

## THE ANTECEDENTS OF THE TISZA RESEARCH

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**Abstract.** Regular and coordinated research work on the Tisza valley started in 1955, but there were several initiations in the previous decades in the framework of the 'Great Hungarian Plain Research Concept'. This paper gives a brief summary of these antecedents, and comprises a short literature on Tisza research.

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At a regular meeting of the Biological Society of Szeged in 1954 Prof. Gábor Kolosváry warned that the issue of launching the Tisza Research program could not be the subject of further debate and hesitation. The Principal Hydrological Committee of the Hungarian Academy of Sciences set up a Tisza Committee in 1955. Following two consecutive scientific expeditions on the river in 1956 and 1957, a one-day Tisza conference was held on 30 November 1957. Gábor Uherkovich considers that day the beginning of the Tisza Research, although the actual research work started in 1955 already and the Tisza Research Committee had its first assembly on 10 January 1958. In the period between 1954 and 1958 the committee's main tasks were organization preparations for studies, raising funds and finding appropriate personnel. Thus it is quite understandable that the beginnings of this research program could be treated superficially - merely by listing the names of persons involved - in a lecture on the history and perspectives of the Tisza Research given by Gábor Kolosváry in 1957. In this paper, the antecedents will be discussed in brief.

The idea of a Tisza Research program emerged from the major concept of the Great Hungarian Plain Research. The principal initiator of the latter was the Hungarian Geographic Society. Lajos Lóczi and Jenő Cholnoky gave a program and established the Great Hungarian Plain Committee at two successive meetings held at Kecskemét and Szeged in 1907 and 1909, respectively. The city of Szeged continued to be the centre of the planning and organization of the Great Hungarian Plain Research in the future as well. The program received a renewed impetus when the University of Kolozsvár was moved to Szeged in 1921. In addition to this, Béla Farkas emphasized the need for a better understanding of the life of the

Tisza river in 1922, and Zoltán Szilády urged on an institutional Tisza research in his work titled "The Fauna of the Great Hungarian Plain" published in 1925. The Great Hungarian Plain Research Committee was set up at Szeged in 1927 and their program was published in the Journal "Föld és Ember". However, this committee was not a long-lived one. In 1940 the Ferenc József University was moved back to Kolozsvár, thus no central organization remained for the co-ordination and financing of the Great Hungarian Plain studies. When the New University of Szeged was founded on 11 November 1940, it was included into its program, that special emphasis should be laid on science and on the study of the Great Hungarian Plain and the river Tisza, areas quite neglected until then.

The Great Hungarian Plain Research Committee was re-established by Károly Kogutovicz. Its financial basis - 43 000 pengő (the currency of Hungary at that time) - was donated by the Hemp Processing Factory of Szeged. In the meantime, Zoltán Szilády repeatedly called for the zoological exploration of the Tisza in his paper "The standardization of zoological studies" published in 1941.

Due to personal conflicts the committee work resumed in 1943 only, when the Ministry of Religion and Public Education appointed Lajos Bartucz to be the director of the Great Hungarian Plain Research Institute. He founded a state-organized institute and requested plans from numerous experts all over the country. The plans were discussed in committees of professionals and were prepared for publication in two volumes. It is not known, if these documents still exist today, as only one volume was printed in the first Yearbook of the Great Hungarian Plain Research Institute in 1946.

Perhaps it was the result of Szilády's appeal, or the product of personal motivations, that several comprehensive works dealing with the Tisza and its tributaries were published between 1925 and 1943. The most important among these were the monographs on mollusks in the environs of Szeged and on the Great Hungarian Plain written by Rotarides and Czögler, on the fluvial mollusks of the Maros and Tisza rivers by the same authors, on the fishery in the Tisza valley by Kolosváry, on the vertebrates of Szeged by Béla Farkas, on the limnology of dig-out pits along the Tisza by László Varga, on precipitation properties of the Tisza by Hajósi, on the protists of the Tisza by Jolán Stiller, József Gelei and Béla Párducz, on the life of riparian spiders along the Tisza by Kolosváry, on the floodplain beetle fauna of the river Maros by Erdős, on the plankton of the rivers Tisza and Maros by Károly Vellich, on the mollusks in the Tisza by Andor Horváth, and on the plankton of the Tisza by János Megyeri. In 1942 István Szalay published his work titled "Contributions to the knowledge of the phytoplankton of the Körös rivers".

In his 1943 paper "Few notes on the zoological investigation of the Great Hungarian Plain" Béla Farkas was the first to assign the task of collecting and studying the terrestrial fauna of the Great Hungarian Plain and the Tisza for the University's Animal Taxonomy Department. He emphasized that in addition to the pure scientific interest, national concerns also give grounds for a comprehensive study of the river Tisza, as fishery plays a considerable role in the country's economy. In his program he considered hydrographical and hydrobiological studies especially important. Investigations on water current, spring-floods, water temperature, suspended load and river-bed properties, and their relevance to parasitological conditions, public health and agriculture were also felt to be crucial. He expressed the need for a Tisza Biological Research Institute as well. The commitment of his institute to the exploration of the Tisza is best shown by several publications of the personnel. Among these he mentioned the 1938 paper by Károly Vellich titled "On the periodic changes of the plankton in the Tisza" and the work by Géza Zilahi Sebess on the biology of the Californian scale insect. Two of his own results were cited. One was the discovery of the dwarf catfish in the river. The other was finding an association between the occurrence of swift trout in the Tisza and the exemption of the fish from the fluke *Distomum micheri*. This was because the water chemistry in the lower Tisza reaches kills the vermin, as he explained. Responding to the call by

Lajos Bartucz in 1943, several plans appeared for the scientific study of the Great Hungarian Plain and the Tisza. Ambrus Ábrahám dealt with the zoological tasks, honorary lecturer József Szentiványi outlined the complete Great Hungarian Plain Research, while Bálint Zólyomi - also honorary lecturer staying at Szeged then - made plans for the phytogeographical and palynological studies. Several comprehensive treatises were published as well. Among geologists, István Miházt and Mária Faragó discussed the freshwater limestone and the suspended and dissolved load of the Tisza. The heath-moths of the Great Hungarian Plain were treated by Szentiványi, while Miksa Szalai worked on the rivers fish fauna. Here it should be noted, that in his plan Szentiványi emphasized the importance of seasonal investigations and the need for increasing the number of protected areas.

The first Tisza study scheme truly independent of the Great Hungarian Plain Research was prepared by Dr. Adorján Kesselyák in 1945. This was printed in the Yearbook of the Great Hungarian Plain Research Institute in 1946. The Hungarian Academy of Sciences approved the plan in 1950 and commissioned Kesselyák to the biological study of the Tisza. He was donated by a barge for his work.

Between 1945 and 1950 a short treatise was published by Margit Szabados (1949) titled "The hydrobiological study of surface waters of Carpatho-Ukraine". In 1952 Dr. János Megyeri submitted a proposal to the Academy for investigations on the lower crayfish in the Tisza at Szeged.

Rezső Soó, member of the Academy, organized a Geobotanical Symposium in 1950, where the vegetation mapping of the Tisza between Szolnok and Szeged and a detailed survey of gallery forests were decided. This work was accomplished by Lajos Timár, and the resulting vegetation map (at the scale of 1:25 000) is held at the Botany Department of the University.

Before discussing Kesselyák's plan, which was probably the starting point of the later Tisza Research plan, a short biography of Adorján Kesselyák will be given. He was born in 1906. From 1929 he worked as the assistant of Lajos Méhely, then continued his studies in the Hesse and Schellenberg Institutes in Berlin between 1929 and 1931. From 1934 he was the assistant of professor Dudich, then he became an honorary lecturer in 1938. In 1939 he worked at the Zoological Research Station in Naples. In 1940 he was elected the head of the Zoology Department of the Teacher Training College at Szeged. For six months in 1945 he was also the head of the Animal Taxonomy Department of the University at Szeged. Between 1948 and 1949

he was appointed by the state to organize the new Zoological Department of the Bolyai University at Kolozsvár. He died of a heart attack in 1950 on the bank of the Tisza when he had just finished an 11-hours-long course given for correspondence students. His main research interest was terrestrial

and aquatic hog louses. He has discovered the occurrence of *Cardiophora caspia* in the Tisza.

Kesselyák's plan is shown and compared with the later Tisza Research program in Tables 1 and 2. His proposal can be divided into two main parts. The first one aims at exploring the region's hydrography

Table 1.

A. Kesselyák's plan for a Tisza treatise	Published treatises
I. Description of the catchment area research Geological, hydrographical, climatic and soil properties	The Hydrological Atlas of Hungary 7. The Tisza. 1958. Microclimate studies by M. Andó.
II. Hydrographical studies Landscape description, photo and painting documentation, Geographical description, history and river course changes, fluvial and eolic sediments, drainage of inland waters, irrigation history, shipping and trading.	Kolosváry, G. Photographic documentation and slide collection  Mike, K.1991. Paleohydrology of Hungary and the history of surface waters.
III. Hydrological studies statistical analysis of water level changes, speed of water current, suspended load, ability to work and,utilizable energy, the origin of inorganic material (K, P, N), water chemistry of the river and the tributaries, temperature and light conditions, characteristics of ice formation and drift.	Lászlóffy, V.1982. Water regulations and water management in the Tisza and its tributaries (prepared with the participation of 76 researchers and 9 institutes)  Andó, M.1994. The hydrological, geographical, geological and environmental components of the water level fluctuations in the Tisza.

Table 2.

A. Kesselyák's plan for a Tisza treatise	The Tisza Research proaram
I. Description of the catchment area flora and fauna genesis in the catchment area, the relict marine fauna, IV. Potamobiology (the Tisza as a biological individual) studies on the turnover of matter (producers, consumers and decomposers) from taxonomical, ecological and genetical viewpoints.	I. The complex study of the Tisza's aquatic and riparian biota II. The protection of humans and their natural environment
Subthemes: A/ producer plants: bacteria, algae and fungi B/ fauna of the Tisza (predicts the importance of vertebrates) B1/ relict marine fauna (from the Ponto-Caspian river system) B2/ dispersal and migration of river fauna B3/ the fish in the Tisza and their economical relevance B4/ the ethnography of fishing in the Tisza C/ decomposers in the Tisza (saprobionts and mineralization) D/ public health relations of the Tisza: pollution, self-purification, pathogene bacteria and parasites E/ communities of organisms in the Tisza (plankton, nekton, river bottom, oxbows, temporary water courses, springs and the tributaries. F/ matter turnover in the Tisza	I.1. Studies on the algae of the Tisza 2. Limnological survey of the river, the flood area, oxbows, and the tributaries Seasonal plankton monitoring, model oxbow lake study 3. Investigations on the Tiscian fauna: river bank, digout holes, flood area, river bottom. 4. Microclimate studies Economical relevance: water saprobity, meadow- and forest management.  II.1. The hydrological, botanical, zoological, geographical and microclimatological survey of the Tisza II. barrage system 2. Study of the Tisza Landscape Protection Area (Mártély- Sasér) 3. Study of the planned Tisza III. barrage system (Csongrád) 4. Influence of pesticides Economical relevance: landscape reconstruction, recreation, biological protection of dikes  Organizations involved: three local Water Conservancy Directorates, the National Public Health Institute and the Principal Environmental Protection Authority for the Lower-Tisza Region. International relations: Collaboration with scientists from Carpato-Ukraine, Rumania and the former Jugoslavia.

and hydrology. This includes the study of the geological, hydrographical, climatic and soil properties, as well as the historical circumstances and the influence of the river on shipping and trade. He also felt important the description of landscapes, thus Gábor Kolosváry prepared a six-volume photographic documentation and a slide collection on this.

The Tisza Research program was never granted with the opportunity of extending the Tisza Research Station. It originally worked with two scientists, later this was reduced to one, and finally the station was closed. Thus research areas having economical relevance became the tasks of other state organizations like the local Water Conservancy Directorates, the Public Health Institute and the principal environmental protection authorities. These state institutes were much better financed and employed a greater staff of professionals. Between 1958 and 1991 these organizations published several comprehensive works on the abiotic factors listed in Kesselyák's plan for the entire length of the Tisza. Mihály Andó's treatise appeared in 1994.

Concerning the river's potamobiological study, several new research areas opened up mostly from the seventies. Investigations became restricted to the Middle- and Lower Tisza Reaches as a result of the prevailing major landscape development plans of economical motivation. This area practically included the Tisza II. and the planned Tisza III. barrages, and two Landscape Protection Areas. In Kesselyák's plan, economical considerations were restricted to fishery and public health relations only. Later these were extended to water saprobity, meadow and forest management, recreation, landscape reconstruction, the biological protection of dikes and the effects of pesticide application. Most recently a need is emerging for the reconstruction of oxbow lakes along the Tisza to compensate for the ever increasing human influence in the river's full course.

Some fields received less attention than it was planned in Kesselyák's proposal, like the flora- and fauna genesis in the catchment area, the relict marine fauna, the influence of the Ponto-Caspian river-system, the microscopic fungi of the Tisza, and the general issues of matter turnover in the Tisza. At the same time, the Tisza Research became an international project with the involvement of neighbouring countries.

Comprehensive treatises dealing with several groups of organisms were published for the entire length or for certain reaches of the Tisza. The first was Zicsi's 1965 compilation on the Lumbricidae, and then on the Bryozoa and Opilionidae fauna. This

was followed by Gábor Uherkovich's 1971 book titled "Microscopic floating plants in the Tisza". László Gallé's 1976-77 synopsis on the lichen coenoses of Hungary also belongs to this group. These were followed in 1974-78 by papers on the plankton algae of the Main Eastern Canal, and on the algae of the rivers in Northern Hungary. Based on studies conducted in 1979, publications appeared in 1981 on the diatom and bacterium flora, the physical and chemical properties of the riverbed sediment, and on the mollusks of the Tisza and its tributaries. Synopses of the same sort were prepared for certain parts of the river as well dealing the following groups: bacteria, diatoms, Zooflagellata, Rhizopoda, Ciliata, Rotatoria, Entomostraca, Platyhelminthes, Lumbricidae, aquatic Oligochaeta, Polychaeta, Chironomidae, Orthoptera, Formicidae, wild bees, aquatic snails and mammals. For other animal groups (e.g. Rotatoria, Pisces, amphibians, reptiles, birds and terrestrial snails) comprehensive works were issued for the entire course of the river. Among these, birds and terrestrial snails have been already included in Kesselyák's plan under the headline of studies on fauna dispersal along the river.

More than one thousand publications appeared as results of the Tisza Research in the period between 1954 and 1995. Thus the literature cited below is far from being complete as it intends to illustrate the main trends only. Papers and treatises issued between 1957 and 1972 are listed in the references of the works by G. Kolosváry, G. Uherkovich and M. Marián.

As the above discussion reflected, 45 years of preparation between 1909 and 1954 had to precede the start of the regular Tisza Research. While the Great Hungarian Plain Research program had not realized, the Tisza Research was successfully launched. Another 40 years has elapsed since the start of the regular research. Perhaps it was due to financial problems, that the highly awaited comprehensive Tisza treatise has not been published yet. Thus we have only "snapshots" of an ever and more and more rapidly changing river and its valley.

This summary is closed with a quotation from István Széchenyi, which was the motto of the Great Hungarian Plain Research: "The past is out of our power, but we rule the future, do we. Let us to do so!"

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