

AQUATIC MOLLUSCA FAUNA OF THE FLOOD AREA AND DEAD ARMS OF THE TISZA

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Abstract

The author has been investigating the Mollusca fauna of the Tisza since 1933. He wrote a review of the Mollusca of the present-day Tisza in 1955. The present paper is a continuation of the publication of his results, and deals with the aquatic Mollusca species to be found on the flood area and in the dead arms of the Tisza. The reasons for their present spread and the role in this of the actions of man are discussed.

History of research into this theme

A few data on the extent of the Mollusca of the Tisza are published in *Fauna Regni Hungariae* (CSIKI 1902). The district (taken in its wider meaning) of Szeged was much more thoroughly explored by ROTARIDES (1927, 1932) and CZÓGLER (1927, 1935). From 1933 to 1950 the present author too made collections throughout this area, and found much to supplement the data of his predecessors. With the financial support of the Hungarian Academy of Sciences, from 1951 he was able to extend his studies to the other areas of the Tisza. The work of collecting and seeking for the most suitable sites for detailed research led him to travel by boat over the entire Hungarian section of the Tisza. The collections took place on many occasions and during many days in the regions of the selected sites (Csongrád, Szolnok, Tokaj). From 1957 he was joined in his work by his one-time student BÁBA, who has concentrated primarily on the study of the Mollusca coenoses. The latter dealt for three years with the Mollusca coenoses of the Szikra dead arm, and produced a fine account of this (BÁBA 1967). Data on the northern part of the Hungarian section of the Tisza have also been published by VÁSÁRHELYI (1958). The study of the fossil fauna of the Tisza prior to its regulation is also of interest from a faunistic and ecological point of view. CZÓGLER (1935) described freshwater shell-fish found in archeological sites in the Szeged district. The author has so far made a study of the pre-regulation fauna in only a few sites in the Szeged district, in the vicinity of Csongrád and Szolnok. These results have in part been published (HORVÁTH 1966).

As regards the origin of the fauna it is important to study the Pleistocene fauna preceding the Holocene fauna. This was done primarily by ROTARIDES (1927, 1932) along the Tisza, and in the main in the vicinity of Szeged. An account of the fossil fauna is not the aim of the present work; this is referred to only when necessary in connection with the present-day fauna.

The flood areas and dead arms

The length of the Hungarian section of the Tisza is 761 km, and it flows at all times in the Great Hungarian Plain. Before its regulation, it flowed slowly with much meandering, and was bordered by a wide flood area rich in aquatic flora. Its flood waters spread over a huge area, and for this reason the level of the river varied only slightly. Since the regulation it has become shorter as a result of the elimination of the meandering, its flow-rate has increased, its banks are bare, and the flowering aquatic flora has disappeared from them. It has embankments on both sides, and thus the flood waters spread over a much smaller area and the water-level fluctuates between wide limits. In places stone-dams too have been built on its banks.

The flood area is much narrower than it was, for it is now confined to the area between the embankment and the river. It is covered mainly by willow and poplar groves, and is only periodically under water, at the times of flooding. The aquatic fauna lives in pits which were formed at the time when the embankments were built. These pits accompany the river throughout its entire course, and are en masse and in close proximity to each other on the flood area. Some of them are deep and contain water permanently, while others are fairly shallow, contain water only periodically, and at various times after the ebbing of the flood they become stagnant and finally dry up. In certain of them reed-grass, rushes and other aquatic flora grow, while in others apart from algae only the roots of willows growing into the water, fallen leaves and perhaps twigs are to be found. On flooding their water may be polluted, but the water of the Tisza is generally relatively pure. The pits are polluted by other effects only comparatively rarely, in places close to human settlements. The pits gradually become filled with the alluvium transported there at the times of flooding, their water content tends to become more periodical, and their aquatic fauna gradually diminishes and then dies out.

The dead arms were formerly bends of the present Tisza, which became standing waters separated from the Tisza after its regulation. In exceptional cases they may be connected with the present Tisza at one end, via a sluice, but this means only the periodic exchange of the water, and does not change their standing water nature. Their banks are normally lined with rushes, and they are rich in aquatic flora (reed-grass, rushes, water-caltrop, more rarely *Nymphaea*, etc.). Various amounts of organic debris accumulate on their bottoms; this undergoes decomposition reactions and leads to a decrease of the oxygen content. Some of them still have ample water today, with good oxygen supplies, and the decomposition processes on their bottoms are moderate. Others, however, are either partially or completely stagnant, and as a result of the decomposition processes their bottoms consist of thick, black mud. The conditions even within the area of a given dead arm may be substantially different.

There are today many human settlements and much cultivated land beside the dead arms, while in places pigs, cattle and horses bathe in them, and thus their waters may be polluted in a number of ways.

Mollusca species of the flood area and dead arms.

This section considers in taxological order the Mollusca species found on the flood area and in the dead arms. The places of occurrence are listed, and their present situation in the fauna along the Tisza is characterized too. The places of occurrence are illustrated on the accompanying sketch map.

Family: Viviparidae

Subclass: **Prosobranchia**. Order: *Mesogastropoda*.

Viviparus viviparus (L.) = *V. contectus* (MILLET). This favours slowly flowing and standing waters. It is frequent in the suitable pits between Szeged and Csongrád. It has been noted only in Tokaj to the northwards, but it is expected to extend to the pits along the entire Tisza. It is also frequent in those pits in which apart from the algae only willow-roots extending into the water and fallen leaves can be found. Young specimens were also found on branches of trees floating in the water of the pits. It is also fairly extensive in the dead arms, but it is absent from those on the bottoms of which there is much decaying matter. It is known in the following dead arms: Sasér, Tiszaug, Cibakháza, Tiszaadony. Vásárhelyi also reports it in the following dead arms: alive Telektanya, empty shells Tokaj, Tiszapolgár, Tiszatarján. It was frequent in the present Tisza before regulation, but it is now rare there because it is not partial to fast-flowing water. The author has not found it in the Pleistocene along the Tisza, but ROTARIDES does list it there. The cold climate of the Pleistocene did not favour it.

Viviparus hungaricus HAZAY = *V. acerosus* BOURG. Its environmental requirements are similar to those of the preceding species. It is frequent in the pits between Szeged and Csongrád, and appears to be more frequent than the above species. The author has found this species in pits in the Tokaj district, and it no doubt extends to the entire flood area along the Tisza. It occurred in the following dead arms: Sasér, Mártély, Tiszaug. Vásárhelyi found it alive in the following dead arms: Telektanya, Tiszadob, Tiszapolgár, Tiszaeszlár. Prior to the regulation it was a much more frequent species than the former in the Tisza. It is very sporadic in the Tisza today. It has not yet been found in the Pleistocene along the Tisza.

Family: Valvatidea

Valvata cristata O. F. MÜLLER. This is an oxygen-requiring species, which prefers pure waters. In slowly flowing and standing waters it usually lives on aquatic flora, or only on their roots. Up to the present it has been found only by BÁBA in the Tisza districts; he located a few specimens in the Szikra dead arm. The author has so far not found it in the fauna from before the regulation. It appears to be rare in the Pleistocene along the Tisza.

Valvata pulchella STUDER. This lives in marshy shallows. It is very rare alive in Hungary (e.g. Szeged—Átokháza). Soós lists only three places of occurrence. The author has not found it in the pre-regulation Tisza. It was frequent in the Pleistocene.

Valvata piscinalis (O. F. MÜLLER). This lives on aquatic flora on the muddy, sandy bottoms of standing and slowly flowing waters. It favours clean water, and is therefore sporadic. The author has also located it in pits with no aquatic flora. It occurs in pits: Szeged, Algyő, Sártó (on the far side of the bridge opposite Algyő), Atka. As a curiosity it is mentioned that he also found many in one of the left bank pits of the Körös in the vicinity of Csongrád. In dead arms: Tiszaug, Szajol, Csereköz (below Tiszafüred), Dinnyeshát. He found many in the alluvium of the Kraszna at Vásárosnamény. The species may be extended along the Kraszna. It was frequent in the Tisza before regulation and also fairly common in the Pleistocene. It is now rare in the present Tisza because of the rapid current.

Valvata naticina MENKE. "It lives in the mud of larger rivers." The author himself found empty shell, which may be alluvium, at the mouth of the Túr. Bába found quite a lot of specimens in the Szikra dead arm. The author has not located it in either the present Tisza or that prior to regulation.

Family: Hydrobiidae

Lithoglyphus naticoides (C. PFEIFFER). Nowadays the most common snail of the present Tisza. It was frequent before the regulation, but since then it has become even more frequent. It prefers faster flowing water. It is a species requiring oxygen, and favours flowing water, but it also occurs in standing waters with a good supply of oxygen. The author has often observed it alive in pits between Szeged and Algyó, but it may have been carried there during flooding. (It has been seen drifting in flood water.) It does not live in dead arms. There are no data as to its existence in the Pleistocene along the Tisza.

(As a result of the sudden death of Dr. Horváth, this paper remained unfinished. The account of the places of occurrence of the following species and the other details were arranged by one of the author's colleagues on the basis of his notes.)

Bithynia tentaculata L. This occurs in pits and in dead arms containing fairly clean water. It is in general widespread and frequent. — Dead arms: Cserököz, the outflow channel of the Dead Tisza, on aquatic flora. Szajol, Tiszaug, on the muddy bottom. Abundant everywhere. Pits: Algyó, Atka, Csongrád, Csongrád-Körös left bank, Körtvélyes, Sasér, Sártó pits contain many. Frequent in pits in the Szeged district. Also on the left bank between the Maros mouth and Algyó. It has also been found in pits at Szolnok, Tiszafüred and Tokaj.

Bithynia leachi SCHEPPARD. Quite a number have been found in dead arms at Cibakháza, Szajol, Tiszaug. On the muddy bottom and on aquatic flora, mainly on the bottom of nymphaea. — Pits: Many from left bank pits in the Körös—Csongrád district. Few on the Szeged left bank, between the Maros mouth and Algyó. This species too has been found in pits near Szolnok.

Subclass: **Prosobranchia**: Summary. Soós mentions 26 species in his book on Hungary. Of these, 7 live on dry land (Pomatiasidae 2, Acmidae 5). To the author's knowledge they do not live along the Tisza, and can not be expected there. *Theodoxus danubialis* C. PFEIFFER does not live in the Tisza and can not be expected from beside it. Soós identifies the Tisza *Theodoxus fluviatilis* L. species with *Theodoxus prevostianus* C. PFR. The *Theodoxus transversalis* C. PFEIFFER occurs only in the present Tisza. It is not to be expected from dead arms and pits. The *Paladilhopsis* 2, *Bythinella* 1, *Sadleriana* 1 genera and the Melanidae 3 family species do not live in the Tisza, and cannot be expected. The 2 *Viviparus* species and *Valvata piscinalis* and *Bithynia tentaculata* live in pits and dead arms, and are rare in the present Tisza. Few data are available with regard to the *Valvata cristata* v. *pulchella*, *V. naticina* and *Bithynia leachi* species. *Lithoglyphus naticoides* lives in the Tisza, is a guest species in pits, and is not found in dead arms.

Subclass: **Pulmonata**. Order: *Basommatophora*.

Family: Limnaeidae

Galba truncatula O. F. MÜLL. In pits and in places in dead arms. On leaves which have fallen into the water, and in waterside flora. Temporarily and occasionally in the Tisza. Before regulation it may have been frequent on the flood area. Dead arms: Cibakháza, Csongrád, few, outflow channel of the Dinnyeshát dead arm. Few on algal mud. Fairly many on aquatic flora, especially on the backs of nymphaea leaves. In pits: Few from Boszorkánysziget, Bagi wood (Vásárosnamény) flood area alluvium and Kraszna mouth alluvium.

Stagnicola palustris O. F. MÜLL. *Variable* species. In the author's view, *corvus* GMELIN and *turricula* HELD are not separate species. Frequent on the flood area before regulation. — In pits: Many sp. curta on the Bodrog—Bodrogkeresztúr natural flood area. Few in the Szeged region, for example between the Maros mouth and Algyó. Many in pits on the Vezseny left bank. In places frequent in dead arms.

Tiszaug, many on aquatic flora, mainly on the bottom of *Nymphaea* leaves. (Empty shells on left bank at Cibakháza.) There are none in the Dead Tisza at Szeged. It favours a marshy environment.

Limnaea stagnalis L. It may have been frequent on the flood area before regulation, but rarer than *Stagnicola*. Generally widespread and common in pits and dead arms. It is not rare either in the present Tisza, but is not of a permanent nature here. The author has collected it from the following dead arms: Atka, many. Vicinity of Bagi wood (Upper Tisza), Gergely-Ugornya Dead Tisza, many. Nagyfa Dead Tisza, frequent. Mártély, and everywhere in Szeged Dead Tisza, frequent. Szunyogos Dead Tisza, Szolnok Dead Tisza, Tiszaug dead arm, many. Tiszaadony dead arm (Upper Tisza). — Pits: Atka, Bodrogkeresztúr flood area pools, many. Körös left bank pits (in Csongrád region), Sártó, pits beside Szajol dead arm, Szolnok 327 river km, Szolnok pits. Everywhere many. Tokaj pits.

Radix auricularia L. In standing waters rich in flora. Oxygen-requiring. Dead Tiszas: Nagyfa Dead Tisza, Mártély dead arm, Szeged Dead Tisza. In the main small specimens. Szolnok dead arm, Szunyogos Dead Tisza, Tiszaug Dead Tisza, few (BÁBA). It also occurs in pits, e.g. in the vicinity of Algyő. Many enter the Fehértó channel from the flood area.

Radix peregra O. F. MÜLL. According to Soós "very common in Hungary". The author has frequently found it in hilly districts. It was frequent on the sides of the Tisza before regulation. At present it seems to be much rarer. Its extent requires further investigation. A few were found from the Tiszaug Dead Tisza (BÁBA).

Radix ovata DRAP. In floral waters. Also common in pits and dead arms. It perches on aquatic flora. Frequent on flood area before regulation. Found in every examined Dead Tisza and pit. It occurred in high numbers at: Bodrogkeresztúr (floating on rush-leaves and on maize-stalk bundles), between the Maros mouth and Algyő, Tiszafüred. From the dead arm at Csongrád, from Tiszaug dead arm, on aquatic flora, mainly on the bottom of *Nymphaea* leaves.

Family: Physidae

Physa fontinalis L. Dead Tiszas: Nagyfa, Szeged, frequent on aquatic flora. Tiszaug Dead Tisza, fairly many in places (BÁBA). Many individuals were found from the flood area of the Bodrog at Bodrogkeresztúr, and the flood area of the Tisza at Tiszafüred.

Physa acuta DRAP. A South and West European species. Introduced to Hungary. Generally widespread. Found in fairly high numbers on aquatic flora from the waters of the Mártély Dead Tisza (1947) and the Szeged Dead Tisza (1946). Found in smaller numbers than the above in the Atka, Nagyfa and Sasér dead arms. Rarely turns up in the Tiszaug dead arm (BÁBA). Of the pits, it occurs in greater numbers in pits at Algyő and Boszorkánysziget in the main.

Aplexa hypnorum L. May occur sporadically on aquatic flora (BÁBA found only one specimen in the Tiszaug dead arm).

Family: Planorbidae

Planorbarius corneus L. Generally frequent everywhere on the flood area of the Tisza before regulation, and in the pits and on the flood area today too. It occurs in higher numbers in the pits. It was found in smaller numbers along the Upper Tisza. (Gergely—Ugornya Dead Tisza, Vásárosnamény Tisza-side, Kraszna flood area. Kraszna alluvium), than in the Middle and Lower Tisza regions (Algyő pit, Bodrog-

keresztúr flood area small specimens, Cibakháza left bank reedy Tisza creek, Csongrád dead arm pit, (on twigs), Gulács step Tisza-side, Körös left bank pits in vicinity of Csongrád, Nagyfa Dead Tisza, Sártó pit, Szajol dead arm and pit, Szeged pits, Szolnok pits, Szunyogos Dead Tisza, Tiszaug dead arm (BÁBA found very few), Tiszafüred natural flood area, Vezeny left bank pits).

Planorbis planorbis L. Frequent in pits and dead arms, and on flood area before regulation. Appeared at 327 river km below Szolnok from a quiet creek of the Tisza. The place of occurrence suggests the pre-regulation habitats. Also found on a natural flood area at Bodrogkeresztúr beside the Bodrog, many, Szeged Dead Tisza, pits, Tiszaadony dead arm, many, Tiszaug dead arm, very few (BÁBA), Tokaj pit.

Planorbis carinatus O. F. MÜLL. There are not many data as to its extent. Scarcely occurs in dead arm at Tiszaug (BÁBA).

Planorbis vortex L. It may have been frequent on the flood area before regulation. The author collected it from the following two places: Tiszafüred natural flood area, fully grown individuals, Tiszaug dead arm on aquatic flora, mainly on the reverse side of Nymphaea leaves, few.

Planorbis vorticulus TROSCHEL ssp. *caricus* HELD. Soós does not mention it from beside the Tisza! Found in Tiszaug dead arm on aquatic flora, mainly on back of Nymphaea leaves, fairly many.

Planorbis spirorbis L. Occurs in pits and dead arms alike. On aquatic plants, and on willow leaves which have fallen into the water. Dead arms: Cibakháza many, Cserőközi Dead Tisza outflow channel many, Szeged Dead Tisza, Tiszaug dead arm on backs of Nymphaea leaves in moderate numbers. Further in Algyő, Nagyhalászi, Szeged, Tápé district pits. Many live on the natural flood area of the Bodrog at Bodrogkeresztúr. Fairly many found from the Kraszna alluvium (Vásárosnamény).

Planorbis septemgyratus E. A. BIELZ. Soós does not mention it from beside the Tisza (only fossilized). Found at two places in Vásárosnamény Kraszna alluvium, few, Tiszaug dead arm, very few (BÁBA).

Planorbis leucostoma Millet. Found alive in Tiszaug dead arm, few (BÁBA). Empty shells from Vásárosnamény Kraszna alluvium, few.

Bathymphalus contortus L. No data. Soós does not list it from beside the Tisza.

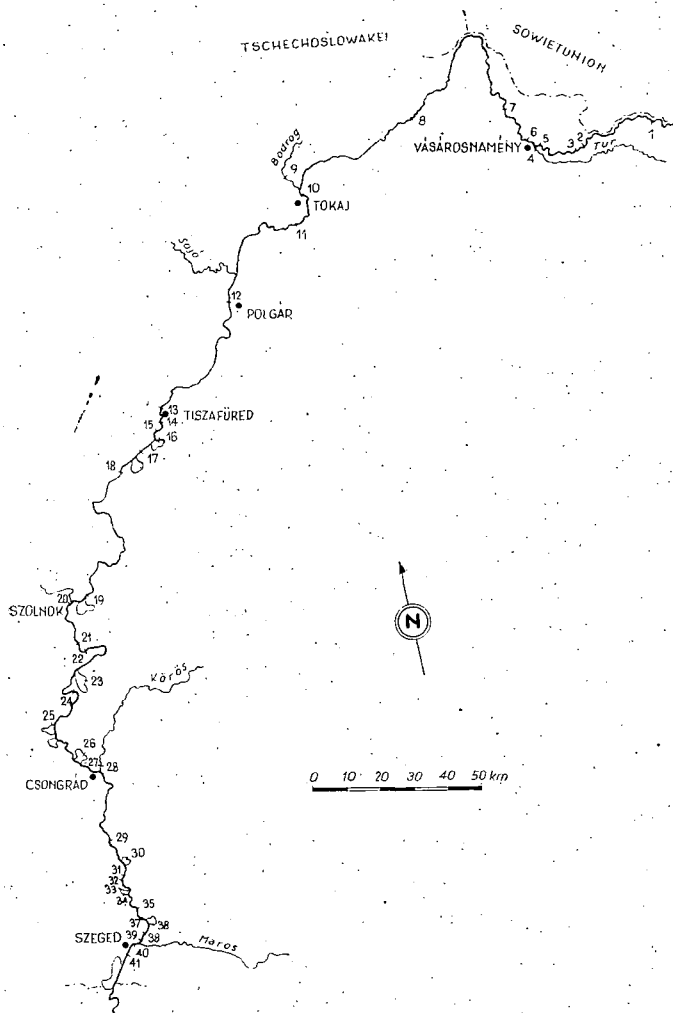
Gyraulus crista L. On plants in standing waters. Atka dead arm, many. It was common on flora in Szeged Dead Tisza (1957). Also occurred at shell. Tiszaug Dead Tisza on aquatic flora, mainly on the backs of Nymphaea leaves, many.

Gyraulus albus O. F. MÜLL. Fairly frequent in places. Dead arms: Cibakháza dead arm, few, Nagyfa dead arm, several specimens, Mártély dead arm, few, Sasér dead arm, Szajol dead arm, many, Szolnok dead arm, Tiszaug Dead Tisza on aquatic flora, particularly on the backs of Nymphaea leaves, many. On the natural flood area of the Tisza (Tiszafüred) and the Bodrog (Bodrogkeresztúr), many. From pits in several places: on reed-grass, leaves on Algyő left bank, many, Körös left bank pits in vicinity of Csongrád, few, at Porgány pumping station, on Sártó arms, on leaves, few, Szajol, many, Szeged, Szolnok pits, few.

Gyraulus laevis ALDER. Soós lists it from Algyő. BÁBA found a few specimens in the Tiszaug dead arm.

Segmentina complanata DRAP. According to Soós "rare in Hungary". Found: On Tiszaug dead arm aquatic flora, mainly on the backs of Nymphaea leaves, fairly many. Szeged dead arm in moderate numbers.

Segmentina nitida O. F. MÜLLER. There are few data on its extent along the Tisza. Dead arms: Cibakháza dead arm, few, Tiszaug dead arm, few (BÁBA). A few specimens were found in left bank pits of the Körös in the vicinity of Csongrád. Many found on the natural flood area of the Bodrog at Bodrogkeresztúr.



List of places of occurrence on the sketch map

Merely the positions of the places of occurrence are depicted on the sketch map.

1. Tiszabecs. 2. Gulács Tisza-side. 3. Gulács step pits. 4. Túr channel mouth, reedy. 5. Jánd.
6. Vásárosnamény right and left banks: Bagi wood flood area dead arm. Gergely-Ugornya decad arm. Kraszna mouth. 7. Tiszaadony dead arm. 8. Dombrád. 9. Bodrogkeresztúr natural flood area.
10. Tokaj pit. 11. Tiszalök dead arm (left bank). 12. Polgár natural flood area. 13. Tiszafüred natural flood area. 14. Tiszaórvény. 15. Nagyhalászi Tisza-side, pits. 16. Tiszaszőlős. 17. Cserőköz, Dead Tisza. 18. Kisköre. 19. Szajol dead arm, pit. 20. Szolnok dead arm, pit. 21. Tiszavárkony dead arm
22. Vezseny left bank pits. 23. Cibakháza dead arm (left bank). 24. Nagyrév. 25. Tiszaug (Szikra dead arm). 26. Csongrád right bank dead arm, pit. 27. Körös mouth left bank pits. 28. Körös mouth right bank pits. 29. Mindszent dead arm. 30. Mártély pit, dead arm. 31. Körtvélyes pit, dead arm..
32. Sasér dead arm. 33. Atka island, pit. 34. Szunyogos Dead Tisza (near Atka). 35. Sártó pit. 36. Algyő left bank. 37. Nagyfa Dead Tisza. 38. Rorgány flood area at the pump. 39. Tápé pit. 40. Szeged Körössy csárda pit. 41. Szeged Boszorkánysziget, pit.

Family: Ancyliidae

Ancylus fluviatilis O. F. MÜLLER. It is not expected from the flood area waters. It has been found only twice in the present Tisza. BÁBA lists it from the Upper Tisza. The author collected it once on stones at the Maros mouth.

Acroloxus lacustris L. Scattered on the Great Hungarian Plain, but generally widespread. The author did not find it fossilized. Frequent in certain dead arms. Cibakháza dead arm on reeds, very many. Mártély dead arm on water-caltrop (*Trapa natans*), very many. Szeged Dead Tisza on reeds, Tiszaug on aquatic flora, mainly on *Nymphaea* leaves, very many. Vezseny Dead Tisza. Pits: Algyő, Sártó, Szajol, Szolnok.

Order: *Basommatophorae*: summary. Soós lists 26 species. Of these, one (*Carychium*) is a dry-land species. Of the *Basommatophorae* found, the following are generally widespread and frequent in both dead arms and pits: *Limnaea stagnalis*, *Radix ovata*, *Physa fontinalis*, *Physa acuta*, *Planorbarius corneus*, *Planorbis planorbis*, *Planorbis spirorbis*, *Gyraulus crista*, *Gyraulus albus*, *Segmentina nitida*, *Acroloxus lacustris*. *Limnaea stagnalis*, *Radix ovata* and *Planorbarius corneus* occurred in greatest numbers. *Ancylus fluviatilis* is not to be expected from standing water. The occurrence of the *Gundlachia* (or *Ferrisia*) species is still uncertain, and there are no anatomical examinations. The following occur sporadically: *Galba truncatula*, *Stagnicola palustris*, *Radix auricularia*, *Radix peregra*, *Aplexa hypnorum*, *Planorbis vortices*, *Planorbis vorticulus*, *Planorbis septemgyratus*, *Planorbis carinatus*, *Planorbis leucostoma*, *Gyraulus laevis*, *Segmentina complanata*. Very rare: *Planorbis carinatus*, *Planorbis leucostoma*, *Segmentina complanata*.

Because of their requirements, which differ from today's conditions, the following have been found only in dead arms: *Aplexa hypnorum*, *Planorbis carinatus*, *Planorbis vorticulus*, *Planorbis leucostoma*, *Segmentina complanata*.

Class: **Lamellibranchiata**. Order: *Eulamellibranchiata*.

Family: Dreissenidae

Dreissena polymorpha PALLAS. Primarily in flowing water; on muddy, sandy bottoms, where there is much plant debris. Found in two places: on maize-stalk bundles in Csongrád dead arm, and in the Mártély dead arm.

Family: Unionidae

Unio crassus PHILIPSSON. The *U. c. decurvatus* sp. *serbicus* Drouet form is more frequent in the Tisza. It is not to be expected in standing water. Empty shells may find their way into the pits by means of the flooding (e.g. Körössy csárda).

Unio tumidus zelebori ZELEBOR. In the Tisza and in standing waters too. Found so far in dead arms at Csongrád, Nagyfa, Mártély, Tiszafüred and Tiszalök.

Unio pictorum L. Both subspecies occur. (*U. p. balatonicus* KÜSTER is more common, and *U. p. platyrhynchus* ROSSM. rarer.) In both running and standing waters. The ssp. *balatonicus* was found in the vicinity of the bridge in a quiet creek on the left bank of the Tisza at Tiszafüred. It has also turned up in dead arms and pits. Places of occurrence: Csongrád pit, Nagyfa dead arm, Mártély dead arm, Sasér dead arm, Szolnok pit, Szeged Dead Tisza.

Anodonta complanata complanata ZELEBOR. Scattered in Tisza. Not to be expected in standing water.

Anodonta cygnea L. Widespread in dead arms, particularly the ssp. *zellensis* GMELIN. There are no data for the present Tisza. Csongrád dead arm, basic form. Körtvélyes pit, Nagyfa Dead Tisza large sp. *zellensis*. Mártély pit, Tiszaug Dead Tisza, few.

Anodonta anatina L. In flowing and standing water. More frequent in standing water. From Atka, Csongrád, Nagyfa, Mártély, Szeged dead arms. Some from pit between Mártély and Körtvélyes.

Family: Spaeriidae

Sphaerium corneum L. On flood area and in dead arms. Nowhere in great numbers. Bagi wood flood area (alluvium). Cibakháza dead arm, few, Cseróköz dead arm outflow channel with aquatic flora, few. Tiszafüred natural flood area, many. Tiszaug dead arm, scarcely occurs (BÁBA).

Sphaerium rivicola LAM. and *Pisidium amnicum* O. F. MÜLL.: empty shells found in the Tisza at Szeged. Live specimens to be expected.

Musculium lacustre L. In dead arms and pits, not rare. Found: Algyő pit (between rotting roots), Bodrog (Bodrograkeresztúr) natural flood area, many, Körös left bank pits (vicinity of Csongrád), many, Sártó pit, Szajol dead arm, Tiszaug dead arm, few.

Pisidium henslowanum SHEPPARD. Tiszaug dead arm, scarcely occurs (BÁBA).

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