

FROM THE LIFE OF TISZA-RESEARCH WORKING COMMITTEE TISZA RESEARCH CONFERENCE XIX (1988)

Compiled by
GY. BODROGKÖZY

Department of Botany, Attila József University, Szeged, Hungary

The members of our work-group work in different towns in the river Tisza region. For this reason it was deemed desirable to organize the regular meeting in this year, too. In this way researchers working on different ecosystems can exchange information on the latest results, thus facilitating the realization of the complex research programme. The conference was held on 24—25 November 1988 in the building of the Szeged Committee of the Hungarian Academy of Sciences. In the course of a two-days' sitting lecture were followed by active discussions. Hereby the participants obtained an overall picture of the Tisza region from the source to the mouth. In his opening speech the honorary president of the work-group provessor Benedeczky pointed out the importance of research of the Tisza region on an international level. The president emphasized the possibilities of utilization of the result obtained in these studies in environment and nature conservation. Long term research programmes make possible the control of the changes occurring in the Tisza river region in respect to environmental biology and biocenology. The reports can be arranged in three main groups:

1. Lectures on the Soviet region of river Tisza

MEZŐ-KRICSFALUSHY G., KRICSFALUSHY G. M. and KOMMENDAR V. I.:

The analysis of complex population in *Ornithogallum umbellatum*
L. (Liliaceae).

In the course of their investigations the authors have studied the community relations, the yield of phytomass and the optimal environmental biology requirements of *Ornithogallum umbellatum*. Answer was given to the question concerning the different tent of changes caused by antropogen effects in mass relations. Parallel to this, data were obtained about the aftermath of other abiotic and biotic stress effects. On the basis of experimental result, methods were developed which could ensure the protection of *Ornithogallum umbellatum* in Sub-Carpathia.

Possibilities for the retention of rainwater along the upper region of the river Tisza

In Sub-Carpathia experiments have been carried out a long time to solve the retention of rain-water by forestation in the areas above the timber-line in the bare forests of the North Eastern Carpathians.

Experiments for the replacement by forestation demonstrated that they could be effective in spite of soil erosion that took place after cutting of timber.

These stands could have a beneficial influence through their water storage and water-retention capacities on the regulation of water flow rate of the rivers in the plains, ergo flood-disasters could be prevented.

2. Lectures on the Hungarian region of the river Tisza

A. SZITÓ and P. BOTOS

Analysis of the longitudinal section of river Tisza in 1986 Deposit-fauna

Water samples were collected at 38 cross-sections along the Hungarian region of river Tisza and the mouth regions of the tributaries (at distances 500—800 m from the mouth) between September 15 and 30. The selection and conservation were performed on the spot, and the analyses were carried out in the laboratory. The data indicate that the abundance of Oligochaetes above Szamos is still low but the values obtained below Szamos are 2—10 times higher than those obtained previously. The number of individuals of Chironomidae mosquito larvas increased even to a higher degree.

Markedly increased the number of species and individuals of backwater animals (*Polipedium bicrenatum*, *P. nubeculosum*, *Chironomus semireductus* Ch. *plomosus*, *Einfeldia* species). The increase in the number of Oligochaetes and Chironomids individuals undoubtedly stimulated by the low water level lasting for years. It can be considered as an extreme case that species normally living on the bank can be found in a great number even in the current deposit.

The number of individuals of shell-fish and snails has decreased significantly. It is particularly conspicuous in the vicinity of larger settlements and towns. In 1979 crawfish (*Astus astacus*) could be found in several sections but at present not a single specimen could be found.

Among the affluents only the effect of Maros could be demonstrated.

J. WAIJANDT

Effect of Szolnok waste-water on the quality of Tisza water

The middle reaches of Tisza suffer a significant pollution only at Szolnok. Characteristic improvement of water quality is observed between the mouth of Sajó and Szolnok. Tisza is being significantly polluted at Szolnok by 5 industrial and 4 habitation sources of different waste-water quality and quantity.

Both of the volume released waste-water and the loading of individual components of waste materials showed a slight increase between 1977—1987. In the course of the approximately 100 days' period of sugar manufacture, the Szolnok Sugar Factory discharges into the river Tisza nearly half of the organic-matter. The major part of washing ingredients, ammonium ions, fats, oils comes from housing estates.

The estimated effect of pollution on the water quality of Tisza is worth mentioning only in the period of sugar-making (between September and December).

Therefore, the impairment of water quality was investigated in details only in this period. As the presence of organic matter, dissolved oxygen and phosphate ions are concerned the impairment of water quality became clearly visible from comparisons of water quality of the sections above Szolnok and at Tiszaug. (Minimum, maximum, mean values, statistical curves). The impairment of water quality was of a lower degree than the calculated one, due to the self-purification of the river, and none of the quality components reached values indicating change in the grade of water quality.

I. BANCSE and KATALIN ZSUGA

Investigation of zooplankton in the area of the Kisköre storage-lake

Kisköre Barrage was put into operation in December 1973 followed by a gradual flooding of the storage-lake. In the course of the following 15 years considerable changes took place in the surroundings of this area. As a result of the flooding and the 89.30 nation-wide level damming areas with different qualities came into existence in a region of 90 km². In our lecture using the results of the 1986 experiments we report on the composition of zooplankton in different water territories.

The wild-life of Tisza is highly reactive to the changes of water regime. The quality and quantity composition of Zooplankton stock depends on the duration of damming.

On the reach below the barrage a reduction in the number of individuals and species can be observed. Among large water territories the fauna of Abádszalók cove most closely resembles the Tisza fauna. In the wild-life of Sarud basin the proportion of backwater organisms is also considerable. In various territories of Poroszló basin rich Zooplankton association can be found. In the Tiszavalk basin besides planktonic both benthos and metaphyton associations are present due to the shallow water. The presence of river water, backwater and beach region organisms is also characteristic for the Tiszafüred Dead Tisza area. In the Tiszafüred Dead Tisza the Rotaria stock, in the Poroszló basin the Cladocera stock were most abundant in 1986. Planktons of wheel animalcules and crustaceans in Eger brook were present in large quantities because of rich nutrition available all year round. Dominant elements in the region of Kisköre Storage-lake are the members of Rotaria, *Brachionus*, *Keratella*, *Polyarthra* and *Synchaeta* genus.

Among Cladoceras *Bosnia longirostris* and *Daphnia cucullata* are the most characteristic species but the increasing spreading of *Leptodora kindtii* is worth mentioning. Among Copepoda organisms the rate of forms of nauplius and copepod is the highest and the number of developed organisms is relatively low.

The Mollusca fauna of the benthos of Tisza and its affluent rivers and Kisköre storage-lake

This lectures summarizes the results of the 1986 malacological investigations in the longitudinal sections of Tisza in the territory of Kisköre storage-lake.

Along the Hungarian reach of Tisza 38 sections were tested. Samples were taken from 3 places of each section (left bank, right bank, drift line). The results of the investigations are discussed. In the mentioned territories 22 resp. 20 Mollusca species were found in the deposit.

The Hungarian reach of Tisza is characterized by domination of 2 species of snails (*Lithoglyphus naticoides* and *Valvata naticina*) as well as of one species of shell-fish (*Pisidium amnicum*). *Lithoglyphus naticoides* belonged to the dominant species of Tisza even in the previous years but *Valvata naticina* was considered as a rarity. The dominance of *Pisidium amnicum* increased. The *Unio* species were also present in larger number of individuals as compared to the previous years.

In Kisköre area the most frequent snails were *Valvata piscinalis*, *Valvata naticina*, as well as *Lithoglyphus naticoides* wether the shell-fish were represented in large quantities by *Dreissena polymorpha*.

Valvata piscinalis can be found in considerable quantities in the basins of the storage-lake whether a great number of *Valvata naticina* is to be found in Tisza and in water territories connected with Tisza.

Both *Lithoglyphus naticoides* as well as *Dreissena polymorpha* passage shell-fish are wide-spread in the area of the storage lake. The number of the individuals of *Unio* species similarly to *Anodonta ametica* was lower than it has been expected.

ERZSÉBET SZÉNÉ. MALIK

One of the presumable reasons of the death of silver carps (*Hypophthalmichthys molitrix* VAL) occuring in river Tisza in spring

In spring deaths of silver carps has occurred regularly in river Tisza and Körös for several years.

After excisions of a weakened silver carp I observed well distinguishable cell inclusions.

After a detailed examination I reached the conclusion that it could not be a parasite. In the literature I found only one report on a similar lesion (LANGDON 1988).

In that case similar inclusions caused by iridovirus have been found in the liver of a rainbow trout. Longer time is necessary to find out the reasons of death. My lecture shows only one case which is interesting in the fish pathology, which has not been revealed as yet, but it could be one of the reasons responsible for deaths in spring.

Electron microscopic investigation on liver and pancreas
tissues of phenol-treated carps

The effect of 5 ml/l sublethal dose of phenol was investigated on liver and pancreas of carp.

The quantity of glycogen in the cytoplasm decreased 24 hours after treatment. In this manner electron permeable light areas developed. The appearance of cells containing two nuclei was also a striking feature.

Alterations of the nuclei could be observed even in the 48th, 72th and 96th hours after the treatment.

Signs suggesting amitoses, furthermore ultrastructural changes abnormally influencing the metabolism of the nuclei developed. The chromatin content of karyoplasm decreased, the appearance of nuclei of irregular shapes became frequent.

Myelin figures and autophagy vacuoles appeared in the cytoplasm indicating increasing of endocytotic processes.

In the extended cisterns of the rough endoplasmic reticulum paraprotein crystals accumulated.

The changes described above prove unambiguously that phenol induces serious degenerative lesions in the organs of vital importance of carps.

MÁRIA HEGEDŰS, ENIKŐ DOBLER and E. FEKETE

Comparative analysis of dead reaches of river Tisza
on the basis of the 1988 investigations

In 1988 10 different places of 6 water territories of dead Tisza were investigated along the Csongrád-Szeged reach.

On basis of an integrated system of requirements as to the quality of surface-waters, the water quality of dead branches was as follows:

I st class in the dead-branch at the open-air bath of Mártély.

II st class of Atka and Körtvélyes dead-branches at the lockkeeper house and the tailbay.

II/IIIrd class at the lower end of Serházzug dead branch. Characteristically, IIIrd class at the Sports-ground, IIIrd class at Gyálarét at all the three places where the samples are generally taken. The water quality is the worst at Nagyfa characteristically III class.

On the basis of the most characteristic result with the help of mathematical method we were looking for an answer to the question what kind of similarities or differences can be found in the conditions of the different water territories.

We could demonstrate that the quality of water in the dead branches differ and only one or two components showed seasonal changes in some sampling places.

K. BÁBA

Cenological and zoo-geographical evaluation of snails of convallaria oaken in Tőserdő

With the help of the square-method (50×25 cm) the author studied the yearly oscillation events in Tőserdő.

The data were evaluated with the help of the Czekanowski cluster analysis ecological species-groups obtained from the Feoli-Orloci block cluster and zoo-geographical methods (BÁBA 1982). The results were compared to the author's regional data of convallaria oaken. It can be established that the snail fauna in the investigated wood is appropriate for the regional conditions in respect to zoogeographical composition and from the point of view of structure as well.

The cenological character species of the oaken belong to type D, that is they represent open field snails. From the point of view of zoo-geography they are continental ubiquitous Holarctic and Turkestan fauna elements, typical for steppes.

The changes in aspect from spring to autumn are manifested in the decrease in characteristic due to a decrease in underground water.

GY. MOLNÁR

Data on the organization of heronries with special regard to the heron colony of the Tiszaalpár Nagylake

The heronry of Tiszaalpár Nagylake has been observed since 1979. Some of heron species have moved to Solymos marsh in the last two years. I have studied the temporal sequence of colony-making of eight heron species. A group of early arriving night herons gets organized around the group of spoonbills that arrive first. Birds hatching later occupy well-defined territories in groups which may indicate their simultaneous returning from the winter colonies. The sensitive heron species with striking feathering like little egrets, tufted herons occupy the middle region of the colony in spite of the later arriving. Joining the colony can be established from mapping and thus an affinity order can be established among the species as well.

On the basis of estimations of distances of the nests from one other, the r values were calculated.

The heronry of Nagylake can be compared with the structure of flood plain colonies and further conclusion can be drawn.

A. LEGÁNY

A method for assessment of different territories from the nature-conservation point of view

Due to the changes brought by civilization areas where natural processes can be observed and studied gradually decrease. Thus it is necessary to turn these territories into nature conservation areas. Therefore, it is indispensable to have a quick assessing method that takes into account realities and can be applied in practice for different regions.

The need for completeness requires the development of zoological evaluating system similar to the botanical evaluating system that has been worked out previously.

Different animal groups are suitable for the above mentioned aim. In this report an evaluation method is suggested that holds for birds.

It can be seen that most suitable method in this respect is based on the summing up the point numbers assigned according to the nature conservation value categories of species.

On the basis different areas can be compared and categorized.

Gy. CSIZMAZIA

Role of mammals in the renewal of planted and natural oak woods in inundation areas

The living conditions of 33 000 propagulums have been studied for four years in the inundation areas of river Tisza (Tiszadob-Felfág) in oak woods and replanted-woods.

Oak acorn and maple fruits were placed into 100 permanent squares. The feeding and preference relations were studied with the help of 10 feeders. The parallel traps were set for catching alive and living habitat was explored.

The highest damage has been found in the case of oak acorn. 5 months after the exposure from about 2000 oak acorns only 12.5% of the seedlings survived.

During the same period in maple, seeds a 46% seedling development was observed. Preference studies have confirmed that oak acorns are eaten up mostly by wood mice and yellow necked wood mice. It has been also proved that the size of rodent population follows, although with a phase delay the quantity of acorn fruits. Knowing the primer production of the area studied and the number of individuals in the rodent population in it the level of consumption and the caused damages can be estimated.

In the areas studied the potential consumption can be estimated to reach 200—250 kg ha⁻¹year⁻¹, representing 58% of the yield. From the experimental data we can conclude that the renewal of natural oak woods is hardly possible because of the presence of rodent mammals.

In the course of planting the gradational effects of mammals on the production of acorns have to be taken into account.

3. Reports on research in the Yugoslav region of the river Tisza

S. GAJIN, M. GANTAR, M. MATAVULJ and Z. OBREHT

Oligotroph bacterium flora in the dead Tisza

In the course of microbiological analysis of the water quality a close attention was paid to the dominant oligotroph microflora. The analysis of morphologically separated bacterium colonies on culture-medium applied for this purpose was carried out on the basis of the nutrient content of the culture medium. Besides the determination of growing ability and intensity the morphological changes of groups grown on less rich culture medium were followed electronmicroscopically.

V. PUJIN

Population dynamics of dominant Rotatoria species in the dead Tisza

The composition of zooplanktons and periphytons in the dead Tisza in Gyöngy-sziget on Yugoslav territory as well as in other waters of Pannon basin are characterized by the dominant and the most variable group of Rotatoria species. The numerical composition of species is characterized by an annual and seasonal dynamics. It culminates to maximum in summer months. This lecture discusses the population dynamics of dominant species in the period of 1983—1988.

The frequency index (pF) is an indicator of the role of individual species.

$$pF = \frac{m}{n} \times 100$$

(n = the total number of samples

m = species number in sample takings)

Frequency of dominance (DF)

$$DF = \frac{md}{n} \times 100$$

md is the number of dominant species in sample takings.

The NAIDENOV, WAWRIK method (1984) was applied to calculate dominance frequency.

$$DT = \frac{DF}{pF} \times 100$$

Most frequently occurring dominant species belong to the *Brachionus*, *Keratella* and the *Polyarthra* genus.

R. RATAJAC

The composition of Crustacea and population dynamics of its dominant species in dead Tisza

The author studied two groups of Crustacea (Cladocera and Cocepoda). Annual and seasonal changes could be established. High value density of dominant species was registered in summer period.

The presence of some ecosystem studied.

The dynamics of the Oligochaeta association in the dead Tisza

The study of oligochaets is an integral part of the complex hydrobiological investigations of the dead Tisza at Gyöngysziget. It was established that a structural change occurred in the association in the period between 1983—1985.

Taking into consideration the quantitative analysis the relative abundance of dominant *Limnodrilus hoffmeisteri* increased year by year.

Within the abundancy increase of Oligochaets the growing contribution of *L. hoffmeisteri* is in close correlation with the accelerated eutrophisation process characteristic for the dead branch as a result of organic loading.

S. MALETIN and D. KOSTIĆ

Growth rate of fish in the dead Tisza in function of types of feeding

The authors studied the growth rate of 8 fish species belonging to different feeding types caught from the dead Tisza in 1987. These are:

- Planktophage: *Scardinius erythrophthalmus*
- Plankhobenthophage: *Rutilus rutilus*, *Abramis brama*
- Benthophage: *Carassius carassius*, *Carassius auratus gibelio*
- Carnivores: *Esox lucius*, *Perca fluviatilis* and *Stizostedion lucioperca*

It has been established that the differences in the growth rate of the fish species studied among other factors within the ecology valency are in function of feeding types, too.

S. MALETIN, N. DJUKIĆ and D. KOSTIĆ

Growth and productivity of *Lepomis gibbosus* (Pisces, Centrarchidae)

In the course of 1985 the authors investigated 273 *L. gibbosus* individuals taken from the dead Tisza from the point of view of growth and productivity. The average length of 3—7 year old specimens measures 102—146 mm and their mass 48—11 gs.

The average values of the absolute productivity depending on the age vary between 4474—11 668 roe-corns, whether those of the relative productivity are in the range of 11—127 roe-corns.

Comparing specimens of naturalized alochton species introduced in waters of Europe more than 100 years ago with specimens originating from their native environment it has been established that in the case of *L. gibbosus* specimens living in the Tisza their longitudinal growth is identical.

L. BUDAKOV

Nutrition biology of pikes *Esox Lucius L.*
(Esocidae, Pisces)

The author studied the nutrition biology of pikes caught from Tisza in the period of 1980—1983.

The body length of one-year old specimens varies in the range 263—702 mm. The length of alimentary canal is 113.79 mm. The mass index is 6.41 g. The analysis of the stomach content was carried out depending on the age and the seasonal nutrition cycle.

Besides considerable amount of detritus fish belonging to 12 different species have been also found in the stomach.

The most frequent prey are: *Rutilus L.* and *Carassius auratus gibelio* BLOCH.

M. MIKES and V. HABIJAM

Small-mammal cenoses along the Gyöngysziget dead Tisza

The distribution of small mammals according to areas, quality and quantity was studied by means of analysis of owl casts.

Cast samples were taken from two habitats:

Along the Földvár reach of Gyöngysziget dead Tisza at the group wintering locality of long-eared owls (*Asio otus*) as well as at the permanent quarters of barn owls (*Tyto alba*) situated at a distance of about 800 m in a farm building. From the 200 casts the remains of 544 vertebrate individuals and of 3 insect species were found (*A. otus* — 126 casts) 290 ind., *T. alba* — 94 (254).

It has been established that both owl species prefer first of all small mammals belonging to the order of insectivores and rodents. At both habitats *Sorex araneus* and *Crocodyra leucodon* amounts to 2/3 of the insectivorous victims, whether *Microtus arvalis*, *Apodemus sylvaticus* constitute 75% of the rodents.

The qualitative differences in the feeding of owls can be attributed to the biocenological characteristics of the habitat. That is while the hygrophylous species (*Apodemus agrarius*, *Arvicola terrestris*, and *Ondatra zibethica*) are part of the rush-bulrush red association in the dead Tisza, *M. arvalis*, *Mus musculus spicilegeus* and *A. sylvaticus*, that have been also found in owl-casts are naturally representatives of the dominant small mammal cenosis from the surrounding pough-lands.

M. TOTH

Interaction of the waters of river Tisza and river Bega

Between May and October of the current year values of basic physical and chemical factors as well as the zooplankton composition were measured in two-weeks periods at Titel in Tisza and Bega at the third and the eighteenth kms from the mouth.

The purpose of this work was to determine the similarity coefficient of the two rivers.

Taxonomical and ecological relation of *Glycyrrhiza echinata* L.
group in the lower Tisza reach

From the results of our investigations follows that also in the lower reach of Tisza *Glycyrrhiza echinata* L. can be divided into two clearly distinguishable species such as *G. echinata* L. and *G. subechinata* sp. nova.

It can be proven on the basis of significant morphological, morphoanatomical, physiological and biochemical differences.

The separation is obvious from the point of view of ecology as well. *G. echinata* can be found in dry areas outside the inundation areas of Tisza where the phreatic level of the water-table lies deeply under the surface.

G. subechinata occurs in the inundation area, too, and generally in places where the phreatic water is closer to the surface. Both species are heliophylous but *G. subechinata* survives longer in halfshaded places.

From the point of view of phytocenology *G. echinata* is rather a member of weed association while *G. subechinata* can be found in borderlands of inundation wood areas and grass fields.