

Description of sampling sites along the Upper Tisa

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Introduction

The research was done on the upper section of River Tisa from its two sources (rivers Bila Tisa and Chorna Tisa) in the territory of Carpathian Ukraine down to the confluence with River Szamos in Hungary (Fig. 1: map). The research was carried out between 1-22 August 1995 within a single expedition.

Considering the influence of the tributaries of River Tisa on its water-quality, we extended our research onto the rivers Tereblia, Teresva and Batar.

The biological samples were collected at 16 sampling stations. A thorough description of these stations is given below, as we consider it to be important to interpret the presence or absence of certain species.

Description of sampling sites

Site 1

Situated on River Bila Tisa, 100 m downstream from its confluence with White brook. Here, 5-6 km downstream from its spring, River Bila Tisa looks like a mountain brook, with its riverbed consisting of boulders and rocks. The velocity of the stream is 1 m/sec and its depth is a maximum of 70 cm. There is also rough sand and even finer sediment among the boulders in the zones of slow flow. The boulders of the riverbed are covered with algae which retain fine particles suspended in the water. Thus, muddy sediment settles among algal filaments. The water carries a great amount of allochthonous fragments: leaves, branches and other vegetal fragments. The river valley is covered with coniferous forests, which protect against high floods. However, we can find signs of bank erosion, which refers to the existence of floods. The rough sand which accumulates among boulders, and the presence of muddy sediment leads us to the conclusion that this stream carries sediment even at low water level (Table 1.). The whitish colour of the water, especially in the White brook, is a result of the erosion of the calcareous rocks. The coat of fine sediment on the boulders is not prosperous for the fixation of benthic organisms.

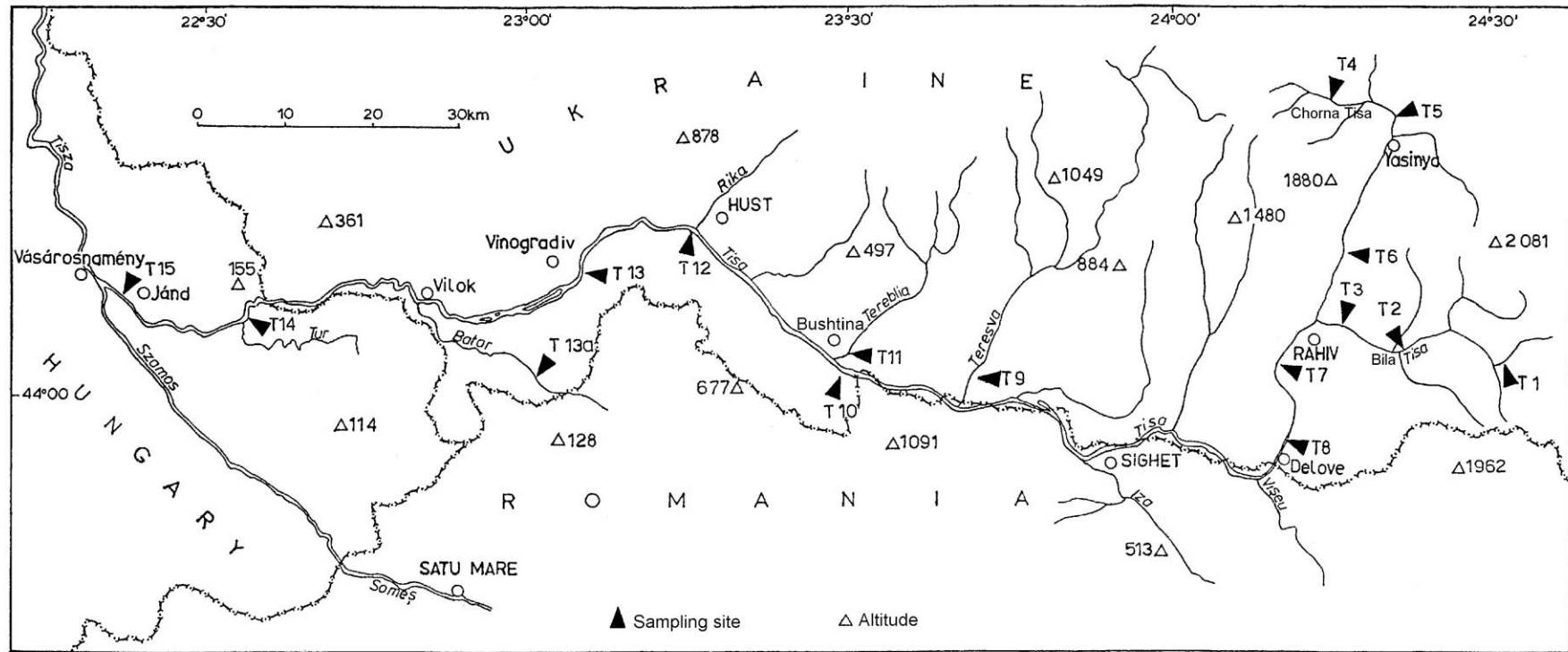


Figure 1

Site 2

Situated on River Bila Tisa, upstream from Breboja, about 20-25 km from its spring. River Bila Tisa gathers many tributaries up to this point and takes the appearance of a mountain river. The riverbed consists of boulders and pebbles, but there is also a great amount of fine sediment (Figure 2) on the bank. The velocity of the stream is 70-80 cm/sec. Boulders are covered with a layer of algae, which holds fine detritus particles. Some times, boulders are overlaid with a greyish-whitish muddy coat.

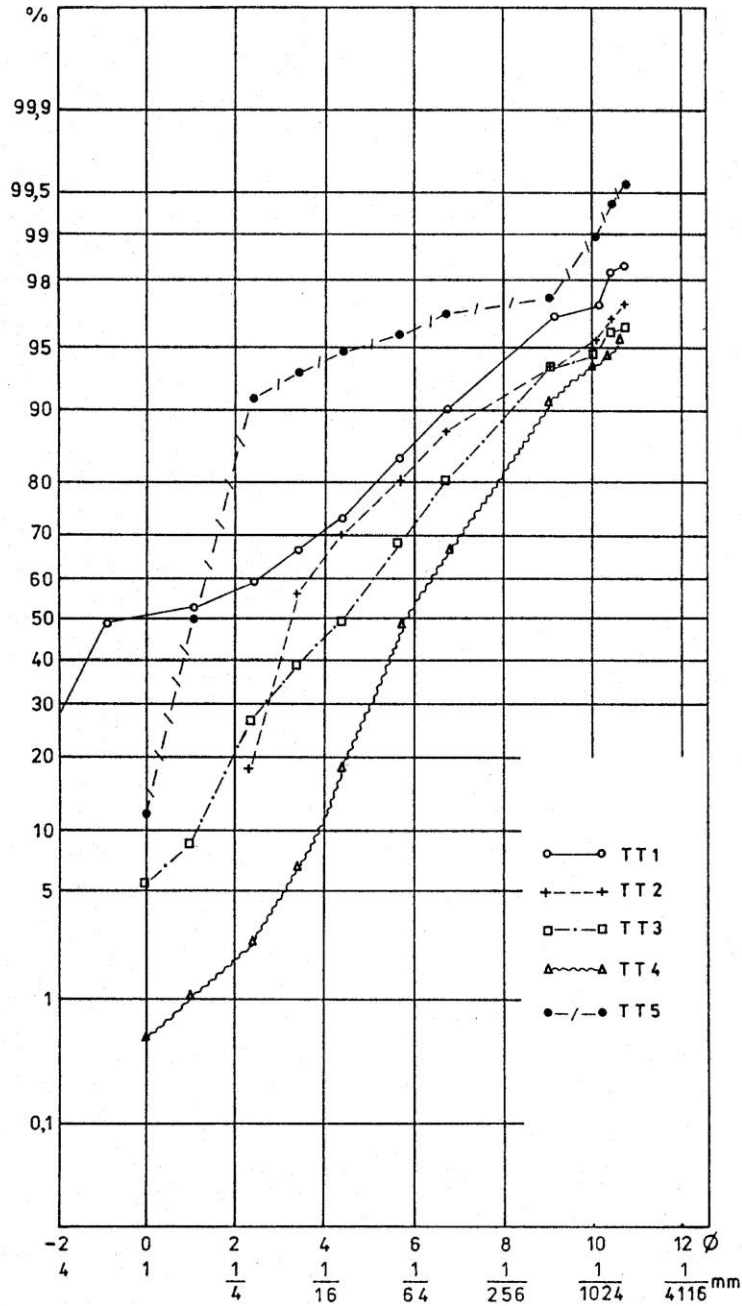


Figure 2.

Site 3

Situated on River Bila Tisa, upstream from Roztoki. The riverbed consists of big and very big boulders, without coarse sand among them. The water current is extremely strong: 1-1,2 m/sec.

Site 4

River Chorna Tisa, 5-6 km downstream from its spring. It looks like a small mountain brook, with a bouldery bed and rapid flow of 0,7-0,8 m/sec. The valley is narrow, wooded. The abundant vegetation on the banks shades the water.

Site 5

River Chorna Tisa, upstream from Yasinya, near the entrance of the natural reserve. The riverbed consists of big boulders and rocks covered with an algal layer holding fine sediment (Figure 2.). The character of the stream is that of a mountain river, with a velocity of 1 m/sec.

Site 6

River Chorna Tisa, downstream from Jasinya. The riverbed consists of boulders and big fragments of rocks. There are great amounts of muddy and sandy sediments on the banks in the zones of slow flow (Figure 3., Table 1.). The velocity of the stream is 0,7 m/sec.

Site 7

River Tisa (formed by the union of rivers Bila Tisa and Chorna Tisa), 2 km downstream from Rahiv. The riverbed consists of big boulders and rocks here and there. The boulders and the rocks are covered with a rich algal coat, which is loaded with very fine sediment. The rest of the fine sediment is deposited near the banks, among boulders (Figure 3., Table 1.).

Site 8

Tisa, upstream from Dilove . The bed consists of big boulders and big fragments of rocks. The boulders are not rolled by the stream and are rounded by the effects of high floods. At low water level, the rocks stick out and form small islands. Water output is higher at this station and the water depth reaches 1,5 m in some places. Rapid flow (0,6-0,7 m/sec) alternates with slow flow. There is much muddy sediment which is unstable and, thus, carried away by high floods. The organic load of these sediments is obvious. It arrives from upstream localities (especially from Rahiv).

Site 9

Tributary Teresva, 1,5 km upstream from the river mouth. Access to the river was prohibited by frontier guards (the river represents the state border between Ukraine and Romania). Therefore, we were not able to work at this section. The riverbed consists of big boulders carried by high floods. These boulders divide the river into branches. Apparently, the water is clear, but there are suspended particles formed by fragments of the rich algal coat found on boulders.

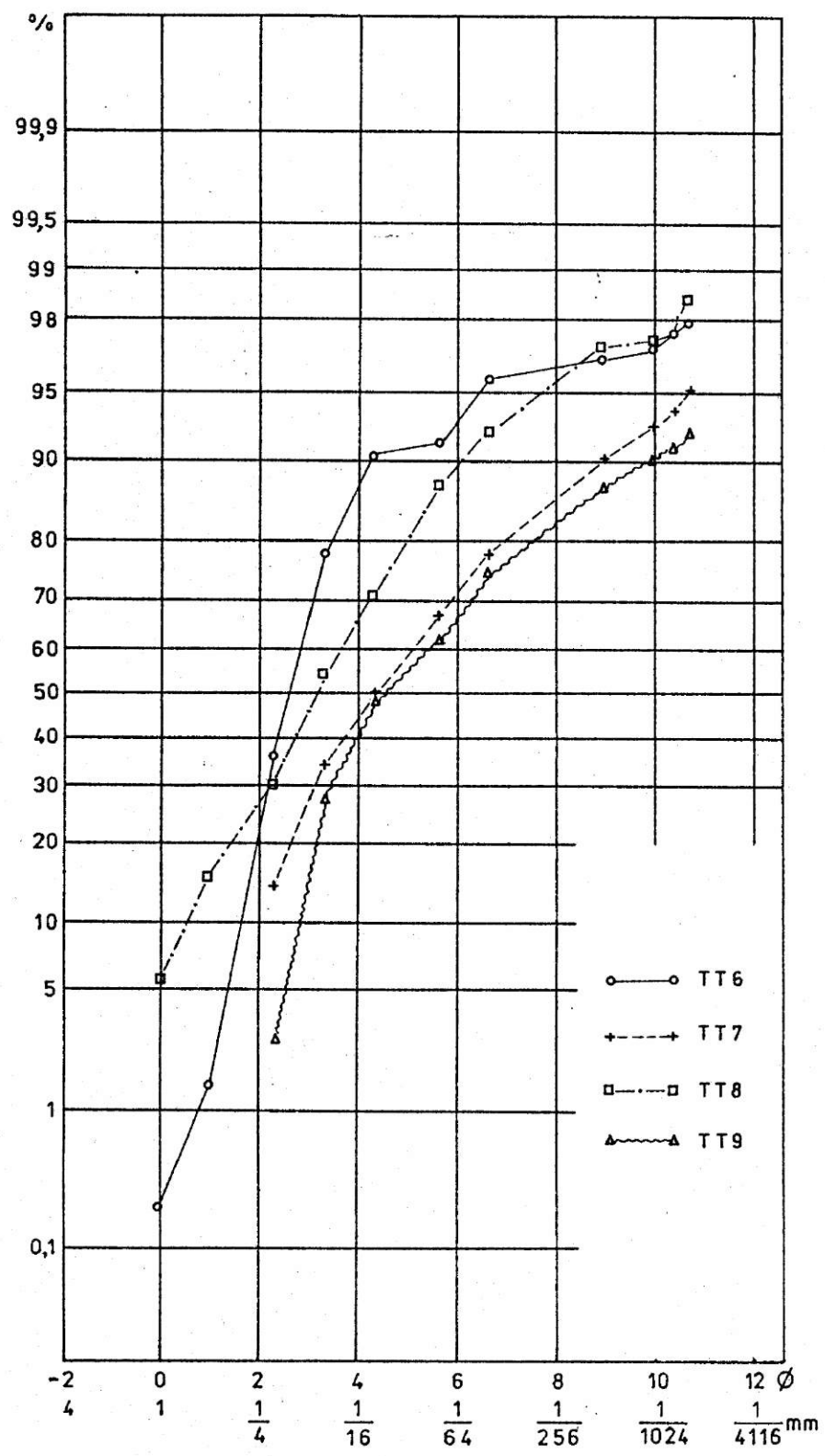


Figure 3

Table 1. Median grain size of sediment in the Tisa river-bad

| Sites | C | P5 | P16 | P25 | M | P75 | P84 | P95 | gravel | sand | silt | clay | sediment |
|-------|-----|------|------|------|------|------|------|------|--------|------|------|------|----------------|
| | Ø | Ø | Ø | Ø | Ø | Ø | Ø | Ø | | | | | |
| 1 | | | | 2.1 | 1 | 4.7 | 5.8 | 8.5 | 36 | 24 | 24 | 6 | medium sand |
| 2 | | | | 2.5 | 3.25 | 5.1 | 6.4 | 10 | | 64 | 26.5 | 9.5 | very fine sand |
| 3 | | 0 | 1.6 | 2.3 | 4.5 | 6.4 | 7.9 | 10.2 | | 44 | 43 | 13 | coarse silt |
| 4 | 1 | 3.05 | 4.2 | 4.75 | 5.8 | 7.45 | 8.25 | 10.6 | | 12 | 70 | 18 | medium silt |
| 5 | | | 0.2 | 0.5 | 1.1 | 1.7 | 2 | 5.6 | | 93.5 | 3.2 | 3.3 | medium sand |
| 6 | 0.8 | 1.4 | 1.85 | 2.1 | 2.65 | 3.3 | 3.8 | | | 85 | 10 | 4 | fine sand |
| 7 | | | 2.5 | 3 | 4.4 | 6.3 | 7.8 | 10.6 | | 43 | 42 | 15 | fine silt |
| 8 | | 5.3 | 1.1 | 2 | 3.2 | 4.7 | 5.4 | 7.8 | | 66 | 28.5 | 4.5 | coarse silt |
| 9 | | 2.5 | 3.1 | 3.3 | 4.6 | 7 | 8.2 | | | 40 | 42 | 18 | very fine silt |

Site 10

River Tisa, upstream from the river mouth of the tributary Tereblia, at Bustina. The riverbed consists of big boulders. There are great amounts of unstable sediment on both banks. Big boulders often lie on a bed of coarse sand. Boulders deposited by high floods divide the river into branches which often change their direction.

Site 11

On the tributary Tereblia, at its confluence with River Tisa. The riverbed is bouldery. Deposits of boulders, gathered by high floods, form a dam at the river-mouth. Water often disappears beneath the accumulated boulders. The water is clear but rich in mineral nutrients. These mineral nutrients probably originate from chemical fertilizers used on nearby mountain pasture lands and hayfields. The great amount of filamentous algae in the reaches of slow flow is a result of the above mentioned phenomenon.

Site 12

River Tisa at Hust. The riverbed consists of big boulders. Pebbles form islands which divide the river into secondary branches. Fine sediment is unstable in places of slow flow. The velocity of the stream varies from 0,5 to 0,70 m/sec.

Site 13

River Tisa at Vinogradiv. The riverbed consists of pebbles, fixed well by matrix of coarse sand. There are thick layers of mud in places of slow flow. These layers are carried away by high floods. Places of rapid water discharge alternate with places of slow flow, especially around the islands formed by sediments. These sedimental islands divide the river into branches.

Site 13/a

The tributary Batar (Vájás) (on the left side of River Tisa), near Chepa (Csepe). The flow is slower because of the gentle slope. Sediment consists of sand and mud.

Site 14

River Tisa at Tivadar (Hungarian territory). The bed is spacious and the river flows slowly. Sediment varies from pebbles to rough sand in accordance with the velocity of the stream. There are small muddy areas near the banks.

Site 15

River Tisa, downstream from Jánd and upstream from the mouth of River Szamos. The bed consists of rough sand. There are extensive muddy areas which are stable and prosperous for the existence of bivalves.

Upper Tisa is a river with particular properties. It flows along woody mountains. Its velocity is fast and its high level often occurs. Because of the bouldery riverbed and the lack of muddy sediment, pelophilic fauna is rather poor.

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