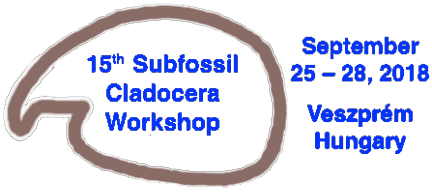

15th Subfossil Cladocera Workshop

25-28 September 2018, Veszprém

Abstract Book

15th Subfossil Cladocera Workshop

September 25 – 28, Veszprém, Hungary

Wednesday, 26th September

8.45-9.00 Registration. Upload presentations

9.00 **Opening ceremony**

9.30 ***Section 1 – Zawisza, E***

Plenary presentation: *Tolotti, Monica: Large perialpine lakes: a multiproxy paleolimnological laboratory for the advance of ecosystem science*

10.20 *Wojewódka, M., Zawisza, E., Hamerlik, L., Krahn, K.J., Cohuo, S.,, Macario-Gonzalez, L., Cisneros, A., Charqueño-Celis, F., Hoelzmann, P., Rose, N.L., Yang, H., Pérez, L., Schwalb, A.*: *Response of the aquatic ecosystem to recent environmental variability recorded in Lake Apastepeque (El Salvador)*

10.40 Zawisza, E., Pociecha, A., Worobiec, E., Szeroczyńska, K, Worobiec, G.: *Cladocera from Miocene (about 12–8 million years ago) fluvial paleolake deposits from Bełchatów lignite mine (Central Poland) – the first recorded data of pre-Quaternary chitinous fossil remains of Cladocera.*

11.00-11.30 Coffee break

11.30 *Horicka, Z.*: *Zooplankton of an alpine lake in the Tatra Mountains (Slovakia/Poland): a 3.5 ka history,*

11.50 Suchora, M.: *Cladocera and humic matter - what do we learned do far studing sediments of łęczna-wlodawa lakes.*

12.00-14.00 Lunch

14.00–17.30 *Szeroczynska, K.*: Microscopic section – Discussion on cladoceran taxonomy, and on own samples.

(15.00 Coffee break)

17.30 **Poster Section – *Tolotti, M.***

Augustyniuk, O., Mirosław-Grabowska, J., Obremska, M., Zawisza, E.: Subfossil Cladocera fauna from Lake Godle (NE Poland),

Berta, C., Korponai, J., Grigorszky, I., Nagy, S. A., Simon, E., Somlyai, I., Gyulai, I.: Examination of heterogeneity by Cladocera community along an oxbow lake in Central Tisza region.

Casillas, G.. O.: The last 2000 years in lake Metztitlan. Local and regional environments.

Morandi, L.: Lac de Creno (1310 m asl, Corsica, France): snapshots from an upland hydroseral succession and first data on Corsican cladoceran assemblages

Pociecha, A., Szarek-Gwiazda, E., Wojtal, A.Z., Ciszewski, D., Kownacki, A.: Subfossil Cladocera response to environmental variables in oxbow lakes downstream the mine water discharge (southern Poland),

Tolotti, M., Patelli, M., Frassetti, M., Nava, V., Leoni, B.: The impact of hydrological dynamics on cladocera community in a deep sub-alpine lake (L. Iseo): a paleolimnological perspective.

19.30 Workshop Dinner

Thursday, 27th September

7.30 Breakfast

8.30 Excursion: Visiting in Balaton Limnological Institute, Centre for Ecological Research of Hungarian Academic of Sciences; short sightseeing in Tihany village; visiting in Balaton-felvidéki National Park (Salföld, Hegyestű), vine tasting in Varga Vinery

20.00 Dinner, Closing act

Friday, 28th September

9.00 **Section 2 – Gyulai, I.**

Plenary Presentation: Molnár, Mihály: *"Single Cladocera dating – is it possible?!" An overview about the recent developments and limitations of Accelerator Mass Spectrometry (AMS) based C-14 dating of very small organic remains*.

9.40-11.00: *Berta, Cs.*: Microscopic section – Discussion on cladoceran taxonomy, and on own samples.

11.15 Closing section - Summary, farewell

11.30 Leaving

Presentations:

Large perialpine lakes: a multiproxy paleolimnological laboratory for the advance of ecosystem science.

Monica Tolotti

Department of Sustainable Agro-ecosystems and Bioresources, Research and Innovation Centre, Fondazione Edmund Mach (FEM), Via Mach 1, 38010, S. Michele all'Adige, Italy

The Perialpine lakes are important component of the Alpine landscape. Due to their piedmont location in the most densely populated and productive region of the Alps, they play a crucial socio-economic role as resource for drinking water, irrigation, industry, tourism, hydroelectric production, and biodiversity conservation. For the same reasons, they are exposed to multiple human pressure, and, as their catchment extend to the glacial Alpine range, they are particularly sensitive to the effects of the global warming.
Limnological surveys during the last few decades outlined coherent responses by large and small Perialpine lakes to the massive nutrient enrichment during the 1950s-1970s, while recent trajectories are rather heterogeneous in relation to local management policies, lake morphology, and superimposed effects of climate change. Recent paleolimnological studies confirmed the strong coherence of the lakes' evolution at a secular perspective, and could relate some individual evolutionary trends to the combination of lake morphology and hydrology, and to the consequently different lake sensitivity to climate variability.
The ongoing studies pinpoint how the investigation of different abiotic and biotic proxies preserved in sediments of Perialpine lakes can complement limnological surveys in reconstructing the past lake ecological evolution from several lines of evidence. In addition, the multiproxy paleoecological approach is crucial for predicting lake sensitivity to present, and especially future human impacts. This is particularly important when defining trophic and ecological reference conditions for setting management policies, since inappropriate conservation/restoration targets might prove unachievable within the current context of global change.
This presentation will show results of recent sediment investigations on large and small Perialpine lakes, moving from a local to a general Alpine perspective, and showing the potential of the multisite and multiproxy paleolimnological approach for the advance of aquatic science.

Response of aquatic ecosystem to recent environmental variability recorded in Lake Apastepeque (E Salvador)

Wojewódka, Marta[1], Zawisza, Edyta[1], Hamerlik, Laci[1,2], Krahn, K.J.[3], Cohuo, S.[3], Macario-Gonzalez, L.[3], Cisneros, A.[6], Charqueño-Celis, F.[6], Hoelzmann, P.[4], Rose, N.L.[5], Yang, H.[5], Pérez, L.[6], Schwalb, A.[3]

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2. Department of Biology and Ecology, Matej Bel University, Slovakia
3. Institute of Geosystems und Bioindication, Technische Universität Braunschweig, Germany
4. Physical Geography, Institute of Geographical Sciences, Department of Earth Sciences, Freie Universität Berlin, Germany
5. Environmental Change Research Centre, University College London, UK6. Instituto de Geología, Departamento de Paleontología, Universidad Nacional Autónoma de México,Mexico

The recent centuries are known as a period of climatic variability and enhanced human impact on environment. However, effect of the afore mentioned factors on the Central American aquatic ecosystems is still poorly investigated. Here we provide an ~600 yr Cladocera record of lake Apastepeque (13°41'32.84"N, 88°44'42.41"W, 509 m a.s.l). This small (0.59 km^2), deep (~ 54 m), maar lake is located in the central part of El Salvador. We compared the results of subfossil Cladocera analysis with other proxies in order to identify the main environmental factors responsible for lake development.

Three main zones were distinguished in the subfossil Cladocera record. The oldest period (zone I, ~1392-m–1500 AD) was characterized by the domination of *Bosmina longirostris* and negligible share of littoral taxa. The following zone II was split into two subzones. Subzone IIa, coinciding with the period ~1500–1950 AD, was marked by the considerable decrease of Cladocera abundance indicating deterioration of environmental conditions. Additionally, the increased contribution of littoral taxa might suggest lower water table compared to zone I. These conditions are supported by the diatom record. However, the chironomid stratigraphy suggests an alternative scenario that point towards increased water level (and thus a well-developed profundal zone) and at the same time, the expansion of littoral zone Taking into account the origin of the lake, and the nowadays observed variability of surface area and Evaporation/Precipitation ratio, we find the secondary scenario more likely. The increased Cladocera and Chironomidae abundances together with the changes in the other proxies after ~ 1950 AD (zone IIb) might have been the effect of enhanced human influence. During the youngest zone III (after 2000 AD) a significant and abrupt change of Cladocera community appeared when Bosminidae were suddenly replaced by *Daphnia longispina*-group. Changes within other proxies also indicated an abrupt environment event. We assume that the reason was an earthquake occurring in 2001. It led to the mixing of water column, movement of the anoxic layer from the bottom to the epilimnion and the reduction of light availability what, in turn, affected the whole aquatic community.The project was funded by the National Science Centre (2015/19/P/ST10/04048 and 2014/13/B/ST10/02534), the EU Horizon 2020 research and innovation programme under the MSC grant no. 665778 and grant Schw 671/16-1 by the Deutsche Forschungsgemeinschaft.

Cladocera from Miocene (about 12–8 million years ago) fluvial paleolake deposits from Bełchatów lignite mine (Central Poland) – the first recorded data of pre-Quaternary chitinous fossil remains of Cladocera

Zawisza, Edyta[1], Pociecha, Agnieszka[2], Worobiec, Elżbieta[3], Szeroczyńska, Krystyna[1], Worobiec, Grzegorz[3]

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2. Institute of Nature Conservation, Polish Academy of Sciences, al. Adama Mickiewicza 33, PL31120 Kraków, Poland, e-mail: pociecha@iop.krakow.pl
3. W. Szafer Institute of Botany, Polish Academy of Sciences, ul. Lubicz 46, PL31512 Kraków, Poland, e-mail: e.worobiec@botany.pl; g.worobiec@botany.pl

The Cladocera exist from millions of years and they have a significant ecological status. The Cladocera order high probably exist from the Paleozoic Era, however, up to date the oldest unequivocal presence attributed to Cladocera are known from the Early Jurassic. Until now all Cladocera fossils described from older than Quaternary deposits were found as imprints in rock. Contrary to these reports, we are presenting the first ever record of very old (12-8 million years ago) subfossil Cladocera remains. During palynological investigations of Neogene deposits (Miocene, stages Tortonian and Messinian) samples from outcrop of the Bełchatów Lignite Mine (51°15′46,4″N 19°18′49,2″E) well preserved chitinous Cladocera remains were found. In the studied samples Cladocera remains belonging to the *Alona* and *Camptocercus* genera, as well to genus *Chydorus* (*Chydorus* cf. *sphaericus*) were found. All taxa were determined on preserved shells, head shells and postabdomens. The cladoceran remains in rock were accompanied by numerous plant macroremains (mainly leaves) and sporomorphs (pollen grains and spores) plus algal microremains (*Botryococcus*, *Closterium*, and *Zygnemataceae*). Results of palaeobotanical investigations suggest warm temperate and moderately wet climate, comparable to the Cfa climate type (warm temperate, fully humid with hot summer) in the Köppen-Geiger climate classification. The mean annual temperature of 13.5–16.5 ^{o}C was estimated on the basis of plant macroremains.

The latest middle Miocene to late Miocene age (ca. 12–8 Ma BP) has been considered for these deposits presumably formed in an abandoned channel of a meandering or braided river with stagnant or slowly moving water which is suggested by presence of leaves and pollen of *Potamogeton* as well as pollen of *Alisma*, *Nuphar* and *Typha/Sparganium*.

Zooplankton of an alpine lake in the Tatra Mountains (Slovakia/Poland): a 3.5 ka history

Hořická, Zuzana[1], Vondrák, Daniel[2], Blechová, Magdalena[2], Jan, Jiří[2], Kopáček, Jiří[1], Stuchlík, Evžen[1]

1. Hydrobiological Institute, BC AS CR, České Budějovice, Czech Republic
2. Institute for Environmental Studies, Charles University, Prague, Czech Republic

One of model lakes in the Tatras studied for anthropogenic acidification and recovery from acidification is Starolesnianske pleso (glacial origin, 1,988 m a. s. l.; area 0.7 ha, z_{max} 4.1 m, rock-meadow watershed 2.3 ha). As the onset of acidification in this area remains unclear and the only records on the lake's zooplankton before degradation come from 1909–1913 (Stanislaw Minkiewicz), we combined recent (40-year) data on chemistry and zooplankton with a paleolimnological study of subfossil remains of Cladocera in the lake. Despite climatic changes in the last millennia, the record showed a very stable cladoceran fauna, poor in species (*Alona quadrangularis*, *Chydorus sphaericus*, *Ceriodaphnia quadrangula*, *Alonella excisa*), over the time, with the only statistically significant change at the beginning of the 20th century, associated with acidification. Data on the zooplankton (Cladocera, Copepoda, and Rotifera) from the limnological monitoring allow to see a more dramatic and more detailed situation, which contributes to a better understanding of the phenomena: During the peaking acidification in the 1980s, the zooplankton were extinct except for one acid-tolerant cladoceran species (*Chydorus sphaericus*), while a return of the copepod crustacean *Acanthocyclops vernalis* started the recovery. The combination of both the approaches provides a complex record and reference/detailed data where no other information is available.

Posters:

Subfossil Cladocera fauna from Lake Godle (NE Poland)

Augustyniuk, Olga, Mirosław-Grabowska, Joanna, Obremska, Milena, Zawisza, Edyta

Institute of Geological Sciences, Polish Academy of Sciences, Research Centre in Warsaw

We present the preliminary results of paleolimnological analysis obtained from Lake Godle (NE Poland). Godle is small (c.a. 1 ha), low trophic, surrounded by forest lake located in the Ełk Lake District (NE Poland). Studied sediment core was possess by Livingstone type corer in the summer 2011. According to six radiocarbon dates and paleontological results obtained sediment sequence is corresponding to Late Glacial (505 -468cm) and Holocene (468-122cm).

The main aim of presented study was to investigate the environmental and climatic changes in the lake and identification natural climatic fluctuation occurred during Late Glacial and Holocene in area. At the beginning, the Cladocera analysis was made. The Cladocera fauna was represented in sediment by the remains of planktonic and littoral taxa belonging to 4 different families: Bosminidae, Daphniidae, Sididae and Chydoridae. Species composition and variability of Cladocera remains allowed us to distinguish three Cladocera Assemblages Zones (CAZ):

CAZ I (495 - 468cm) corresponded with Late Glacial. During this time planktonic and littoral Cladocera were abundant and oligotrophic *Bosmina (E.) longispina* was dominant.

CAZ II (468 - 265cm) corresponded with Early and Middle Holocene. At the time contribution of Bosminidae family decreased whereas significantly increased share of littoral taxa such as: *Alona affinis*, *Alona rectangula* and *Acroperus harpae.*

CAZ III (265 – modern times) corresponded with Upper Holocene. At this time no Bosminidae family remains were noted. Predominant species was *Chydorus sphaericus*.

Reconstruction of past environment is currently in progress on the basis of multi-proxy analysis like: lithology, geochemical composition of sediments, radiocarbon data, pollen, subfossil Cladocera.

Lac de Creno (1310 m asl, Corsica, France): snapshots from an upland hydroseral succession and first data on Corsican cladoceran assemblages

Morandi, Lionello

First data on subfossil Cladocera from the island of Corsica were collected, analysing a core taken from a currently infilled area at the upland site of Lac de Creno (Deux-Sorru, Corse-du Sud). The sequence, well-known to palynologists, has been previously investigated, given the presence of one of the few late Glacial deposits from Corsican mountain lakes (Reille *et al*. 1997). At the moment, a precise chronology for the part of the core comprised between 400 and 576 cm is lacking, although based on the dates recovered from previous studies and the correlation with Reille's pollen horizons it is likely that it spans from the late Glacial to the early Holocene. The limnic and telmatic horizons of the sequence show a predominance of clear-water species (e.g. *Alonella excisa* and *Alona intermedia*) and vegetation-loving bog species (*Graptoleberis testudinaria*), as well as the occurrence of *Chydorus sphaericus* towards the bottom of the core. The study will be soon extended to the upper horizons, where terrestrialization occurs, to observe the impact of this process on the cladoceran population.

Subfossil Cladocera response to environmental variables in oxbow lakes downstream the mine water discharge (southern Poland).

Pociecha, Agnieszka[1], Szarek-Gwiazda, Ewa[1], Wojtal, Agata Z.[1], Ciszewski, Dariusz[2], Kownacki, Andrzej[1]

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2. University of Science and Technology AGH Department of Geology, Geophysics and Environmental Protection Mickiewicza St. 30, 30-059 Kraków, Poland

Bottom sediments of mining-related subsidence ponds in the Chechło River valley in southern Poland are contaminated with heavy metals (Zn, Pb, Cd, Cu) from the former Pb and Zn mine at Trzebinia. Since mining closure in 2009, contamination of sediments has been decreasing, however, it still exceeds toxic values for many aquatic organisms. Aquatic organisms are used as a proxy to monitor environmental conditions and are a very good indicators, rapidly responding to changing water quality.
The aim of the research was to investigate changes in the species composition of Cladocera in response to mining cessation recorded in bottom sediments of subsidence ponds.
The remains of aquatic organisms were analyzed in sediment cores collected from eight sites in a pond of subsidence basin formed after closure of the mine (RI, RII, RIV, RXVII, RXVIII, RXIX, RXX, RXXI) and in eight sites of subsidence basin ponded during peak of Zn and Pb ore exploitation (RVI, RVII, RVIII, RXII, RXIII, RXIV, RXV, RXVI).
In the most contaminated sediments the negative correllation was found bettween Cu concentrations in bottom sediments and occurrence of taxa of the genus: *Alona*, *Alonella*, *Daphnia* and *Glaptoleberis*; also negative correlation was revealed between density of *Alona* sp. and Zn and Pb concentrations in sediments.
Negative correlations with Cu concentration was also found in less polluted sediments but only for *Alona* and *Daphnia* genus. The cladoceran *Alona* and *Daphnia* seems to be organisms which are more sensitive for heavy metals contamination than remaining investigated Cladocera. Our results showed the negative impact of metal mining on cladoceran and as well as mutual positive correlations between taxa.

Researches have been founded by National Science Center grant no. 2014/15/B/ST10/03862 and supported by Institute of Nature Conversation, Polish Academy of Sciences.

The impact of hydrological dynamics on cladocera community in a deep sub-alpine lake (L. Iseo): a paleolimnological perspective.

Tolotti, Monica[1], Patelli, Martina[2], Frassetti Maria[2], Nava Veronica[2], Leoni Barbara[2]

1. Department of Sustainable Agro-ecosystems and Bioresources, Research and Innovation Centre, Fondazione Edmund Mach (FEM), Via Mach 1, 38010, S. Michele all'Adige, Italy
2. Department of Earth and Environmental Sciences, Università Milano-Bicocca, Piazza della Scienza 1, 20126 Milano, Italy

Lake deposits provide ideal archives to study the past catchment dynamics and the related response of lake ecosystems. In particular, sediment records deposited over long time periods can provide information on lake development stages preceding the moment of the most relevant human disturbance, and can help disentangling and quantifying the lake ecosystem responses to natural variability and human perturbation, such as climatic and hydrological variation, eutrophication and chemical contamination. Subfossil Cladocera records allow tracking long-term changes in both bottom-up drivers and top-down regulators and they particularly respond to alterations in nutrients, temperature and water level. The aim of this work was to investigated a short sediment core from a deep subalpine lake (Lake Iseo, northern Italy) aiming at reconstructing the influence of human activities and climate variability on the lake ecosystem. We compared the sediment records with historical information on major hydrological events during the last century, and with climate-related limnological data. As already observed in other subalpine lakes, the sediment records of Lake Iseo suggest that catchment related processes are able to decisively affect the food web dynamics and the lake functionalities. In particular, we observed that a series of flood events in the period between the 1970s and 1980s resulted in a decrease in the Cladocera total abundance and a prevalence of the littoral species over the pelagic one. The decline of the pelagic species has been attributed to the transport of inorganic material from the catchment area to the lake.

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