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# FROM THE LIFE OF TISZA-RESEARCH WORKING COMMITTEE, WHICH HAS BECOME INTERNATIONAL

## Tisza-Research Conference XVII (1986)

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## I. Lecture on studies from the Tisza reach in the Soviet Union

KOMENDAR V. I. and FODOR I.:

### Effect of the changing upper forest border on the development of the floods

The present contribution is in connection with the complex studies performed at the upper boundary of the river Tisza, thus it is rather timely. As the result of the many years' negative farming the natural upper forest border moved down by 50—200 m, due to which the ecological balance became disturbed in the zone of the sub-Alps. It is known that the Black and White Tisza begin in the high mountains. Accordingly, it is clear why great attention should be paid to farming done on a scientific base. The only way out of this situation is to restore the upper border of the forest. For this purpose, in 1959 experimental plantations were raised at the Runa polonina at the height of 1200—1450 m. With this contribution, we wish to throw light upon the results obtained.

## II. Reports on the Hungarian Tisza reach

VÁGÁS. I.:

### Hydrological questions concerning the catchment area of the river Tisza

The intense Tisza-management of the past century at the lowland region of the river brought about changes in the hydrological relations. The building of high dams made higher water levels possible. By stopping the spread of the floods by means of speeding up the flow of the waters, the level of the Summer shallow waters also became lower.

Since there are no extremities in the water course over longer periods and relatively dry or relatively humid periods are present for several years, occassionally many tend to conclude on changes in climate or water course. A few years of either dry or humid period may be enought for many to consider this state a permanent change, and to extrapolate the doubtless effects exerted on the living world without sufficient reason.

The changes in water course caused by the managements, however, produced a statistically uniform condition of the water course, which may include strong extremities of both directions. On the other hand, it is also incidental to this statistical character that in case the statistical "runs" of either the dry or humid years are of long duration and expressed, they may become the basis for misleading conclusions without the consideration of the complete secular series of the study data.

The secular uniformity of the water course at the catchment area of the river Tisza is thus against such assumptions which would generalize the irreversible changes in the living world due to hydrological causes.

ANDÓ, M.:

## Surface-structural relations of the area between Alpár and Tőserdő

The flood-plain between Alpár and Tőserdő is a regional unit of complex structure geomorphologically and genetically. During the preliminary studies concerning the "Alpár storagetank", it could well be reflected that the composition of the surface-close sediments refers to sometimes Danube- and sometimes to Tisza-origin.

It is known that the mineral and chemical structure of the surface-close sediments may considerably determine the chemical composition of the prevailing underground water, and through this the appearance of the natural vegetation occurring there.

Therefore, this essay gives a complex geographical review firstly on the stages of surface development, the layer structures, surface relieves as well as the condition of the underground waters.

HEGEDŰS, MÁRIA:

## Hygienic quality of the living waters at the Alpár basin

In 1986, in accordance with the Tisza-research plan of work, the hygienic quality of the living waters at the Alpár basin was studied at eight sampling sites. The following results were obtained:

- The water quality at the bridge and the middle of the backwater at Bokros, Lake Sulymos, and the backwater at Lakitelek was found to be of II. class "slightly polluted" quality based on annual mean values.
- The water quality of the backwater at Alpár, the Kubik pit and the Égeres marsh proved to be of III. class "polluted" quality.
- Only the backwater at Lakitelek was found to be of IV. class "strongly polluted" quality at the region of the research station.
- Salmonella bacteria were isolated from 1000 ml of water sample from only two sampling sites on one occasion. The isolated serotype was S. infantis strain from both water sample.
- It was concluded that the quality of the surface waters of the basin changed unfavourably in the "Summer" period. The most likely cause of the change was that the different bacteriological parameters of the study spectrum indicated enhancement in the degree of organic matter decomposition.

KISS, I.:

Soil-algae from the Alpár basin

In the future, the Tisza-III-river barrage and its large storage-tank will be built at the Alpár basin of the Tisza-valley. This prompted author to perform studies apart from the algae of the water also on the algal world of the soils, starting from 1975. Special attention was paid to the species producing "soil bloom" (flos humi), showing an increase in number on occasions.

So far, the soil-colouring increase of 31 blue-alga (Cyanophyta) and 9 green-alga (Chlorophyta) species was detected at the meadow, pasture and plough-land areas of the Alpár basin. Their frequency in time and space showed great divergencies. 4 species of the *Nostoc* genus and 3 species of the *Phormidium* and *Schizothrix* were found. From the green-algae the most frequent were the *Chlorococcum humicolum,* the *Coccomyxa dispar, Hormidium flaccidium* and the *Palmella miniata.* On the dark green soil surface of a drying up puddle, a *Chlamidomonas* species was observed to transform into protococcoid stage. The traces of the blue-algae were detectable below the surface of the soil as well. At the area under turf-cutting the *Stigonema turfaceum* manifested bluish-gray colouring even at soil level of 6—7 cm.

In respect to the future technical establishments, the phenomena deserves attention that at the clefty, clayey loess-wall in the vicinity of the village Tiszaalpár at the Alpár basin, generally well visible, perpendicular, blackish or brown stripes appear. On May 20, 1984, here the *Nostoc muscorum* was the predominant constituent from the algal communities of the blackish bluish-green patches of 37 stripes. At the same time, the *Hormidium flaccidum* multiplied with great variedness in appearance in the dark green patches of 28 vertical stripes. The blackish colouring of the stripes can be led back to humus substances, and the brown to the trivalent iron content of the detritus. A common observation is that prior to the rainy weather these patches of algal mass production become brighter and more striking. On such occasions the enhanced ionization of the atmosphere may be of favourable effect.

KISS, I.:

Simultaneous appearance of algal mass-productions in the dead-Tisza at Tőserdő and in Lake Balaton in the Summer of 1982

The increased eutrophication caused so to say dramatic changes in the algal world of the dead-Tisza neighbouring Lakitelek-Tőserdő, and simultaneously also in that of Lake Balaton in the Summer of 1982. The joint characteristic of these changes was the disappearance of the *Ceratium hirundinella* rather characteristic to Lake Balaton from the algal communities of both biotopes, and the increased number of another species, causing water-bloom. In the dead-Tisza, on August 4, 1982, the *Euglena Ehrenbergii* coloured the complete water surface dark green, which phenomenon was still observable in October. At the whole area of Lake Balaton, a nitrogen-binding blue alga, the *Anabaenopsis Raciborskii*, produced enormous mass-production in August and September, 1982. Besides this species, in 1983 L. VÖRÖS from Tihany observed the reappearance of the *Ceratium hirundinella,* which had disappeared in the previous year. This, however, was not so in the backwater, in fact, even the remaining *Peridinium palatinum* disappeared here. The biotic and abiotic factors

apparently seemed to be more unfavourable and of explicitly antagonistic nature at this site.

The mass-productions developed simultaneously in the dead-Tisza and Lake Balaton, thus the question can rightly be raised as to the role played by the atmospheric effects. The weather fronts are capable of drawing several hundred kilometre distances simultaneously under the same atmospheric effects. It is not impossible that here the atmospheric ionization as well as the formation of nitrogen-oxides also played role. The negative or positive ionization preponderance of the atmosphere has equally favourable influence on the life processes of the plants by affecting the enzymes. The nitrogen-oxides get washed into the soil or the water with the precipitation, where they may serve as plant-nutrients.

GÁL, D.:

## The zooplankton of the biocenosis of Lake Sulymos located at Lakitelek, in the year 1986

The qualitative and quantitative changes in the zooplankton of Lake Sulymos were studied in the course of 1986 by means of monthly collections.

During the studies a total of 38 species were found (Protozon 14, Rotatoria 18, Entomostraca 6 species).

With the exception of the Spring months, the dominant species is the Rotatoria in respect to both species- and individual number.

In the Winter months the total individual count is around 300 ind/litre. The *Keratella cochlearis* is a dominant species (172 ind/l). The characteristic species of the Winter months, the *Notholca acuminata,* also appears (27 ind/l).

In Spring there is a considerable increase in the total individual number, reaching even 900 ind/l. In March a significant increase is manifest in the number of the naupliar larvae (284 ind/l), and with its mass appearance (651 ind/l), the *Megacyclops viridis* practically colours the water green in April.

The total individual number decreases to a certain extent in the Summer months (400—500 ind/l). There is a significant increase in the number of the Testacea species, and although their individual count is not too high, their total individual number approximates that of the Rotatoria species due to the decrease in the number of this species. The predominant species are the *Colurella colurus* and the *Arcella gibbosa.*

In the Autumn months an increase is manifest again in the total individual number (600—700 ind/l), firstly owing to the mass appearance of the Cladocera *(Moina rectirostris, Alona rectangularis).*

SZALMA, E.:

## Chemical analysis (RFA) of the sediment-, water- and plant-samples of reed-grass vegetations at the Tiszaalpár basin

The distribution and appearance of the aquatic plants of higher order in lakes and backwaters are partly determined by the geochemical properties of the site, the chemical state of the water body, and partly by the changes taking place during the metamorphosis of the water. At three sample areas — Lake Sulymos at Lakitelek-Tőserdő, dead-Tisza at Alpár, backwater at Bokros —, in the vegetation period, sedi-

ment-, water- and plant-samples were taken monthly from the cenoses of the Lemno-Potamea and Ptamogetonetea association classes, and the element-contents analysed.

Whithin the three sample areas the highest amount of S, Mn and Fe was found in the sediment-samples from Lake Sulymos. At places at the dead-Tisza area at Alpár the quantitative data of the K showed maximum values. In the sediment-samples from the backwater at Bokros the Si, Ca and Ti were found in large quantities.

Consequential upon the geochemical properties of the sample areas, the various water-bodies showed sharp differentiation from each other based on their element-contents. From the plant stands of Lake Sulymos the S, K, Ca, Mn and Fe contents of the *Nymphaea alba* were lower than typical. The Ca uptake from the sediment was the least in case of the *Nymphaea alba*. The *Hottonia palustris* was found to take up Fe from its environment rather energetically, and its S, K, and Mn accumulation was also significant. The *Potamogeton pectinatus* reed-grass species accumulated S and Ca from its environment in large quantities. The alkali metals and alkali earth metals were taken up by the *Stratiotes aloides* species in considerable amounts. From the plant stands of the dead-Tisza at Alpár, the *Nymphoides peltata* accumulated K, Ca and Mn to the greatest degree. Among the species of the *Lemno-Utricularietum* association, the submerse *Myriophyllum verticillatum* manifested maximal values of S and Ca at the beginning of the Summer aspect, and of Mn and Fe at the end of the vegetation period. From the plant stands of the backwater at Bokros the *Ceratophyllum demersum* reed-grass species took up the K, S and Fe ions rather energetically from its environment. The *Wolffia arrhiza* reed-grass species growing at the same place and forming a separate association accumulated the Mn ions from its environment to a considerable degree.

BAGI, I.:

## Problems of succession and zonation in river-bed Nanocyperetalia plant associations

Nowadays the attitude is all the more assumed in succession-research that the zonation and succession stages of the vegetation can only be correlated with each other on a large scale or not in that manner either. This situation is observable in the development of the spatial-temporal pattern of the river-bed littoral vegetation, too.

In the bed section which can be characterized by the *Dichostylidi-Gnaphalietum, Cypereto-Juncetum* initial plant associations, the zonation of the vegetation does not represent the steps of succession; the Nanocyperetalis stands of the upper relief are in successional relationship with the Bidention associations developing at the areas higher than the flood-plain littoral levels, and those found at the lower relieves with the Agropyro-Rumicion associations. Accordingly, the Agropyro-Rumicion vegetation of the lowest river-bed zones represents a higher succession degree as compared to the Bidention stands found above it. The diversity of the temporal and spatial processes of the vegetational changes can also be verified with multivaried methods as well as with the application of the NUMATA kind of "degree of succession" index. The diversity also has vegetation-dynamic causes, besides the non-continuous spatial changes of the environmental parameters.

BODROGKÖZY, GY.:

## Vegetation map of the reconstructed plant-cover at the Kisköre Storage-tank of the Tisza-valley prior to its filling up

The 127 km² large Storage-tank was the greatest floodplain of the Tisza-valley. The variegated relief relations of the area led to the development of an exuberant living world and hereby characteristic scenic fundamentals. Its aquatic, marsh-, meadow and forest biocenoses reflect the biocenoses of the earlier Tisza-valley. This is why it became necessary to record these for the succeeding generations, by means of preparing the vegetation map of the area, which was done with the help of sketches originating from the period prior to the building of the Storage-tank.

The backwaters had extremely abundant hydatophyton stands, especially in the region of Tiszafüred. Here the water-chestnuts had particular predominance besides the *Nymphaeetum* stands. The *Nymphoidetum peltatae*: islands being rare at other places were similarly blooming. In the older backwaters filling up by biogenic and mineralogenic means, and which often dried out, the Potamion species components of the great reed-grass capable of accommodating to amphibic habitude also subsisted.

From the hydato-helophyta forming the littoral zone, the water-dropwort *(Rorippo-Oenanthetum)* and cat-tail *(Sparganietum)* populations were followed by the vast stands of the helophyton sedges, mostly the *Caricetum gracilis, C. acutiformis-ripariae,* rarely the *Caricetum vesicariae.* The majority of the present Storage-tank area was dominated by the hygrophyton-like meadow foxtail grasslands, the *Agrostio-Alopecuretum, Lythro-Alopecuretum,* in the associations of which the protected *Gentiana pneumonanthe* rare in the Tisza-valley could also be found, particularly at the marshy areas. The *Chrysanthemum* variants were also striking.

Its forest communities were formed mainly from the willowpoplar groves *(Salicetum albae)* of secondary origin and without character. The only diversification was the green curtains of the *Vitis riparia,* creeping up several metres high.

SZITÓ, A.:

## The sediment-fauna of the river Tisza and its tributaries based on the longitudinal-segment studies of 1986.

Samples were collected between September 15—30. The stations, time-points and methods were the same as in 1979. The following conclusions could be drawn, based on the selections and individual countings performed on the spot:

The amount of annelids with few bristles (Oligochaeta) was invariably low above the Szamos, only a few individuals were found, however, their number at the whole studied reach below the Szamos even surpassed 2—10 folds of the earlier values. The density of the Chironomidae larvae increased to a greater extent as compared to the Oligochaeta.

From the mollusks, the snails were first found 500 m below the Szamos in a rather high — 132 ind/m² — amount. Their individual number, incidence showed an increase at the entire reach compared to the earlier findings. Mussels were found for the first time at the area above the Bodrog. The rarity of young individuals at the whole length of the river Tisza was a striking phenomenon. The individual number and frequency of the mussels were found to be decreased mainly at the regions of

Szolnok, Csongrád and Szeged. Earlier, the samples frequently contained crayfish, too, on this occasion, however, none were found.

Apart from the higher organic matter content of the sediment, the increase in the density of the Oligochaetae and Chironomidae may have been caused by the gathering of the individuals withdrawing with the water due to the extremely low water level. At the same time, the decreased individual number and incidence of the mussels — mainly in the city regions — refer to unfavourable environmental effects as well.

SZITÓ, A.:

## The number of Chironomidae larvae and the nutrient-supply in certain basins of the Kisköre Storage-tank at the Tisza-valley

Based on the average density of the Chironomidae, the productive capacity of the different basins was as follows:

The highest larval density at the area of the storage-tank was found in the Small-Tisza, meaning — mainly in knowledge of the environmental demands of the dominant species — that the sediment is the richest in mineral- and organic matter at this region from the whole area of the Storage-tank. To clarify the nutrient source further — first of all sedimentchemical — studies are necessitated.

From the different basins, the nutrient-supply is the most favourable at the Valk- and Poroszló-basins, to where the water of the banked up river reaches, depositing alluvium. In the Valk-basin the larval density is the greatest at the mouth of the irrigation canal, and is also similar at the nearby areas.

In the Abádszalók-basin a considerably lower amount of larvae was found, the Sarud-basin forms a transition between the Poroszló- and Abádszalók-basins, the lowest larval density was manifest at the banked up Tisza-reach and in the low water samples.

Based on the data obtained so far, it is concluded that at present the accumulation of toxicants in the sediment of the storage-tank and the banked up Tisza-reach is not of such degree that would endanger the existence of the macrozoobenthos or would cause a perceivable reduction of their individual number.

AVASI, Z.:

## The effect of flood perturbation on flood-plain Carabidae populations

Throughout three years following the 1982 flood raising above 700 cm and inundating the whole flood-plain, Barber soil-traps were placed at four specific habitats characteristic to the Maros flood-plains (I. Inner dam-side — *Agrostio-Alopecuretum* association, II. Aspen grove — *Salicetum a.f. populetosum* association, III. Willow grove — *Salicetum a.f. rubetosum* association, IV. Littoral dwarf willow grove — *Salicetum triandrae* association), in order to study the effect of the flood on the Carabidae populations.

Based on diversity and similarity studies, it could be concluded that the flood raising above 700 cm caused a significant disorganization of the Carabidae communities. After the subsidence of the inundation, a characteristic process of structuralism, stabilization takes place, in the course of which the species endeavour to develop a

characteristic coexistence-pattern similar to the previous one. Though this process is influenced by the annually occurring 550—600 cm high overflows, only the greater floods, appearing every few years and inundating the complete flood-plain, are capable of hindering the development of a structurally permanent, stable Carabidae community. The areas functioning as a refuge — thus the dam-sides, too — play an important role in the reorganization of the communities.

TANÁCS, L.:

Appreciation of the bee-like communities found at the dam and flood-plain of the river Tisza, according to zoogeographic spread, climatic tolerance and flight dynamics

During the processing of the more than ten-thousand individuals collected in the course of the ten-years studies, a total of 293 species were demonstrated. Almost half of the bee-like species of the Carpathian-basin occurred in the studied meadow- and grassland-communities. The relative wildbee species-richness of the stands developed as the result of the favourable coexistence of the environmental factors.

The wildbee community was appreciated according to zoogeographic spread, climatic tolerance and flight-dynamic classification:

*a)* In the terrestrial biotopes along the river Tisza the most significant were the Palaearctic (57 species, 19,45%) and the European species (33 species, 11,26%). In case of the Mediterranean and European types, a considerable ratio was shown by the Northern Mediterranean (49 species, 16,72%), Holomediterranean (39 species, 13,32%), Ponto-Mediterranean (21 species, 7,17%) and the Central European species (14 species, 4,78%).

*b)* According to the distribution of the species regarding climatic tolerance, the euryoecic eremophilous species had the highest ratio (122 species, 41,64%). The stenoecid hylophilous species were only few in number (3 species, 1,02%).

*c)* The species forming the largest part of the community at the dam-system and flood-plain of the river Tisza were those with medium flying period (109 species, 37,20%).

The bivoltine species with long flying period constituted a considerable proportion (84 species, 28,67%). Only about 1/5 of the community was formed by the species with short flying period (56 species, 19,11%). The wildbee species with continuous and long flying period had a smaller ratio within the community (28 species, 9,56%).

GASKÓ, B.:

On the spread of the cylindrical straw-beetle (*Theophilea cylindricollis* pic)

The cylindrical straw-beetle is a protected animal since 1st July, 1982. The ideal value of a single individual is 10 000 Ft. The beetle belongs to the problematic species. At its locality in Hungary known so far, it has strong populations, or at least they are not endangered directly. It seems the enhanced protection of this animal can rather be led back to the few background information at disposal at the time of decreeing the protection.

At the beginning of our Century, the one and only place of occurrence of the

Theophilea was mentioned by WINKLER (1924—1932) as being the Caucasus. TILL 1976, there was no ecological basis to this zoogeographic datum.

The other essential obstacle was the wrongly published foster-plant. The cylindrical straw-beetle, in contrast to its name — is not capable of developing in the stalk of grain crops. The corn-stalks could at most be suitable nutrient source for the development of the Cerambycida larvae till the beginning of ripening. In knowledge of the swarming, this period is too short.

The Hungarian literary data on the Ponto-Mediterranean species (KASZAB 1971, HORVATOVIĆ 1978, 1979, 1980, SZALÓKI 1976) were limited to Transdanubia. The species is held to be explicitly xerophyll be HORVATOVIĆ (1980), which is not supported by the studies performed at the flood-plains of the rivers Tisza and Maros. However, it is highly frequent at areas of cooler microclimate, thus from the lower third of the dam till the Salicetum albae-fragilis zone, and also in the border-communities of the wider inner clearings.

Its spread can also be influenced by the fact that the Theophilea cylindricollis continues ripening feeding. This has also been observed in case of several Euphorbia species.

BÁBA, K.:

Data to the succession of aquatic mollusks in the Tisza-valley

Based on studies performed at the Tisza-valley, a comparison was drawn between the aquatic mollusk groups and the succession of the plant communities. The relations of 14 aquatic plant communities from 94 sites were studied on the basis of 41 species and 11.023 living individuals. The studies originated from biotopes expanding from the marsh-meadows till the fenwoods and belonging to the lake succession series.

The condition of the various succession phases was studied on the basis of cluster analysis and their diversities, and the appreciation was based on trophic patterns.

The marsh-meadow succession series in characterized by the increase in the ratio of the saprophage elements and the decrease in the herbivorous elements. The arid marsh-meadow series is characteristic of an increase in the herbivorous elements. The two feeding types in both groups are in complementary relationship.

In the two variants of the lake succession series the trophic patterns differ at the moderately and suddenly deepening riverside sectors. At the suddenly deepening riverside sectors the increase of the herbivorous elements is in complementary relationship with the decrease in the saprophage elements. At the moderately deepening riverside sectors the succession is characterized by the preponderance of the omnivorous elements. The marsh-lake represents a transitional type. In the backwater at Tőserdő being under cultural effect, the ubiquist saprophage snails indicate eutrophication. Besides the decrease in species- and individual number, the cultural effects induce the homogenization of the snail-groups in both succession series.

FARKAS, Á.:

Comparative studies on the interspecific competition of the *Rutilus rutilus* (roach) and the *Leuciscus Idus* (ide) in the Lakitelek and Körtvélyes backwaters at the Tisza-valley

The roach and the ide are frequently occurring species at both backwaters. The backwater at Lakitelek is strongly, that at Körtvélyes is less eutrophic. Both fish species are capable of utilizing a wide spectrum of the food chain. If the amount

of aliment of animel origin decreases, both fish species change over to multicellular vegetable feeding. The roach raises its food of vegetable origin to the double, the ide to the triple (BRADRAND 1985). The *Potamogeton crispus* takes a considerable share in the feeding of both fish species. Since the consumption of the roach is within a wide spectrum of foodstuffs, it is capable of living on a rather few food types. According to the studies of several authors the mesotrophic and eutrophic lakes are favourable for the existence of these fish species (HARTLEY 1947, SVARDSON 1975, PREJS 1978, BRADRAND 1984). Contrary to the roach, the ide only rarely rules the fish communities, and is generally found together with other Cyprinidae. The ide is also capable of feeding in a wide spectrum, similarly to the roach.

The purpose of the lecture is to document the feeding of the roach and ide, resp., in two environments where due to different ecological relations particular intra- and interspecific competition can be observed.

BENEDECZKY, I., ASZTALOS, B., NEMCSÓK, J. and GÁBRIEL, R.:

Effect of combined copper sulphate and methidation treatment on the liver tissue of carp

The pesticides and compound-residues getting into the fresh- and stagnant-waters of Hungary generally exert their effect jointly on the metabolic processes of the living organisms. Therefore, our aim was to analyse the joint effect of a few pesticide-combinations on the function and pathologic alterations of the liver, with the help of simultaneous biochemical and morphological studies. The experiments were performed on carps kept in aquarium. The pesticide concentrations were 2,5 mg/l in case of copper sulphate, and 1 mg/l in case of methidation. The duration of the treatment was 1, 4, 6 and 14 days.

Two weeks after the treatment focal cell necrosis was detectable light microscopically in the liver tissue. By electron microscopy, hepatocytes with light cytoplasm were frequently observed, no sEr was found in the glycogen granules and the vesicularization of the rough surfaced endoplasmic reticulum was observable. The appearance of myelin figures was often found to be in connection with the damage of the mitochondria and the Golgi apparatus, but these formations also occurred in the hyaloplasm matrix. The afore-mentioned fine structural alterations refer to the significant damage of the protein-synthesizing and energy-supply system of the hepatocytes. Owing to the facts that the isoenzyme-image of the liver also appeared in the blood serum, and there was an increase in the GOT and GlDH enzyme levels as well, unambiguous biochemical proofs are at disposal in respect to cell damage in the liver tissue ensuing upon the effect of compounds.

GYOVAI, F.:

Demographic studies on the *Rana arvalis* population at the alder grove in Tiszaalpár

The maximal density of the *Rana arvalis* population at the alder grove in Tiszaalpár in the past three years was as follows: 500 individuals in 1984, 1500 in 1985 and 3600 in 1986. The maximal biomass values were found to be 2 kg/ha in 1984, 5 kg/ha in 1985 and 20 kg/ha in 1986, being rather high values in case of small bodied vertebrates.

This year's outstandingly high biomass was presumably the consequence of the optimal meteorological factors and the food abundance. The individual biomass values, however, were found to be lower by about 25% compared to the values of the previous year.

The growth rate of the males was significantly more intensive than that of the females. The segregation of body measurement within this age-group also contributed significantly to the minimalization of the intraspecific competition, by means of the "gap-free" division of the resources.

The *Rana arvalis* population shows type III. mortality. The signs of predation are manifest in 2% of the juvenile individuals.

The size of the individual motion-zones is the function of the body measure; 5—20 $m^2$ for juveniles, 30—100 $m^2$ for adults. Accordingly, loyalty to the area, recognition of the dwelling area are demonstrable. For the time being, however, the protection and exclusive use of the individual territory cannot be proved. Considerable migration is demonstrable in case of every age-group in the Spring period.

MOLNÁR, GY.:

Study of avicenoses at the region of Tiszaalpár using quadrat-method

Author studied the composition of the bird stocks in the quadrats of alder groves, oak groves and mixed old forests at the area of Tiszaalpár-Tőserdő between the years 1981—1986.

Based on the modified I.P.A. system, it was demonstrable that the earlier quadrat-method proved insufficient in studying the avicenoses. The forests of clomax stage and diverse species have similar avicenoses and high biomass. The data from other, control areas studied in the Tisza-basin are not concordant with the results obtained at Tiszaalpár. This is in relation to the biogeographic diversities of the similar stocks, the shape of the areas, etc., also giving rise to isolate problems.

## III. Reports on the studies from the Tisza reach in Jugoslavia

MATAVULJ, M., GAJIN SLAVKA, PETROVIČ OLGA and GANTAR, M.:

Indications of water quality at the Jugoslavian reach of the river Tisza, based on microbiological and enzymonological analyses

Authors review their microbiological results pertaining to the Tisza reach in Jugoslavia, based on studies performed over a four years period. Data are provided on the total bacterial plankton and heterotrophic bacteria quantities, on the distribution of the different physiological bacteria-groups, furthermore on the indicators of the T/H saprobity index as well as on the enzymatic-phosphatase and beta-glucoside activities, as indicators of the saprobity index, — at five sampling sites, using traditional microbiology techniques. In the given case the two methods coincidentally proved the classification of the Tisza water to grade II—III, and III., resp., according to the organic matter loadinsg.

During the course of the studies, comparison was made for the first time between the data obtained by traditional microbiological analysis (bacteria-quantity and

-quota) and those by the indication of the saprobity degree of the water (phosphatase activity index) as well as by beta-glucoside activity. The statistically significant positive correlation manifest by the compared parameters refers to the fact that analysis of the enzymatic beta-glucose activity of the water would promote the faster, more reliable and exact determination of the organic matter loading of surface waters.

PUJIN VLASTA, RATAJAC RUŽICA, DJUKIČ NADA, MALETIN, S. and SVIRČEV ZORICA:

## Biology of feeding of a few introduced fish species in the backwater of the Jugoslavian Tisza-valley

The Dead-Tisza at Gyöngysziget developing as the consequence of the management of the river Tisza (1858) is suitable for fish-breeding of lake character. The paper gives a review of the spectrum of feeding of fish species intorduced into the Dead-Tisza *(Hypophthalmichtys molitrix* VAL., *Carassius auratus gibelio* BLOCH, and the *Lepomis gibbosus* L.*)*

In the studied period (1983—85) the phytoplankton of the Dead-Tisza was formed by the Cyanobacteria, Diatomophyta, Pyrrhophyta, Xanthophyta, Euglenophyta and Chlorophyta algalgroups, from which the predominant were the Cyanobacteria and the Diatomophyta algae. The species belonging to the Protozoa, Rotatoria, Cladocera and Copepoda groups constituted the zooplankton. The Rotatoria group was the richest in species (cc. 40 species), while the basic component of the biomass was found to be the Copepoda representatives. Their share surpassed 50%. The Chironomidae and the dominant Oligochaeta, with the value of 88,8—560 ind. $m^{-2}$, constituted the bottom fauna.

The main food for the hypophthalmichtys molitrix was found to be a single species of the Cyanobacteria group belonging to the *Oscillatoria* order. The other algal groups occurring in the Dead-Tisza were only sporadically present in the fish aliment. The Copepoda species also formed the regularly occurring food, while the species of the Rotatoria group from the *Keratella* and *Brachionus* genera were only sporadically manifest in the fish aliment.

The members of the Copepoda and Cladocera, then the Oligochaeta group composed the fundamental component of food for the *Carassius auratus gibelio*. The algae of the phytoplankton manifested a secondary role. The *Lepomis gibbosus* was found to be exclusively zoophage. Its food was mainly formed by the species of the benthos Chironomidae and Oligochaeta groups.

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## Helmintofauna contamination of a few frog species at the Jugoslavian Tisza-valley

In their preliminary study, authors are the first to describe the helmintofauna contamination of frogs collected from the Voivode district. The infectedness of host-animals with helminths studied so far in Jugoslavia has been reviewed by Hristovski in his series of publications from the region of Macedonia.

A report is given on the extensity and intensity of the contamination in case of 295 individuals of six frog species *(Bombina bombina, B. variegata, Bufo viridis, Rana esculenta, R. ridibunda* and *R. arvalis)*. The infectedness was studied at the level of the lung, bladder, digestive system, stomach, small intestines and rectum. The tempo-

ral as well as spatial distribution of the data collection provides possibility later on for both the faunistic processing and zoocenological appreciation of the infectedness; considering on the one hand the stage of development of the host-animals, on the other hand the effect of the seasonal changes in the living space as well as other characteristics of the biotope.

The most considerable from the different vermin-groups are the Nematoda members. The Trematoda contamination is also of relatively high degree, while the occurrence of the vermins belonging to the Cestoda, and even more so to the Acanthocephala group is insignificant.