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THE FOSSIL HOLOCENE MOLLUSCA FAUNA OF THE LAKE AT KARDOSKÚT AND ENVIRONS

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On more occasions I have paid visits to the lake at Kardoskút in the neighbourhood of Orosháza, like a member of the cooperative researching the salt waters of the Hungarian Plain. The highly salt water of the lake is grey, containing much floating mud. It is large but shallow, fordable in every period of the year and completely drying up in summer. Its bottom is of boggy mud without any floriferous water plant in it. Also the lake-side is bare, bordered by low grass.

In the water there were but a few specimens of *Anisus spirorbis* L. alive. This stout ubiquitous species endures well the water of strongly alkali reaction and its periodical drying up, as well. Nevertheless, in the water of lake it only vegetates, perhaps because of a lack in food and the whirling of mud. At the shore there vegetated some *Succinea oblonga* Drap. In the vicinity of the lake there lived some *Pupilla muscorum* L. and *Imparietula tridens* O. F. Müller in the grass, in low individual number. A mass of fossil species are thrown out here and there to the lake-side by the waves, those can be found en masse on the bottom of the lake, as well, after it having been dried up. They are evidences for the rule of thoroughly different living conditions much more favourable from the point of view of the molluscs here erstwhile. Analysing that fossil fauna I have got the following results.

Water fauna. Number of species: 19. *Valvata pulchella* Studer. It seems to die out already in the Hungarian Plain to-day, north of us, however, it is still a frequent species. Its individual number is high, remembering the loess fauna. *Valvata cristata* O. F. Müller. Its individual number is high. In the rather clear stagnant waters of the Plain with water vegetation it is, even to-day, similarly frequent here and there. The frequency of *Bithynia leachi* Sheppard, besides the lack in *Bithynia tentaculata* L., remembering us similarly of the pleistocene conditions. In the Plain the *tentaculata* is dominant at present, while the *leachi* is spread much less. *Stagnicola palustris* O. F. Müller feels here similarly well as at present, too, in our marshy stagnant waters. Also the individual number of the f. *corvus* Gmelin and f. *turricula* Held is high. The quantity of *Galba truncatula* O. F. Müller is large. Its occurrence in our Plain in that quantity is frequent in pleistocene

but it is rare in a recent form. The individual number of the recent common *Planorbis corneus* L. is moderate, represented by individuals of small stature, in the loess fauna we have had a similar experience. The quantity of *Tropidiscus planorbis* L. is similarly high, as it is at present, too, in a lot of our standing waters. The individual number of *Spiralina vortex* L. is low, in a lot of places, in loess, and as a recent one, too, it is more frequent than here. *Anisus spirorbis* L. is similarly frequent as it is in the present. *Anisus septemgyratus* E. A. Bielz. It is frequent enough. Its origin is in Eastern Europe, it is a somewhat thermophilous species. I have observed its occurrence in a similar quantity in the loess of the milder glacials and in our stagnant waters, as well. *Anisus leucostoma* Millet. It is rather frequent, remembering more the loess than the present conditions. The quantity of *Bathyomphalus contortus* L. is considerable, in our Plain its occurrence in such a large mass in loess is more frequent, than at present. The quantity of *Gyraulus albus* O. F. Müller is very small, at present it is spread and frequent. *Gyraulus laevis* Alder. It is frequent enough. This species is frequent in loess of the Plain, while we have hardly any data about its recent occurrence here. The individual number of *Armiger crista* L. and *Segmentina nitida* O. F. Müller is low, it is more seldom in loess with us than similar recent ones. The quantity of *Pisidium obtusale* C. Pfeiffer and *Pisidium cinereum* Alder is comparatively small, they are here and there in the loess, and as recent ones as well, more frequent. *Dreissena polymorpha* Pallas. A fragment from top of a juvenile specimen. It is known from the pliocene sediments in this country, in the pleistocene, however, none of them has been found here, as yet. Its homes were originally the rivers flowing into the Caspian Sea and Black Sea, in Europe it has spread since the beginning of the last century by the ship traffic. Its occurrence at Kardoskút, must, anyhow, be still older. The species is dwelling in lakes, as well, where it has supposedly got with the mud, stuck to the feet of the water birds. Also here it may have arrived from the river Maros.

On the basis of the fauna described above, the lake used to be of standing character, cool water, neutral reaction, rich in water plants and of good oxygen supply. Considering the present conditions of the Hungarian Plain, the fauna is more similar to the population of loess of the mild glacial, without verifying the glacial. The fauna, surviving the glacial, influenced by the milder climate and not troubled, as yet, by human influences, has proliferated in an area suitable for that. Also this water may have been like that.

Riparian species. Number of species: 3. *Carychium minimum* Risso. Few. *Succinea oblonga* Drap. Its quantity is very high. In the loess it is frequent, and along our Plain salt lakes it is alive in a high number at present, too. *Succinea pfeifferi* Rm. Its individual number is high. In the Plain in loess, too, and also at present, it is frequent. It is very sensitive to be shrivelled. It is found on the part of water plants above the surface of the water, and in the shade of the riparian vegetation. Accordingly, the lake-shore was not so bare as it is at present. **Hygrophilic ubiquitous species.** Number of species: 13.

Cochlicopa lubrica O. F. Müller. Rather many. *Vertigo pygmaea* Drap. Rather many. *Vertigo antivertigo* Drap. Rather many. *Truncatellina cylindrica* Fér. Very few. *Pupilla muscorum* L. A great many. *Vallonia pulchella* O. F. Müller. Many. *Vallonia enniensis* Gredler. Few. *Vallonia costata* O. F. Müller. Very few. *Zonitoides nitidus* O. F. Müller. Few. *Vitrea crystallina* O. F. Müller. Rather many. *Euconulus trochiformis* Montagu. Rather many. *Zenobiella rubiginosa* A. Schmidt. A lot. *Trichia hispida* L. Few. All these species occur in the loess, as well, and they are alive along our Plain waters at present, too, where they find enough shade in the riparian vegetation against insolation, and the air is supplied with due vapour content by the nearby water. The quantitative distribution of species is highly influenced by the micro-climate. The environment may have been humid, unfavourable from the point of view of *Truncatellina cylindrica* Fér. Among the three *Vallonia* species, the hygrophilic *V. pulchella* is very frequent, the more xerophilic *V. enniensis* is fewer, the still more xerophilic *V. costata* has the lowest number of individuals. The great quantity of the *Zenobiella rubiginosa* that is rare in loess, makes the population holocene in character.

Grove-dwellers. Number of species: 3. The occurrence of the *Vertigo substriata* Jeffreys is sporadic. It is a North-Alpine species in a broader sense. In Hungary there was found only one recent specimen of it (Nagyhideghegy, Börzsöny mountain). From the Hungarian pleistocene there are only two data concerning the finding site of it (Királyhalom in the neighbourhood of Szeged and Nagykőrös. Rotrides' s data). Its occurrence in the Plain holocene is remarkable. *Perpolita hammonis* Ström. In Hungary it is at present mainly a mountain species, its Plain occurrences (Ócsa, Bátorliget) have rather a character of relicts. In the pleistocene it is frequent. It seems to have been erstwhile in the Plain in holocene much more scattered than at present.

Perforatella bidens Chemnitz. Sporadic. On the Hungarian Plain it is considered as a pleistocene relict. It is known in the moore of Bátorliget, author collected it in mass at the mouth of the river Szamos (Sárkánykert). In the loess it is rather frequent. It has a considerable demand on humidity. On the basis of the three species we need not suppose any wood or grove, they do survive in humid meadows, too. *Perpolita hammonis* is pleased to dwell in *Betuletum*, *Perforatella bidens* is in *Alnetum* often found whose occurrence is possible at the lake.
Thermophilic fauna. Number of species: 4. *Abida frumentum* Drap., *Imparietula tridens* O. F. Müller, *Helicella hungarica* Soós et H. Wagner, *Cepaea vindobonensis* C. Pfeiffer. The number of the individuals of all the four species is very high. Although they occur in loess, but on the basis of such a quantity of theirs only a holocene climate can be supposed any more. The occurrence en masse of the *Cepaea vindobonensis* C. Pfeiffer, which is very rare in loess, is particularly obvious. Besides its accustomed specimens of dark ribbons, there occur different ribbon variations of it, also the f. *pallescens* Fér. with pale ribbons is frequent. The species likes the warm environment with half-shade that may have been in the drier bushy environment of

the lake-side. That environment also the other thermophilic species fit into. The lack of *Helicella obvia* Hartmann is obvious, at present this species is the most frequent thermophilic snail of the Plain, dwelling, however, only in open sunlit places.

The number of the species collected is 42. According to the above-discussed data, they are the fossilized members of a mollusc population from the holocene period. The lake and its environment, and accordingly also its fauna, are over a succession process. We have recognized two stages of that process, an old one from the holocene period and the present one. Each stagnant water of the Plain has a history of succession the recognition of whitch is only possible with a simultaneous investigation of the fossil and recent fauna.

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