which species was the algal maximum of the winter-period of 1976 brought about? — Answer: The lake systems in question enjoy a regular maintainance and, owing to this, *Clytocella, Cryptomonas,* and *Chlamydomonas* species bring about the algal maximum.

HEGEDŰS, MÁRIA: Are these lakes suitable at all for an after-purification? —Answer: According to the statements of the investigations, so far, they seem to be creased. In the time of winter samplings the amount of zooplankton markedly diminished, unambiguously determined by the oxygen-deficient environment, formed under the ice (strong bacterial activity, decrease in algal number, etc.).

We are reminded of by the harmfully changed chemical parameters, the increased algal number, together with the above described phenomena, that the oxygen-household, equilibrium of lakes were disturbed (it is to be feared that under the ice even anaerobes are to be taken into consideration), respectively that the large mass of algae and zooplankton (together with nutritive materials) getting into the reception basin (Tisza), promotes its eutrophication, endangers the water quality of the Kisköre Reservoir. And this is thoroughly undesired.

Contributions to the discussion:

BANCSI, I.: Is there a correlation between the amounts of algae and zooplankton? — Answer: Between the observed algae and zooplankton a remarkable correlation took place.

HAMAR, J.: In the course of investigating the water flowing away, could Ciliata be demonstrated? — Answer: Ciliata could be demonstrated from these waters only casually.

SZITÓ, A.: What was the temperature of water on the occasion of investigations? — Answer:

The temperature of water getting into the lakes changed between 12 and 25 °C but at the end of November the lakes froze in. Under the ice the temperature was −2 to −4 °C. In late February, the water temperature was 6—7 °C.

Could $H_2S$ be demonstrated from the water? — Answer: Any release of this was not observed.

VÉGVÁRI, P.: What is the role of the far-eastern fish species in the life of lakes? — Answer: From, among the fishes got into the lakes the body-weight of increased threefold, on the other hand the body-weight of carps became tenfold in a year.

(22) M. MARIÁN has reported on the results of the Tisza research in 1976 and outlined the tasks of the next year.

Remarks and suggestions by the participants:

SZITÓ, A.: At the Tisza III river barrage, he suggested to build a proper and functioning fish-barrage

VÉGVÁRI, P.: He asks the fellow-researches for a many-sided investigation into the district of the Kisköre River Barrage from zoological, botanical, and other points of view.

BELICZAY, I.: He established that the far-eastern fish species would — as is to be expected — proliferate in the water of the Tisza, as well, because the zygotes could be exported on the feathers of the aquatic birds from some lakes.

TANÁCS, L.: He asks the Presidency of the Tisza-Research Working Committee to ask centrally the competent authorities for free admission of the research workers to the nature conservation areas.

The Conference ended with the presidential closing speech and evaluation of Dr. IMRE HORVÁTH.

## Proposals compilated by the Presidency after Tisza-Research Conference VIII

The lectures delivered at Tisza-Research Conference VIII in Szeged, on 22—23 April, 1977, and the discussions following these, have raised several problems deserving attention from practical point of view, as well. There are some among the proposals of Tisza-Research Conference VII in Szeged, possessing present interest, as well: these are, therefore, repeated here.

(1) For solving the environment- and water-quality conservation problems of the Tisza, it would be necessary to create a regional laboratory. This should be organized in the vicinty of Tiszafüred.

(2) It is much to be wished that the National Water Office and other organs support as much as possible the exchange of working methods abroad of the experts of water management participating in the Tisza research.

(3) It is much to be wished that in preparing the great investments touching the Tisza (planning fish barrages to be built into damming plant weirs, etc.), also experts dealing with problems of environmental conservation (hydrobiologist, ecologist, etc.) take part.

(4) It is to be prevented with any means that herbivorous fishes get into protected waters (by building proper technical installations, etc.). It is desirable that the competent organs harmonize the economic interests with those of the environmental and nature conservation. And the decisions issued for conserving the purity of waters should be enforced.

In the course of the Tisza research work, in the future an increased attention should be paid to the following questions:

(1) The systematic investigation into the quality of water and the influence of tributaries on the water quality of the Tisza.

(2) Elaboration of the biological parameters suitable to determine water quality.

(3) Investigation into, and forecast of, the biological equilibrium of the reservoirs of major depth, to be expected.

(4) Water-body investigation in the complete Tisza stretch in Hungary and Jugoslavia.

(5) Investigation into the supposed prolification of the herbivorous fishes (amur) in the Tisza and its tributaries.

(6) Investigation into the efficiency of the Kisköre river barrage.

(7) Effect of a lasting water-covering on the living world of flood-plains.

(8) Effect of the agricultural pollution on the biological equilibrium of water.

(9) Investigation into the effect of water-speed upon the abiotoc and biotic parameters of water.

(10) At the complex investigation into each domain, we ought to strive to put into practice the increased co-operation of the experts working in various domains.

(11) We have to begin preparing the syntheses concerning all the problems and Tisza reaches, respectively, of which there are sufficient research materials at our disposal.

(12) It is an important task of the Tisza research, to promote forecasting the various human interventions for a longer time.

The compiler acknowledges with thanks the placing at his disposal the minutes made by Dr. M. MARIÁN, Dr. MÁRIA HEGEDŰS, and Dr. L. TANÁCS, for assisting him in bringing together the material of the Conference.