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Programme
Résumés
Liste des participants

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Towards a better understanding of the origin of species diversity of *Amplocypris* (Ostracoda, Eucypridinae) in Neogene lakes of Central and Eastern Europe

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The genus *Amplocypris* ZALANYI, 1944 contains exclusively halobiont species which existed during the Late Miocene and Early Pliocene in Lake Pannon and the Dacian Basin. About 40 *Amplocypris* species were described (30 nominated taxa and 10 left in open nomenclature) mainly from Lake Pannon, while only two species were mentioned in the Dacian Basin. Both palaeo-lakes have an extended longevity of several million years. In Lake Pannon *Amplocypris* is documented since the Early Pannonian in the western-central part and from the Late Pannonian or Pontian in the eastern-southern part of the lake (lasting therefore ~ 4-5 Ma). *Amplocypris* in the Dacian Basin is documented for the period between 5.8-4 Ma (hence less than 2 Ma).

Within the subfamily Eucypridinae Bronshtein the species diversity of *Amplocypris* is remarkable. Compared to this species rich group, other 9 genera with recent and/or fossil representatives display low taxonomic diversity, meaning less than 10 species per genus. There is only one genus, *Eucypris* VAVRA, which is more species rich than *Amplocypris*; it has 65 recent species and several fossil ones.

Amplocypris, compared to the closely related genera *Moenocypris* TRIEBEL and *Tonnacypris* DIEBEL & PIETRZENIUK, is well individuated by the peculiar shape of the anterior and antero-ventral marginal zones of the valves as well as through the shape of the valves with a clear trend towards elongated and/or high rectangular valve-shapes with postero-ventral acumination.

Our presentation addresses two questions: a general one about the objectivity of the present documentation of such high species richness existing in the case of *Amplocypris* and a specific one, why the two long-lived palaeo-lakes display markedly different species diversities.

Considering the origin of morphotype variety of *Amplocypris* which could explain the high species diversity, nowadays documented, one has to consider two possible scenarios: In the first one, the adult valve-shapes are fully expressed due to the genes which code for various shape-configurations. A second scenario considers that the final shape of adult valves depends not solely on genetic information which is conveyed to the phenotype, but also on the way this information is modulated by the environment during the developmental part of ostracod live. This latter alternative deals with the phenotypic plasticity of valves, a question already known to occur in other ostracod groups, like *Cyprideis*. The consequences of this scenario, if applied to *Amplocypris,* means that some of actual species could be invalidated and considered morphotypes belonging to related species with a flexible developmental strategy. We show that phenotypic plasticity of valve-shape occurs in *Heterocypris barbara* GAUTHIER under different temperature treatments in controlled laboratory conditions (Baltanás, unpubl.). We expected to find phenotypic plasticity environmentally cued also in the case of *Amplocypris* species.

Two data sets of *Amplocypris* belonging to the species groups *A. abscissa* (REUSS) and *A. recta* (REUSS) (these taxa are here characterized with new arguments) are used for the examination of the *Amplocypris* diversity presently known in Lake Pannon. In the case of the

A. recta group we compare with geometric morphometric methods and multivariate statistics the variety of valve-shapes of two species, *A. recta* (REUSS) and *A. lipae* KRSTIC. We note a gradual shift of shapes going from the *recta*-type to the *lipae*-type. Even if phenotypic plasticity cued by the environment could not be documented in this case the gradual polymorphism from one species to the other suggests that *A. lipae* is just a morphotype of *A. recta* and therefore should be consider a junior synonym of the latter species. This example addresses the need to carefully examine valve-polymorphism for better evaluation of *Amplocypris* species diversity.

Within the second data set we compare the acuminated valve-shape of *A. abscissa* with specimens identified as *A. subacuta* ZALANYI from north-eastern Hungary, from south-western Romania and from Croatia. We note that neither the Romanian morphotype nor the Croatian one fit the shape of the Hungarian phenotype originally illustrated by ZALANYI. The differences in morphological shapes as well as in their widely separated geographic location, suggest that we are dealing with several distinct species belonging to *A. abscissa* lineage. This is an argument that species diversity of *Amplocypris* is real and still not completely documented. In Lake Pannon *Amplocypris* appears as a strongly evolvable group.

The last part of our presentation deals with *Amplocypris* species in the Dacian Basin. We show that there are at least two possible explanations for the low species diversity there. First, the lower number of *Amplocypris* species, all belonging to what we define as *A. dorsobrevis* lineage, could be due to the younger history of this group in the Dacian Basin, as mentioned above. Secondly, a socio-psychological factor could also plaid a role, namely the arbitrariness of species identification and further their poor morphological discrimination. The example of *Amplocypris odaessensis* mentioned in Serbia and Romania documents this latter assertion.

We counteract to the above taxonomic practice demonstrating that within one place, at Badislava (in the foreland of the Southern Carpathians) within a well dated section from late Pontian – earlier Dacian, one can perceive two well individuated species which lived in contrasted salinity environments. Note that in the same region a third species occurs too.

For the future, we propose a better understanding of the morphological diversity of *Amplocypris* species and/or their adaptation to local palaeo-environmental conditions by investigations of similar aspects on living ostracods, using both field and laboratory research. Considering this latter case one could use *Heterocypris barbara* and/or *Eucypris inflata* SARS and follow the ecological and/or ecomorphological approaches developed by Baltanás and his students. For palaeontological research one should use more frequently high resolution sampling programs, cf. research of M. GROSS and associates, combined with investigation of larger ostracod samples. The comparative description of valves with geometric morphometrics and evaluation of results with multivariate statistics should become routine-procedure.

Our presentation ends with the following message:

We should strengthen the cooperation between palaeontologists and neontologists belonging to different generations and scientific traditions. It is important to remember that we learn for what we are doing from the experience of former generations of scientists.

Here, we want to honor the ostracodologic experience of Henri J. OERTLI, his enthusiastic way to communicate and/or help colleagues and friends. It is now time to offer him our thanks. The know-how we acquired during past years should further transferred to the next generation of ostracodologists, as Henri J. OERTLI did at the time with some of us.

Thanks Henri!