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The Examination of Subfossil Cladeocera Remains and environmental conditions in the case of lake Velencei, Hungary

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INTRODUCTION & AIM

Lake Velencei, the third largest shallow lake in Hungary with extensive reed coverage , was formed 10.000 years ago. In the 1960s, accelerated eutrophication from nutrient inflow and natural succession led to human intervention through reed dredging. As a result of the basin reconstruction and the water level regulation, lake Velencei can be separated into three major areas: a larger eastern part with open water regions and a smaller nature conservation area in the western basin. Reed fields in the western part cause water sodification, and the lake's water quality varies dark brown near the reeds, grey in the central region, and brownish-green in the North-East due to algae. We aimed to study the heterogeneity of lake Velence based on the subfossil Cladocera remains assemblages, sediment and water chemistry.

METHODS

Lake Velence is a sodic lake rich in sodium, magnesium, hydrogen-carbonate, and sulphates. Sediment sampling involved collecting 10 cm cores from three areas, two cores per site, using a gravity corer. For subfossil Cladocera analysis, 2 cm slices from each core were treated with 10% KOH solution, heated at 70 °C for 30 minutes, and sieved with a 35 µm mesh. Samples were preserved in 96% Patosolv alcohol, with safranin for staining. Cladocera communities were identified using the classification schemes of Frey (1987), Szeroczynska and Sarmaja-Korjonen (2007), Korhola and Rautio (2001), and Gulyás and Forró (1999).

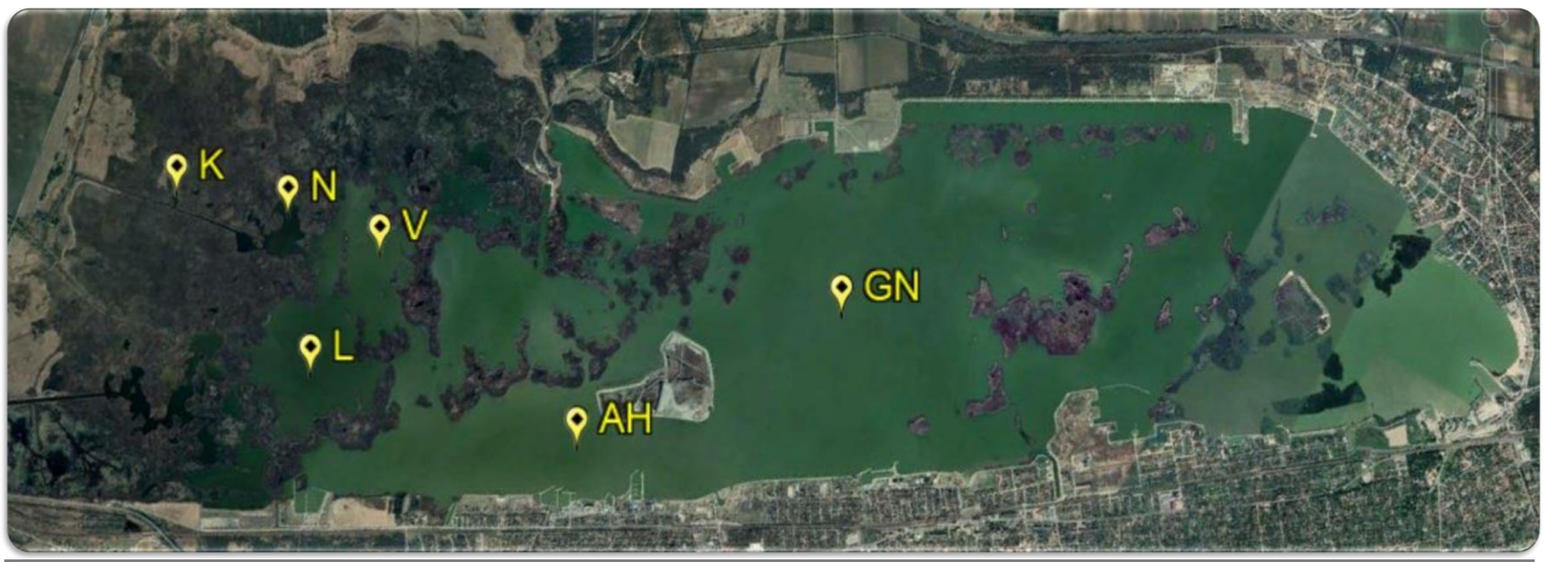

Fig. 1. Nature conservation areas Kerek-tisztás (K) and Németh-tisztás (N), transitional zones Vendel-tisztás (V) and Lángi-tisztás (L) from the recreational areas Agárdi Hosszú-tisztás (AH) and Gárdonyi Nagy-tisztás (GN).

RESULTS

Total 26 species were identified in the sediment samples. We identified 23 species in the sediment column in the protected areas, 22 in the transition zone and 15 in the recreation areas. The average number of individuals in protected areas was 20973 individuals/cm^3, the average number of individuals in transition zones was 33105 individuals/cm^3 and the average number of individuals in recreation areas was 7233 individuals/cm^3. Two species were identified that were only found in the nature reserves: *Alonella exigua* and *Alonella nana*. 5 species were identified, and 9 individuals were counted in the Gárdonyi Nagy-tisztás sediment column. The results of the non-metric multidimensional scaling (NMDS) based on the Bray-Curtis similarity showed small overlap in the species composition of Cladocera remains among sites and the recreational site showed separation (Fig.2.). Significantly higher number of species were found in the protected and transitional sites than in recreational (Fig.3.). The Cladocera abundance was similar at the different sampling points (Fig.4.).

Table 1. Sampling results

Sampling sites	K	N	L	V	AH	GN
Species number	21	12	20	13	14	5
Number of individuals	10879	31067	16745	49496	14466	9

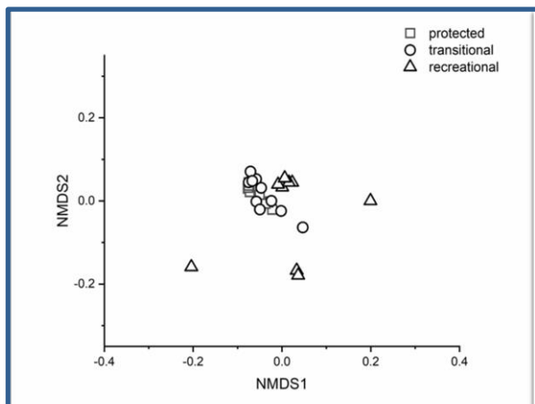

Fig.2. Non-metric multidimensional scaling (NMDS)

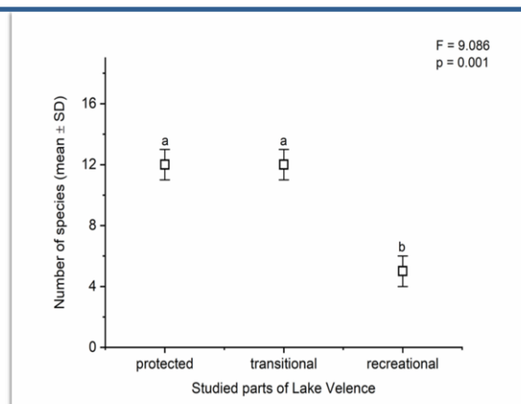

Fig.3. Number of Cladocera remains species in the studied sites.

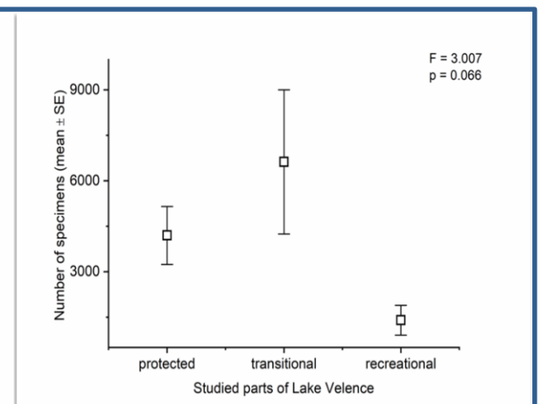

Fig.4. Abundance of Cladocera remains in the studied sites.

CONCLUSION

The heterogeneity of Lake Velencei was shown through the diversity of subfossil cladoceran remains, sediment, and water chemistry. Slight similarities were found among sites based on cladoceran species. As Davidson et al. (2007) noted, cladoceran communities, both pelagic and plant-associated, vary seasonally. Our results confirm that sedimentary cladoceran remains are valuable environmental indicators, consistent with previous studies. Bigler et al. (2006) found that altitude and temperature significantly influence subfossil chironomid and cladoceran assemblages.

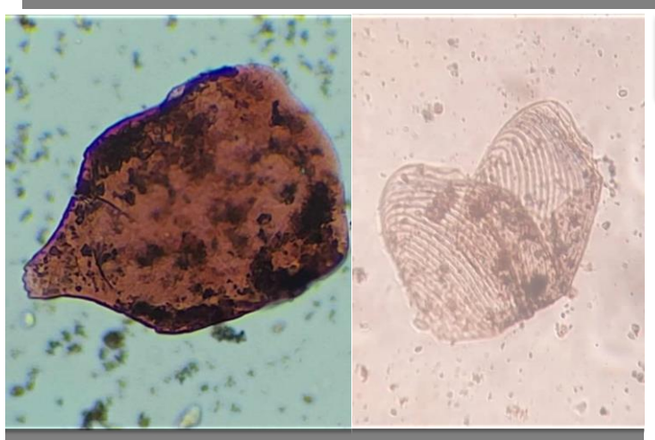

Fig.5. *Monospilus dispar, Alonella nana*

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