

# ISO 19

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## Abstract book



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## **(Talk) Mediterranean Outflow Water Variability in the Gulf of Cadiz – Ostracod evidence from IODP Site U1390**

Carlos A. Alvarez Zarikian\*, Paul Moal-Darrigade, Emmanuelle Ducassou, Edelgard Baumann, Simone N. Brandão & Pierre Carbonel

We studied the ostracod assemblages from IODP Site U1390 in the central middle slope of the Gulf of Cadiz to reconstruct past changes in Mediterranean Outflow Water (MOW) since the Last Glacial Maximum (LGM) and through the Holocene. The site lies at ~1000 m of water depth on the sheeted drifts of a contourite depositional system and offers particularly high sedimentation rates that allows for high resolution paleoceanographic studies. Therefore, it is ideal for reconstructing MOW variability across this transition. In this study, we combine the analysis of ostracod assemblages and environmental indicator species records with grain-size and benthic foraminifer  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  data to evaluate MOW dynamics, bottom water oxygenation and nutrient availability. A copious ostracod assemblage shows changes in composition that correspond to well-known events of this period such as the LGM, the Younger Dryas, Heinrich stadial, and the Bölling-Allerød, and it is markedly reduced during the deposition of Sapropel 1 in the Mediterranean. Species such as *Krithe keyi* and *Rectobuntonia miranda* are interpreted to be indicative of presence of MOW at the bottom of the Gulf of Cadiz during the Holocene. We will also show and discuss the Site U1390 ostracod assemblage results in relation to those from Cores MD99-2337 (598m) and CADKS24 (1,316m) to reconstruct the vertical shifts of the MOW and paleoenvironmental conditions in the region.

## **(Talk) Ostracod response to monsoon and OMZ variability over the past 1.2 Myr**

Carlos A. Alvarez Zarikian\*, Chimnaz Nadiri, Montserrat Alonso-García, Teresa Rodrigues, Huai-Hsuan M. Huang, Sebastian Lindhorst, Tereza Kunkelova, Dick Kroon, Christian Betzler, Moriaki Yasuhara

We present a middle through late Pleistocene record of ostracods from the northern Indian Ocean derived from sediment cores taken at IODP Site U1467. The site lies at 487 m water depth in the Inner Sea of the Maldives, an ideal place for studying the effects of the South Asian Monsoon (SAM) system on primary productivity, intermediate depth ocean circulation, and the regional oxygen minimum zone (OMZ). The Inner Sea acts as a natural sediment trap that has undergone continuous sedimentation for millions of years with minor terrestrial influence. Our record spans from Marine Isotope Stage (MIS) 35 to the present, covering the mid-Pleistocene transition (1.2–0.6 Ma) and the Mid-Brunhes Event (~0.48 Ma) the time when ice age cycles transitioned from occurring every 40,000 years to 100,000 years. The ostracod data is interpreted alongside the existing datasets from the same site of sedimentological (grain-size) and XRF-elemental analyses, and new organic biomarker data also from Site U1467. These datasets support the paleoenvironmental interpretation of the ostracod assemblages. Ostracods are abundant and diverse, displaying a prominent change in faunal composition at the MBE related to the increase in the amplitude of glacial-interglacial cycles, which deeply affected the monsoon system and thereby the past oceanographic conditions of the Maldives Inner Sea. Furthermore, ostracods exhibit distinctly different assemblages across glacial-interglacial cycles, particularly after the MBE, and these changes are interpreted to correspond to variability of the OMZ. Glacial periods are characterized by ostracod indicators of well-oxygenated bottom water due to the intensification of the winter monsoon and the contraction of the OMZ. The presence of deep-water genera *Henryhowella*, *Agrenocythere* and *Bradleya* during glacials suggests a cold, well oxygenated southern sourced water mass (i.e., Antarctic Intermediate Water and/or Subantarctic Mode water) bathed the Maldives Inner Sea during glacial periods. In contrast, interglacial stages are characterized by ostracod genera (such as *Argilloecia*, *Parakrithe*, *Paracypris*, and *Loxoconcha*) and biomarker data that reflect low-oxygen conditions and sluggish bottom water circulation pointing to an expansion of the regional OMZ.

### **(Talk) New information about the furca in the genus *Neonesidea* (Podocopida: Bairdioidea)**

Reina Asaba\*, Erika Asaba, Akira Tsukagoshi

The chaetotaxy and microstructure of the furca were observed in interstitial and epifaunal species of the genus *Neonesidea* (Podocopida: Bairdioidea). Of the seven setae found on the furca, the thick and curved first to third setae from the distal end are relatively long, and they have two rows of serrations. The fourth and fifth setae with intermediate lengths are covered with numerous setulae of various lengths and orientations. The sixth and seventh setae with the shortest lengths have setulae and an opening at the tip. These morphological variations must reflect functional differences, suggesting that the furca has not only a mechanoreceptor function, but also acts as a chemoreceptor. There were no noticeable furcal characteristics that distinguished interstitial from epifaunal species. In addition, some undescribed interstitial *Neonesidea* species from Japan are shown.

Keywords: Furca, Chaetotaxy, Interstitial species, Epifaunal species, Morphology

### **(Poster) Fossil and Recent Ostracods of Texas**

Alper Ataman\*, Okan Külköylüoğlu

Dealing with the most contemporary and earlier studies (published from 1927 to 2021) on ostracods reported in Texas (USA), we found that there are about 117 non-marine ostracods and 674 fossil taxa. All fossil taxa belongs to 142 genera while 43 genera covers all nonmarine species. 19 of 674 taxa were considered nonmarine fossil ostracods but there are only five fossil species also listed in the recent ostracods. The oldest taxa (73 taxa) were dated back to Pennsylvanian period (ca. 310 mya) of Paleozoic era followed by Middle Permian (51 taxa), Upper Jurassic (24 taxa), Cretaceous (36 taxa), Cretaceous-Tertiary (67 taxa) Paleocene (4 taxa), Eocene (123 taxa), and Holocene (39 taxa). Other species are distributed into different periods. Our detailed review on the literature search exhibited that there are no ostracod reported from Neogene and Triassic periods. Results indicate ostracod species richness and diversity are apparently very high in Texas but deserves more attention for future studies.

Keywords: Species richness and diversity, Comparative analyses, Ecology, Diversity, Texas

## **(Talk) The Neogene history of the Caribbean Extinction Event and its impact on ostracod fauna**

Kyawt Aye\*, Moriaki Yasuhara, Aaron O'Dea, Huai-Hsuan May Huang

The rich Caribbean biodiversity observed in the present time owes its origin to the Neogene formation of the Isthmus of Panama, a geographical land barrier that connected the North and South American continents. Extensive palaeontological and geological evidence indicates that the closure of the Central American Seaway and the surrounding interoceanic straits (IOS) associated with the Panamanian Isthmus caused a major productivity crash, prompting a regional extinction of shallow marine taxa now termed the Caribbean Extinction Event (CEE). However, marine invertebrate fossil records reveal an inconsistency in the timing of the productivity collapse and subsequent extinction event, leading to the question of whether other oceanographic processes influenced the CEE. The aim of this research is to quantify ostracod faunal compositions before, during, and after the closure of the IOS to better constrain the timing of the formation of the Isthmus of Panama and evaluate the role of productivity in the CEE. We will use Caribbean samples from the Panama Palaeontology Project to investigate ostracod fauna at the species and genus resolution. Details of pre- and post- extinction assemblages during the CEE will be presented at the conference.

Keywords: Ostracoda, Biodiversity, Tropical Western Atlantic

## **(Poster) Faunal, stable isotope and morphological variability of ostracods in Lago Enriquillo (Dominican Republic) during dry season**

Christopher Berndt\*, Torsten Haberzettl, Michael Ernst Böttcher, Sandra José Clases, Eddy Josue Arias Santos, Edwin Rafael García Cocco, Claudia Wroczynna

Ostracods precipitate their carapace from the surrounding waters within a short time. Thus, their valve chemistry represents specific conditions of the aquatic environment. Stable isotope compositions of ostracod valves can be used as proxy for the formation conditions and are thus important for paleo-climate reconstructions. Differences in species-specific life cycles, however, may effectuate different calcification conditions within the same habitat. Lago Enriquillo (SW Dominican Republic) is the largest lake of the Caribbean. It is characterized by frequent water level changes of several meters resulting in drastic salinity changes within a few years which are associated with intensive rainfall events, such as hurricanes. Our study aims to investigate the influence of the water depth on geochemical signatures ( $\delta^{18}O$ ,  $\delta^{13}C$ ) of ostracod valves and their morphology. During fieldwork in March 2022, we collected surface sediment and water samples between 0.9 and 25 m water depth from the lake in order to determine the spatial distribution of modern ostracod species. Physicochemical in-situ measurements display a current salinity of 44 psu and a nearly complete oxygenation of the water body. Preliminary observations furthermore indicate that the lake is inhabited by species of *Cyprideis* and *Loxoconchidae*.

Keywords: Neotropics, Water depth, *Cyprideis*, Valve chemistry, Phenotypic adaptation

### **(Talk) Biodiversity of ostracods in a protected wetland on the Iberian Peninsula, with focus on exotic species**

Maria Bisquert-Ribes\*, Juan Rueda, Raul Martínez, Pablo Vera, Javier Armengol, Francesc Mesquita-Joanes

The Albufera Natural Park (eastern Iberian Peninsula) is a coastal wetland encompassing a shallow lake surrounded by rice fields, which have been identified as gateways for the introduction of exotic ostracod species in protected wetlands. Our aim is to evaluate the diversity of ostracods focusing on alien species in the rice fields and characterize the distribution of ostracods in the lake in two different environments, littoral and open waters. We sampled ostracods in 34 rice fields in two inundation periods (summer and winter), and in the lake in two zones (38 sites), littoral and open waters. In the lake samples, the presence of exotic species was lower than in the rice fields, but some of them could also colonize this area, especially the littoral zone. In the center of the lake, where the vegetation is scarce, ostracod richness is low. In rice fields, around 30% of the total species found were alien, and some of them appeared only in summer, as expected, like *Cypris decaryi*, *Fabaeformiscandona subacuta* or *Chlamydotheca colombiensis*, but other alien species were detected also in winter, including *Candonocypris novaezelandiae* or *Hemicypris barbadensis*, pointing to their capability of colonizing new environments.

Keywords: Alien species, Colonization, Lake, Ostracoda, Species richness

### **(Talk) Taxonomy, ontogeny, and ecology of *Tonnacypris stewarti* (Daday, 1908) *comb. nov.*, an ostracod from high altitudes, Lake Nam Co, Tibet**

Mauricio Bonilla Flores\*, Paula Echeverria Galindo, Liseth Pérez, Nicole Börner, Katharina Dulias, Jumbo Wang, Antje Schwalb

*Tonnacypris stewarti* *comb. nov.*, an ostracod widely distributed in the Tibetan Plateau, is taxonomically revised in this study. Based on the currently available literature and biological material, four synonymies were identified: *Eucypris afghanistanensis*, *E. gyirongensis*, *Tonnacypris estonica* and *T. gyirongensis*. In surface sediment samples from Lake Nam Co, we recorded the ontogenetic series of *T. stewarti* for the first time. Seven developmental stages juveniles were registered in Nam Co and only females were found, similar to those previously recorded in Mongolia. In addition, sexual populations from Afghanistan and near the city of Linzhi, China, probably indicate geographic parthenogenesis. Our results constrain the ecological parameters that could control the abundance of *T. stewarti*. A cluster analysis shows that the highest abundances can be found mainly in lacustrine habitats (groups 1 and 2) with depths of 4-14 m, conductivities of 1300-1800  $\mu\text{S}/\text{cm}$ , and temperatures of 9 to 12 °C. Group 3 displayed low abundances in shallow rivers (0.2 m) and low conductivities (210  $\mu\text{S}/\text{cm}$ ). This study highlights the importance of clarifying taxonomic issues as a basis for future paleoecological studies, as well as exploring and potentially using female lobes as a distinctive character between species.

Keywords: Taxonomy, Developmental stages, Ecology, Nam Co lake

## **(Talk) Deep-sea Ostracoda and Foraminifera from the Miocene of ODP Site 752A, south-eastern Indian Ocean**

Ian Boomer\*, Emma M. Hanson, Dana Ridha & Kirsty M. Edgar

The Miocene was a period that witnessed several marked global climate events including the (warm) Mid-Miocene Climatic Optimum (MMCO) followed by cooling that resulted in the build-up of the East Antarctic Ice Sheet and the subsequent intensification of the Asian Monsoon System. Much of our understanding for the global extent of these events comes from the deep-sea. Although we have records from Atlantic and Pacific regions during this time, deep-sea, ostracod assemblages from the Indian Ocean are relatively rare. However, in this work we document well-preserved ostracods from 13 samples through the Miocene and earliest Pliocene of ODP Site 752A on Broken Ridge in the south-eastern region of the Indian Ocean, c.2000 km west of Australia. We present the changing nature of the ostracod assemblages and compare them to changes in the benthic foraminifera that occupy the same deep-water ecological niches during this period. Stable-isotope records from the benthic foraminifera in these samples are also considered as a proxy for bottom water temperatures/global ice volume. Our study also provides an insight into the stability and resilience of deep-water ostracods during such events as well as assessing the relative endemicity of the taxa encountered in these assemblages.

Keywords: Miocene, Deep-sea, Ostracoda, Benthic Foraminifera, Stable isotopes

## **(Poster) Utility of calcareous microfossil assemblages to date and provenance fossil marine reptile specimens in museum collections that lack associated data**

Ian Boomer\*, Phil Copestake, Nigel Larkin & Dean Lomax

Many museums hold impressive palaeontological specimens, such as the large marine vertebrates of the Mesozoic (ichthyosaurs, plesiosaurs, pliosaurs, etc), but some of these lack details regarding their collection locality, level or age, and this is especially the case for specimens collected in the 19<sup>th</sup> and early 20<sup>th</sup> centuries. Taking a forensic approach to this problem, and where fragments of matrix can be spared, micropalaeontology can fill-in some of the knowledge gaps, thus enhancing the scientific value of these specimens. Over the last few years, the two lead authors have been working with our co-authors on Early Jurassic specimens from British collections in an attempt to recover details regarding their stratigraphical provenance, geological age and possible geographical origin, based on the associated microfossils (ostracods and foraminifera).

This approach is not always successful (especially when preserved in well-cemented limestone) but in some cases a few grams of mudstone matrix recovered from an inconspicuous part of the specimen (such as the underside) can provide a useful assemblage of calcareous microfossils. We provide examples to show how effective this approach can be and suggest that such collaborations could be instigated by micropalaeontologists around the world to help support scientific research in their local museums.

Keywords: Museum Collections, Forensic Micropalaeontology, Ichthyosaur

## **(Poster) Late Holocene paleoenvironmental changes in the Razelm-Sinoe lagoonal system, Danube Delta**

A. Briceag \*, S. Rotaru, R.G. Dimitriu, I. Stanciu, B. Barbu, B. Ispas & I. Stănescu

The Danube Delta developed in the Quaternary, when Danube started to flow into the Black Sea basin. It contains a sequence of deposits ranging from tens to 300-400 meters thick layers accumulated mainly during the Late Pleistocene and Holocene.

This study is based on multidisciplinary investigations of a 7-meter-long sediment core recovered from the western bank of Razelm-Sinoe lagoonal system, currently located about 14 km from the Black Sea shoreline. The development of this area was influenced by the local sea-level changes, shifting from brackish lagoon to a freshwater lake environment. The distinguished ostracod assemblages contain oligohaline to mesohaline taxa, represented by Mediterranean and Ponto-Caspian origin species. The dominant mesohaline taxa are represented by *Cyprideis torosa*, *Heterocythereis amnicola*, *Amnicythere olivia*, *A. pediformis* and *Loxoconcha gibboides*. The mesohaline environment also contains benthic foraminifera represented almost entirely by abundant *Ammonia tepida*. The most representative oligohaline ostracod species are *Darwinula stevensoni*, *Candona neglecta*, *Pseudocandona compressa*, *P. albicans* and *Limnocythere inopinata*.

This study offers new insights into the Late Holocene paleoenvironmental and paleogeographic changes that took place in the Danube Delta's Razelm-Sinoe lagoonal system.

Keywords: Ostracods, Foraminifera, Sea-level change, Black Sea

## **(Poster) Ecotoxic effects of a uranium mine receiving effluent in Guangdong: ostracods as indicators**

Liang Chen, Zheng Huo, Yi Liu, Baiqiang Niu & Wenting Zhang

With the development of nuclear industry, uranium mining has led to an increasingly serious environmental contamination of radionuclide uranium. The study evaluated the environmental contamination level of a uranium mine in northern Guangdong, using physicochemical and biological methods. According to the single factor index method, it was found that the radionuclide U had higher hazard Index ( $P_i$  values) and heavy pollution level around the pit, while the tailing pond had lower pollution level. The results of the potential risk index method analysis showed that the ecological risk level of U and Cd was serious, and the rest of the heavy metals were of low risk, but the combined ecological risk of each sample still reached the serious risk level. The samples were evaluated for toxicity using ostracods, and the experimental results showed that *Cypridopsis vidua* and *Heterocypris* sp. both showed excellent sensitivity to contaminated water, reflecting the relationship between individual mortality and the degree of contamination. The mortality rate at the tailings pond (T1) with the highest level of contamination was much higher than the rest of the sample sites, and the degree of contamination gradually decreased with increasing distance, causing a decrease in mortality.

Keywords: Uranium mines, Ecotoxicity, Pollution evaluation

## **(Talk) Permian ostracods from limestones associated with a coal deposit, Tak Fa Formation (Guadalupian), central Thailand**

Anisong Chitnarin\*, Marie-Béatrice Forel & Prachya Tepnarong

This research aims to interpret depositional environment of limestones associated with coals found in Nong Phai District, Phetchabun Province, central Thailand based on microfacies and fossil ostracods. Core samples Tak Fa Formation, assigned to late Middle Permian, were obtained in course of subsurface prospecting. Most samples were muddy limestones. Two coal seams were found at 45- and 82-meters depth. Intercalations of limestones, sandstones, shales were found above the upper coal. Limestones classified as bioclastic wackestone and packstone contain brachiopod, ostracods, gastropods, dasyclad green algae, calcispheres and smaller foraminifers. Microfacies study suggest the inner part of homoclinal ramp, from shallow marine to shoal and restricted lagoon. Thirty-three limestone samples were processed by Hot Acetolysis: they provided thirty-four species belonging to 16 genera. The Bairdioidea is dominated while Hollinoidea, Kirkbyoidea, Kloedenelloidea occur in lower proportions. The occurrence of *Paleodarwinula* and *Carbonita?* at 13 meters depth suggests the influence of freshwater influence within a shallowing sequence. In conclusion, these limestones and coals from the Tak Fa Formation seem to have accumulated in shallow to transitional marine waters. These observations may relate to the regional sea level drop during late Middle Permian (Wordian-Capitanian), coals being deposited in lagoons developed during this period.

Keywords: Argillaceous limestone, Indochina Terrane, Wordian, Capitanian

## **(Talk) Biostratigraphy and palaeoecology of a non-marine ostracod fauna from the Lower Cretaceous Shinekhudag Formation, SW Mongolia**

Byung-Do Choi\* & Yaqiong Wang

A “Purbeck-Wealden type” ostracod fauna has been recovered from two sections (Tsagaan Tsvurga and Oshih Hollow East) of the Shinekhudag Formation (Gobi-Altai, SW Mongolia). It consists of 10 species of the genera *Cypridea*, *Yumenia*, *Scabriculocypris*, *Trapezoidella?*, *Lycopterocypris*, *Candona*, and *Vlakomia*. Among them, several species are of biostratigraphic utility: *Cypridea verrucata*, *C. tumefacta*, *Scabriculocypris subscalara* and *Vlakomia ulanense* are indicative of pre-Aptian (mainly Barremian), whereas *Cypridea ihsienensis* and *Yumenia oriformis* have been reported from Aptian–Albian strata in China. *Cypridea unicostata* has a wide range of Hauterivian–Albian in East Asia. Meanwhile, the previous studies (ostracods and  $^{40}\text{Ar}/^{39}\text{Ar}$  dating) indicate a Hauterivian–Barremian age for this formation. Therefore, the ostracod fauna constrains the age of the Shinekhudag Formation to mainly Barremian, potentially extending upwards into the Aptian. In addition, our results provide insights about a potential microfaunal interchange between the Gobi-Altai and northern China during the Early Cretaceous. *Vlakomia ulanense* is considered a probable phylogenetic ancestor of the post-Aptian *Vlakomia*-lineage of East Asia. Considering taphonomic features, the dominance of *Vlakomia* in the Tsagaan Tsvurga is interpreted as indicating a high salinity, shallow-littoral lacustrine environment. The dominance of cypridoideans with high adult/juvenile ratio in the Oshih Hollow East represents ephemeral lakes with fluvial influences.

Keywords: *Vlakomia*, Cyprideidae, Shinekhudag Formation, Biostratigraphy, Palaeoenvironment

## **(Talk) Geographical parthenogenesis in the northern Neotropical region, a geological and environmental perspective**

Sergio Cohuo\* & Laura Macario-Gonzalez

Geographical parthenogenesis (GP) is a phenomenon describing distinct patterns of distribution of sexual and asexual populations within the same or related species. Current patterns of GP worldwide illustrate that asexual organisms have larger and more northern distributions than their sexual relatives. In Ostracoda, the GP has been observed in European species such as *Eucypris virens* and *Limnocythere inopinata* and is hypothesized to be associated to Pleistocene glaciation.

Here, we describe a GP pattern in the freshwater ostracode *Chlamydotheca unispinosa* from tropical and subtropical America. Based on historical (at continental scale) and recent records (n=130 populations) across central Mexico to Nicaragua from 2015 to 2020, we found that sexual populations of *C. unispinosa* are restricted to cave systems in Yucatán Peninsula (Mexico), whereas parthenogenetic populations are widely distributed in the Neotropical and Nearctic regions. COI gene analysis (n=30) reveal genetic divergences < 3% and lack of genetic differentiation between sexual and parthenogenetic populations. The GP in the northern Neotropics is considered multifactorial and the restriction of sexual populations is assumed to be related to successive hydrological collapses during the late Pleistocene/Holocene, competitive pressure, and species-niche specialization (driven by the geology of Yucatán Peninsula). This is first evidence of GP patterns in the northern Neotropics of an animal species.

Keywords: Sexual- asexual reproduction, Geographical parthenogenesis, Tropical America

## **(Poster) Water chemistry and not urbanization influences community structure of non-marine Ostracoda (Crustacea) in northern Belgium**

Marie Cours, Jan Vanaverbeke, Koen Parmentier, Marc Knockaert, Janet Higuti, Koen Martens\* & Isa Schön\*

Urbanization is one of the major causes of the destruction of natural habitats in the world. Cities are urban heat islands and can thus significantly influence populations of plants and animals. The research project SPEEDY investigated the effects of urbanization in northern Belgium with a nested sampling design at local and landscape scales for a variety of organisms. Here, we tested the effects of urbanization on non-marine ostracod communities, sampling 81 small pools in three urbanization categories, as defined by percentage built up cover (low, intermediate, high). We identified 17 ostracod species occurring in 60 of the 81 sampled pools. We found that urbanization *per se* had no significant effect on ostracod communities. Of all the measured local factors, ammonium and total phosphorus concentrations had a significant effect on the community structure. In contrast, water temperature had no significant effect, most likely because the ostracod species found in northern Belgium in the present survey mostly have wide temperature tolerances.

Keywords: Freshwater ostracods, Flanders, Pond

## **(Talk) Ostracode applications to Arctic Paleoceanography**

Thomas M. Cronin & Laura Gemery\*

Understanding climate change during the ~ 150 years – called by some the Anthropocene Epoch – involves not only paleo-reconstructions of the preceding two millennia for context, but also past periods of global warmth and elevated CO<sub>2</sub> concentrations, rapid sea-level rise, catastrophic ice sheet and shelf decay, among other climate phenomena. The Arctic is a focus of many such studies due to its sensitivity to current and past warming, a phenomenon known as “Arctic Amplification”. This talk will review the application of ostracode ecology and shell chemistry to reconstructions of Arctic Paleoceanography focusing on Arctic sea ice variability, major climate transitions such as the Mid-Brunhes Event, ocean circulation and sea ice extent during interglacials (such as MIS 5, 11), abrupt ocean-ice shelf events, and Arctic paleo-productivity. We will discuss the last 40,000 years from box and multicore sediment records and orbital, glacial-interglacial cycles from the last 1,000,000 years using piston and gravity cores. In addition, we will discuss international efforts to integrate ostracode data into past and future sediment coring programs. We conclude that ostracodes play a pivotal role in understanding Arctic paleoclimatology.

Keywords: Arctic oceanography and sea ice, Mid-Brunhes Event, Warm Interglacial periods, Abrupt climate events, Holocene paleoclimate

## **(Talk) Using ostracods to track down the intra-interglacial cooling: case study from eastern Poland**

Monika Czajkowska\*

During the Holsteinian interglacial, about 400,000 years ago, a lake district existed in the area of eastern Poland. This warm period lasted about 20,000 years and had few distinct intra-interglacial coolings, one of them called Older Holsteinian Oscillation (OHO) the study of which is the aim of this study. The reconstruction of the paleoenvironmental conditions during this short time span was possible using a multi-proxy analysis on the lake sediments from the Ortel Królewski II site. The high-resolution analysis covered the uppermost part of the profile, representing the so called pre-optimal part of the interglacial, namely the *Taxus* and *Pinus-Larix* pollen zones.

While during the *Taxus* zone the temperature was rather stable, the short cooling event correlated with OHO was documented in the beginning of the *Pinus-Larix* zone. The higher numbers of some cold-loving ostracods (*Candona candida*, *Candona neglecta* and *Fabaeformiscandona protzi*) indicate some deterioration of thermal conditions, which was additionally confirmed by the mutual ostracod temperature range (MOTR) method and the isotope record of ostracod carapaces. Additionally, lake level drop and expansion of reed zones within the *Pinus-Larix* pollen zone are inferred from the increased abundance of shallow water ostracod and mollusc species as well as increased  $\delta^{13}\text{C}$  values.

Keywords: Holsteinian interglacial, Quaternary, Lacustrine sediments, Molluscs, *Scotia tumida*

### **(Talk) The cytheroidean spinneret seta, an evolutionary novelty in ostracod phylogeny**

Dan L. Danielopol\*, Tadeusz Namiotko\*, David J. Horne & Koen Martens

Evolutionary novelties relate to characters which within the evolutionary pathway of a phylogenetic lineage are perceived as first appearance of features with novel functions. Such innovations represent stable ground-traits characterising higher taxa. The paradox of their rarity of generation combined with their persistent stability is a perennial topic of discussion. We examine a special case, the antennal Spinneret Seta, unique to the superfamily Cytheroidea in the context of not only the Ostracoda but also the Pancrustacea. Connected with a spinneret gland in the forehead, it is a modified exopodite that extrudes a sticky thread, thought to be a polymeric substance similar to spider “silk”. Other crustaceans produce such threads, but from differently-located glands and different modified limbs. Observed/suggested functions of the Spinneret Seta include fixing to solid substrates to aid crawling or climbing, attaching to larger mobile organisms or spinning long threads to aid dispersal by currents in the deep ocean, and the construction of cocoons to protect themselves while moulting. By exploring the origin and antiquity of the Spinneret Seta through comparative morphological studies of the antennal exopodites of the main taxonomic groups of the subclass Podocopa, we hope to identify potentially rewarding topics and directions for future research.

Keywords: Cytheroidea, Antenna, Spinneret gland, Morphology, Evolution

### **(Talk) Ostracoda (Crustacea) from the Corumbataí Formation, ?Permian/Triassic of the Paraná Basin, State of Goiás, Central Brazil**

Cláudio Magalhães De Almeida, Dermeval Aparecido Do Carmo\* & Marie-Béatrice Forel

Taxonomic and relative dating investigations of Permian/Triassic strata in Brazil have traditionally focused on macrofossils and palynomorphs recovered from the Irati and Corumbataí formations exposed in the Paraná basin. Herein seven ostracod species from the ?Permian/Lower Triassic of the Corumbataí Formation in Goiás State are identified: *Liuzhinia antalyaensis* Crasquin-Soleau, 2004, *Bairdiacypris* sp. 1., *Bairdia?* sp., *Candona* sp., Genus and sp. indet. A, Genus and sp. indet. B and Genus and sp. indet. C. *Liuzhinia antalyaensis* is the first species formally identified from the ?Permian/Lower Triassic interval in Brazil. Based on previous publications, as well as the occurrences of limnic microfossils identified as charophyte, a shallow marine palaeoenvironment under the influence of continental water is inferred. *Liuzhinia antalyaensi* is known from the Lower Triassic worldwide; In Brazil it is restricted to the Corumbataí Formation, thus suggesting a possible age for this formation.

Keywords: Podocopida, Goiás State, Brazil, relative dating, shallow marine

**(Talk) Hirnantian Ostracoda in South America: implications for the biochronostratigraphy and palaeozoogeography of the Paraná basin, Goiás State, Central Brazil**

Dermeval Aparecido Do Carmo\*, Lívio Reily de Oliveira Gonçalves, Maria José Salas, Rodrigo Rodrigues Adôrno, Tõnu Meidla, Matheus Denezine, Lívia Cardoso da Silva Rodrigues, Mario Luis Assine & Lucas Silveira Antonietto

Here we report the occurrence of ostracodes in the Iapó Formation, an uppermost Ordovician unit of the Rio Ivaí Group in the Paraná basin, Brazil. Two ostracode species are identified in the Três Barras Farm section: *Harpabollia harparum* (Troedsson, 1918) and *Satiellina paranaensis* Adôrno and Salas, 2016. These species were recovered from dropstone-bearing shales overlying glaciogenic diamictites, deposits typical of Hirnantian (uppermost Ordovician) strata throughout Gondwana. Occurrences of *Harpabollia harparum* and *Satiellina* species are common in areas influenced by supposedly cold waters. In addition, the occurrence of *Harpabollia harparum*, an index species in the uppermost Ordovician of several stratigraphic units in southern Gondwana and paleocontinent Baltica, infers an Hirnantian age for the deposits of the Iapó Formation. Other than occurring in the Iapó Formation *Satiellina paranaensis* is also found at lower levels in the Vila Maria Formation, deposits which are therefore also considered Hirnantian in age. These ostracode occurrences in the Paraná basin are evidence of similar and connected marine paleoenvironments in Gondwana and Baltica paleocontinents.

Keywords: Ostracoda, Hirnantian, *Harpabollia*, Paraná basin, Brazil

**(Poster) Tracking the Black Sea reconnections with the World Ocean by ostracoda and paleoenvironmental reconstruction within a coastal barrier (Midia, western Black Sea coast)**

Mihaela Elena Dobre\*, Bogdan Stan Ionel, Sabin Rotaru, Alfred Vespremeanu-Stroe, Preoteasa Luminita, Tutuianu Laurentiu & Alexandru Berbecariu

A deep drill (100 m) was made in the Midia sandy barrier closing the Taşaul liman, a relict waterbody at the mouth of the Casimcea river on the western Black Sea coast.

Two to four sediment samples per meter were taken, from along the core and at each side of the visible facies changes. The samples were analyzed for microfauna assemblages, especially ostracods. Paleofauna analysis was complemented by loss on ignition (LOI), grain size, geochemical (XRF), and magnetic susceptibility analyses for paleoenvironmental reconstructions.

AMS radiocarbon dating provided the chronology of the upper 22 m of the core where ages between 42 and 46 ka (close to the method limit) were obtained. Microfauna assemblages show a marine environment from 10-14 m and a change to brackish and marine environment between 14-22 m, and a change to continental facies, lower than 22m. We consider that the age of 42-43 ka obtained at this depth indicates that the MIS 3 high stand was previously underestimated on the western coast of the Black Sea. A more detailed chronology is further needed to determine the timing of the paleoenvironmental changes precisely.

## **(Talk) Coprolites and ostracod associations in the Montceau-les-Mines Lagerstätte (Carboniferous, France)**

Christophe Dupichaud\*, Jérôme Adrien & Vincent Perrier

The Montceau-les-Mines Lagerstätte (Carboniferous, France) is celebrated for the exceptional preservation of 3D fossils in sideritic nodules. Traditionally the nodules were split open mechanically in order to access the fossils. Nowadays the development of  $\mu$ CT-scan and 3D reconstitution methods allow a more detailed and non-destructive study of the fossils from this Lagerstätte. Here we focus on two nodules showing associations between coprolites and ostracods. The first coprolite is interpreted as possibly coming from a lungfish and contains one *Carbonita* aff. *C. salteriana* ostracod. Because the ostracod is situated on the surface of the coprolite we suggest that this ostracod may have displayed a coprophagous behaviour. The second coprolite is interpreted as possibly coming from a bony fish or a spiny shark, and contains a cluster of *Carbonita* aff. *C. salteriana*. The ostracods are embedded inside the coprolite and bear their carapaces; hence we postulate that they were eaten by filter-feeding fish.

Keywords: Ostracods, Coprolite, Ichnofossil, Exceptional preservation, Tomography

## **(Talk) The principle of determining taxonomic features in the fossil Ostracoda**

N. Dykan\*

The principle of determining taxonomic (diagnostic) signs for the hierarchical series "order-species" ("pyramid principle") was developed based on the example of Quaternary ostracods of the Podopida order. The hierarchy of the taxonomic signs is built according to the principle of the pyramid: the lower rank of the taxon, the wider spectrum of its signs. Signs of the taxa of the lower ranks lay at the low levels of the pyramid. Signs of the taxa of the higher ranks lay at the upper levels accordingly. The lowest hierarchical taxon "species" has the widest spectrum of the diagnostic signs and lays at the base of the pyramid. Determination of the similarities and differences in the structure of the morphological elements of a shell and the degree of its detail was taken as a criterion for the determination of the taxonomical signs of fossil ostracods. The degree of detail of a sign reduces with the increase of the rank of a taxon. Taxonomic weight of the morphological elements was determined by the method of synthesis and analysis for each level of the hierarchical "order-species", one after another beginning from the lowest one "species". The taxonomic signs are deduced according to the rank of the analyzed taxon during gradual transition from a lower level to a higher level.

**(Poster) On a new genus and four new species of the subfamily Cyprettinae Hartmann, 1971 (Ostracoda, Crustacea) from tropical floodplains in Brazil**

Vitor Góis Ferreira, Janet Higuti, Koen Martens\*

The genus *Cypretta* Vavra, 1895 is diverse in circumtropical areas. It is characterized by the globular shape of the carapace and the presence of marginal septae in both valves. Recent collections in Brazilian floodplains yielded four new species resembling *Cypretta*. However, detailed observations of valves and appendages showed consistent differences with this genus. Here, we present a new genus and four new species from the four main Brazilian floodplains (Amazon, Araguaia, Pantanal and Paraná). The new species were found associated with aquatic macrophytes, and with benthos in both lentic and lotic environments. Valves of the new genus are rounded to triangular in lateral view, with greatest height in the middle and have marginal septae on both valves. However, they lack the series of inner tubercles on the posteroventral corner of the right valve present in all *Cypretta* s.s. The appendage morphology of the new genus is characterized by a much shorter d1 seta on the T2 and thinner and smaller  $\alpha$  and  $\beta$  setae on the mandibular palp, while the caudal ramus on the new genus is also slenderer than in most *Cypretta* species. A marked anterior protrusion on the right valve occurs in two of the new species.

Keywords: Comparative morphology, Non-marine ostracods

**(Talk) The Permian and Triassic record of drilling predation on ostracods**

Marie-Béatrice Forel\*, Cristianini Trescastro Bergue & Maria da Saudade Araújo Santos Maranhao

Drill holes are relatively common trace fossils on post-Paleozoic ostracods (especially post-Cretaceous) and usually ascribed to predation by Muricidae and Naticidae gastropods. In the last few decades, increasing reports of these marks on Late Paleozoic and Early Mesozoic ostracods appeared in the literature. We reviewed the drill holes on marine and mixohaline ostracods with emphasis on the Permian and Triassic intervals, based on a detailed analysis of publications, as well as new specimens and data.

Analyses of several types of marks observed on ostracods were carried out to distinguish holes caused by predation on live individuals from the effects of dissolution and post-mortem bioerosion. The twenty-two marks identified as drill holes are classified into nine types, ranging from Kungurian-Roadian to Rhaetian in age. The diversity of drill hole patterns supplies new evidence that the end-Permian extinction influenced not only the global ostracod diversity, but also the trophic interactions. In the Late Triassic, the drilling predators were already deterred by increased thickness or complex ornamentation of bairdiid shells. It is assumed that different animal groups might have performed this action throughout geologic time, due to the diversity of paleoenvironments and broad chronostratigraphic occurrence of drill holes analysed.

Keywords: Permian, Triassic, Drilling predation, Paleoecology

### **(Poster) Roland Fuhrmann, \*1938 – †2020**

Peter Frenzel\*, Renate Matzke-Karasz & Anna Pint

Roland Fuhrmann investigated Quaternary faunas of Central Germany, Ostracoda and Mollusca, and the amber Lagerstätte of Bitterfeld. Beside his many highly valuable case studies on fossil faunas from the region he compiled a marvellously illustrated atlas of 181 Recent and Quaternary Ostracoda of Central Germany used by many of our colleagues working with fossil material in the Quaternary (Fuhrmann 2013). This atlas is based on decades of collecting fossil and Recent Ostracoda from Central and Eastern Germany. He described several Pleistocene to Recent ostracod species from the region as new. All his work for ostracods was done in his free time because he was employed as an applied geologist for the Geological Survey until 2003. Thus, his ostracod research became more intense after his retirement. He published almost all his studies on Ostracoda within the journal *Mauritiana* of the small Natural Science Museum in Altenburg, Central Germany, to which he also donated his important reference collection of Ostracoda. With the present poster and by dedicating a session about Pleistocene Ostracoda in memory of Roland Fuhrmann we want to remember him and increase the visibility of his work to the international research community.

Keywords: Obituary, freshwater Ostracoda, Quaternary, Central Germany

### **(Poster) Recent Ostracoda from estuarine systems of Ghana, western Africa**

Peter Frenzel\*, Lailah Gifty Akita, Olga Gildeeva, Maria Schott & Mauro Alivernini

Here we present a faunistic overview of ostracods from ten estuarine systems covering the entire coast of Ghana. In total 58 surface samples and eight short cores were taken for the first study on brackish water ostracods from Ghana. The only previously published papers on Recent ostracods from Ghana are two studies about freshwater taxa.

We found 44 ostracod species, two platycopid and 42 podocopid species belonging to the genera *Acanthocythereis*, *Aglaioocypris*, *Basslerites*, *Chrysocythere*, *Clectocythereis*, *Cyprideis*, *Cyprinotus*, *Cytheropteron*, *Cytherura*, *Eucythere*, *Gibboborchella*, *Hermanites*, *Heterocypris*, *Leptocythere*, *Loxoconcha*, *Mackenziella*, *Neomonoceratina*, *Neocaudites*, *Neonesidea*, *Paracypris*, *Paradoxostoma*, *Perissocytheridea*, *Pontocythere*, *Pseudoconcha*, *Puriana*, *Reymentia*, *Ruggieria*, *Semicytherura*, *Soudanella*, plus three left in open nomenclature. The most diverse families are Trachyleberididae and Hemicytheridae, the most diverse genus is *Puriana* with four different species.

The fauna closely resembles the ostracod fauna from adjacent Nigeria and, to some degree, those from Gambia and Senegal but are distinctively different from those of the North African or South African coasts.

Ostracod diversity tends to decrease with salinity, highest values are found in the outer estuaries with polyhaline to euhaline conditions. High abundance of the brackish water taxa *Gibboborchella kuznetsovae* (Omatsola, 1970) and *Cyprideis remanei* Klie, 1940 indicates estuarine waters strongly impacted by organic pollution.

Keywords: Brackish water, Marginal marine, Biogeography, Ostracod taxa

### **(Talk) First record of intertidal Ostracoda from Fossvogur and Kópavogur bays (SW Iceland)**

Alejandra García-Madrigal\*, Steffen Mischke & Angel Ruiz Angulo

Ostracods have been used in coastal monitoring as indicators of recent and past environmental changes due to their relatively high diversity and sensitivity. To assess the influence of salinity and potential human impacts on their diversity and distribution in two neighbouring bays in a growing urban area in SW Iceland, a set of 28 modern sediment samples was collected at low tide in Fossvogur and Kópavogur. This first systematic record of intertidal ostracods in Iceland yielded a total of 16 taxa belonging to 10 families common to the Arctic and Temperate Northern Atlantic marine realms. Specimens are dominated by *Leptocythere castanea*, *Hemicythere villosa*, *Semicytherura nigrescens*, *Hirschmannia viridis* and *Leptocythere lacertosa*. In general, lower diversity and abundance were recorded at artificial rocky shores as a result of coarser sediment at these locations, whilst *L. lacertosa* and *Semicytherura sella* showed a marked preference for natural shores. Although salinity was not a controlling factor, 85% of specimens of *S. sella* were found in locations influenced by water inflows. Greater overall diversity was found where wave energy and currents are not limiting key factors. This study represents a reference for local biodiversity and the spatial and temporal ostracod distribution in times of global change.

Keywords: Arctic; N Atlantic; Salinity; Artificial shores; Marginal marine ostracods

### **(Poster) A “Purbeck-Wealden type” ostracod fauna from the Xiagou Formation: Biostratigraphy and palaeoenvironmental implications**

Zichen Ge\* & Yaqiong Wang

Non-marine Lower Cretaceous “Purbeck-Wealden type” ostracod faunas have been widely documented in Europe, East Asia, South and North America, and Africa. However, the faunal compositions of these are quite different depending on the global geographic region and the regional basins. Here we re-study the non-marine ostracods from the Xiagou Formation of the Jiuquan Basin (northwestern China), based on our newly collected material. This non-marine “Purbeck-Wealden type” ostracod fauna consists of 11 species belonging to 7 genera: *Cypridea xiagouensis*, *C. kansuensis*, *C. subunicostata*, *C. koskulensis*, *Bisulcocypridea astuta*, *Ziziphocypris costata*, *Rhinocypris jurassica*, *Stenestroemia? xiagouensis*, *S.? subpeccularis*, *Mongolianella* sp., *Alicenula* sp. Specimens of *Rhinocypris jiadianensis* in Hu and Xu (2005) we interpret as representing juvenile individuals of *R. jurassica*. Within the species *Ziziphocypris costata*, we document denticles (tiny teeth) along free margins of right valve for the first time. Our ostracod biostratigraphic data and correlations indicate that this ostracod fauna can be assigned to the Barremian-Aptian *Cypridea* (*Cypridea*)-*Cypridea* (*Ulewillia*)-*Limnocypridea* ostracod assemblage. This result, combined with the updated Early Cretaceous chronostratigraphic framework from the Jiuquan Basin, indicates that the Xiagou Formation is Aptian. Based on ostracod taxonomic and taphonomic as well as sedimentological analysis, the depositional environment of the Xiagou Formation is interpreted as lacustrine to fluvial (fluvial-deltaic).

Keywords. *Cypridea*, *Ziziphocypris*, Aptian, Jiuquan Basin, NW China

## **(Talk) Ostracode ecology, biogeography and shell geochemistry: Application to Arctic Ocean biomonitoring and paleoenvironmental reconstructions**

Laura Gemery\*, Thomas M. Cronin, Lee W. Cooper & Jacqueline M. Grebmeier

We investigated the continental shelf environments of the Bering, Chukchi and Beaufort Seas using species of Ostracoda and their shell chemistry as indicators of oceanographic conditions and change. The first objective examined assemblages over several decades (1970-2018) and the relationship with environmental factors that affect their biogeography. Results showed that large-scale (south-to-north) and small-scale (nearshore-offshore) gradients in ostracode assemblages were tied to changes in water mass properties (primarily temperature) in combination with food sources and sediment substrate. Although the dominant species did not significantly change over the investigated period, the frequency of two cold-temperate species primarily found in North Pacific areas off Asia increased during the last decade. The second component of this work assessed the feasibility of using stable oxygen isotopes ( $\delta^{18}\text{O}$ ) of carbonate from ostracode shells as paleoceanographic proxies for water mass identification on Arctic and subarctic continental shelves. We established that the  $\delta^{18}\text{O}$  values of carbonates from two species (of five investigated) can be reliable recorders of summer water mass changes in temperature and seawater  $\delta^{18}\text{O}$ . Overall, results support that on complex and dynamic continental shelves, paleoenvironmental conditions can be better resolved by documenting meiofaunal assemblages, measuring stable isotope variability in microfossil carbonates, as well as relating the distribution of species in time with an understanding of species ecology.

Keywords: Subarctic, Arctic Ocean, Stable isotopes, Faunal assemblages

## **(Poster) Taxonomic revision of *Loxoconcha muelleri* (Méhes, 1908) and its occurrence in the Neogene of Paratethys and Palaeomediterranean**

Elsa Gliozzi\* & Costanza Faranda

Following a recent sampling of the lower Pannonian deposits of Sopron (Hungary), the type locality of *Loxoconcha muelleri* (Méhes, 1908), we present a taxonomic revision of *L. muelleri* and some affine species [*Loxoconcha porosa* Méhes, 1908, *Loxoconcha minima* Müller, 1894 and *Loxoconcha granifera* (Reuss, 1850)] provided through optical stereomicroscope and SEM observation as well as geometric morphometrics using the software Morphomatica.

Results show that: a) *L. muelleri* and *L. minima* are very similar and could be the same species; b) the valves identified as *L. minima* from the lower Messinian of the Velona Basin (Italy) are probably referable to a new species, similar but not identical to *L. minima*; c) the valves identified as *L. muelleri* from the late Messinian Lago-Mare facies of the Messinian Salinity Crisis of the Palaeomediterranean area must be referred to the new species of the lower Messinian of the Velona Basin.

The latter result has relevant implication in the palaeobiogeography/palaeogeography and biostratigraphy of Palaeomediterranean and Paratethys area during the Miocene, since *L. muelleri* was, so far, considered the first Paratethyan immigrant in the Palaeomediterranean after the evaporite deposition. Starting from literature, a revision of the occurrence of *L. muelleri* in both Palaeomediterranean and Paratethys is proposed.

Keywords: Taxonomic revision, Loxoconchidae, Palaeobiogeography, Biostratigraphy, Miocene

### **(Talk) Campanian–Maastrichtian non-marine ostracode biogeography in Gondwanan context and their chronological significance.**

Silvia Regina Gobbo\* & Reinaldo J. Bertini

The occurrence of common non-marine ostracod species of the Neuquén Basin (Neuquén Group), Argentina; Paraná (Bauru Group); Santos and Campos basins, Brazil; Congo Basin (Kwango Series), Congo; and the Deccan Intertrappean Strata (Lameta Formation), India; are discussed. Based on ostracod correlations we identify eight paleobiogeographic affinities. 1. Neuquén and Paraná: *Ilyocypris triebeli*, *Ilyocypris riograndensis*, *Neuquenocypris tenuipunctata*, *Wolburgiopsis vicinalis*, *Wolburgiopsis neocretacea*, *Vecticypris aff. punctata*. 2. Neuquén, Paraná, Campos: *Ilyocypris wichmani*. 3. Neuquén, Paraná, Santos: *Fossocytheridea lobulata*. 4. Paraná, Santos, Congo and India: *Stenocypris cylindrica*. 5. Paraná and Congo: Species K 530b Grekoff, 1960. 6. Argentina, Paraná and Congo: *Ilyocypris argentinensis*, *Alicenula kwangoensis*. 7. Paraná and India: *Paracandona jabalpurensis*. 8. Paraná, Congo and India: *Periosocypris megistus*. We propose here that *Limnocythere bajpaii* is a junior synonym to *L. soaresi*, and that “*Metacypris*” sp. (Dias-Brito *et al.*, 2001) presents strong affinities with *Cypridopsis huenei*. Other generic correlations, especially regarding the genera *Wolburgiopsis*, *Neuquenocypris* and *Virgatocypris*, reinforce the above paleobiogeographical similarities, and indicate a Campanian-Maastrichtian age for the Bauru Group (Paraná Basin, Brazil) and the Kwango Series (Congo Basin, Congo).

Keywords: Upper Cretaceous, Lameta Formation, Kwango Series, Bauru Group, Neuquén Basin

### **(Talk) An assessment of the taxonomic validity of “*Metacypris cf. polita*” from Paraná Basin, and their chronostratigraphic implications**

Silvia Regina Gobbo\* & Reinaldo J. Bertini

*Metacypris polita* was described from the “Wealdean B” of the Congo Basin (Grekoff, 1960), but it was subsequently considered a junior synonym of *Vecticypris polita*. In this contribution, we propose that the occurrence of “*Metacypris*” *cf. polita* in Bauru Group, Upper Cretaceous (Dias Brito *et al.*, 2011), Paraná Basin, Brasil, actually belongs to the Genus *Vecticypris*, but this species is new and closer to *Vecticypris punctata*, from the Allen Formation (upper Campanian-lower Maastrichtian), Neuquén Basin, Argentina. In this work, we contribute a re-illustration (SEM images) of the *Vecticypris polita* holotype from Grekoff collection, and briefly discuss origin, dispersion and stratigraphical range of the Genus *Vecticypris* and compare to Bauru Group occurrences. “*Metacypris*” sp., also described from the Bauru Group, shows similarities to *Cypridopsis huenei*, from the Lameta Formation (Maastrichtian), India, and probably belongs to *Vecticypris*. These new identifications have important implications for chronological discussions and reinforces the Campanian-Maastrichtian age to some geological units of the Bauru Group.

Keywords: Campanian-Maastrichtian, Gondwana, Biogeography, *Vecticypris*

**(Poster) Re-illustration of four non-marine ostracodes from “Grès Polymorphe”, Congo Basin, described by Grekoff (1958)**

Silvia Regina Gobbo\* & Reinaldo J. Bertini

The Congo Basin is very important for understanding non-marine ostracodes faunal turnover from Jurassic until Tertiary. Grekoff made interesting investigations, describing several ostracods of the Congo Basin (1957, 1958, 1960). In this contribution, we re-illustrate type material of four species from the «Grès Polymorphe», basal part of the Kalahari Group (Grekoff, 1958). These species were re-illustrated with SEM images to provide references for future systematic investigations, and useful biostratigraphical and paleoenvironmental applications. This work focuses on 3 genera and 4 species. The species are: *Cypris farhami*; *Cypris* G. P. 542; ?*Erpetocypris* G. P.542 and ?*Gomphocythere* l. 234. *Cypris farhami* is considered a good fossil index of the «Grès Polymorphe». We kept the original nomenclature from Grekoff for historical reasons, and diagnoses, catalogue numbers and dimensions are taken from the original publication.

Keywords: Tertiary, Kalahari Group, Cenozoic

**(Poster) Preliminary palaeoecological results from the palaeolake of Pheneos Polje, N. Peloponnese, Greece, based on ostracods**

M. Groumpou \*, I. Koukouvelas, K. Nikolakopoulos, P. Papadopoulou, M. Tsoni & G. Iliopoulos

The aim of this work is to reconstruct the boundaries of a palaeolake that existed during the late Quaternary in Pheneos Polje, in North Peloponnese, Greece, and determine its palaeoenvironmental evolution, based on micropalaeontological and geomorphological evidence. It is known from historical records that several times in the past an ephemeral lake had been formed in the study area due to the flooding of the Polje. Based on our geomorphological observations, some geomorphological features (gravel bars) were detected that could be considered the possible palaeo-shorelines of a palaeolake. However, the presence of coarse-grained material and the absence of obvious lacustrine sediment deposits at the steep rocky margins of the Polje, could not clearly evince the presence of this palaeolake. Hence, 27 sediment samples were collected from these coarse-grained deposits for micropaleontological analyses. After wet sieving, a good number of charophyte gyrogonites and ostracod valves were unexpectedly detected. The collected ostracod valves belong to the genera *Candona* and *Ilyocypris*. The presence of the two freshwater ostracod taxa clearly indicates the presence of freshwater bodies in the polje, and verifies that the detected geomorphological features are indeed the palaeo shorelines of a palaeolake.

Keywords: Palaeo-shorelines, *Ilyocypris*, *Candona*

## **(Talk) The impact of the Late Devonian Hangenberg anoxic event on ostracod faunas**

Elvis Guillam\*, Sylvie Crasquin & Marie-Béatrice Forel

The Kellwasser event (-372 Myr) is one of the five major extinction events. It is followed by the Hangenberg event (-359 Myr) sometimes considered as equally intense. Both were caused by an accumulation of factors including volcanism and climate change. The Hangenberg event remains little studied and many points need to be clarified, particularly concerning its intensity and the recovery of ecosystems. The aim of this work is to synthesize the impact of the Hangenberg event on marine ostracods. It is based on data from publications, gathering all available information to explore the diversity of ostracods at the Devonian-Carboniferous transition.

This event caused the disappearance of about 65% of ostracod species and its impact varies according to their ecology. Thus, it was less intense than the Kellwasser event through which 75% of ostracod species became extinct. However, it could be responsible for the disappearance of the Leperditicopida, large putative ostracods characteristic of Palaeozoic lagoonal environments. Faunal recovery of marine ostracod assemblages was very dependent on environmental variations, particularly those associated with the basal Carboniferous transgression. Two main factors have been involved in post-event recovery: diversification of surviving lineages; and recolonization of neritic environments by speciation of deeper water faunas having survived in refuge areas.

Keywords: Late Devonian, Famennian, Extinction event, Review.

## **(Poster) The palaeobiogeography of Late Devonian and Early Carboniferous marine ostracods**

Elvis Guillam\*, Sylvie Crasquin & Marie-Béatrice Forel

Over geological time, life experienced many periods of significant biodiversity variations. Among the declines during the Phanerozoic, five events are considered as major crises. One of them marked the Frasnian-Famennian boundary (-372 Myr) and was followed by another extinction close to the Devonian-Carboniferous boundary (-359 Myr).

In order to study the impact of these events on marine ostracods in a global framework, data from publications documenting Frasnian, Famennian and Tournaisian ostracods have been compiled. Entomozoidae (mostly pelagic) and deep-water faunas (i.e., Thuringian Mega-assemblage) are not considered because too few data are available so far. Moreover, Entomozoidae had a very wide spatial distribution during the Late Devonian. Data has been distributed within operational geographical units (i.e., Siberia, South China Block...) in order to consider faunas living in the same geographical area, although they may have lived under different environmental settings. This minimizes the impact of local palaeoenvironmental conditions on large-scale palaeobiogeographical studies. The palaeogeographical distribution of ostracods in the interval appears to have been related to climatic zonation, and thus was mainly constrained by the climate. Similarities between faunas from different and distant geographical zones suggest the existence of connections. They were potentially made possible by surface currents.

Keywords: Late Devonian, Early Carboniferous, Palaeobiogeography.

### **(Talk) Late Glacial and Holocene sedimentary record at Pirovac Bay (Dalmatia, Croatia) reveals freshwater and marine ostracods**

Valentina Hajek Tadesse\*, Nikolina Ilijanić, Miko Slobodan, Dea Brunović, Ozren Hasan, Ozren Hasan, Ivan Razum & Martina Šparica Miko

The distribution and composition of ostracods of the Late Glacial and Holocene in the two cores Prosika 1 (742 cm) and Arta 1 (150 cm) from the karst depression Pirovac Bay can be used to reconstruct palaeoenvironmental conditions and can be interpreted in the context of hydrological conditions and the evolution of the Pirovac Bay during the 14,100 year-long records. Forty-seven ostracod species from non-marine and marine families Darwinulidae, Candonidae, Ilyocyprididae, Cyprididae, Cytherideidae, Limnocytheridae, Leptocytheridae, Loxoconchidae, Cytheruridae, Trachyleberididae, Cytheromatidae, Pontocyprididae, Hemicytheridae, Xestoleberididae are recognized. Considering results of the multiproxy investigation (palaeontological, lithological, geochemical, and geophysical data), especially ostracod assemblage composition and the presence of benthic foraminifera, two main zones, a freshwater zone (FZ) and a marine shallow-water zone (MZ) with one transitional subzone (TS) are detected. The FZ is characterized by freshwater species typical for the paleoenvironment of an organic-rich, low-energy wetland. In the MZ marine ostracods are represented by shallow marine species. In this zone, marine ostracods are mixed with various allochthonous freshwater taxa. Their mixing can be explained due to the specificity of the karst terrain and the existence of vruljas (freshwater springs under marine water). Between the two zones, the TS includes abundant lake freshwater taxa with rare marine ostracods and benthic foraminifera. The occurrence of rare marine taxa in the TS is connected to the global sea-level rise and first incursion of marine water in Pirovac Bay.

Keywords: Ostracoda, Eastern Adriatic Sea, Paleoenvironmental changes, Transgressive trend

### **(Poster) Stygobiont ostracods from a deep cave Njemica (Biokovo Mt., Croatia)**

Valentina Hajek Tadesse\*, Tomislav Kurečić, Lara Wacha, Horvat Marija, Nina Trinajstić & Ivan Mišur

Njemica cave on Biokovo Mountain is the fifth deepest pit in the Republic of Croatia (-936 m). It is primarily a vertical speleological object characterized by the alternation of spacious large halls and large verticals. At the bottom of the pit is a deep siphon lake with an unclear hydrological regime. From the deepest part of the pit in March 2021, sampling was conducted in the hall at the bottom of the pit. Two micro-locations were selected. The first location is situated nearby an underground bivouac at the depth of 930 meters. The second sampling site is situated nearby siphon lake at the very bottom of Njemica cave.

Sub-recent ostracods were found within the sediment. Numerous ostracods of one endemic species of the family Cyprididae - *Pseudocypridopsis sywulai* Petkovski, Scharf, and Keyser, together with a small number of the juvenile specimens of the family Candonidae - *Phreatocandona cf. motasi* Danielopol were identified in all samples.

Keywords: Freshwater Ostracoda, Cave sediments, Dinaric Karst, SE Europe

## **(Poster) Using ostracodes to reconstruct paleoenvironmental changes in a Pliocene lake record from the Central Jordan Valley**

Christine M.S. Hall\*, John M. Greenlee, Silas Dean, Lisa E. Park Boush & Nicolas Waldmann

The Pliocene was a time of generally warm shifting climatic conditions and is often used as an analogue for possible future climate scenarios. While a considerable amount of work has been done investigating marine records from this time, lacustrine records are less well established. In the Levantine Corridor, Pliocene paleoenvironmental changes would have been particularly important in developing the landscapes that supported diverse animal life, but these changes are not well understood. The 'Erk-el-Ahmar Formation (3.15-4.5 Ma) in the Central Jordan Valley consists of ~200 m of fossiliferous fluvio-lacustrine sediments and represents a chance to evaluate the paleoenvironmental conditions in the area during this time. In this study, we are using a combined paleontological and sedimentological approach to reconstruct a record of paleoenvironmental change for this site using samples from outcrop and drill cores. Ostracodes (as well as mollusks) are present in varying abundances throughout the section, and preliminary results indicate that the ostracode record changes through time in conjunction with sedimentological indicators of changes in environmental conditions such as grain size and elemental composition. Specifically, differences in ostracode abundance and species assemblages correlate with proxies for lake level and indicate fluctuating salinity throughout the record.

Keywords: Paleolimnology, Pliocene, Central Jordan Valley

## **(Poster) Non-marine ostracods (Crustacea) from New Caledonia, Pacific Ocean**

Janet Higuti & Koen Martens\*

The New Caledonian archipelago, situated in the Pacific Ocean, North East of Australia, and one of Earth's top 25 priority conservation regions (Myers *et al.* 2000), is known for its rich biodiversity and a high proportion of endemism in flora and fauna, thus far, only 16 species of non-marine ostracods were reported. After three hydrobiological expeditions (2016, 2017, 2018) to the main island of the archipelago (Grande Terre) organized by the Muséum national d'Histoire naturelle (Paris, France), about four times more species have been found, about half of which are assumed to be new. Two new species, *Cyprinotus drubea* Martens, Yavuzatmaca & Higuti, 2019 and *Strandesia mehesi* Kisseih, Higuti & Martens, 2020 have already been described.

Here, we report on the ecology and distribution of some other species, mostly still in open nomenclature, across the "Grand Terre" in 350 samples taken from mainly lotic habitats, such as small streams, which constitute the majority of aquatic habitats in New Caledonia, but also from some large lakes and temporary pools. Most noteworthy are an endemic radiation of *Gomphocythere*, different species of *Elpidium* in imported bromeliads, new species of *Cypretta* and several darwinulid species.

Keywords: Streams, Non-marine ostracods, *Penthesilenula*, *Vestalenula*, *Darwinula*

## **(Talk) Spatio-temporal distribution of ostracod species in saline inland lakes (Mansfeld lake area; Central Germany)**

Marlene Hoehle\* & Claudia Wrozyna

Inferences on temporal-spatial distribution of ostracod species is the prerequisite for palaeoenvironmental reconstructions. This requires precise knowledge not only about ecological preferences and specific life histories, but also the understanding how (local) ecological parameters affect ostracod species assemblages (abundance and composition). We therefore investigated modern ostracod populations from twelve waterbodies in different seasons (April, June, September), differentiated for living/dead and adult/juvenile ostracods, in relation to physico-chemical parameters (temperature, oxygen content, electrical conductivity, pH). Relative abundances of ostracods show strong fluctuations displayed by differences in composition of the assemblages between and within the water bodies and between bio- and taphocoenoses. The measured physico-chemical parameters do not explain the observed temporal-spatial distribution of the species. Differences in taphocoenoses show that taphonomic processes can be very local, and sampling site as well as time, is crucial.

The variability of assemblages between sampling month and the relationship between abundance of valves and living ostracods is not straightforward. Therefore, without precise knowledge of the ecological requirements of a species at a local scale, uncertainties may exist for the palaeoecological indication of a species. Ostracod species composition and abundance in fossil samples result from interplay of several processes during life and post-mortem and can be very site-specific.

Keywords: Biodiversity, Limnology, Ostracods, Seasonal distribution, Taphonomy

## **(Poster) Is the ostracod fauna similar between native and non-native macrophytes?**

Lara Hoffmeister Luz, Danielle Katharine Petsch, Nadiny Martins Almeida, Jonathan Rosa, Vitor Góis Ferreira, Koen Martens\* & Janet Higuti

*Egeria najas* Planch., native to South America and *Hydrilla verticillata* (Lf) Royle [maybe delete authors or provide full author and year similar to ostracod species], native to Asia and invasive in South America, have a similar morphological architecture. Both species are rooted, submerged macrophytes and belong to the family Hydrocharitaceae. The objective of this study was to compare the ostracod fauna associated with a native (*E. najas*) and a non-native (*H. verticillata*) plant from the upper Paraná River floodplain (Brazil). Ostracods associated with both macrophytes were collected using a hand net (160 µm) between 2004 and 2020. We found 18 ostracod species belonging to the families Cyprididae, Limnocytheridae and Darwinulidae. The most abundance species were *Diaphanocypris meridana* (Furtos, 1936), *Bradleytriebella lineata* (Victor & Fernando, 1981) and *Cypricercus alfredo* Almeida et al., 2021. Ostracod richness and abundance were not significantly different between the macrophytes. The PERMDISP's results showed that the variability in species composition was similar in the two macrophyte species, and that they had a similar species composition, as tested by PERMANOVA. The similarity between the ostracod faunas, associated with native and non-native macrophytes, might be related to the similar architecture of these plants. The non-native species *H. verticillate* thus seems to provide a favourable habitat for native ostracod communities.

Keywords: *Egeria najas*, *Hydrilla verticillata*, Invasive species, Brazilian floodplain

### **(Talk) Decadal-scale marine ecological changes based on multiple proxies in Hong Kong**

Yuanyuan Hong\*, Moriaki Yasuhara, Hokuto Iwatani, Koji Seto, Yusuke Yokoyama, Jingwen Zhang, Stephen P. Obrochta, Akira Tsujimot, Kaoru Yoshioka & Zonghui Liu

Paleo-studies have recently shown that Hong Kong's marine ecosystem, a typical urbanized seascape, has been affected by both anthropogenic and natural climate changes. But high resolution and quantitative down-core records remain scarce. Here we conducted multiproxy analyses on two 1.5 m long sediment cores (TLH1C and TLH2C) obtained from semi-enclosed Tolo Harbour, Hong Kong, including ostracods, pollen and biomarkers, etc, to reconstruct Hong Kong's marine ecosystem history for the last 1200 years. Preliminary results showed ostracod faunal turnover and diversity increase from the beginning of the nineteenth century in both cores. Such faunal changes could be related to intensified monsoon activities as higher sea surface temperature (SST) is shown at that time based on alkenones. However, ostracods abundance and diversity started to decrease since the mid-twentieth century with declining SST, which could be the result from combined effects of both weaker monsoon activities and severe anthropogenic impacts over the past decades. More details and other environmental data are under analyses and will be presented in the conference.

Keywords: Conservation paleobiology, East Asian Monsoon, Anthropogenic impact, Urban marine environment, Multiproxy reconstruction

### **(Talk) Niche stability or lability in *Cytherissa lacustris*? A test case for ecological uniformitarianism in Ostracoda**

David J. Horne\*, Dan L. Danielopol, Jonathan A. Holmes, Anna March, Koen Martens, Tadeusz Namiotko, Isa Schön & Alison J. Smith

How robust is the uniformitarian principle: "the present is the key to the past"? *Cytherissa lacustris* is a Holarctic, non-marine ostracod species regarded as an inhabitant of deep, cold lacustrine waters today and a cold-climate indicator fossil in the Pleistocene. A non-swimming, infaunal, benthonic species preferring silty substrates, it tolerates low dissolved oxygen levels but is vulnerable to seasonal anoxia due to its two-year life cycle. An ecological uniformitarian approach to palaeoenvironmental reconstruction assumes niche stability in *Cytherissa lacustris*, i.e., that its Pleistocene to Recent environmental preferences remained the same. However, living populations are also found in shallow lake margins and it occurs in fossil assemblages interpreted as oligohaline as well as freshwater, fluvial as well as lacustrine. Does this signify ecological lability, and if so, what are the implications for palaeoclimate reconstructions dependent on assumptions of ecological stability? Could such differences be explained in terms of ecologically differentiated clonal lineages (cryptic diversity) in parthenogenetic populations of this species? Is ecological lability reflected in geochemical variability (trace elements and isotopes) of the carapace? Preliminary studies of living *Cytherissa lacustris* records from North American, European and Asian datasets, combined with Pleistocene fossil data, may suggest answers to some of these questions.

Keywords: Holarctic, Non-marine, Pleistocene, Palaeoenvironment, Palaeoclimate

### **(Talk) Preliminary study of automatic identification of ostracods with deep learning**

Jiamian Hu\*, Yuanyuan Hong, Yihua Chen & Moriaki Yasuhara

Microfossils of ostracods provide abundant information to understand past climate and environmental changes. But identifying large amounts of ostracod specimens are time consuming tasks for researchers. Recent advancement of digital microscopy and deep-learning image classification technology provided the ground to automate micropaleontological identification process. Here, to investigate the suitability of automatic identification of ostracods with deep learning technology, we developed an automatic identification framework to classify genera and species of foraminiferans by using digital image from *Endlessforams* dataset. The framework tested VGG net, ResNet, Vision transformer, Reg-Net and ConvNext models in foraminiferans species identification task and achieved 88.0% test accuracy. The test accuracy in foraminiferans genera classification task reached 92.8%. Additionally, we examined the application of object detection methods by training Yolo-v5 model on re-composited images from the dataset. The trained Yolo-v5 network achieved 87.4% average precision in locating and identifying the species of multiple foraminiferans inside an given area during test phase. Given the promising results from foraminiferans identification, we are going to identify ostracods with deep learning based models and plan to present the initial results in the conference.

Keywords: Machine learning, Deep learning, Computer vision, Automatic identification, Convolutional neural network

### **(Talk) Ostracods in database: State of the art, data mobilization and future applications**

Huai-Hsuan M. Huang\*, Moriaki Yasuhara, David J. Horne, Vincent Perrier, Alison J. Smith & Simone N. Brandão

Biodiversity databases are prolonging and diversifying the usage of data by providing data repositories, digitalizing data, and mobilizing data. They can also be a collaboration tool for synthesizing global data and reaching consensus with combined evidence. Thanks to many contributors, ostracod data are an important component in many biodiversity databases, such as taxonomic-oriented and occurrence-based databases. However, comprehensive assessments on the role of ostracod data in the trend of database research are lacking. Here we review all mainstream databases that include ostracods by (1) visualizing their spatial and temporal coverages, (2) comparing different strategies for data management and quality control, (3) summarizing the intertwined relationships between databases, (4) presenting examples of data analysis, and (5) identifying key areas for improvements. Our investigations show that despite a lot of future work is required, ostracods in databases can and have provided important insights on biodiversity patterns and dynamics in both space and time. The database field continues to require enormous contributions from working groups to overcome challenges such as taxonomic harmonization, data validation, and paleolocality uncertainties.

Keywords: Biogeography, Macroecology, Collaboration tool, Open science, Biodiversity informatics

## **(Talk) A test of the correspondence between paleontological and biological species in Late Cretaceous ostracods**

Gene Hunt\*, M. João Fernandes Martins & T. Markham Puckett

Higher taxa such as genera are commonly analyzed in evolutionary paleobiology, but species-level data should provide more direct information about extinction, speciation and phyletic evolution — as long as fossil species generally correspond to real, species-level biological lineages. Observations from living species demonstrated the existence of many morphologically cryptic species, which must be even more common in paleontology where only the subset of features reflected in mineralized skeletons are available to diagnose species.

Here we assess the adequacy of fossil species using a very large dataset of cytheroid ostracods from the Late Cretaceous of the U.S. Coastal Plain. As part of a previous study on sexual dimorphism, we characterized size and shape in over 100 nominal species from this fauna. When examining sexual dimorphism in individuals from what we initially thought was a single population, in about 10% of cases we encountered the presence of morphological clustering indicative of two, previously undetected, biological species in the sample. In at least some cases, we were able to discover additional, independent characters that corroborate the statistical clustering. This 10% incidence of cryptic diversity must be an underestimate because some kinds of cryptic variation will not be detectable by our approach.

Keywords: taxonomy, species concepts, sexual dimorphism

## **(Poster) Taxonomic harmonization of Paratethyan brackish ostracods described by Livaltal, 1929 from Babazanan type locality (Azerbaijan)**

Arzu Javadova\*, Costanza Faranda, Maria Zenina & Elsa Gliozzi

Neogene ostracods from Paratethys are, potentially, a powerful biostratigraphic tool to depict the geological history of different basins [Styrian, Vienna, Pannonian, Dacian, Euxinic (former extent of the modern Black Sea basin), and Caspian-Aralic basins]. Yet, most species were described by different authors (Reuss, Méhes, Zálányi, Livaltal) in mid-19<sup>th</sup> and early 20<sup>th</sup> centuries and, often, descriptions and illustrations are very poor. Very likely, the Neogene Paratethyan biodiversity is overestimated due to lack of literature exchange at time or the undervaluation of ecophenotypical intra-specific variability. As a consequence, often, under different specific (or even generic) names could be hidden the same species. Unfortunately, most of the historical ostracod collection are gone lost or destroyed and the only way to solve this problem is to get new samples from the type localities.

Recently, clays and silts cropping out at Babazanan (Azerbaijan), type locality of the species described by Livaltal in 1929, were re-sampled, and here we present the results of our taxonomical studies of the collected ostracods providing new definition of the specific characters, mainly based on SEM illustration. An updated synonymy, paleogeographic and stratigraphic distribution starting from the extant literature, will be also provided.

Keywords: Taxonomic harmonization, Paratethys, Palaeobiogeography, Neogene, Quaternary

## **(Talk) Microfauna of the Miocene Deposits in South Caspian Basin**

Arzu Javadova\*

Comprehensive geological and geophysical study, as well as exploration drilling in Miocene sediments resulted in the vast material that makes it possible to assess the microfaunal content of South Caspian Basin.

Commercial reservoirs have been established in the Miocene of the South Caspian Basin. These deposits are of great practical and scientific interest as they underlie the formations of the thick Pliocene Productive series. More than 800 core samples were taken from tens of exploration wells of the Miocene deposits, where were recovered abundant ostracod and foraminifera fauna. The studied sections allowed to define the detailed stratigraphic sequences into individual stratigraphic units: Pontian, Meotian Sarmatian, Conkian-Karaganian, Chokrakian, Maikopian deposits.

The facies of the Miocene deposits in the South Caspian offshore part of Basin vary considerably and these different facial sedimentary environments affected the microfauna composition as well. This is confirmed by rather abrupt changes in microfaunal features from different regions of South Caspian Basin. The Miocene deposits of South Caspian offshore part of basin is rich in microfauna and many of ostracod species were common in Tethys and Paratethys bioprovinces and ostracod assemblages are composed by brackish and shallow marine genera.

Keyword: Ostracoda, South Caspian Basin, Stratigraphy, Miocene deposits, Foraminifera

## **(Talk) *Eucytherura* Müller, 1894 of Jurassic and Cretaceous: state of art**

M.S. Karpuk\* & E.M. Tesakova

The genus *Eucytherura* was established by G.W. Müller (1894, p.305) on four recent species from the Gulf of Naples. Subsequently, Alexander (1936, p.692) designated *Eucytherura complexa* (Brady, 1867) as type species. In 1949, Weingeist undertook a review and provided a detailed description of the genus. Ayress et al. (1995), in their study of Cenozoic deep-sea Cytheruridae from the SW Pacific and Indian oceans, provided an emended diagnosis of the genus, while Whatley and Boomer (2000) united many Mesozoic genera into *Eucytherura*. As a result, the genus has become a combination of several morphogroups of uncertain affinities, which has led to difficulties in using fossil, particularly Mesozoic, *Eucytherura* for palaeoecological and sometimes stratigraphical research. Our Jurassic and Cretaceous material suggests that the generic characteristics of *Eucytherura* should be revised while the scope of Jurassic and Cretaceous *Eucytherura*, should exclude taxa such as *Rutlandella* Bate and Coleman, 1975 and *Wellandia* Bate and Coleman, 1975. We also discuss the generic assignment of several species.

The study was funded by research project № 21-77-00081 of the Russian Science Foundation.

Keywords: *Eucytherura*, taxonomy, Jurassic, Cretaceous

### **(Talk) *Echinocythereis* during the Ypresian (Early Eocene) of western Europe**

Michael Keen\*

Living *Echinocythereis* are typically found in deeper marine environments, but during the Tertiary species are commonly present in shallower and more varied marine settings. These Tertiary ostracods commonly exhibit either a reticulate or papillose ornamentation, and frequently papillose species are succeeded by reticulate forms. This phenomenon is examined in detail with Ypresian faunas from the Hampshire and London Basins, northern France, the Paris Basin, and Belgium. A similar pattern is found in these areas: a short lived papillose species referred to as *Echinocythereis* sp. A, is succeeded by the reticulate *Echinocythereis reticulatissima* Eager 1965. Studies of the ornamentation show that micro-pustules develop along the muri of the reticulation, often giving a crenelated appearance; in the adults some of these micro-pustules enlarge into macro-pustules especially at muri junctions and occasionally the reticulation disappears altogether, leading to the two distinct morphologies. *Echinocythereis* sp. A forms a datum throughout the region mentioned above, and has proven useful in stratigraphical correlation. The question is whether this variation is 'ecophenotypic' or a genuine specific difference, whether it is a case of evolution, migration, or environmentally-cued change.

Keywords: *Echinocythereis*, Ypresian, Eocene, Evolution, Europe

### **(Poster) Phylogenetic relationships within the subfamily Candoninae: new evidence from combined mtDNA and nDNA data**

Michalina Kijowska\*, Tadeusz Namiotko & Anna Wysocka

The subfamily Candoninae is one of the most taxonomically difficult and species-rich higher taxa of freshwater ostracods, comprising 50 genera with over 550 species, which are diagnosed almost exclusively by morphological characters. Owing to several homoplasies, phylogenetic relationships within the subfamily still remain ambiguous. To test the morphology-based taxonomy and monophyly of European morphogenera of Candoninae, we used two molecular markers: 1) the cytochrome oxidase subunit I mitochondrial gene (*COI* mtDNA), commonly used as a molecular barcode due to its supposed uniparental inheritance, high mutation rate and high number of copies, and 2) *28S rDNA*, a nuclear region characterized by a lower mutation rate, compared to the former one. The dataset consisted of over 70 combined *28S rDNA* and *COI* sequences obtained from the same individuals of 22 species belonging to eight genera. The phylogenetic analyses based on the Bayesian inference method revealed a complex pattern of relationships among the studied genera and an incomplete correspondence between morphology-based and molecular-based affinities. The monophyletic status of most Candoninae genera appears to be confirmed, whereas the phylogenetic tree illustrated the polyphyletic nature of the genus *Fabaeformiscandona*. The genetic results confirm also the morphological separation of the genera *Typhlocypris* and *Pseudocandona*, nevertheless maintaining their close relationships.

Keywords: Candonidae, Taxonomy, Phylogeny, *COI*, *28S rDNA*

### **(Poster) Multiple cryptic species within *Heterocypris incongruens* (Ramdohr, 1808)**

Adrianna Kilikowska\*, Tadeusz Namiotko, Koen Martens & Isa Schön

The problem of species identity remains one of the most controversial issues in biology. Hidden genetic diversity and incompatibility of the rate of morphological and molecular evolution often result in an overestimation or underestimation of species boundaries. Particularly problematic in this respect appears to be asexually reproducing populations, such as in many freshwater ostracods, mainly of the Cypridoidea. The aim of the present research was to analyse cryptic diversity within *Heterocypris incongruens* - a geographic parthenogen, in which sexual females and males co-exist with asexual females in the circum-Mediterranean area, whereas only asexual females occur in most of its range. For the analysis of intraspecific variability, a fragment of the mitochondrial cytochrome oxidase subunit 1 (*cox1*) was sequenced. For 234 individuals from 50 sites, representing a quite significant part of the range of this species, 51 haplotypes were recorded. Some mtDNA haplotypes showed a genetic divergence of more than 20%, which surpasses values of genetic variability commonly accepted for a single species. Analyses of the phylogeny and of genetic species delimitations using Birky's K/teta method reveal the existence of a species complex with more than 10 cryptic species.

Keywords: Cryptic diversity, *Heterocypris incongruens*, mt DNA

### **(Poster) Investigation of the influence of different salinities in inland waters on *Cyprideis torosa* (Jones, 1850)**

Silvia Kolomaznik\* & Peter Frenzel

*Cyprideis torosa* forms characteristic sieve pores in its shell. Rosenfeld & Vesper (1977) discovered a correlation between the percentage of round sieve pores and the salinity of the surrounding water, confirmed by Frenzel et al. (2016).

Because this relationship has been documented for marine and brackish but not for athalassic waters, we took samples from water bodies of the Mansfelder Seen area in Germany. We found a correlation between sieve pore shape and salinity which is described by the formula:

$S = -0.9157 \cdot RS + 58.699$  ( $R^2 = 0.9407$ ). *S* stands for the salinity and *RS* is the percentage of round sieve pores.

The calculated salinities using our new formula are slightly below the ones if applying the equation from Frenzel et al. (2016), who used brackish sea water which was diluted later in the laboratory. For salinities <3 PSU lies the graph of our formula slightly below Rosenfeld & Vesper's (1977) and above for >3 PSU. Rosenfeld & Vesper (1977) used a mix of marginal marine and athalassic populations.

Some authors suppose an underestimation of salinity in athalassic waters if reconstructed from sieve pore analysis based on fossil associations using a formula derived from sea water populations. This can be avoided by our new formula.

### **(Talk) New Ostracod reports from Nansen Island, Antarctica**

Okan Klkylođlu\*, Sphan Karaytuđ, Serdar Sak, Serdar Snmez, Ođuz Mlayim, İsmail mer Yılmaz, Filiz Batmaz, Ekin Eren & Mehmet Yavuzatmaca

During the sixth Turkish Antarctica Expedition to Western Antarctica including five islands, sediment and water samples were collected from 32 different water bodies (lakes, ponds, creeks, springs, littoral zones of sea etc.). Although a few other taxonomic groups (copepods, insects, etc.) were recovered, a new ostracod species was encountered from two samples collected from Nansen Island. This is the first report of ostracods from this island below 60°S. Absence of ostracods from other islands may be related to several a/biotic factors such as water chemistry (e.g., relatively low calcium levels), extreme aquatic conditions (e.g., low temperature values) improper habitat conditions (e.g., low or absence of sediment in the water bodies) and isolation of the island(s) from the mainland. As far as we know, this is the first ostracods report from Nansen Island in Antarctica.

Keywords: Antarctica, First reports, Water Chemistry, Distribution, Ecology

### **(Poster) Seasonal occurrence of ostracod species in lake Kara Murat (Bolu, Turkey)**

Okan Klkylođlu\*, Filiz Batmaz, Ahmet zdilek & Alper Ataman

Lake Kara Murat is a small and shallow monomictic lake located in the west of Bolu city. To investigate seasonality of nonmarine ostracods and compare species assemblages between the lake and the spring source, which is the main flowing creek to the lake, we sampled five stations from the lake and two from the springs around the lake for 12 months from 2019 and 2021. Up to now, 11 living ostracod taxa were reported. While *Darwinula stevensoni* and *Cypria ophthalmica* were the dominant species for the lake, *Psychrodromus cf. fontinalis* and *P. olivaceus* were reported from the spring sources. A relatively rare species, *Notodromas monacha*, was found in May and June while two species (*D. stevensoni*, *C. ophthalmica*) were encountered from almost all stations in each month. From the ecological perspective, we characterize lake Kara Murat as a monomictic lake with an average water temperature of ca 14°C and dissolved oxygen of 10 mg/L. The study is still continuing; therefore, temporary conclusions are provided in here.

Keywords: Seasonality, Lake Kara Murat, Mesotrophic, Limnoecology

### **(Poster) A new species of *Cypridopsis* from Texas (USA)**

Okan Klkylođlu\*, Alaettin Tuncer & Joseph A. Veech

Total of 39 ostracods (19 living species, 20 taxa) were collected from 59 different shallow aquatic bodies in Texas during April to June 2017. *Cypridopsis schwartzi* n. sp. is proposed as a new species collected from a cattle pond in the Freeman Ranch, Texas. The species has several differences from other bisexual forms, including carapace shape, presence of a curved- z3 seta on the second antenna, numbers of vibratory plate on the first thoracic leg, shape of hemipenis, numbers of whorls on the Zenker organ, and several other differences in the numbers and shapes of other parts of the chaetotaxy. Including *Cypridopsis schwartzi* n. sp., there are now 12 species in the genus *Cypridopsis* when the new species is the fifth bisexual form for Texas. The new species was compared with other species of the genus in Texas and the taxonomic relationships are discussed.

Keywords: New species, Taxonomy, Distribution, Ecology

### **(Poster) Introduction of a new genus of Candoninae from Texas (USA)**

Okan Klkylođlu\*, Randy Gibson & Pete Diaz

Ostracod species diversity is one of the most interesting issues in the waters of Texas, where there are about 117 nonmarine ostracods belonging to 43 genera reported so far. We now introduce a new species of a new genus collected from a rheocene spring in Blanco County, Texas. Both, taxonomic description and results of cladistic analyses showed that the new genus belongs to the tribe Cabralcandonini in the subfamily Candoninae (family Candonidae) and displays several features (e.g., presence of two alae on the valves and differences in other soft body parts) different than other genera of the tribe. Accordingly, numbers of nonmarine ostracods increased to 118 species in 44 genera in the area. This supports the idea that ostracod species diversity is relatively high and needs further attention.

Keywords: New genus and species, Ostracod diversity, Taxonomy

### **(Poster) Diversity and distribution of ostracods in a high-use coastal ecosystem, Bay of Sept-Îles, Québec**

Marie-Christine Landry\*, Émilie Saulnier-Talbot & Philippe Archambault

Ecosystem dynamics in high-use coastal areas need to be better understood to improve science-based management and conservation. This project's primary objective is to assess coastal ostracod diversity and to determine their use as bioindicators of ecosystem health in the Sept-Îles Bay (SIB) region (Gulf of Saint-Lawrence, Québec), where urban, port and industrial activities could threaten ecosystem integrity. Surface sediments of 25 sites in the intertidal zone of the SIB and of 35 deeper sites (15 to 20 meters) were sampled. Physico-chemical parameters of the water were recorded at each site and sedimentary analyses will be performed to characterize the ostracod habitat. Once ostracod assemblages have been described, they will be analysed in light of the environmental data using multivariate analyses, allowing us to determine the factors that can best explain their distribution and abundance in the region. By the end of the project, we hope to obtain results which will provide the basis of ostracods as bioindicators that will allow further environmental monitoring and palaeoecological research in the SIB.

Keywords: Biogeography, Sediments, Coastal, Bioindicator, High-use

### **(Poster) Depth distribution of ostracods in Lake Ngoring on the Tibetan Plateau and its ecological and palaeolimnological significance**

Xiangzhong Li\*, Dayou Zhai, Qianwei Wang, Ruilin Wen & Ming Ji

31 surface-sediment samples were analyzed from the large fresh-water Lake Ngoring with water depth from two to 31 m on the northeastern Tibet-Qinghai Plateau to provide depth-preference information of ostracods valuable for palaeobathymetric reconstruction. Among the nine species discovered, *Tonnacypris estonica* and *Ilyocypris echinate* show clear preferences to shallow waters while *Leucocythere* sp. 1 and *Cytherissa lacustris* are confined to depths exceeding 22 m. *Ilyocypris* sp., *Candoninae* sp. [what is this? indet. Candonids? > *Candoninae* indet.), and *Leucocythere* sp. 2 are slightly more abundant in deeper parts of the lake, while *Candona candida* and *Fabaeformiscandona* sp. tend to be more abundant in the shallow area. Such information can be used to reconstruct qualitatively lake level change. Meanwhile, based on 23 samples with over 200 valve counts, three water-depth transfer functions are established, which have generally good and comparable performances judged from their determination coefficients and predictive errors. We propose that future studies should endeavor to investigate the distribution of more ostracod species across wider depth ranges from various lakes to encompass the large changes in ostracod assemblage and depth in the geologic past, and that datasets from different lakes can be synthesized into 'mega-transfer functions' to improve palaeolimnological reconstruction.

Keywords: Ostracoda, Lake Ngoring, Water depth, Transfer function, Biogeography, Qinghai-Tibet Plateau

### **(Talk) Ostracods biostratigraphy and stable isotope of the Upper Cretaceous Nenjiang and Sifangtai Formations in southern Songliao Basin (China)**

Jing Liu, Yunqi Ye, Dangpeng Xi\*, Dermeval Aparecido Do Carmo, Lixin Sun, Zuohuan Qin & Xiaoqiao Wan

The Songliao Basin in northeastern China preserves a diverse assemblage of Cretaceous fossil ostracods. Compared to the north and central Songliao Basin, ostracods from southern Songliao Basin are still less studied. The biostratigraphy, as well as carbon and oxygen isotopes, of the Santonian-early Campanian Nenjiang and Sifangtai formations from the ZKY2-1 borehole and Shenjiatun section in the southern of Songliao Basin are carried in this study. Four ostracod assemblages are established: *Lycopterocypris profunda* – *Talicypridea reticulata* – *Renicypris? renalata*; *Ilyocyprimorpha netchaevae* – *Scabriculocypris trapezoids*; *Strumosia accepta* – *Daqingella arca* – *Harbinia hapla*; *Mongolocypis magna* – *Cypridea ardua* – *Cypridea acclinia*, corresponding to the members 1-3 of Nenjiang Formation and to the Sifangtai Formation respectively. The change of the ostracod fauna between the Nenjiang and Sifangtai formations is consistent with the change from deep or sub-deep lacustrine to shallow lacustrine or fluvial environments. The  $\delta^{13}\text{C}$  of the ostracod shells display a range of 0‰ to 5‰ in the Nenjiang Formation and of -1‰ to 1‰ in the Sifangtai Formation. The  $\delta^{18}\text{O}$  shows an interval of -6‰ to -4‰ in the Nenjiang Formation and of -9‰ to -7‰ in the Sifangtai Formation. Covariance of carbon and oxygen isotopes suggests a closed lake system during the deposition of the Nenjiang Formation, while it points to an open lake during the Sifangtai Formation.

Keywords: Ostracod, Biostratigraphy, Stable isotope, Paleoclimate, Late Cretaceous, Songliao Basin

### **(Talk) Influences of geological diversity on limnology and freshwater ostracode species distributions in the northern Neotropical region**

Laura Macario-González\*, Sergio Cohuo, Philipp Hoelzmann, Liseth Pérez, Manuel Elías-Gutiérrez, Margarita Caballero & Antje Schwalb

In the northern Neotropics, the contributions of diverse landscapes and geological history in structuring aquatic environments and species associations remain poorly understood. We evaluated the relationships among geodiversity, limnology and freshwater ostracodes from southern Mexico to Nicaragua. Cluster analysis, based on geology, physical and chemical variables of water-columns, and geochemical and mineralogical characteristics of 76 aquatic ecosystems revealed two main limnological regions: (1) karst plateaus of the Yucatán Peninsula and northern Guatemala, and (2) volcanic terrains of the Guatemalan highlands, mid-elevation sites in El Salvador and Honduras, and the Nicaraguan lowlands. Seven subregions were recognized, demonstrating a high heterogeneity of aquatic environments. Principal Component Analysis identified water chemistry and mineralogy as most influential for aquatic ecosystem classification. Multi-parametric analyses, based on biological data, revealed that ostracode species associations represent disjunct faunas. Five species associations, distributed according to limnological regions, were recognized. Structural equation modelling (SEM) revealed that geodiversity explains the limnological regions and subregions. Limnology further explained species composition, but not species richness. The influence of conductivity and elevation were statistically significant for species composition, though not for richness. We conclude that geodiversity has a strong influence on the limnology, which, in turn, influences species composition in lakes of the northern neotropical region.

Keywords: Geology, Limnology, Freshwater ostracods, Northern neotropical region

### **(Talk) Late Miocene Ostracods from South-Eastern Slovenia**

Miha Marinšek\*, Valentina Hajek-Tadesse, Tea Kolar-Jurkovšek & Luka Gale

The purpose of this study was to identify the ostracod assemblage from a 43 m thick section belonging to the Bizeljsko Formation of the Krško Basin situated in South-eastern Slovenia. In total, 38 samples were collected and processed in the laboratory of the Geological Survey of Slovenia. Samples were dissolved in a 5% hydrogen peroxide solution; any samples that contained a large number of valves filled with sediment were put in an ultrasonic bath for 30 seconds. The dissolved material was then wet sieved through sieves with orifice diameters of 0.500 mm, 0.250 mm, 0.125 mm, and 0.063 mm. The determined ostracods belong to the Cyprididae, Cytheridae, Darwinulidae, and Loxoconchidae families. In total, 30 species were identified. An additional eight morphotypes were determined to the genus level. The most common genera are *Candona*, *Hemicytheria*, and *Cyprideis*. The assemblage belongs to the *Candona (Caspiocypris) labiata* biozone from the upper Pannonian. The palaeoenvironment is defined as a brackish lake with occasional freshwater influences. The ostracod assemblage from the Krško Basin shows the greatest similarity in species composition with Pannonian ostracods from Croatia and Serbia.

Key words: Lake Pannon, Bizeljsko Formation, Pannonian, Biostratigraphy, Ostracods

### **(Talk) An endemic species flock of cypridopsine ostracods (Crustacea) from Lake Malawi (Africa), with an overview of ancient lake ostracods**

Koen Martens\*, Bram Jacobs & Isa Schön

We present *Malawidopsis* Jacobs & Martens, 2022, a genus of Cypridopsinae Kaufmann, 1900 from the East African Ancient Lake Malawi. The genus comprises at least 17 new species, of which three are formally described, which makes it a significant ostracod radiation in this lake, parallel to a similar (but different) cypridopsine radiation in Lake Tanganyika. Potential drivers of speciation within ancient lake ostracod clades, using *Malawidopsis* as an example, are discussed. Bathymetric allopatry might have been important, with most species being restricted to shallower depths and only four species also occurring at depths of 75 m or more. Most species occurred on coarse sand, but this sediment category coincides with shallower stations. Overall, most species appear to have a wide geographical distribution in the lake., so no geographical parapatric speciation is apparent. The occurrence of all species in sexual populations and the significant differences in the male sexual organs and the valves suggest that sexual selection might have been the most important driver in the speciation process of this species flock, but this should be further explored. Following deep coring results in Lake Malawi, the present clade could be (at least) c one million years old.

Keywords: freshwater ostracods, *Malawidopsis*, long-lived lakes

## **(Poster) Two new genera of *Physocypria sensu lato* (Crustacea, Ostracoda) from Neotropical floodplains**

Nadiny Martins de Almeida, Vitor Góis Ferreira, Janet Higuti & Koen Martens\*

Several species of *Physocypria* Vávra, 1897 have thus far been reported from the Neotropical region. Recent collections from from three Brazilian floodplains (Upper Paraná River, Pantanal Sul Matogrossense and Amazon River) yielded seven new species belonging to two new genera. These genera and species resemble *Physocypria s.s.* in the shape of the carapace, the overlap of the LV over the RV, the presence of marginal tubercles on the RV, and the absence of d2-seta on T2. However, details of valves and appendages showed differences amongst the genera. Here, we describe the type species of the two new genera, which differ from each other especially in the shape of the hemipenis and from *Physocypria s.s.* by the absence of the short accompanying seta of the five natatory setae on A2, of the d1-seta on T2 and of the d2-seta on T3. In addition, four more new species belonging to the first new genus and one more new species belonging to the second new genus were also recorded. The morphology of the hemipenis and of the prehensile palps, together with the shape of the valves, were important characters to distinguish these new species. *Keysercypria* Karanovic, 2011 is here re-instated but with a much more restricted diagnosis.

Keywords: Microcrustacean, Candonidae, Cyclocypridinae, Endemism, Brazil

## **(Talk) The rediscovery of *Palaeocypris edwardsii* Brongniart, 1876, or how collection digitization can have an unexpected benefit**

Renate Matzke-Karasz\*, Marie-Béatrice Forel & Robin James Smith

In 1876, Charles Brongniart provided the first report of fossil ostracods with preserved soft parts, describing 13 specimens as the new species *Palaeocypris edwardsii*. These were found inside a silicified Carboniferous *Cardiocarpus* seed, revealed by a thin section prepared by the palaeobotanist Bernard Renault, who had perfected the technique – proven by a collection of over 4000 slides still present at the MNHN. *Palaeocypris edwardsii* may have a high potential to help understand when and how ostracods colonized continental waters. For decades, restudying these valuable fossils was prevented because the slide could not be located in the Renault collection at the MNHN. Recently, the first author explored all ca. 2000 Renault collection items that had meanwhile been incorporated into the online MNHN digital collection. Unexpectedly, the fossil was found.

Supported by an EU Synthesys Transnational Access grant, the authors will re-study these fossils in May 2022 by applying modern microscopic techniques to investigate the high scientific relevance this slide has to offer. The first results of this investigation will be presented in the context of what is known about non-marine ostracods in the Carboniferous.

Keywords: Soft part preservation in ostracods, Carboniferous, Digitized collections.

### **(Talk) The new Specific Population Stage (SPS) index: putting the dead ostracods to work**

Ilaria Mazzini\*, Roberta Parisi, Diana Barra & Giuseppe Aiello

Paleobiology conservation studies compare living and fossil communities to identify reference conditions. When dealing with ostracod assemblages, the conundrum that the living specimens are always under-represented compared to the naturally time-averaged accumulations of shells has remained unresolved. In fact, studies on Recent marine benthic ostracods often failed to discriminate between the live and the dead or displaced elements of the assemblages because the method of protein-specific non-vital staining Rose Bengal, seems to be unreliable when applied to ostracods.

Our study wants to test: i) whether the living/dead ostracod specimens can be distinguished in an ostracod assemblage using alternative methods to staining and ii) how the processing of the sediment sample can affect the diversity of the assemblage. Nine subsamples from a short core, collected in the circalittoral zone of Pontine Archipelago, central-eastern Tyrrhenian Sea (Italy), were investigated. More than 2000 ostracod valves have been measured to calculate the adult to juvenile ratio, the population age structure and to perform statistical analyses. The new Specific Population Stage (SPS) index is proposed, that can be used to effectively assess the autochthonous component of an assemblage without the need for staining and thus could help in defining reference conditions in conservation paleobiology studies.

Keywords: Paleobiology conservation, Paleoenvironmental reconstructions, Biocenosis, Thanatocenosis, Non-vital staining

### **(Talk) Latest Miocene Ostracoda from the Bookpurnong Formation, Murray Basin, southeastern Australia: shallow marine migrants into an epicontinental sea.**

Abbey P. McDonald\* & Mark T. Warne

The latest Miocene Bookpurnong Formation occurring within the Murray Basin of Australia contains a rich and diverse fossil marine ostracod fauna. This fauna is associated with a latest Miocene marine transgression that reflooded inland regions of southeastern Australia to form an epicontinental sea. Many of the latest Miocene ostracod species present in the Bookpurnong Formation were new migrants into seas around southeastern Australia at this time, and evidence a subtropical range expansion of thermophilic and warm-water ostracod species into southern hemisphere mid latitudes. This perhaps reflects the strong influence of warm plumes of the East Australian Current waters impacting southeastern Australia during the latest Miocene. Fossil ostracod assemblages are interpreted to have mostly occurred in low to moderate energy, shallow, offshore marine palaeoenvironments and occurred in warm temperate to subtropical waters.

Keywords: Late Miocene, Southeastern Australia, Murray Basin, Palaeoenvironments, Taxonomy

### **(Talk) Body weight and respiration in some podocopid ostracods**

Francesc Mesquita-Joanes \*, Lidia López, Julio Cruz, Lara Quijada, Patricia Jerez, Alexandre Mestre & Ferran Palero

The ecology and distribution of non-marine ostracods depend, among other factors, on water temperature. Although an increase in metabolic rate is expected in warmer waters, the ecophysiological response of ostracods to temperature is still poorly known. In order to test this expectation, oxygen uptake was measured at different temperatures in four species of podocopid ostracods (*Cyprideis torosa*, *Physocypria* sp., *Cypridopsis vidua* and *Heterocypris salina*). Furthermore, the influence of locomotory activity on respiration was tested using anaesthesia in a fifth species (*Eucypris virens*) which is larger in size. As metabolic rate strongly depends on body weight, dry weight per individual was also measured for each species, with values ranging between 10 and 118  $\mu\text{g}$  (c. 55-70% corresponding to shell weight). An increase in oxygen consumption with temperature was observed, with lowest values of  $0.3 \mu\text{L O}_2 \cdot \text{h}^{-1} \cdot \text{mg}^{-1}$  at  $10^\circ\text{C}$  and highest rates of  $2.1 \mu\text{L O}_2 \cdot \text{h}^{-1} \cdot \text{mg}^{-1}$  at  $30^\circ\text{C}$  in small and medium sized species, but up to  $6.9 \mu\text{L O}_2 \cdot \text{h}^{-1} \cdot \text{mg}^{-1}$  at  $20^\circ\text{C}$  in the largest *E. virens*. The swimming activity of actively moving individuals of *E. virens* accounted for up to 88% of oxygen consumption, compared with anaesthetized individuals (i.e. basal metabolic rate).

Keywords: Metabolic rate, Oxygen consumption, Locomotory activity, Thermal effects, Podocopida

### **(Talk) Ostracod distribution in the Sea of Galilee, northern Israel**

S. Mischke\*, P. Braun, E. Ito, A. Nishri & A. Almogi-Labin

The Sea of Galilee (Lake Kinneret) is the only freshwater lake in Israel. It is 22 km from north to south and 12 km from east to west, and bowl-shaped with a maximum depth of ca. 40 m. Ostracod valves and living specimens were investigated from surface-sediment samples collected in January 2012 to improve the knowledge of the lake's fauna, its depth distribution, and to examine the effects of seasonal anoxic conditions beneath ca. 17 m as result of thermal stratification. A total of 68 samples from 0.3 to 39.6-m depth were analyzed. Valves of *Cyprideis torosa* (*C. f. torosa* and *C. f. littoralis*), *Ilyocypris hartmanni*, *I. nitida*, *Darwinula stevensoni* and *Neglecandona angulata* represent the most abundant taxa among the 15 species recorded. The abundance of recorded valves (including carapaces) in 100-mL samples varies in a large range from 6-435 (mean 160) above a depth of 18 m whilst 0-42 valves (mean 12) were recorded below 18 m. The drop in the abundance of ostracod valves at a depth of 18 m shows that only few ostracod valves experience post-mortem transport beneath the metalimnion although the Sea of Galilee is known for the intense daily westerly winds and strong currents.

Keywords: Near East; Levant; Freshwater Ostracoda; Taphonomy

### **(Poster) Environmental conditions in the early Late Pleistocene of the Nihewan Basin (Hebei, NE China): the Paleolithic Youfangbei Site**

S. Mischke\*, H. Zhao, P. Tan & X. Sun

The Nihewan Basin in NE China is famous for the many artefacts and megafauna fossils recovered from Early Pleistocene deposits. In contrast, only few studies focussed on Late Pleistocene archaeological sites in the region. We investigated artefacts and calcareous fossils from the Youfangbei Site. The artefact-bearing layer at Youfangbei is 2.5-m thick and overlain by a 10-m thick sequence of loess-like deposits. OSL dating of sediments from the cultural layer shows that hominins were active in the region during the second half of the last interglacial between ca. 107 and 86 ka (MIS 5). Ostracod valves and shells of bivalves and partly terrestrial gastropods were mainly recovered from the middle and upper part of the cultural layer. In total, 11 ostracod taxa including *Ilyocypris* spp., *Pseudocandona* sp., *Heterocypris salina*, *Physocypria kraepelini* and *Cyclocypris ovum*, five gastropod taxa, and the bivalve *Pisidium* were recorded. The identified taxa are mostly typical of shallow and partly temporary waterbodies. Together with the occurrence of shells of terrestrial gastropods, the calcareous remains of the aquatic organisms indicate that a wetland setting with slowly flowing water and exposed, dry spots nearby existed at the Youfangbei Site when hominins were present during the early Late Pleistocene.

Keywords: Geoarchaeology; Freshwater Ostracoda; Bivalvia; Gastropoda; Wetlands

### **(Talk) Correlation of early Pleistocene sediment sections in the Nihewan Basin, China, using ostracod assemblage data and sedimentology**

Ahmed H. Moghazi\*, Hailong Zhao, Chengjun Zhang, Elísabet Ásta Eypórsdóttir & Steffen Mischke

Stone tools embedded in fluviolacustrine sediments of the Nihewan Basin in NE Asia represent one of the earliest evidence for hominin occupation outside of Africa. In addition, abundant fossils of the Pleistocene megafauna attracted a lot of research in the past. However, detailed lithological and micropalaeontological analyses were rarely applied to better understand the basin's depositional history. We studied three nearby sedimentary sections of up to 50-m thickness along the Dachangliang ridge at the eastern basin margin. Ostracod assemblage data of laterally apparently consistent sedimentary beds were used to correlate these sections. From 414 investigated sediment samples, approximately 79% of the samples yielded ostracod valves. Their abundance fluctuates between 0 to 12,000 specimens per 30 grams of sediment. However, the ostracod valves are relatively evenly distributed over the studied sections. The fauna comprises 13 species. Significant faunal change occurs in layers of white marls which are dominated by valves of *Cytherissa lacustris* and/or *Leucocythere dorsotuberosa*. Under- and overlaying beds mostly include valves of *Limnocythere flexa*, *Ilyocypris* and *Heterocypris salina*. The white marl layers serve as marker beds which were formed during periods of relatively high lake levels, whilst the under- and overlaying sediments accumulated in wetlands and/or on alluvial plains.

Keywords: Quaternary; Asia; Stratigraphic correlation; Hominins; Paleolithic

**(Talk) Correlation between morphological types of male copulatory organs and distribution patterns of corolla-like pore systems in *Bicornucythere bisanensis***

Daisuke Nakamura\* & Akira Tsukagoshi

Correlation between the morphology of male copulatory organs and the distribution patterns of pore systems in the *Bicornucythere bisanensis* (Okubo, 1975) were examined. The specimens were collected from Aburatsubo Cove (central Japan), Ushimado (western Japan), and from the Yatsushiro Sea (southwestern Japan). The male copulatory organs show noticeable intraspecific variation in the distal lobe, especially the length of the tip in the population from Aburatsubo Cove. The variation can be recognized as four morphotypes and each type is defined by a combination of four shapes observed in the right and left distal lobes. The distribution patterns of pore systems were compared between the four morphotypes of the male copulatory organs. As a result, some correlations were found between the four morphotypes of male copulatory organs and distribution patterns of corolla-like pore systems. Considering the circumstances mentioned above, it is postulated that the morphotypes have different mating frequencies, which is genetically reflected in the creation and maintenance of different pore distribution patterns.

Keywords: Inner bay ostracods, Intraspecific variation, *Bicornucythere bisanensis*, Male copulatory organ, Corolla-like pore system

**(Poster) An undescribed species of *Saipanetta* (Superfamily Sigillioidea) from central Japan – the first report from the upper eulittoral zone, with details of its habitat**

Yuriko Nakao\* & Akira Tsukagoshi

An undescribed living species of *Saipanetta* was found from the intertidal zone of central Japan. Carapaces of the specimens were observed using a light microscope, and SEM without coating. The following features were recorded: The carapace is a somewhat elongate ovoid in lateral view and the surface is smooth; the valves are unequal, with the left valve larger and overlapping the right valve around the entire margin; many small adductor muscle scars make a large circular aggregate, although the outline of each scar is obscure; and the hinge is merodont-type. Considering these features and anatomical observations of dissected soft parts of male specimens, the species is assignable to the genus *Saipanetta*. Some unique features were observed, including an extremely faint geometrical pattern on the carapace surface, and the absence of pore canals in the postero-dorsal area. Thus, based on the carapace alone, the species is distinguished from other saipanettids. All *Saipanetta* previously reported were obtained from the sublittoral zone with coarse-grained substrates. Our specimens were obtained from the upper eulittoral zone, the shallowest record of living *Saipanetta*. Moreover, as they were obtained from coarse-grained substrates, it is reasonable to surmise that they are truly interstitial. Details of the habitat and soft part anatomy will be discussed.

Keywords: *Saipanetta*, Upper eulittoral zone, Interstitial, Habitat

### **(Talk) Composition and distribution of recent ostracod assemblages from the bottom sediments of Lake Kournas (Crete Island, Greece)**

V. Navrozidou\*, O. Koukousioura, P. Frenzel, P. Avramidis, M. Triantaphyllou, E. Aidona & G. Syrides

Recent ostracod assemblages were analyzed in order to investigate their composition and distribution in Lake Kournas (Crete Island, Greece), compared to a multi-parameter environmental dataset (temperature, salinity, pH, TDS), grain size, organic carbon and magnetic susceptibility measurements. Lake Kournas is the only natural lake in Crete and the southernmost lake of Europe. The lake is monitored for its environmental status and is characterized by a continuous degradation due to anthropogenic activities in the surrounding area. Sampling of the top 2 cm of the surface sediment was conducted in 3 stations in 2017 and in 12 stations in 2020. 3139 ostracod valves were identified and assigned to eight species, with the most dominant being *Cyprideis torosa* followed by *Candona* spp. Lake Kournas presents a brackish character as supported by most of the ostracod species (*Candona angulata*, *Candona neglecta*, *Cyprideis torosa*, *Cyclocypris* cf. *ovum*, *Darwinula stevensoni*, *Heterocypris salina*, *Herpetocypris* sp.), which are typical for their brackish preference. Along the north part of the lake ostracod abundances and species richness displayed the highest values, while the lowest were observed along the south-eastern part suggesting stressful environmental conditions mainly due to the extensive touristic activities which are focused in this part of the lake.

Keywords: Recent ostracods, *Cyprideis torosa*, Lake Kournas, Environmental conditions, Greece

### **(Poster) Non-marine ostracoda from Mediterranean islands**

Ahmet Özdilek\* & Okan Külköylüoğlu

Islands are isolated areas and/or regions where species or populations are adapted to certain kinds of ecological conditions. In terms of ostracods, suitable water conditions can provide possibilities for their survival. However, unlike many other taxonomic groups, distribution of non-marine ostracods to the islands is produced as passive way. In this context they can be transported between or among the islands by means of hosts such as birds, humans or other agents. Knowledge about such relationship on how ostracods are dispersed aids creating ecological and/or biogeographical models. Thus, beginning from the available literature, we worked on the ostracods reported from 40 Mediterranean islands. Sicily, with 48 species, showed the highest diversity while *Cyprideis torosa* was the most common ostracod in the Mediterranean islands. Accordingly, we found 107 taxa belonging to 46 genera. Among them, two genera (*Cypridopsis*, *Ilyocypris*) were most frequently reported groups among the islands.

Keywords: Island biogeography, Passive-active dispersion, Non-marine ostracods, Ecology

### **(Talk) Ostracod analysis of Marathousa 1 and Kyparissia 4 sites of Megalopolis Basin (Southern Greece): refugia or not?**

Penelope Papadopoulou\*, Maria Tsoni, George E. Konidaris, Vangelis Tourloukis, Annett Junginger, Eleni Panagopoulou, Panagiotis Karkanis, Katerina Harvati & George Iliopoulos

The Megalopolis Basin is situated on the central part of Peloponnese (Greece). It is an intramontane half-graben, known as one of the most important Middle Pleistocene (Lower Paleolithic) archaeological and palaeontological regions in Greece, yielding a wealth of fossil large mammals. Nowadays it is one of the largest coal mining districts of the country. During the Pleistocene, lacustrine and fluvial sediments were deposited in the basin. Especially the Marathousa Member (Choremi Formation) consists of alternations between clastic sediments and lignite seams. It bears a total thickness of ~150 m. Ostracods have recently been used for the palaeoenvironmental reconstruction of two Middle Pleistocene sites (Marathousa 1 and Kyparissia 4) as part of a multi-proxy methodological approach. The results of the ostracod analysis of 54 samples, revealed a poor taphocoenosis with low abundance and diversity. However, 14 different ostracod species were identified (*Candona angulata*, *Candona neglecta*, *Cyclocypris* cf. *ovum*, *Darwinula* sp., *Fabaeformiscandona breuili*, *Ilyocypris bradyi*, *Ilyocypris decipiens*, *Ilyocypris getica*, *Ilyocypris gibba*, *Potamocypris zschokkei*, *Prionocypris zenkeri*, *Pseudocandona marchica*, *Psychrodromus* sp., *Sarsicypridopsis* sp.). The identified assemblage along with the calculated taphonomic indices revealed the existence of different freshwater bodies of small volume, connected to springs and gave supporting evidence for the effects of glacial extremes and refugia for hominins in this southern European region.

Keywords: Ostracods; Kyparissia 4; Marathousa 1; Pleistocene; Greece

### **(Poster) New Ostracod Discoveries from the Late Miocene-Early Pliocene age Danakil Formation, Eritrea**

Lisa Park Boush\* & Christine Hall

New fossil finds are reported from a previously unknown geographic location in the arid Danakil Depression, a ~300 km wide diffuse extensional province within the northern Afar region of Dallol, Eritrea. We present <sup>40</sup>Ar/<sup>39</sup>Ar ages (6.39 and 3.71 Ma) that provide robust chronostratigraphic control for the oldest dated fossil assemblage discovered within this northern region of the East African Rift System (EARS). Five ostracod species from three families, Cyprididae, Cytherideidae and Candonidae were found in the lacustrine units of the 100 meters of measured section. Species include *Afrocypris* sp. Sars 1924, *Zonocypris* sp. Muller, 1898, *Aglaiella afreraensis* Gramann 1971, *Cyprideis torosa* Jones 1850, and *Miocyprideis* cf. *spinulosa* G.S. Brady 1868. Some of the species, like that of the genus *Afrocypris* are considered freshwater, while others, like *Cyprideis torosa* can occur in a salinity range from freshwater to hypersaline. Other species, like *Zonocypris* sp. occur in alkaline conditions, particularly in shallow lakes. The presence of these species indicates a shallow fresh-brackish lake environment. Presence of three gastropods, *Bellamyia unicolor*, *Melanoides tuberculata* and *Cleopatra bullimoides* support this interpretation. The fossil assemblages help evaluate the paleoenvironmental and landscape continuity within the EARS during the climatic and faunal evolution of the Miocene-Pliocene in Africa.

Keywords: Lacustrine, East African Rift, Freshwater, Brackish

## **(Talk) Late Holocene Ostracoda and climate changes in the southern margins of the Arabian Desert (Yemen)**

Shah Parth, Nicolas Waldmann; James Russell & Ilaria Mazzini\*

The southern margin of the Arabian Desert is a climatic sensitive zone that responds to hydrological changes modulated by the Indian Monsoon System. A multiproxy approach was carried out on two sediment cores located in south Yemen. A ~1 m long core sequence was taken from the extinct crater of Kharif Shawran where a central depression is filled with saltwater fringed by mangrove trees. A 3.3 m long core was retrieved from the sink hole lake Gayal el Bazal, today reduced to small residual pools due to human groundwater withdrawal and agriculture.

The ostracod assemblage from the crater lake is represented by monotypic smooth *Cyprideis torosa*, confirming the salinity of the water and its hydraulic continuity with the sea. In the sink hole lake instead, *Vestalenula molopoensis*, *Bradleytriebella lineata*, *Fabaeformiscandona* spp. and *Limnocythere inopinata* have been found. Thanks to the well constrained chronology of the core, *B. lineata* and *V. molopensis* density fluctuations have been related to the Medieval Climate Anomaly and the Little Ice Age climatic phases. *Fabaeformiscandona* spp. seems to be more linked to anthropic disturbance. The ostracod assemblages have provided useful information to understand how two lakes, with different geological and hydrological setting, reacted to climate change.

Keywords: Climate changes, Monsoon variability, Lacustrine environment, Paleoenvironmental reconstruction

## **(Poster) Systematics of *Elpidium* Müller, 1880 (Podocopida: Limnocytheridae) and implications to Brazilian Atlantic Forest biogeography**

J. S. Pereira \*, C. E. F. Rocha, R. L. Pinto & M. B. DaSilva

*Elpidium* is a freshwater genus restricted to phytotelm environments, particularly tank-bromeliads. Following the geographic distribution of bromeliads, *Elpidium* possibly occurs throughout the Neotropical region, especially in humid forest areas. Such wide geographic distribution would imply a high level of diversity and endemism, with species clusters occurring in some but not all sub-regions of the Neotropical region, if we consider the dependence of the genus on dispersal vectors, especially amphibians, to maintain gene flow and colonize new habitats. Here, we raise the number of described *Elpidium* species from Brazil (mainly from the Atlantic Forest) from one (the type-species *E. bromeliarum* described in 1880) to 14 species. Of these, nine species represent the first record of the genus for the states where they were collected, and seven occur in the Northeast Brazilian Atlantic Forest, the most fragmented and threatened Atlantic Forest sub-region. In addition, we propose a morphological phylogeny for the genus and discuss its monophyly, internal and external relationships with closely related lineages of the subfamily Timiriaseviinae. Finally, we assess the possibility of using *Elpidium* to understand the historical biogeography of the Brazilian Atlantic Forest.

Keywords: Ostracoda, Neotropical region, Atlantic Forest, Systematic, Biogeography

### **(Talk) Ecological diversification of early planktonic ostracods in the upper Silurian**

Vincent Perrier\*, Gwendal Perrichon, Félix Nesme, Saturnino Lorenzo & Juan Carlos Gutiérrez-Marco

The Silurian myodocope ostracod fauna has been recognized for several decades as including the pioneer planktonic component of the group. Although the mid Silurian (Wenlock-Ludlow) colonization event is well documented worldwide, the evolution of this fauna during the late Silurian (Pridoli) is poorly known. Here we describe two ecologically distinct myodocope ostracod faunas from the same horizon (Pridoli, probably *Istrograptus transgrediens* Biozone) in Alcaracejos, Cordoba district, central Spain.

One fauna was recovered from weathered black shales and includes five myodocopes species associated with orthoconic cephalopods, bivalves and graptolites. The other fauna comes from large reddish calcareous nodules containing six myodocopes species associated with planktonic crinoids (*Scyphocrinites elegans*), orthoconic cephalopods, phyllocarids and bivalves. Among the nine species of myodocopes present in the localities in Alcaracejos only two are present both in the shales and the nodules, thus suggesting that these two faunas could have had different ecologies. The faunal association of the shales would represent a planktonic fauna of the water column; while it is suggested that the faunal association of the nodules would have lived near "floating islands" formed by the colonies of *Scyphocrinites*. These two faunas therefore probably occupied distinct ecological niches in different parts of the water column.

Key words: Ostracoda, Myodocopa, Plankton, Palaeoecology, Silurian

### **(Poster) Quantitative variation of morphological 3D-traits in ostracod shells. *Eucypris virens* – a case study**

Kai Pfennings\* & Finn Viehberg

The detailed description of valve traits is a fundamental aspect of ostracod taxonomy and links fossil and recent systematics. Quantitative 2D geometric morphometric methods have been successfully used to determine morphospecies, distinguish ecophenotypes, and to compare valve shape with molecular data. 3D approaches are still under development in the field of ostracodology, but may provide an even more precise idea of morphological diversity. This study focused on the morpho-variable ostracod species *Eucypris virens* (Jurine, 1820). Previous studies showed that the *E. virens* species complex contains multiple cryptic genetic species, which are not clearly morphologically distinguishable by 2D valve outline analysis. We used high-resolution  $\mu$ -CT scans for an objective geometric morphometric approach using 3D curve and surface-sliding semi-landmarks. The morphological results were compared to genetic clades of *E. virens* by multivariate statistics. At least three previously considered cryptic species are morphologically distinguishable. We show that 3D curve and surface-sliding semi-landmarks are useful to quantify small-scale 3D changes on feature-poor non-marine ostracod shells.

Keywords: Comparative morphology, Taxonomy, Cryptic species

## **(Poster) Reconstruction of the environs of Elaia's ancient harbour using ostracods and foraminifers**

Anna Pint\*, Silvia Kolomaznik, Martin Seeliger & Peter Frenzel

During Hellenistic and Roman times Elaia, the harbour city of ancient Pergamum, was an important place of trading and traffic in the eastern Mediterranean Sea. The aim of the present study is to reconstruct the history of Elaia's harbour within the context of coastal evolution. For that purpose, a sediment core was drilled in the centre of the ancient closed harbour. As indicated by a diverse marine microfauna, the site's evolution started in coastal marine conditions, followed by a lagoonal soft bottom assemblage mirroring the construction of the breakwaters in Hellenistic times. Silting up caused the abandonment of the harbour in late Roman times. Fragmentation of the very shallow water body and freshwater inputs produced brackish and coastal pond conditions as indicated by ostracods as *Cyprideis torosa*, *Sarscypridopsis aculeata* and *Heterocypris salina*. The dominance of *Ilyocypris bradyi* suggests no-marine conditions during a short time in the Medieval period. Whereas Foraminifera are more abundant during the marine phase and can be used together with Ostracoda, the latter are more valuable proxies recording the perishing of ancient coastal harbours. Sieve-pore shape analyses of *Cyprideis torosa* reflect strong variations of salinity and, especially during the uppermost silting up phase, hypersaline conditions.

Keywords: Elaia, Ostracoda, Mediterranean, Foraminifera, Harbour

## **(Talk) Further evidence for a widespread *Cardinium* infection in non-marine Ostracoda**

Karina Prais, Monika Mioduchowska, Tadeusz Namiotko\* & Adrianna Kilikowska\*

*Cardinium* is a genus of intracellular and maternally inherited bacteria, known to influence reproduction of their hosts. We present new data on incidence and prevalence of *Cardinium* in non-marine ostracods based on bacterial 16S rDNA sequences from 469 individuals belonging to 31 species of seven families and originating from 48 populations collected from 31 sites in 10 European and African countries. The investigated populations represented sexual and asexual (parthenogenetic) reproduction modes. The total incidence of infection was high (90.3%), including 19 species in which *Cardinium* was reported for the first time. *Cardinium* was observed in species with both sexual and asexual mode of reproduction but no difference between incidence of *Cardinium* infection between sexual (84.6%) and asexual (94.4%) species was observed (Fisher exact test  $p=0.558$ ). Considering only those species for which at least 5 specimens were screened, the prevalence of *Cardinium* infection ranged from 16.7% to 100%. Pooling individuals of all species, the total prevalence of *Cardinium* in sexually reproducing species was 40.3%, while in asexual species 83.0%, and this difference was highly significant (Chi-square test  $p<0.001$ ). Our results confirm inferences based on previously published surveys and consolidate the existing knowledge on the widespread *Cardinium* infection in non-marine ostracods.

Keywords: Intracellular bacteria, 16S rDNA, Incidence, Prevalence, Endosymbionts

### **(Talk) Taxonomy, biostratigraphy and palaeoecology of Early Cretaceous non-marine ostracods in Luanping Basin, North China**

Zuohuan Qin, Dangpeng Xi\*, Benjamin Sames\* & Xiaoqiao Wan

The Luanping Basin and other basins in northern Hebei Province, China, preserve abundant fossils of the Early Cretaceous Jehol Biota, including non-marine ostracods. However, there are still some controversies concerning the stratigraphic correlation of the respective deposits in these regions. In addition, taxonomy and palaeoenvironmental interpretation of the ostracods from the Luanping Basin needs further study. Detailed field work on representative sections of the Lower Cretaceous Dabeigou, Dadianzi and Xiguayuan formations of the Luanping Basin have revealed a diverse ostracod fauna with ostracods occurring frequently in the sections and in high abundance. Preliminary taxonomic analysis revealed 13 ostracod genera, including *Cypridea*, *Yumenia*, *Daurina*, *Yanshanina*, *Ocrocypris*, *Eoparacypris*, *Djungarica*, *Darwinula*, *Alicenula*, *Rhinocypris*, *Timiriasevia*, *Lycopterocypris* and *Mongolianella*, and around 40 species of non-marine ostracods. The ostracods of the Dabeigou, Dadianzi and Xiguayuan formations in the Luanping Basin can be divided into the *Luanpingella*-*Ocrocypris*-*Eoparacypris*, *Cypridea*-*Timiriasevia*-*Daurina* and *Cypridea*-*Limnocypridea*-*Lycopterocypris* assemblage zones, respectively. From older to younger deposits, we also can see an overall trend in reduction of the mean body size of the ostracods. The extending geographic distribution and increasing diversity of the ostracods over time we interpret as response to the climate turnover from generally cool to warm during this time interval.

Keywords: Ostracods, Taxonomy, Biostratigraphy, Palaeoecology, Luanping Basin

### **(Poster) Anthropogenic impacts on the ostracod fauna of Lake Stechlin, north-eastern Germany**

Ella Quante\* & Peter Frenzel

Lake Stechlin, in north-eastern Germany, has a long history of environmental monitoring for physical, chemical, and biological changes. The ostracod fauna was, however, only investigated in the 1960's by Flößner (1985). During 1966–1990 a nuclear power plant operated near the north-western shore. The cooling water, discharged into the former oligotrophic lake, led to higher water temperatures even in the profundal zone and rose the trophic state. Eutrophication processes and an increase of biomass of planktic algae are still continuing today.

We studied the ostracod assemblages in benthic surface samples in different areas of the lake, to analyse changes in the fauna, environments and possible human impacts. Preliminary results show that the ostracod fauna is still diverse, and *Cytherissa lacustris* is still abundant in the sublittoral and possibly profundal areas. However, ostracods are widely missing from surface sediments beneath 10 m water depth because of longer anoxia periods and dissolution of ostracod shells. Additionally, anthropogenic activities at the shores (e.g., bathing, fish farming) show to have a negative local impact on both ostracod abundance and diversity.

Keywords: Freshwater, Lake, Oligotrophic, Anthropogenic impact, *Cytherissa lacustris*

### **(Talk) New age constraints on the Transcaucasian basin: high resolution ostracod analysis of the Guria region**

L. Rausch\*, D. Bista & M. Stoica

The Paratethys, the unified precursor of the Black and Caspian seas, has a dynamic history of basin development and biotic evolution. The largely isolated evolution of fauna and flora resulted in highly endemic assemblages, forming the bases of complex regional stratigraphic frameworks. Accurate age correlations between these regional stratigraphic schemes are still hampered in many places by the lack of proper age constraints. Here, we present an updated biostratigraphic framework based on high-resolution ostracod analysis for the Guria region in the Transcaucasian Basin (Georgia). Khvarbeti is the type section for the Gurian regional stage, previously magnetostratigraphically correlated to the early Pleistocene (1,8 – 0,8 Ma). The ostracod assemblages, however, contain several species known from elsewhere in the region not exceeding a temporal range higher than late Miocene – early Pliocene (6,1 – 5,5 Ma) corresponding to the Pontian/Kimmerian regional stages of the Black Sea basin. We also measured the Sr isotopic ratio on ostracods collected from the Khvarbeti section to examine the connectivity of the Black Sea with the Caspian Sea. In the light of the biostratigraphy-based late Miocene age, we show that the Black and Caspian seas have similar Sr isotopic values indicating that the two basins were hydrologically connected during that time.

Keywords: Gurian, Ostracods, Paratethys, Caucasus, Biostratigraphy

### **(Talk) Benthic signal of ostracods in the last glacial cycle (MIS5-MIS1, Bay of Biscay, NE Atlantic)**

Julio Rodriguez-Lazaro\*, Ana Pascua, Zeltia Varela & Blanca Martínez-García

Deep marine ostracods have been used to paleoenvironmental reconstructions, considering different proxies where the benthic and planktonic signals can be characterized. In this work we study low bathyal ostracods' response to late Quaternary (MIS5-MIS1) climatic sub-orbital variability in central Atlantic Bay of Biscay. Based on a detailed chronology as well as isotopic and elemental analyses and foraminifer signals, most important climatic events (Heinrich, Greenland stadials GS, interstadials GI) can be characterized. We used foraminifers to evaluate the degree of oxygenation of benthos and the paleoproductivity of surface waters. Ostracods of deep Bay of Biscay exhibit a very low abundance and are represented by genera as *Krithe* (6 spp.), *Argilloecia* (6 spp.) and *Cytheropteron* (5 spp.), among others. The ostracod response to paleoclimatic oscillations is discussed by considering changes in their assemblages and diversity. A more detailed study has been taken for MIS5, where no particular thermal response (glacial inception, MIS5d) was found for the ostracods. Maximum of *Krithe* and *Argilloecia* occurred in this area during the stadial GS23, coincident with Heinrich HS9, an oxic and low Ca interval, and low intensity of deep currents that, besides oscillations in surface productivity, controlled ostracod distribution in this region of NE central Atlantic.

Keywords: Ostracods, Deep-sea, Paleoclimate, MIS5-MIS1, Bay of Biscay

### **(Talk) Ultra-high resolution ostracod data as a tool for a deeper understanding of the Mulde/ *lundgreni* event (lower Silurian)**

S. Rinkevičiūtė\*, A. Spiridonov, T. Meidla

The Mulde/ *lundgreni* event (Wenlock Series) was one of the most significant faunal turnover episodes of the Silurian period. The event was of a short duration (~30-40 Ka); however, most of the biota underwent a reorganization during the event. Ostracods were not an exception: they went through a sudden decrease and ultimately complete temporary disappearance during the peak of the event following complete restructuring of their communities.

This study presents ultra-high resolution (split interval - 0, 25 m or 5 thousand years in time scale) Mulde event ostracod data from the Gėluva-118 core section, Lithuania, South Baltic. The main focus of the study is the comparison of fine scale changes in ostracod communities in pre-, during and post-event intervals. This study revealed a much more detailed picture of the Mulde/ *lundgreni* interval from the stand point of benthic communities.

Data analysis revealed the transitioning point of temporary disappearance and reoccurrence of dominant species. With regard to taxonomic extinctions, the impact of this event was insignificant as not a single recorded species of ostracod completely disappeared during the studied interval. Additionally, in the aftermath even an increase in local species richness was observed.

Keywords: Ostracods, Mulde/ *lundgreni* event, extinction

### **(Poster) Response of marginal marine ostracods to Holocene environmental changes: river influences vs marine influxes in the Danube delta**

S. Rotaru\*, A. Vespremeanu-Stroe, D. Hanganu & L. Tutuianu

Marginal marine systems such as estuaries, deltas, coasts are very sensitive to environmental changes due to their transitional character, marking the gradual change from continental to basin conditions. Danube delta recorded significant geomorphological transformations throughout its Holocene evolution caused by the interplay between Danube River water and sediment supply and Black Sea dispersing forces and sea-level oscillations.

This study explores the paleoenvironmental evolution of the upper Danube delta starting from the mid-Holocene, at the onset of delta progradation in the Danube paleo-estuary, through the late Holocene following the decoupling of the upper delta from basin processes. Paleoecological analyses were done based on ostracod samples retrieved from a 16 meters long core from Babele Lake. The ostracod assemblages revealed a succession of five salinity intervals ranging from hypohaline to mesohaline conditions. Between 7000-6200 cal yr BP, the ostracod assemblages show that the site was connected to brackish coastal lagoons and was under the influence of relative sea-level fluctuations. Between 6800 and 6450 cal yr BP higher saline influxes suggest a sea-level rise, followed by a fluvial reactivation and a freshening of the environment after 6200 cal yr BP when the site is far away from the prograding shoreline.

Keywords: Paleoecological analyses, Sea-level, Fluvial delta, Progradation, Black Sea

## **(Talk) Ostracod fauna from the Western Ross Sea Shelf surface sediments; a key to interpreting the climate changes recorded by the IODP Expedition 374 Site U1523**

G. Salvi\*, F. Sciuto, P. Falco, P. Castagno, M. Ferneti, P. Montagna, M. Taviani, J.B. Anderson, R. McKay, L. De Santis, D.K. Kulhanek & the IODP Expedition 374 Scientific Party

The study represents the first study of the ostracod fauna collected from ninety surface samples in the Western Ross Sea Shelf (WRSS), analyzed together with salinity, temperature and water depth data, acquired during 17 Italian National Antarctic Research Programme (PNRA) expeditions from 1995 to 2019. The results demonstrated that the dominant ostracod association in WRSS is mainly represented by species able to colonize different shelf environment characterized by an extensive range of water depths. These characteristics could have probably served as a potential source for shelf recolonization after the last glacial phase. The faunal density and diversity values correlate well with nutrient distribution and sediment supply primarily related to the circulation of water masses and the different oceanographic regimes affecting the floor of the Ross Sea shelf. These data have been compared with quantitative and qualitative ostracod associations parameters recorded in three plio-pleistocene holes at the IODP Site U1523 that represent modern-like ostracod fauna. Therefore, we believe that through the comparison between modern and past ostracod associations, we could provide a possible reconstruction of the complex environmental, climatic and oceanographic changes that affected the Ross Sea during the last 3.0 Ma.

## **(Talk) Terminology and mode of relevance of ornamentation elements in non-marine ostracods: How not to name an ostracod species**

Benjamin Sames\*

Ornamentation is a common feature in the podocopid carapace. However, there is still confusion regarding terminology (i.e., the question whether an ornamentation term is just descriptive or also includes aspects of origin of the respective feature) as well as the mode of relevance of certain ornamentation elements (i.e., whether a feature is of taxonomic or other relevance). Particularly in non-marine and some brackish-water ostracods, local ecophenotypic swellings of the carapace, such as nodes, are very common but have mostly been misinterpreted as taxonomically relevant features in fossil ostracods. This led to the identification of a plethora of additional species named for unidentified ecophenotypic variants and/or earlier ontogenetic stages often conjecturable by names such as '*nodosa*', '*bulbosa*', '*nodoreticulata*' and so forth. Moreover, such misinterpretation conceals the biostratigraphic and palaeoenvironmental utility of ostracod taxa exhibiting such ornamentation elements. The identification of the true nature of an ornamentation element, in turn, can facilitate new applications. This is considered in a refined terminology and classification of ornamentation presented and discussed here ('local' and 'area-wide-ornamentation elements'), illustrated by example of Mesozoic non-marine ostracods for 'nodes' and 'node-like tubercles'. Consequently, descriptive new species names based on such features should be avoided at all costs.

Keywords: Ornamentation, Terminological revision, Ecophenotypy, Taxonomy, Application

### **(Talk) Microbiomes of the putative ancient asexual ostracod *Darwinula stevensoni***

Isa Schön\*, Francesc Mesquita-Joanes & Koen Martens

Advances in DNA sequencing technology can assess the diversity of entire microbial communities simultaneously. Besides different environmental samples, such studies can also focus on microbial communities inside eukaryotic hosts. In humans, for example, the importance of the gut microbiome has become obvious, and changes of its composition have been linked to diseases. Here, we have characterized the microbiome of the putative ancient asexual, non-marine ostracod species *Darwinula stevensoni* with a two-fold aim:

- (1) To identify ostracod-specific components of microbiomes, we have also sequenced and analysed microbial communities of freshwater sediments and open water from the same locations.
- (2) To test if the microbiome of *Darwinula stevensoni* supports the theory of phyllosymbiosis, we have analyzed samples from three different countries and habitats.

All ostracod samples together contain more than 3,000 identified amplicon sequence variants illustrating high microbiome diversity of *D. stevensoni*. Although proteobacteria dominate all sample types, ostracod microbiomes differ significantly from microbial communities in the open water and sediment in all three localities. There is no significant difference in the alpha diversity of *D. stevensoni* microbiomes between the three ostracod populations indicating a strict association of ostracod hosts and their microbiomes.

Keywords: Microbiome, Lakes, High throughput sequencing, Bacterial diversity

### **(Poster) Introducing the project HabitAnt - Past and future habitability in Antarctic lakes: succession, colonization, extinction, and survival in glacial refugia**

Isa Schön\*, Koen Martens, Wim Vyverman & Elie Verleyen

Coupled climate and Earth-system models predict increased temperatures and altered precipitation patterns in vast regions of Maritime and coastal Continental Antarctica. These changes will likely result in more extensive glacial melt and the expansion of ice-free areas, increasing connectivity between regions, and changes in their hydrology. These projected environmental changes are expected to cause biotic homogenization between regions. Recent studies demonstrated that terrestrial and lacustrine biota in the Antarctic are more globally distinct and biogeographically structured than previously believed, due to the long-term survival and diversification of taxa in isolated glacial refugia. Hence, it is to be expected that biotic homogenisation will significantly increase the risk of extinction of endemic species and the spread of invasive species.

We will assess biodiversity of Antarctic lakes from recent samples. Furthermore, fossil DNA from lake sediment cores will be sequenced and used to develop molecular phylogenies of non-marine ostracods, rotifers and copepods to study the processes that contributed to the present-day diversity of these organisms in Antarctic lakes. Studied evolutionary processes will include long-term persistence of biota in glacial refugia, their extinction, colonization, diversification, and biological succession in response to past climate and environmental changes.

Keywords: Antarctic lakes, Ancient DNA, Sediment cores, Glacial refugia

### **(Poster) First ostracod draft genomes providing insights into ostracod biology and evolution**

Isa Schön\*, Fernando Rodriguez, Irina Arkhipova, Patrick Tran Van, Tanja Schwander & Koen Martens

Ostracods are small, bivalved crustaceans with the most extensive fossil record of all living arthropods. Here, we describe features of the first published draft genomes of three non-marine ostracod species. Two of these species, *Cyprideis torosa* (Jones, 1850) and *Notodromas monacha* (O.F. Müller, 1776) are obligate sexuals, while *Darwinula stevensoni* (Brady and Robertson, 1870) is a putative ancient asexual. We compare the quality and gene content of these genomes to those of published genomes of other crustaceans and discuss estimates of heterozygosity of *N. monacha* and *D. stevensoni* and their biological implications.

We also present first results on the load of transposable elements (TEs) in *D. stevensoni* (Schön et al. 2021). Contrary to other putative ancient asexuals, we find a relatively high TE content of 19% to 26% and a high TE diversity, with DNA transposons being most frequent. Estimates of TE sequence diversity indicate that the majority of TEs is or has been recently active.

Keywords: Genomes, Asexuality, Transposons

### **(Poster) Ostracods and Foraminifera living on coralligenous bioconstructions offshore Marzamemi (western Ionian Sea, Southern Italy)**

F. Sciuto\*, C. Altieri, G. Donato, D. Basso, R. Sanfilippo, D. Serio, A. Rosso, V.A. Bracchi, R. Leonardi & A. Viola

Within the project “CRESCIBLUREEF - Grown in the blue: new technologies for knowledge and conservation of Mediterranean reefs”, ostracod and foraminifera associations living on coralligenous bioconstructions, mainly generated by calcareous red algae, are analysed for the first time along the Ionian coast of SE Sicily offshore Marzamemi (SR, Italy). A total of seven samples were collected between 35 and 37 m depth using the sorbona sampling device: three samples were taken from the top and the body of the bioconstructions, and four from the surrounding sediment at the base of the bioconstructions. Ostracod associations include 20 living species. Clearly dominant are the specimens belonging to the genus *Xestoleberis*, followed by the genera *Bairdia*, *Tenedocythere*, *Aurila*, *Loxoconcha*, *Urocythereis*; poorly represented are the genera *Carinocythereis*, *Paradoxostoma* and *Polycope*. Forams associations are almost exclusively represented by benthic phytal taxa and include over 3000 specimens belonging to 130 different taxa. The families quantitatively prevalent, both in terms of richness of species and abundance, are Elphidiidae, followed by Hauerinidae, Cibicididae, Ammoniidae, Homotrematidae, Planorbulinidae, Textulariidae, Cribrolinoididae, Asterigerinatidae, Rosalinidae. Spiroloculinidae and Globigerinidae are subordinate, while little represented are Astrononionidae, Haplophragmoididae, Polymorphinidae, Ammodiscidae, Ellipsolagenidae, Spirillinidae etc.

The analysis performed showed substantial differences between samples taken at the base and on the body of the algal bioconstructions, allowing to expand knowledge of the ecology of the groups studied.

Keywords: Ostracods, Foraminifers, Mediterranean Sea, Sicily SE.

### **(Talk) Silurian myodocopes display adaptations for a nektobenthic lifestyle: the paleobiological evidence**

David J. Siveter, Vincent Perrier\* & Mark Williams

There is comprehensive complementary sedimentological, faunal and paleogeographic data to indicate that myodocopid ostracods invaded the water column in the Silurian, in the latest Wenlock and especially the Ludlow Epoch, resulting in the pioneer pelagic ostracod fauna. As detailed herein, there is now also considerable paleobiological evidence, from study of rare, exceptionally preserved fossil myodocopes, particularly the nektobenthic myodocopids of the mid Wenlock Herefordshire Lagerstätte, UK, that anatomical and other features that enabled this ecological transition were already present in early Silurian myodocopes. The oldest known Silurian myodocope, a species of the Herefordshire cylindroleberidid myodocopid genus *Pauline*, established from shells from Telychian Llandovery Series carbonates of Greenland, would have had similar anatomical features and therefore adaptations for nektonic activity. Evidence from rare Late Ordovician species suggests even earlier nektobenthic activity by myodocopes.

Keywords: Lagerstätte, Myodocopa, Nektobenthic, Paleobiology, Silurian

### **(Poster) Late Devonian benthic ostracods from South China and their response to the Frasnian–Famennian event**

Junjun Song\*, Sylvie Crasquin & Wenkun Qie

In this study, Late Devonian ostracods are described for the first time from the Frasnian–Famennian (F–F) transition of the Zengpiyan section, Guangxi, South China. 45 ostracod species belonging to 25 genera are identified and figured. The Frasnian–Famennian boundary (F–FB) in the Zengpiyan section coincides with the lithological boundary between the Guilin and the Dongcun formations, and could be marked by the disappearance of *Rectobairdia proximischimensis* (Lethier & Casier, 1998) and *Jenningsina guilinensis* Song, 2021. The ostracods belong to the Eifelian Mega-Assemblage, which implies a shallow-water palaeoenvironment. The ostracod fauna and sedimentary features of the Guilin and Dongcun formations at the Zengpiyan section suggest a transition from subtidal to low energy tidal flat on the Guilin Platform during the F–F event. The extinction rate of benthic ostracod species is about 61% during the F–F event in the Zengpiyan section. Two stages of faunal changes have been recognized in the event and the second stage is more severe than the first one.

Keywords: Benthic ostracods, Frasnian–Famennian boundary, Biofacies, Mass extinction, South China

## **(Talk) FossilSketch - an innovative way to teach micropaleontology in undergraduate geoscience classes, first results of classroom testing**

Anna Stepanova\*, Christina Belanger, Raniero Lara-Garduno, Tracy Hammond, Christine Stanley & Sara Raven

We developed FossilSketch to train undergraduates in the basics of micropaleontology. Our learning outcome goals included increase in student comprehension and retention of micropaleontology knowledge, as well as increase student engagement with analysis and application of micropaleontological data.

FossilSketch is an interactive digital online learning tool that introduces students to micropaleontology (Foraminifera and Ostracoda) through educational videos, games and exercises. It includes the following sections:

- Introductory educational videos provide introductory information to help contextualize concepts covered in the rest of the program.
- Mini-games aim to improve student comprehension of microfossil identification, where identification tasks are divided into smaller tasks to help students practice identifying individual features before combining their skills to fully identify common genera.
- Interactive genus identification exercises that guide students through the characteristic morphologic features and the principles of genus-level identification.

Interactive paleoenvironment reconstruction exercises integrate ecologically-relevant concepts and allow beginners to develop the skills necessary for making rapid environmental assessments from fossil data. The ostracod exercise is based on Baltic Sea material from IODP Exp. 347, with three assemblages corresponding to alternating environmental phases characteristic of its Holocene history.

Comparison of qualitative data from lab assignments between traditional and FossilSketch-based classes using Chi Squared test showed that students who used FossilSketch statistically performed better ( $p=0.02$ ).

Keywords: Micropaleontology, Undergraduate education

## **(Poster) Problems of using marine ostracods for stratigraphic correlation of the northern shelf of the Middle Cretaceous Tethys**

Vitalii Syniehubka

During Middle Cretaceous time, the northern margin of the Tethys Ocean with a coastline extending from the modern British Isles to Tajikistan existed in Eurasia. Reconstructions of abiotic conditions in the ocean turn out to be favourable for ostracod dispersal, and thus very similar sets of ostracod taxa should be found along the entire oceanic margin, however, detailed research shows controversial results. My work shows that the boreal zone species *Golcocythere calkeri* Bonnema and *Cythereis longaeva* Pokorny were found in Ukraine since the lower Turonian, but they were identified from the Coniacian and Santonian in the European basins. Also, species *Cornicythereis larivourensis* (Damotte & Grosdidier) and *Homocythere harrisiana* (Jones), that disappeared in the middle Cenomanian in Western Europe, were typical for the upper Cenomanian in Ukraine. The species *Bythoceratina montuosa montuosa* (Jones & Hinde) was prevalent in the lower Turonian in Ukraine, however, it has been found since the upper Turonian in Turkmenistan and Western Europe. I also recognised endemic species which remained in place in Ukraine since the lower Cretaceous. These examples illustrate the heterogeneous process of ostracod dispersal with the development of the Upper Cretaceous transgression and the Cenomanian anoxic event. It also highlights insufficient study of the issues of stratigraphic correlation of remote parts of the basin.

Keywords: Cenomanian, Turonian, Boreal ostracoda, Ukraine

## **(Poster) Biodiversity of non-marine Ostracoda of Botswana as compared with other Southern African countries**

Agata Szwarc\* & Tadeusz Namiotko

Biodiversity of inland water Ostracoda of Southern Africa is still relatively poorly known. Of approximately 150 species belonging to 50 genera recorded so far from the region, most have been found in South Africa and Namibia. The Western Cape Province of South Africa has the best studied ostracod fauna in the region, followed by the KwaZulu-Natal Province. Almost nothing is known about ostracod species richness in other Southern African countries. The present study aimed at providing a checklist of living and Late Pleistocene to Holocene fossil non-marine ostracods of Botswana and at comparing ostracod taxonomic diversity of Botswana with its neighboring countries. In total, 54 ostracod species are listed from Botswana based on the literature and new collections. Our survey yielded 17 species, of which nine have not been recorded before in the country. Species composition of the reported fauna shows that the Cyprididae is the most species-rich family (76% of all recorded species). We found low alpha diversity and significant difference in species composition and beta diversity of the Okavango ecoregion versus the Kalahari and Zambezi Lowveld ecoregions. Yet, further studies are needed to investigate complex biogeographical relationships between ostracod faunas of various ecoregions of Southern Africa.

Keywords: Southern Africa, Species checklist, Ostracods, Taxonomic diversity, Temporary waters

## **(Talk) First data on Gelasian to Calabrian (Early Pleistocene) marine Ostracoda from Mida section (Cap Bon, Tunisia)**

Rim Temani \*, Francesco Sciuto & Ammar Hayet Khayati

We report for the first time a rich and well-preserved marine ostracod assemblage from Lower to Middle Pleistocene fossiliferous sands located in the Mida section (Cap Bon, NE Tunisia). Micropalaeontological analysis of nine samples taken along an eight-meter exposure revealed 41 ostracod species belonging to 32 genera. The ostracod assemblages recorded enabled us to draw a palaeoenvironmental reconstruction of this area during the Gelasian to Calabrian time. The chronological distribution of the ostracod assemblages, highlighted by individual sample analysis, allows us to hypothesize a regressive cycle from circalittoral to shallow infralittoral palaeoenvironments. Another important fact is the discovery of *Bythocythere turgida* (Sars, 1866) in the lower part of the section and *Semicytherura angulata* (Brady, 1868) in the upper part. These data confirm that the input of "cold species" taxa coming from the circumpolar area of the North Atlantic Ocean into the Mediterranean Sea occurred at various times. Due to its climatic and palaeoecological value, ostracod distribution data have yielded important details regarding the stratigraphic evolution of the studied area. The Mida site is significant not only for reconstructing Pleistocene geological history in North Eastern Tunisia, but also for palaeogeographic studies for the whole of Tunisia during the early to middle Pleistocene.

Keywords: Ostracods, Pleistocene, Tunisia, Environmental evolution

### **(Talk) Geological history of the genus *Plumhoffia* Brand, 1990 (Ostracoda)**

E.M. Tesakova & M. Franz\*

The genus *Plumhoffia* is recorded in the Middle Jurassic of Western Europe from the Early Bajocian. *P. praequadricostae* sp. nov. is recorded in southern Germany from the Sauzei Zone. In the Humphriesianum Zone the genus diverged, and *P. praequadricostae*, *P. curvicosta* Ohmert & Franz, *P. ? foveata* sp. nov. and *P. curticosta* sp. nov. are distinguished. In this instance, evolution occurred through phylogenesis, by the Late Bajocian and Bathonian speciation occurred by anagenesis. Based on this lineage: *P. praequadricostae* (Sauzei–Niortense zones) → *P. brandi* sp. nov. (Garantiana–Subcontractum zones) → *P. quadricostae* Brand (Morrisi–Hodsoni zones) new lineage zones are proposed for Western Europe. Representatives of *P. brandi* formed two geographical subspecies *P. b. germanica* ssp. nov. and *P. b. polonica* ssp. nov. These ostracods migrated to the Russian platform and populated new seas that established during the Bajocian transgression. In the Garantiana Zone, *P. tricostata* (Khabarova) colonized the Dnieper-Donetsk Depression, and in the Michalskii Zone entered the seas of European Russia and western Kazakhstan. The Russian platform *Plumhoffia* also diverged as *P. tricostata ukrainica* ssp. nov. and *P. t. rossica* ssp. nov., according to their first appearance the new eponymous migration units are proposed for Ukraine (Garantiana–Zigzag zones) and Russia (Michalskii–Besnosovi zones).

Keywords: Ostracods, New species, Macroevolution, Palaeogeography, Biostratigraphy

### **(Talk) Spatio-temporal distribution of the *Cythereis*-species in the Mid-Cretaceous Orbata platform of the Central Tunisian Atlas**

Khaled Trabelsi\* & Benjamin Sames

Exhaustive micropalaeontological investigation and integrated biostratigraphic analyses recently carried out on the Mid-Cretaceous, shallow, siliclastic carbonate platform (Orbata Formation) of the Central Tunisian Atlas (CTA), have refined its chronostratigraphic subdivision. Representative species of the ostracod genus *Cythereis* (and closed related taxa) display interesting spatio-temporal distributions in the study area, and therefore are of substantial utility to the biozonation of the Orbata Formation as well as its improved regional stratigraphic correlation and palaeogeographic framework.

In the lower Orbata Member (early Aptian), the species *Cythereis (Rehacythereis) ghabounensis ghabounensis*, *C. (R.) geometrica geometrica*, *C. (R.) geometrica fittoni*, *C. (R.) cf. buechlerae*, and *C. (R.) cf. laqueiformis*, are abundant and facilitate its biostratigraphic constraint to the *Cythereis geometrica* biozone.

The middle Orbata Member (late Aptian) shows a dominance of *C. (R.) Cythereis btaterensis btaterensis*, *C. (R.) btaterensis interstincta*, *C. (R.) btaterensis torifera imminuticostata*, and *C. (R.) arabica arabica*, and can be assigned to the *Cythereis btaterensis* biozone.

The upper Orbata Member (early Albian) mainly contains the species *C. (R.) libanensis*, *C. (R.) arabica houneensis*, *C. (R.) arabica diffusecostata*, *C. (R.) phoenissa serotina*, *C. (R.) reticulata*, and *C. (Cornicythereis) zoumoffeni*, characteristic of the *Cythereis libanensis* biozone.

Keywords: *Cythereis* species, Biostratigraphy, Orbata Formation, Mid-Cretaceous, Central Tunisian Atlas.

## **(Talk) Ostracods as proxy to reconstruct palaeoenvironmental and palaeoclimatic control of the Quaternary Sárrét Basin, NW Hungary**

Khaled Trabelsi\*, Benjamin Sames & Miklós Kázmér

Here we present qualitative and quantitative assessments of the Late Pleistocene–Holocene Freshwater ostracod fauna derived from a 5 m-thick sequence from the Sárrét-3 core, in the Sárrét Basin, NW Hungary. A total of 11 studied samples contained 18,753 valves that belong to 22 species: *Cytherissa lacustris*, *Candona candida*, *C. neglecta*, *C. weltneri*, *C. kingsleii*, *C. media*, *Fabaeformiscandona protzi*, *F. brevicornis*, *F. levanderi*, *Pseudocandona marchica*, *P. parallela*, *Cyclocypris ovum*, *C. laevis*, *C. serena*, *Cypria ophtalmica*, *Limnocythere inopinata*, *Darwinula stevensoni*, *Ilyocypris decipiens*, *Metacypris cordata*, *Paracandona euplectella*, *Plesiocypridopsis newtoni*, and *Potamocypris* aff. *unicaudata*.

We used cluster analysis and Mutual Ostracod Temperature Range methods allowed recognizing a total of 4 subsequent habitat-specific assemblage zones and 3 palaeoclimatic events, that include from the base to the top: the “*Cytherissa*-fauna” (depth 500–440 cm), indicating sandy littoral lake under oligotrophic and cold conditions dated 13,000–11,000 yr BP; the “*Metacypris*-fauna” (440–310 cm), reflecting shallow well-lit lacustrine system under eutrophic warm and humid conditions during 11,000–8,600 yr BP; the “*Candona*-fauna” (310–50 cm), pointing to a very shallow mesotrophic marly lake with a transient cold event around 8,600–8,200 yr BP followed by warm condition during 8,200–1,600 yr BP; and finally the “*Pseudocandona*-fauna” (50–0 cm), adapting to high organic influx conditions after 1,600 yr BP.

Keywords: Non-marine ostracods, Palaeoecology, Palaeoclimate, Late Pleistocene–Holocene, Sárrét Basin, NW Hungary.

## **(Poster) Micropalaeontological study of sediments from Sichaena, Achaia, Greece and geometric morphometrics of *Cyprideis torosa***

D. Valavani, M. Tsoni\*, P. Papadopoulou, G. Iliopoulos & S. Giokas

Rio Basin is located on the west side of the Corinth Graben, Greece. It is a region of significant palaeontological interest due to the abundance of microfossils, such as Ostracoda and Foraminifera. This work is primarily based on the study of Ostracoda and its purpose is to determine the palaeoenvironmental conditions of the studied sections and to unravel the respective middle-late Pleistocene palaeoenvironmental evolution. A total of 112 sediment samples were collected from two sedimentary sequences (Sequence B and Sequence C) located at Sichaena, Achaia. The results of the micropalaeontological analyses imply a semi-closed lagoonal environment with a significant freshwater input, as well as with an increased marine water influence. From three units of Sequence C, 90 right female valves of *Cyprideis torosa* were selected to analyse disparity in the valve shape using Geometric Morphometrics (outline method). The analysis showed important shape differences in the posterior and anterior areas of the studied valves as well as in their length. Data correlation (environmental data and data from Geometric Morphometrics) revealed that the most important influencing factors that affect the differentiation of *C. torosa* valves are the distance from the sea and the fluctuation in salinity or/and oxygen levels.

Keywords: Corinth Graben, Middle Pleistocene, Palaeoenvironment, Ostracods, Geometric morphometrics

## **(Talk) Ostracods as a palaeoenvironmental indicators: A case study from the Rio Basin (Corinth rift)**

M. Tsoni\*, P. Papadopoulou, D. Valavani, M. Groumpou & G. Iliopoulos

Microfossils are potentially very useful palaeoenvironmental indicators because of their specific ecological preferences. The combination of different species' ecological preferences in an assemblage can reflect in detail the parameters of a palaeoenvironment as well as the changes that have taken place. For the first time, detailed stratigraphical and micropalaeontological analyses were employed in the Rio Basin (Corinth Rift, Greece). It is an area with a complex palaeoenvironmental evolution because of the strong interaction between tectonic processes and continuous eustatic changes. The micropalaeontological analyses revealed cyclic alterations between lacustrine, transitional and marine environments attributed mainly to climatic effects. One of the main palaeoenvironmental tools was the combined study of ostracods and foraminifera. Ostracods have been proved as the most reliable group of organisms for precise palaeoenvironmental reconstruction especially for lagoonal environments. Additional and detailed information about the palaeoenvironmental interpretation were extracted through the ostracods' ecological preferences. Moreover, taphonomic indices and geometric morphometrics were also used in order to decipher the palaeoenvironmental conditions. Ostracods also proved useful for chronostratigraphic determinations despite their otherwise limited use for this purpose in contrast to foraminifera. The occurrence of *Cimbourila cimbaeformis* provides important information concerning the lower Pleistocene of the study area.

## **(Talk) First discovery of ostracod and mollusk fauna of the Aşağıçığıl Formation (Ilgın Basin, SW Anatolia): New insights for the Middle-Late Miocene paleoenvironmental evolution and biochronology of the Ilgın Basin**

Alaettin Tuncer\*, Cemal Tunoğlu & Burçin Aşkın Gümüş

Late Cenozoic regional tectonism around the Isparta Angle (northern Taurids, SW Anatolia) triggered the development of many sedimentary basins, and both marine and non-marine depositional processes have prevailed since Early Miocene. Among these, Yalvaç, Beyşehir-Suğla, Altınapa, and Ilgın basins exhibit continental Neogene successions with economic coal seams.

The Ilgın Basin commenced developing in Early Miocene (Aquitainian), has coal-bearing thick fluvio-lacustrine deposits, and contains remarkable and diverse faunal/floral archives. The Middle-Upper Miocene sequences, the Aşağıçığıl Formation, mainly crop out in the southern flank of the basin. For the first time in this study, the meiofauna (ostracods, mollusks) and microflora (charophytes) of the formation were determined, and ostracods and accompanying taxa were evaluated to interpret the paleoenvironmental characteristics and biochronology of the formation. In this context, 5 stratigraphic sections were measured along the middle-upper levels of the formation, and 25 genera and 35 species of non-marine ostracods were determined. At the same time, 2 new ostracod species (*Psychrodromus seni* n. sp., *Heterocypris granuloreticulata* n. sp.) have been proposed. Furthermore, within the paleobiogeographical investigations, the first fossil records of some obtained ostracod taxa (*Cavernocypris subterranea*, *Cyprinotus inaequalis*, *Amnicythere nodigera*, *Leucocythere immigrata*, and the genus *Strandesia*) in Turkey were described.

In conclusion, the ostracod-based paleoenvironmental evaluations point out that the middle-upper parts of the formation were mainly deposited under the freshwater-oligohaline and permanent aquatic conditions in a spring-fed (predominantly cold), phytal, and shallow (littoral) lacustrine setting during late Middle (Serravallian)?–early Late (Tortonian) Miocene.

Keywords: Ostracods, Paleoenvironment, Biochronology, Miocene, Ilgın Basin.

## **(Talk) Meiobenthic ostracodes (Crustacea, Ostracoda) assemblages of different bottom substrates in the north-western Black Sea**

Olena Uzun\* & Anastasiya Snigirova

River inflow and the enclosed nature formed the unique conditions in the shallow area of the north-western part of the Black Sea. As Ostracoda can be used for biomonitoring of environmental change along the coastal water areas, species composition of ostracod assemblages of various hard bottom substrates types (plastic litter, concrete, natural stones and rocks) was analyzed in areas with different levels of environmental status according to the marine Strategy Framework Directive.

Diversity of ostracodes was represented mainly by typical widespread species, the most abundant of which were *Paradoxostoma intermedium* Müller, 1894, *Xestoleberis cornelii* Caraion, 1963 and *Xestoleberis decipiens* Müller, 1894. Comparative analysis showed that density and biomass of ostracodes were lower on the plastic substrate than on other natural and artificial hard substrates. The highest density and biomass of ostracodes were on the algal substrates area (on *Laurencia paniculata* made up  $41931 \pm 12689$  ind. $\cdot$ m<sup>-2</sup> and  $400.56 \pm 125.65$  mg $\cdot$ m<sup>-2</sup>, respectively). The good ecological state water area was characterized by the highest percentage of ostracodes (up to 42.21%) among the total meiobenthic taxa with higher means of their density and biomass, that may indicate favorable environmental conditions.

Keywords: Seed shrimps, Meiofauna, Hard substrates, Plastic litter, Brackish waters

## **(Poster) Early Cretaceous ostracods from the base of the ODP Site 959, Ivory Coast**

João Villar de Queiroz Neto\*

This study presents the micropaleontological results from core samples taken in the lowermost part of the ODP Leg 159, Site 959, Hole D drilled on the Ivory Coast – Ghana Marginal Ridge. Despite the few ostracods retrieved it was possible to add valuable biostratigraphic and palaeoecological information in strata below the ones already studied by foraminifera and nannofossils dated as Late Albian.

First downhole occurrence is at the depth of 1053.34m and holds 7 shallow marine ostracods carapaces, being two left without determination and five recognized at the genus level: one *Bairdoppilata* sp.1, three *Cythereis* sp. and an *Asciocythere* sp. Intermediate sample with shallow-marine ostracods at 1053.69m provided 3 carapaces, Albian species *Aracajuia benderi*, *Bairdoppilata* sp.2 and *Asciocythere?* sp. Finally, the last interval with ostracods at 1103.51m provided a single carapace of an Aptian non-marine to transitional species *Pattersoncypris sinuata*. Ostracods determined at species level provide two relative dating for the upper and lower strata, thus *A. benderi*, as Aptian-Albian shallow marine is still coherent with the previous nannofossils ages, although the presence of *Pattersoncypris sinuata* dating the Ivory Coast basin as Aptian non-marine to transitional is a new feature for the ODP 959 ages and paleoenvironment.

Keywords: Marine, Non-marine, Ostracod, Ivory Coast, ODP Site 959

### **(Talk) How to optimize the study of *Cyprideis torosa* (Jones, 1850) sieve pores: morphometric indices and automatic detection**

Cécile Vittori\*, Valentin Chardon, Stoil Chapkanski, Pierre Carbonel, Jean-Philippe Goiran & Laurent Schmitt

The study of the sieve pore shape of *Cyprideis torosa* (JONES, 1856) is an efficient approach to estimate palaeosalinity trends, particularly in marginal marine environments. Usually, three groups of sieve pore shapes (round, elongated and irregular) were defined and a negative correlation between round-shaped sieve pores and salinity was evidenced for this species. Rosenfeld and Vesper (1977) used an elongation index (length/beam) to discriminate "round" and "elongated" sieve pores. However, the identification of irregular shapes depends on the operator's appreciation. In order to reduce operator biases and standardize data between studies, two methods were developed to discriminate the sieve pore shapes based on morphometric dataset generated by ImageJ-FIJI software: (i) a Functional Discriminant analysis based on five variables (Feret's aspect ratio, roundness, aspect ratio and two ratios:  $A_{\text{pore}}/A_{\text{Minimum Bounding Circle}}$  and  $P_{\text{pore}}/P_{\text{Minimum Bounding Circle}}$ ) and (ii) the development of an irregularity index ( $\text{Roundness}/(A_{\text{pore}}/A_{\text{Minimum Bounding Circle}})$ ), as a complement to the elongation index. Given its time-consuming character, the study of the *C. torosa* sieve pore shape is rarely performed. To reduce time of analysis, we have developed the first robust protocol for the automatic detection of sieve pores using the ImageJ-FIJI software and based on Backscattered Electron Scanning Electron Microscopy (SEM-BSE) images. The use of SEM-BSE images has optimized the sieve pore contrasts for automatic detection and extends the observation possibilities of sieve pores on less well-preserved valves. This automatic detection procedure for sieve pores could be applied in the future to other species to study their size, shape and distribution on the surface of the valves.

Keywords: Sieve pores, Automatic detection, SEM-BSE images, Irregularity index, Functional Discriminant Analysis

### **(Talk) A non-marine ostracod fauna from the Yingzuilazi Formation (Baishan Basin, NE China) and its biostratigraphic implications**

Yaqiong Wang\* & Yuting Zhong

The Yingzuilazi Formation in the Baishan Basin holds an ostracod fauna consisting of fifteen species belonging to seven genera: *Cypridea tubercularis*, *Cypridea horni* sp. nov., *C. bulumensis*, *C. aff. multispinosa*, *C. cf. unicastata*, *C. beipiaoensis*, *Rhinocypris jurassica*, *Rhinocypris* sp., *Djungarica* sp., *Zizophocypris linchengensis*, *Lycocypris infantilis*, *L. debilis*, *Timiriasevia principalis*, *Alicenula? dadianziensis*, *Alicenula? leguminella*. Based on the ostracod biostratigraphic correlations, the age of the Yingzuilazi Formation is Hauterivian to Barremian. This age, combined with our new SIMS zircon U-Pb age of  $128.0 \pm 1.3$  Ma for the upper part of the Yingzuilazi Formation, indicate that the Yingzuilazi Formation is Barremian in age.

In addition to a diverse non-marine ostracod fauna, the biota from the Yingzuilazi Formation contains several other animal and plant fossil groups, including conchostracans (clam shrimp), bivalves, gastropods, insects, fishes, and amphibians. On the basis of radiometric age for the Yingzuilazi Formation, the biota from this formation coincides in time with the Jehol Biota *sensu stricto* stage I. But it is closely related to Jehol Biota *sensu stricto* stage II in terms of comprehensive biostratigraphy and paleontological compositions.

Key words. *Cypridea*, *Zizophocypris*, Zircon U-Pb dating, North China Craton, Latest Barremian

## **(Talk) The Pliocene arrival of the ‘*Ambostracon pumilum*’ species group in Australasia via the vector of Shearwater (seabird) migration**

Mark Warne\*

The species *Ambostracon costatum* recorded from Pliocene and Quaternary strata and temperate marine waters of California (USA), appears to be close in carapace morphology to the species *Ambostracon pumilum* recorded from Pliocene and Quaternary strata and temperate marine waters of southeastern Australia. These and similar species from both regions represent two closely related NE Pacific and SW Pacific ‘species groups’, which demonstrate a largely (asymmetrical) anti-tropical temperate marine distribution.

Along the east coast of Australia, the *pumilum* species group occurs in shallow temperate marine waters south of the Tasman Front, this oceanographic feature separating the tropical Coral Sea to the north from the temperate Tasman Sea to the south. The first common appearance of *Ambostracon ex gr. pumilum* in the southeast Australian stratigraphical record is in the late Pliocene.

Recent DNA studies have indicated that Australasian Shearwater (Muttonbird) species (*Ardenna* spp.) first evolved during the Pliocene. Australian and New Zealand Shearwater species have long migration flyways between the Northern and Southern hemispheres, including a route from the temperate west coasts of North America to the temperate (southern) coasts of Australasia. Thus, one possible dispersal mechanism, which led to the anti-tropical distribution of *Ambostracon* species, is via Shearwater (seabird) migration.

Keywords: Ostracod, Marine, Anti-tropical, Dispersal, Australasia

## **(Talk) Large-scale geographic size variability of *Cyprideis torosa* (Ostracoda) and its taxonomic and ecologic implications**

Claudia Wroczynna\*, Steffen Mischke, Marlene Hoehle, Martin Gross & Werner E. Piller

Body-size variability results from a variety of extrinsic and intrinsic factors (environmental and biological influences) underpinned by phylogeny. In ostracods it is assumed that body size is predominantly controlled by ecological conditions, but investigations have mostly focused on local or regional study areas. We therefore investigated the geographical size (length, height and width) variability of Holocene and Recent valves of *Cyprideis torosa* within a large geographical area (31-51° N, and 12-96° E). Our results show that distant local size clusters of *C. torosa* are framed within two large-scale geographical patterns. The first pattern describes the separation of two different size classes (i.e., morphotypes) at around ~42° N. The almost disjunct distribution of the morphotypes and probable ecological differentiation indicates the existence of at least two different species. The second large-scale pattern represents a continuous increase in valve size of *C. torosa* with latitude, according to the macroecological pattern referred as Bergmann trend. This is assumed to originate from interspecific size differentiation. Our results imply that the size of *Cyprideis* is predominantly controlled by phylogeny, rather than environmental factors (i.e., salinity).

Keywords: *Cyprideis torosa*, Valve size, Latitude, Salinity

### **(Talk) Late Cretaceous ostracod biostratigraphy from the scientific drilling SK1 and SK3 in the Songliao Basin, NE China**

Dangpeng Xi\*, Benjamin Sames, Haiying Qu, Shun Li, Zhongye Shi, Xinyu Meng, Yafeng Ning, Zuohuan Qin & Xiaoqiao Wan

The Songliao Basin was one of the largest non-marine rift basins in Asia during the Cretaceous. Widespread non-marine deposits in the basin are mainly composed of clastic sediments which contain abundant ostracod. These well-preserved fossil ostracods provide valuable information about Cretaceous climate changes and biotic responses in a greenhouse environment. The Cretaceous International Continental Scientific Drilling Project core SK1 and SK3 from the Songliao Basin offers a rare opportunity to study Late Cretaceous non-marine ostracods over a long, continuously documented, time interval. The SK1 contains the upper Quantou, Qingshankou, Yaojia, Nenjiang, Sifangtai, and Mingshui formations in ascending order. The SK3 contains the Denglouku and lower to middle Quantou formations in ascending order. A high-resolution non-marine ostracod biostratigraphy based on SK1 and SK3 has been established. Twenty ostracod assemblages have been recognized from the upper Quantou to Mingshui formations. The preliminary biostratigraphic correlation indicates that assemblages 1 to 19 span the Cenomanian to Maastrichtian, while Assemblage Zone 20 might span the latest Maastrichtian to earliest Danian. This series of biozones can be correlated regionally and supraregionally. Although the preliminary biostratigraphy of SK1 and SK3 has been established, further detailed taxonomy, supraregional correlation and paleoecology are still needed.

Keywords: Ostracod, Taxonomy, Biostratigraphy, Cretaceous, Songliao Basin

### **(Talk) Neuroanatomy of the mandibular gnathal edge in the cypridid ostracod**

Shinnosuke Yamada\*

This research focused on the neuroanatomy of the mandibular gnathal edge in the cypridid ostracod *Heterocypris incongruens*, to understand the functions of mandibular skeleto-muscular system. Electron microscopy reveals that numerous sensilla, including a scolopale, are distributed inside the mandibular gnathal edges and they consist of two types of sensilla (heterodynal and monodynal), which differ in the number of dendrites and their probable function. This sensory nervous system in the gnathal edges contributes to precise interdigitation of the right and left mandibles for a powerful omnivorous mastication and the mandibular interdigitation plays a role as the fulcrum of triggering action to open the valves. Therefore, by reversing in its fulcrum and point of load, the mandibular skeleto-muscular system in cypridids (probably in podocopids) has the two sub-system related to its functions, namely the “mandibular masticatory system” and “valve opening system”.

Keywords: bivalved arthropods, bivalved crustaceans, mandibular condyle, mastication, scolopidia

## **(Talk) Time Machine Biology: Paleobiology provides glimpses of future ocean**

Moriaki Yasuhara\*

Direct observations of marine ecosystems are inherently limited in their temporal scope. Yet, ongoing global anthropogenic change urgently requires improved understanding of long-term baselines, greater insight into the relationship between climate and biodiversity, and knowledge of the evolutionary consequences of our actions. Sediment cores and fossils can provide this understanding by linking data on the responses of marine biota to reconstructions of past environmental and climatic change. Given continuous sedimentation and robust age control, studies of sediment cores have the potential to constrain the state and dynamics of past climates and biodiversity on timescales of centuries to millions of years. Here we review the development and recent advances in "ocean drilling paleobiology" or "Time Machine Biology"—a synthetic science with potential to illuminate the interplay and relative importance of ecological and evolutionary factors during times of global change. Climate appears to control marine ecosystems on various timescales. This paper will showcase several examples from recent studies.

Keywords: Paleobiology, Biodiversity, Microfossils, Ocean drilling, Cenozoic

## **(Poster) The morphology and taxonomy of three non-marine ostracod species from Inner Mongolia and Beijing, northern China**

Na Yu, Shunxin Ma, Qianwei Wang & Dayou Zhai\*

In ISO19, we presented the morphology of three species of non-marine ostracods from northern China we recently published (Yu et al., 2022). These include *Pseudocandona cheni*, *Cyclocypris pangi*, and *Tonnacypris rectangularis*. *Pseudocandona cheni* is a member of the *compressa* group, and is readily recognized by the structure of the hemipenis as well as thick trunks of the male fifth limb endopodites. *Cyclocypris pangi* can be identified based on the morphology of the hemipenis, in addition to the rectangular trunk of the male fifth limb endopodite. *Tonnacypris rectangularis* can be distinguished from other species in the genus by its distinct sub-rectangular carapace alone, although other characters such as the lengths of the swimming setae, the lengths of the distal claws on the second antennae, and the morphology of the pincer organ on the seventh limb, offer additional information for identification. Our work improves the understanding of the poorly known extant non-marine ostracod fauna of Inner Mongolia and Beijing, and offers taxonomic guide for future studies of the ostracods in these regions.

Keywords: Biodiversity, *Cyclocypris*, *Pseudocandona*, Taxonomy, *Tonnacypris*

## **(Talk) Ostracod eye as a paleo-water-depth proxy**

Jingwen Zhang\*, Moriaki Yasuhara, Kyawt Aye & Skye Yunshu Tian

Eye loss has been a long-standing interest in evolutionary biology. Organisms that inhabit environments without any light penetration (*i.e.* the deep sea) tend to exhibit eye loss and thus are blind. However, the water-depth distribution of eyes in marine organisms is generally not well understood. Ostracods are widely distributed crustaceans in marine settings and many sighted ostracods have eye tubercles, the cuticular lens of nauplius eye, as a part of their shell. Since eye tubercles are visible on the shells in well-preserved fossils, it is easy to detect their presence or absence in both living and fossils ostracods. Understanding the relationship between eye tubercles and water-depth is important, not only biologically, but also as a potential proxy to paleo-water-depth reconstruction. We used published ostracod datasets from the Arctic, northwestern Pacific and northwestern Atlantic to calculate the eye ratio based on species-level information about eye tubercle from literatures. Preliminary analyses showed that the eye ratio decreases as water depth increases, and becomes constantly zero in waters deeper than 1,000m. Additionally, among the shallow water range of different regions, the water-depth trends of eye ratio are different. These results will improve our understanding of the relationship between eyes and water depths.

Keywords: Ostracoda, Nauplius eyes, Eye tubercles, Paleo water depth

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