

New coprolite and fish bones from the Ljubljansko barje in Slovenia

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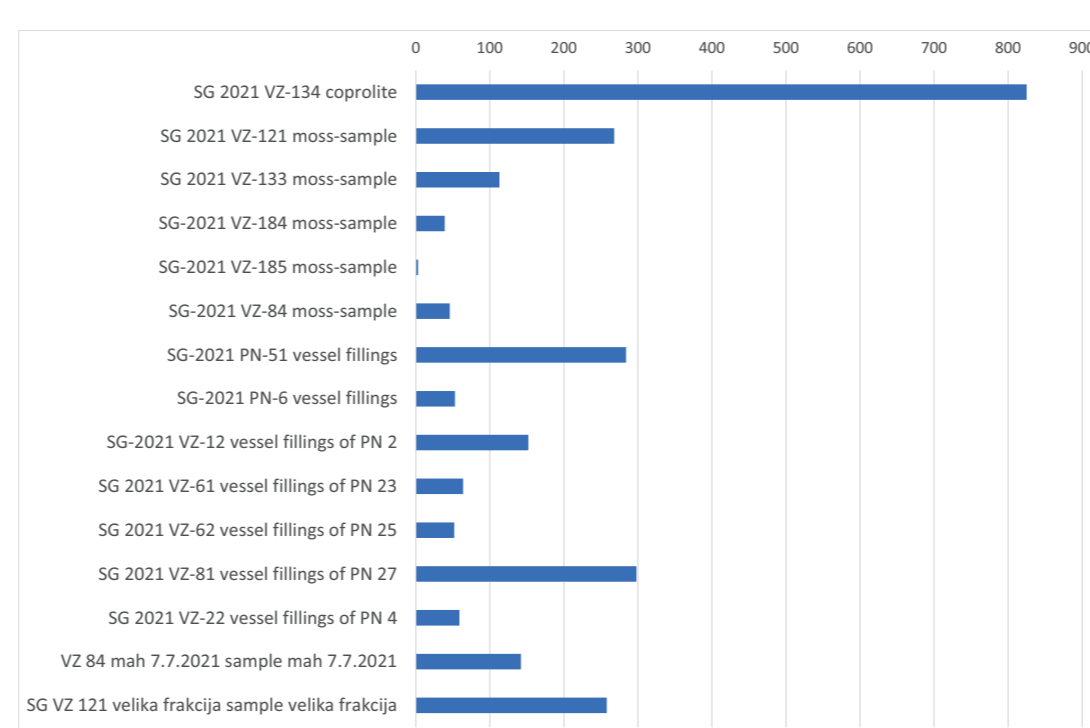
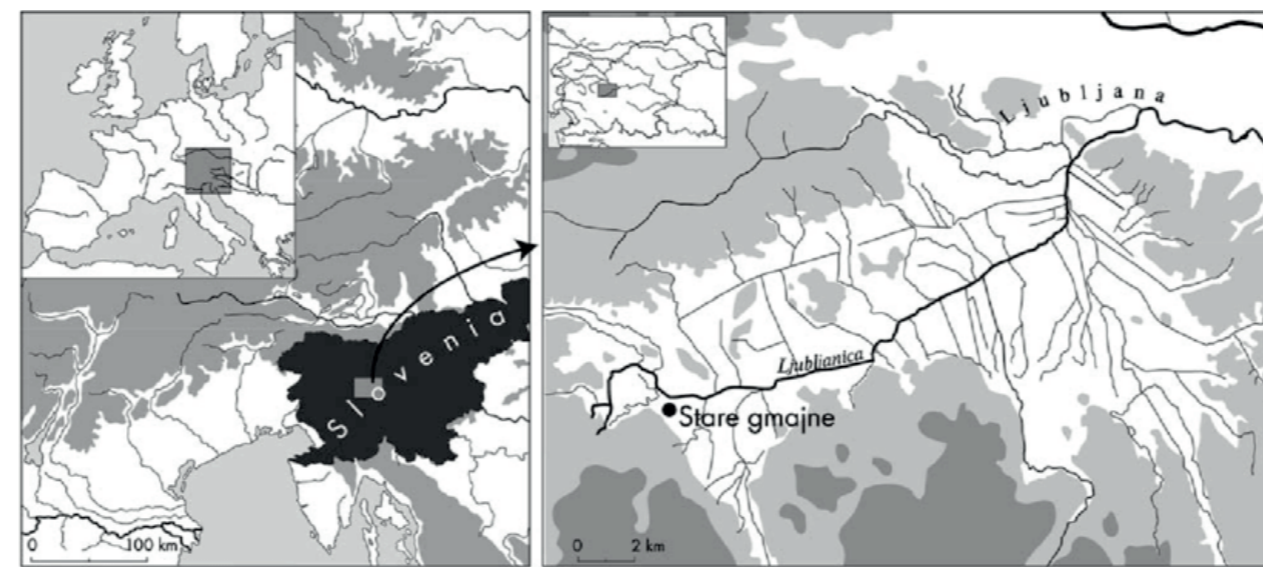
Abstract

Recent and new excavations in 2021 at the Neolithic pile-dwelling sites Stare gmajne in the Ljubljansko barje in Slovenia brought frequent ichthyo-archaeological material to light, which are under study in course of an international cooperation project – FWF I 4977 and ARRS J7-1817. At one hand the study on remains out of coprolites can be fortunately continued and on the other hand the intense cooperation between archaeobotany and ichthyo-archaeology enhances now the picture of fish exploitation at the pile-dwelling site, because numerous fish-remains come from the precisely screened finds from the floated and finely sieved archaeobotanical samples.

The coprolites serve as archives for multi-proxy analysis and shed light to human–dog relationship. The content contains various materials such as palynological, palaeoparasitological, archaeobotanical and archaeozoological finds, which are currently studied. Not only the most probably dog coprolites but other archaeological contexts contained various quite small fish remains for instance scales, bones and isolated teeth. The resumption of excavations in the settlement area provides further important information on fishing and fish consumption in the Slovenian Neolithic. The remains prove consumption of Cyprinids, river perch and northern pike and they are mostly composed of rather small and fairly fragmented remains. In addition, the fish remains from the sediment layers within the settlement will provide further important information on fishing and fish consumption in the Slovenian Neolithic.

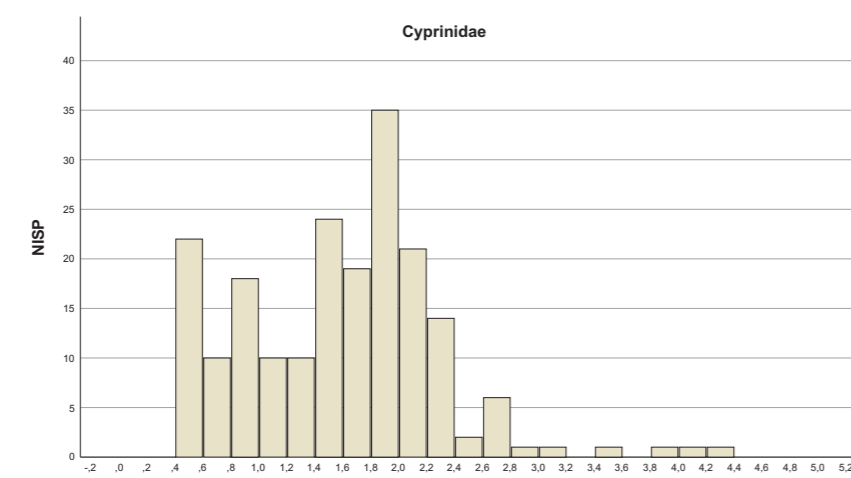
Keywords:

Neolithic, pile-dwelling, Slovenia, fish

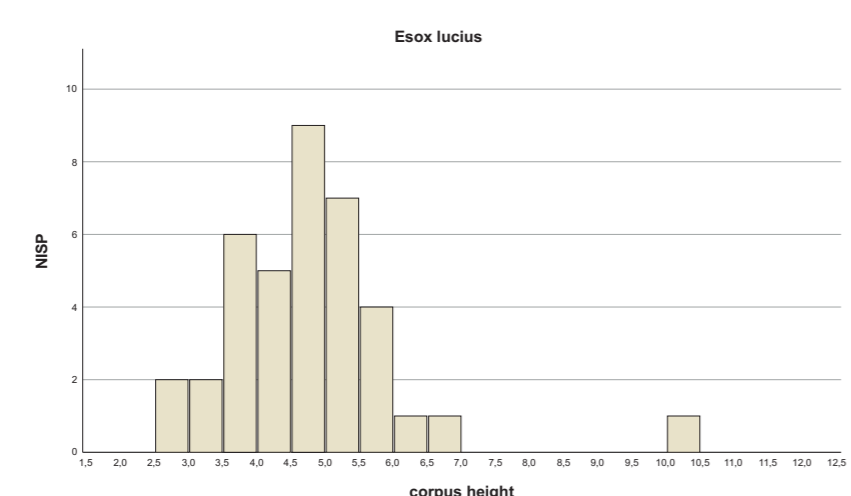


The frequencies of finds vary significantly amongst the moss and vessel samples form 2021 and the coprolite from 2007, which contained the highest concentrations of fish remains. If of human or canine origin, the “producer” ate/consumed fishes without doubt. While the other samples, are certainly containing fish remains of domestic origin, representing fish remains of most probably random accumulation.

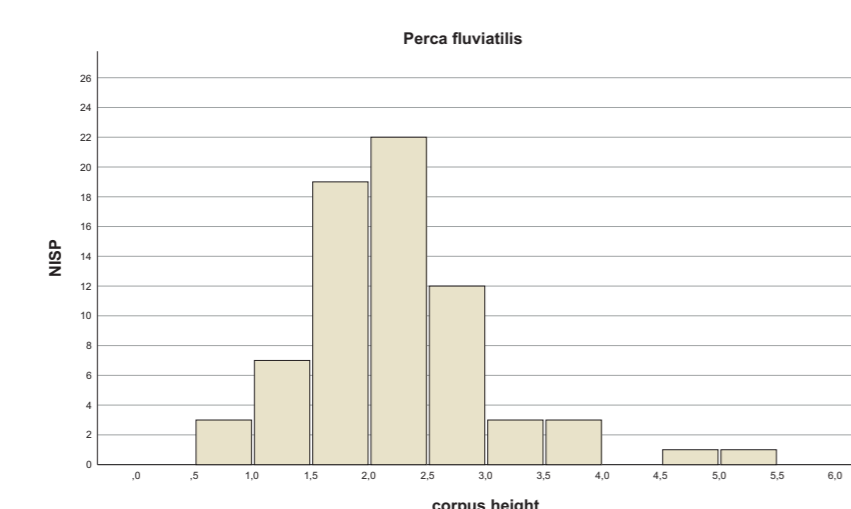
However, the distribution of fish remains indicate in all types of samples (vessel and moss) a high percentage of not identifiable fish remains, which were mostly heavily fragmented. The most frequent species are river perch, northern pike and cyprinids. Besides ordinary river perches a few remains of ruffe (*Gymnocephalus* sp.) appeared amongst the percid remains as well. The cyprinids comprised only very few identifiable remains, proving common carp and common roach. In low quantities remains of river loaches (*Balitoridae*) and lampreys (*Petromyzontidae*). A single vertebra of a whitefish (*Coregonus* sp.) was unexpectedly uncovered as well.



Derived from vertebral dimensions the size of caught cyprinids accumulates up to one millimetre and another peak is about 1,4 up to 2,4 millimetre indicating that the mass of fishes was of small size. Larger fishes with dimensions up to 4 mm are quite rare up to now.



Northern pike indicates a picture with dimensions of few very small vertebrae less than 4 mm and an accumulation of dimensions around 4 to 5 mm in size. Remains of big catches are proven by a single vertebra of about 10 millimetres diameter.



The size distribution of river perch vertebrae indicates a wide distribution in sizes between 1 mm up to 6mm. However, the major size is about 1,5 to 3mm in diameter and only few larger specimens were found among the percid material.

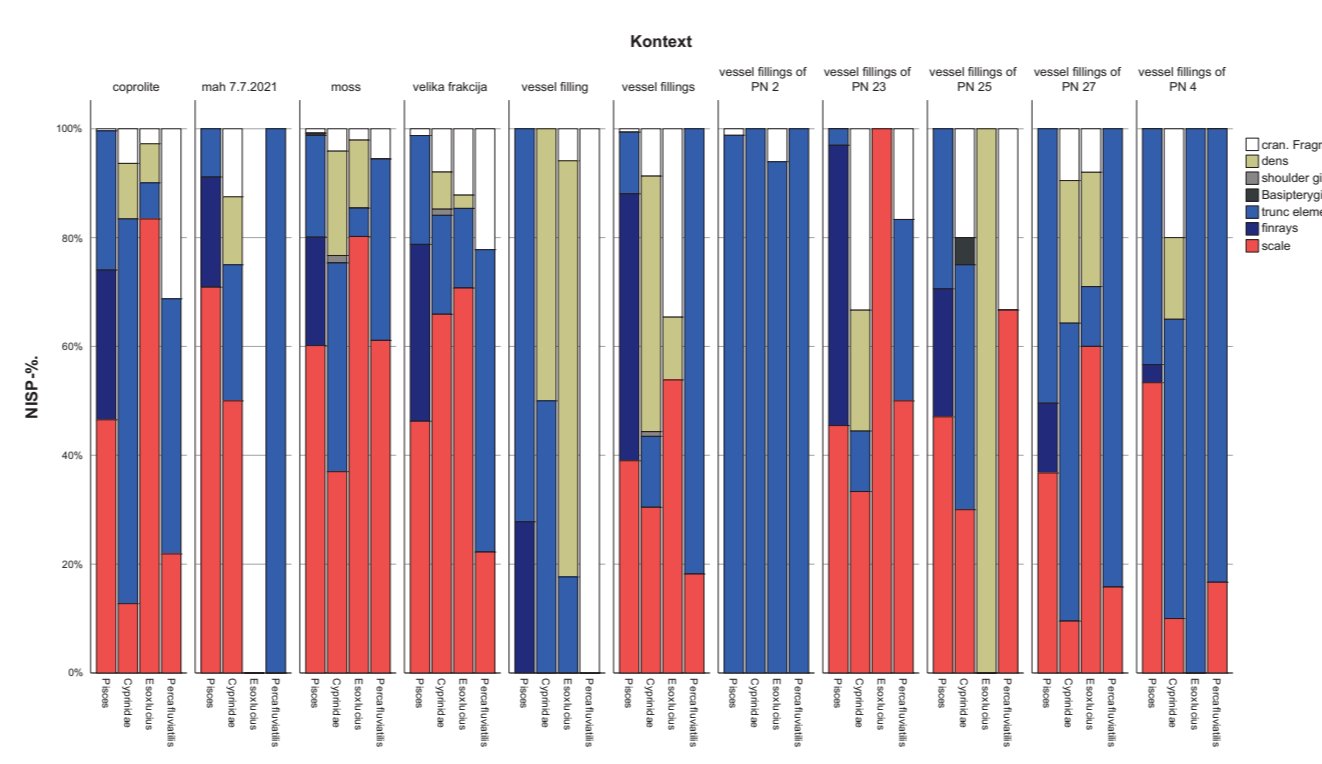
Current state of investigation is derived from palynological, parasitological and partly of archaeobotanical analyses. Fish remains still wait to be analysed, because focus laid on microanalyses from the new excavated coprolites in 2021. At one hand maybe some of the coprolites could be suspected to be of human- but others might be of canine origin. However, the fish remains under examination here indicate intense fishing certainly with a focus on small and very small fishes. Ageing and seasoning might provide a better insight into fishing behaviour and consumption pattern of the late Neolithic people at Stare Gmajne.

Introduction:

Archaeological excavations in summer 2021 were carried out in two trenches 4 and 5 in Stare gmajne. The excavations documented a dark brown clayey to silty cultural layer, that is located approximately 60 cm beneath the top soil and most of the archaeological material was recovered within this layer, which was up to 64 cm thick. Underlying this cultural layer another grey clay layer contained ceramic and wood, as well. Beneath it, lake marl or so-called polžarica continues, where the vertical wooden pillars were driven in. Sediment samples were collected in both trenches, only trench 4 had a cultural layer. The first focus was on judgementally sampled archaeobotanical material, i.e. concentrations of interweaved mosses, samples of sediments in and around fragmented vessels, along two wooden artefacts (like a ring), a bow and a ring, and two coprolites. During wet sieving of the systematically sampled sediment samples, six more coprolites and one more wooden ring were found, all in trench 4 and mostly in two m2 (quadrants A4 and B4).

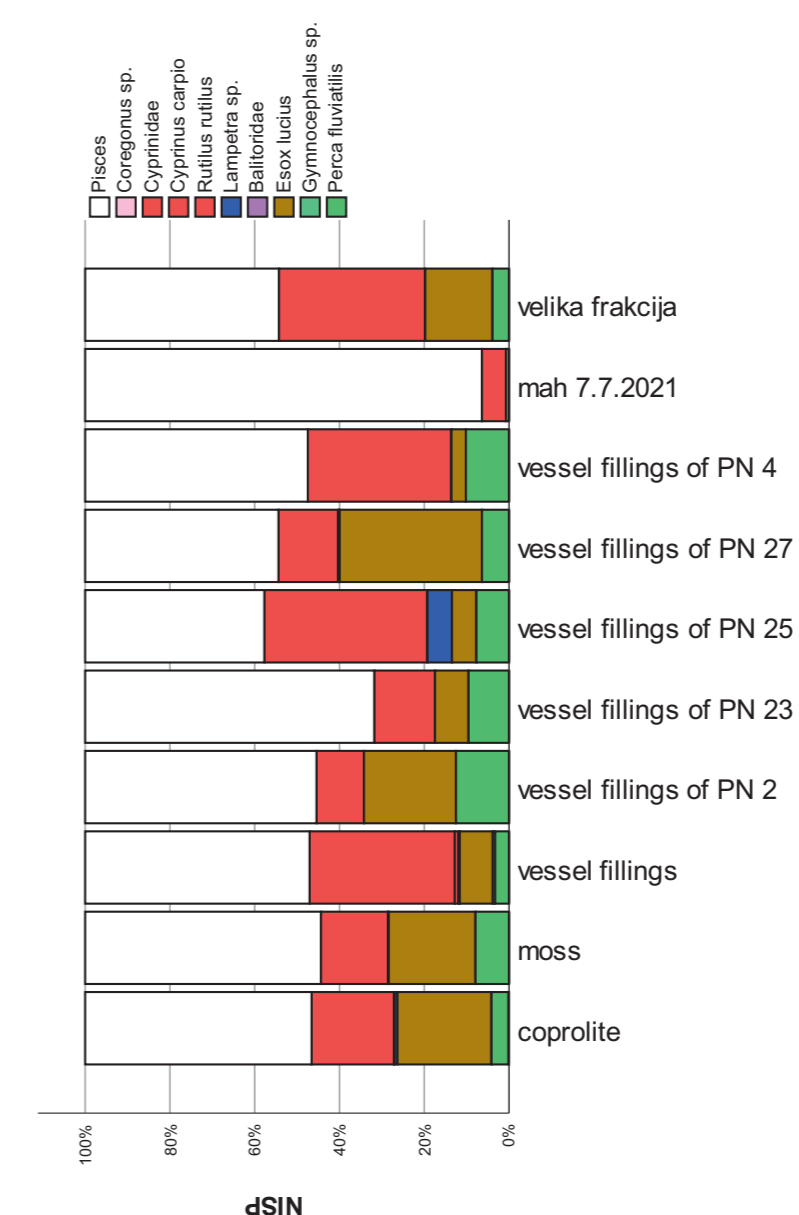
Three types of the archaeobotanical remains are analysed: moss and seeds/fruits, waterlogged wood and charcoal. Neolithic collection of moss in the adjacent forests turned out again being an important task of the Neolithic lake-dwellers. The remains of nutritional plant taxa (i.e. cultivated and gathered), water and lake-shore, weeds and ruderals confirm the economy and ecology of the Late Neolithic Stare gmajne lake dwelling. Coprolite samples contained pollen indicating vegetation around the site mostly consisted of water dependent flora. Large percentage of *Quercus*, *Corylus*, *Alnus* and low percentage of *Fagus* and *Abies* suggest a quite open landscape.

Fish remains appeared in all archaeobotanical judgemental samples from the excavation in Stare gmajne 2021. An exception is sample VZ 185, where only fish scales were found, which is most probably due to small size of the sample. Larger fish scales of bigger fish species and completely preserved scales of smaller fish were carefully picked out during the archaeobotanical investigations. In the first step only vessel and moss samples were wet sieved, and macro-remains (included fish) sorted out, while only two coprolites were found during excavations in 2021. These two were rather subsampled for micro-analyses first, i.e. parasitological, palynological and biochemical. While six more coprolites were subsequently found during wet sieving in 2022, the macro-remains (included fishes) are surely going to be obtained in some of them in the further step of investigation.



Depending on the finds frequency some of the samples contained fish scales, however two of the vessel fillings didn't evidence presence of scales. The scales come from river perch, northern pike and cyprinids. Scales of larger northern pike as well as cyprinids are unfortunately heavily fragmented, while the ctenoid scales of river perch are in a better state of preservation. Complete and at least complete parts of scales were documented and will be analysed due to age and seasonality of catches.

The unidentifiable fish remains consists mainly of fish scale fragments, fin-rays and trunc elements. Within the group of cyprinids mainly trunc- and less cranial elements are observable, if the isolated teeth of pharyngeal bones are extra counted. Two vessel fillings contained more cranial elements, and elements of the shoulder girdle and pelvic body parts are generally rare in the cyprinids. Northern pike is also clearly biased by presence of isolated teeth, but in general clearly more trunc elements are available as cranial elements. The same skeletal element pattern is true for river perch, too. Nevertheless, the distribution of skeletal elements may indicate the usage and consumption of complete fishes.



Literature:

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Other new lit?