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15th International Symposium on Ostracoda

ISO 15
15th International Symposium on Ostracoda
Freie Universität Berlin

In Memory of
Friedrich-Franz Helmdach (1935-1994)

Freie Universität Berlin
September 12-15, 2005

Abstract Volume (edited by Rolf Kohring and Benjamin Sames)

Preface

The 15th International Symposium on Ostracoda takes place in Berlin in September 2005, hosted by the Institute of Geological Sciences of the Freie Universität Berlin. This is the second time that the International Symposium on Ostracoda has been held in Germany, following the 5th International Symposium in Hamburg in 1974. The relative importance of Ostracodology - the science that studies Ostracoda - in Germany is further highlighted by well-known names such as G.W. Müller, Klie, Triebel and Helmdach, and others who stand for the long tradition of research on Ostracoda in Germany.

During our symposium in Berlin more than 150 participants from 36 countries will meet to discuss all aspects of living and fossil Ostracoda. We hope that the scientific communities working on the biology and palaeontology of Ostracoda will benefit from interesting talks and inspiring discussions - in accordance with the symposium's theme:

Ostracodology - linking bio- and geosciences

We wish every participant a successful symposium and a pleasant stay in Berlin

Berlin, July 27th 2005

Michael Schudack and Steffen Mischke

CONTENT

Acknowledgements

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The editors would like to thank the ISO 15 Organizing Committee, the Freie Universität Berlin and our language secretary Anne Beck (Berlin) for critically reading and improving many abstracts.

MONDAY, SEPTEMBER 12	
07:00-09:15	Registration
09:15-10:00	Opening Session
10:00-11:00	Session “**Evolution and Systematics 1**”
11:00-11:30	Coffee Break
11:30-12:45	Session “**Evolution and Systematics 2**”
12:45-13:15	Congress Photo
13.15-14:30	Lunch
14:30-16:00	Session “**Biogeography 1**”
16:00-16:30	Coffee Break
16:30-17:45	Session “**Biogeography 2**”
18:00-19:00	**Workshop 1**
19:00	**Congress party** at the Conference Site

TUESDAY, SEPTEMBER 13	
08:30-10:00	Session “**Methods and Applications 1**”
10:00-10:30	Coffee Break
10:30-11:00	Session “**Methods and Applications 2**”
11:15-12:15	Session “**Ecology of Freshwater Ostracods 1**”
12:15-14:00	Lunch
14:00-15:30	Session “**Ecology of Freshwater Ostracods 2**”
15:30-16:00	Coffee Break
16:00-18:30	**Workshop 2**
19:00-20:00	**Plenary Session of the IRGO**

WEDNESDAY, SEPTEMBER 14	
08:30-10:15	Session “**Ecology of Saline and Brackish Water Ostracods**”
10:15-12:00	Poster Session (incl. Coffee Break)
11:15-12:45	Lunch
12:45	Departure of buses to the boat trip
14:00-20:00	Boat trip (**Mid-symposium excursion**)

THURSDAY, SEPTEMBER 15	
08:30-11:00	**Workshop 3**
10:30-11:00	Coffee Break
11:00-12:30	Session “**Ecology of Marine Ostracods**”
12:30-14:00	Lunch
14:00-15:00	Session “**Reproduction, Ontogeny and Behaviour**”
15:00-15:30	Coffee Break
15:30-16:45	Session “**Anatomy, Histology and Molecular Biology**”
16:45-17:15	Coffee Break
17:15-18:30	Session “**Biodiversity**”
19:00	Closing Session - **Sylvester-Bradley Awards**

Sunday, September 11

18:00 – 20:00 Registration at the Conference Site

Monday, September 12

7:00-9:15 Registration

9:15-10:00 OPENING SESSION
Helmut Keupp (Vicepresident Free University of Berlin)
Alan Lord (IRGO Chairman)
Michael Schudack (ISO15 Chairman)

10:00-11:00 Session "EVOLUTION AND SYSTEMATICS 1"
10:00-10:15 Horne, D.J., Schön, I., Smith, R.J. & Martens, K.: What are Ostracoda? A cladistic analysis of the extant superfamilies of the subclasses Myodocopa and Podocopa (Crustacea: Ostracoda)
10:15-10:30 Liow, L.H.: How to be a geologically persistent ostracode: a quantitative perspective
10:30-10:45 Yamada, S.: A new concept of podocopan ostracode hinge structure
10:45-11:00 Meisch, Cl.: On the origin of the putative furca of the extant Ostracoda

11:00-11:30 Coffee Break

11:30-12:45 Session "EVOLUTION AND SYSTEMATICS 2"
11:30-11:45 Ishii, T. & Kamiya, T.: Evolutionary history of *Loxoconcha* species based on pore-systems
11:45-12:00 Minati, K., Artheau, M., Gross, M., Pipik, R., Daxner-Höck, G. & Danielopol, D.L.: Evolutionary pathways within *Vestalenula* lineage (Ostracoda, Darwinulidae)
12:00-12:15 Cabral, M.C., Colin, J.-P. & Azerêdo, A.C.: New non-marine ostracod species from the Middle Cenomanian of Lousa (Lisbon region, Portugal)
12:15-12:30 Crasquin-Soleau, S.: Ostracods and the Permian-Triassic boundary: survivors and newcomers
12:30-12:45 Siveter, D.J., Briggs, D.E.G., Siveter, D.J. & Sutton, M.D.: The ostracod-bearing Silurian Herefordshire Konservat-Lagerstätte

12:45-13:15 Congress Photo (in front of the Conference Building, house G)

13.15-14:30 Lunch

14:30-16:00 Session "BIOGEOGRAPHY 1"
14:30-15:00 Martens, K., Schön, I. & Horne, D.J.: Biogeography and phylogeography of non-marine Ostracoda (Crustacea)
15:00-15:15 Pipík, R. & Bodergat, A.-M.: Historical biogeography of recent Central European freshwater ostracods
15:15-15:30 Halse, S.: Surface water ostracods from the Pilbara region, northwestern Australia: biogeography and habitat preferences
15:30-15:45 Reeves, J., De Deckker, P. & Halse, S.: Groundwater ostracods from the arid Pilbara, northwestern Australia: distribution and water chemistry
15:45-16:00 Ogoh, K. & Ohmiya, Y.: Biogeography of luminous marine ostracod driven irreversibly by the Japan Current

16:00-16:30 Coffee Break

16:30-17:45 Session "BIOGEOGRAPHY 2"
16:30-16:45 Dojen, C.: Pragian ostracodes from Mauro-Ibero-Armorica
16:45-17:00 Honigstein, A., Rosenfeld, A. & Derin, B.: Late Permian ostracodes from Israel - an update
17:00-17:15 Luger, P.: Palaeobiogeography of Aptian through Early Paleocene Ostracoda in North to Equatorial Africa and Arabia/Iran
17:15-17:30 Musacchio, E.A. & Simeoni, M.: Early Cretaceous marine Ostracods from Patagonia: correlations and palaeogeography

17:30-17:45 Sames, B.: Ostracoda and Charophyta of the Late Jurassic/Early Cretaceous Tendaguru Beds at the type locality (Tendaguru Hill, Southeast Tanzania) and their biostratigraphic, palaeobiogeographic and palaeoecologic relevance

18:00-19:00 Workshop 1
Presentation of the Marie Curie Research training network (MRTN) SexAsex. Conducted by Koen Martens.

19:00 Congress party at the Conference Site

Tuesday, September 13

8:30-10:00 Session "METHODS AND APPLICATIONS 1"
8:30-8:45 Angel, M.V. & Blachowiak-Samolyk, K.: Insights gained from a web-based atlas of halocyprid ostracods of the Southern Ocean
8:45-9:00 Horne, D.J., Whittaker, J.E. & Holmes, J.A.: Age, palaeoenvironments and palaeoclimate of a mid-Pleistocene hominid site at Boxgrove, southern England, based on ostracods
9:00-9:15 Keyser, D., Pint, A. & Smurov, A.O.: Ostracods and archaeology in the Aral Sea region (Central Asia)
9:15-9:30 Frenzel, P.: Methods using Quaternary brackish water ostracods as palaeoenvironmental proxies: examples from the Baltic Sea
9:30-9:45 Mischke, S., Herzschuh, U., Buckl, L., Kramer, M. & Zhang, C.: An ostracod-inferred electrical-conductivity transfer function for the Tibetan Plateau
9:45-10:00 Viehberg, F.A.: A Holocene ostracod thermometer - a quantitative palaeolimnological transfer function for northeast Germany

10:00-10:30 Coffee Break

10:30-11:00 Session "METHODS AND APPLICATIONS 2"
10:30-10:45 Nagorskaya, L. & Murphy, J.: Ostracoda assemblages in lakes across a gradient of radioactive contamination
10:45-11:00 Van Nieuwenhuise, D.S. & Hazel, J.E.: Biostratigraphically useful Ostracoda of the North American Paleogene

11:15-12:15 Session "ECOLOGY OF FRESHWATER OSTRACODS 1"
11:15-11:30 Krstić, N.: Ostracodes and paleolimnology - examples from Balkan Peninsula
11:30-11:45 Angelos, M.E.: Vernal pool ostracod community organization: interaction of habitat and seasonal gradients with life history characteristics
11:45-12:00 Külköylüoglu, O., Dügel, M. & Kiliç, M.: Ecological requirements of Ostracoda (Crustacea) and conservation status of a shallow eutrophic lake Yeniçaga (Bolu, Turkey)
12:00-12:15 Pieri, V., Caserini, C., Gomarasca, S., Martens, K. & Rossetti, G.: Diversity of the Recent ostracod fauna in relation to water quality in lowland springs from Lombardy (Northern Italy)

12:15-14:00 Lunch

14:00-15:30 Session "ECOLOGY OF FRESHWATER OSTRACODS 2"
14:00-14:15 Belis, C.A., Finsinger, W., Tinner, T. & Ammann, B.: A late glacial ostracod and pollen record from Lake Piccolo d'Avigliana (Northern Italy)
14:15-14:30 Bookhagen, B. & Mischke, S.: Subrecent development of freshwater lake Donggi Cona (NE Tibetan Plateau)
14:30-14:45 Krzyminska, J.: Ostracods as indicators of palaeoenvironmental changes of the Southern Baltic during the late glacial and the Holocene
14:45-15:00 Kossler, A.: Palaeoenvironmental reconstructions of the Quaternary Paddenluch (Brandenburg, Germany) based on freshwater ostracods
15:00-15:15 Wetterich, S.: Recent freshwater ostracodes from the Lena River Delta (NE Siberia)
15:15-15:30 Van Itterbeeck, J., Horne, D., Bultynck, P. & Vandenberghe, N.: Stratigraphy and palaeoenvironment of the Upper Cretaceous, dinosaur-bearing Iren Dabasu Formation (Inner Mongolia, People's Republic of China)

15:30-16:00 Coffee Break

16:00-18:30 Workshop 2
"The beauty of ostracods, featured by MicroKern's world of microscopes". A workshop presented by David Horne, Renate Matzke-Karasz and Radka Symonová.
Demonstration of the unique "Auto Montage" Software for deep focal images under your microscope or stereolupe. By Raczek-Analysentechnik

19:00-20:00 Plenary Session of the IRGO
20:00 Meetings of regional groups (e.g. "Deutschsprachige Ostracodologen") and other special groups (as necessary)

Wednesday, September 14

8:30-10:15 Session "ECOLOGY OF SALINE AND BRACKISH WATER OSTRACODS"
8:30-8:45 Stepanova, A., Taldenkova, E. & Simstich, J.: Recent Ostracoda from the Kara Sea
8:45-9:00 Do Carmo, D.A., Spigolon, A.L.D., Guimarães, E.M., Richter, M. & Mendonça-Filho, J.G.: Palaeoenvironmental analysis based on palaeoecology of early Cretaceous non-marine ostracods from the Alagamar Formation, Potiguar Basin, NE-Brazil
9:00-9:15 Arp, G. & Mennerich, C.: Facies, ostracod faunas and cyclicity of the limnic to brackish upper Münder Formation (lowermost Cretaceous, Hils Syncline, N-Germany)
9:15-9:30 Gouramanis, C. & Wilkins, D.: Holocene climatic change in southern Australia based on ostracod assemblages and geochemistry
9:30-9:45 Sarr, R., Sow, E.H., Sarr, B. & Fofana, A.K.: Marine intrusions in the Upper Holocene of the Retba and Mbawane lakes (Senegal) evidenced by ostracode faunas
9:45-10:00 Pirkenseer, C. & Berger, J.-P.: Oligocene ostracods from the Southern Upper Rhinegraben area: paleoecological implications
10.00-10.15 Wilkinson, I.P., Williams, M., Leng, M.J., Stephenson, M., Siveter, D.J. & Miller, C.G.: Colonisation of brackish water milieu by Early Carboniferous ostracods

10:15-12:00 Poster Session (incl. Coffee Break)

11:15-12:45 Lunch

12:45 Departure of buses to the boat trip
14:00-20:00 Boat trip (Mid-symposium excursion) (cf. p. 135)

Thursday, September 15

8:30-11:00 Workshop 3
Morphometric Workshop by Dan Danielopol and Angel Baltanas.
Demonstration of software and possibility to try and use it. – Room G.108

10:30-11:00 Coffee Break

11:00-12:30 Session "ECOLOGY OF MARINE OSTRACODS"
11:00-11:15 Irizuki, T., Shoji, M., Ishida, K. & Tanaka, Y.: Cyclic paleobathymetric changes and opening of the southwestern strait of the Sea of Japan during ca. 3.2 to 2.8 Ma based on fossil ostracode analyses
11:15-11:30 Dewi, K.T., Frenzel, P. & Müller, A.: Tropical Recent ostracoda in the eastern Indonesian Seas: from Sahul Shelf to the Banda Sea
11:30-11:45 Gebhardt, H. & Zorn, I.: The ostracod response to Cenomanian sealevel, food supply and oxygenation changes in the Tarfaya upwelling region, southern Morocco
11:45-12:00 Yamaguchi, T. & Kamiya, T.: Eocene-Oligocene shallow-marine ostracode faunal change in southwestern Japan
12:00-12:15 Sohrabi, M.M., Khosrotehrani, Kh. & Momeni, L.: Ostracoda in the Iranian coastline of the Persian Gulf

12:15-12:30 Castillo, R., Ayón, P., Antezana, T. & Mendo, J.: Pelagic ostracods in the Humboldt Current during El Niño 1997-98 and in 2001

12:30-14:00 Lunch

14:00-15:00 Session "REPRODUCTION, ONTOGENY AND BEHAVIOUR"

14:00-14:15 Pinto, R.L., Rocha, C.E.F. & Martens, K.: Brood selection or bet-hedging in the putative ancient asexual ostracod *Penthesilenula brasiliensis* (Pinto & Kotzian, 1961) (Crustacea) ?

14:15-14:30 Smith, R.J. & Kamiya, T.: Copulatory behaviour, sexual morphology and life cycle of three *Fabaeformiscandona* Krstic, 1972 (Candonidae, Ostracoda, Crustacea) species from Japan

14:30-14:45 Matzke-Karasz, R.: Ostracod spermatology - does it need to be revived again ?

14:45-15:00 Perrier, V., Vannier, J. & Siveter, D.J.: The Late Silurian entomozoid ostracod Richteria migrans: ontogeny, sexual dimorphism and lifestyle

15:00-15:30 Coffee Break

15:30-16:45 Session "ANATOMY, HISTOLOGY AND MOLECULAR BIOLOGY"

15:30-15:45 Tinn, O. & Oakley, T.H.: Incongruence of fossil and molecular estimates of evolutionary divergence times in Ostracoda

15:45-16:00 Schön, I., Pinto, R. & Martens, K.: Genetic structure of putative ancient asexual Darwinulidae

16:00-16:15 Nakao, Y.: Segmental structures recognized in male copulatory organs of cytheroid ostracoda

16:15-16:30 Symonová, R.: Free cells in the body cavity of freshwater ostracods

16:30-16:45 Tanaka, G. & Siveter, D.J.: The optics of a Silurian ostracod eye: functional & palaeoenvironmental significance

16:45-17:15 Coffee Break

17:15-18:30 Session "BIODIVERSITY"

17:15-17:30 Karanovic, I.: Diversity of the Australian Candoninae (Podocopida, Candonidae) with a cladistic analysis based on morphology

17:30-17:45 Iepure, S., Namiotko, T. & Danielopol, D.L.: Microevolutionary & taxonomical aspects within the species-group *Pseudocandona eremita* (Vejdovsky) (Ostracoda)

17:45-18:00 Uffenorde, H.: The Lienenklaus collection deposited in Goettingen and the ostracode type locality Buende (Chattian, NW Germany)

18:00-18:15 Tunoğlu, C. & Ertekin, I.K.: Ostracoda and associate fossil groups from the Campanian-Paleocene Davutlar Formation, Devrekani (Kastamonu), NW Turkey

18:15-18:30 Ertekin, I.K. & Tunoğlu, C.: Pleistocene-Recent marine ostracods from the Mersin offshore sediments, eastern Mediterranean, Turkey

18:30-18:45 Brandão, S.N.: Recent deep-sea Podocopa (Ostracoda) from the Atlantic Sector of Antarctica

19:00 Closing Session – SYLVESTER-BRADLEY Awards

Abstracts

ISO 15 Berlin

POPULATION DYNAMICS OF *HETEROCYPRIS* CF. *BOSNIACA* IN TEMPORARY ROCK POOLS IN VALÈNCIA (SPAIN)

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Keywords: Temporary Rock Pools, Population Ecology, Nonmarine Ostracoda, València, Iberian Peninsula

Heterocypris bosniaca was described by Petkowski et al. (2000) from samples collected in the Balkan Peninsula, where they found both male and female individuals in the population. Two years later, Martens et al. (2002) reported on the presence of a bisexual population in Israel. In December 2004, we collected females of a *Heterocypris* species that highly resembles *H. bosniaca*, in pools excavated by water weathering in the carbonate rocks of the mountains near Rafelguaraf (València, Spain). Immediately afterwards, we started a sampling campaign to assess the distribution of the species in the area and selected two sites for a survey on its population dynamics.

The species was found in 9 small-sized temporary rock pools, and we chose two of these sites, differing in size (92 x 120 cm; 32 x 59 cm) and illumination, for further analyses. Weekly sampling started at the beginning of December 2004 and ended in late January 2005, when the pools dried. Temperature during the day varied between 8 and 15 ºC, and conductivity varied between 160 and 330 $\mu S\ cm^{-1}$ in the largest pool, and between 180 and 580 $\mu S\ cm^{-1}$ in the smallest one. Sudden decreases in conductivity were detected after heavy rains. More than 20 animals of each size class were measured at each sampling date and site, and all the collected animals were counted and assigned to different size-classes (instars). For a more precise determination of each instar size, we reared some juveniles in the laboratory at room temperature, and could in this way determine carapace length for all developing instars. In one of the pools there were no adults at the first sampling date, so here we could detect the recruitment of the first adult cohort, but not in the other pool, in which adults were already present at the beginning of the survey. In both cases, changes in the relative abundance of different juvenile and adult instars show the follow-up of the population from a higher proportion of early juvenile instars to a higher proportion of late juvenile instars. A trend is also observed with regard to mean size of late instars, in which animals collected at the end of the period are smaller, compared to the same instars at previous sampling dates. We discuss the possible factors causing this change in carapace length in ostracods.

References

Petkovski, T., Scharf, B. and Keyser, D. 2000. New and little known ostracods of the genus *Heterocypris* (Crustacea, Ostracoda) from the Balkan Peninsula.- Limnologica **30:** 45-57.

Martens, K., Schwartz, S.S., Meisch, C. and Blaustein, L. 2002. Non-marine Ostracoda (Crustacea) of Mount Carmel (Israel), with taxonomic notes on Eucypridinae and circum-Mediterranean *Heterocypris*.- Israel Journal of Zoology **48:** 53-70.

OSTRACODS INHABITING INTERDUNE PONDS BETWEEN A FRESHWATER LAKE AND THE SEA (ALBUFERA DE VALÈNCIA, SPAIN), WITH SPECIAL REFERENCE TO THE LIFE CYCLE OF *SARSCYPRIDOPSIS ACULEATA*

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Keywords: Temporary Brackish Ponds, Ecology, Nonmarine Ostracoda, Albufera, Iberian Peninsula

In the framework of a biodiversity assessment of the invertebrates living in interdune ponds of the Natural Park Albufera de València, ostracods were collected using hand nets, to be studied as a part of the invertebrate community. More than 50 of these ponds, located on a sand bar separating the shallow freshwater lake Albufera from the Mediterranean sea, and occupying an area about 7 km long and 1 km wide, were sampled and main abiotic factors analysed, including temperature, conductivity, salinity, pH, oxygen concentration and alkalinity.

Most of the study sites are temporary and have a variable hydroperiod depending on precipitation, but a few others maintain a permanent water table throughout the year. Salinity varied between 0.2 and 43 ppt, with 7 ppt on average, and mean pH was 8.0.

The ostracod community is dominated by species tolerant to desiccation, and also to some degree to salinity variation. The most frequent species were *Sarscypridopsis aculeata, Eucypris virens* and *Heterocypris salina,* common inhabitants of temporary ponds. In brackish permanent waters, *Cyprideis torosa* was the most abundant species.

In order to better understand the ecological adaptation to temporary waters in ostracods, we reared individuals of *S. aculeata* in the laboratory at room temperature (21-26 ºC). Individually placed females were able to lay eggs, and we followed the development of juvenile instars until new adults were present and laid eggs again. Our results are consistent with the findings of Ganning (1971) in the sense that this species can complete its development (from egg to egg-laying adult) in about 17 days, a very fast life-cycle for an ostracod. However, we found a higher egg production per female, attaining more than 70 eggs laid per female, in contrast to the results shown by this author who found a maximum of 36 eggs per female.

In general, ostracod species living in interdune temporary ponds need to be resistant to desiccation, usually through diapausing eggs, tolerate wide salinity variation, and reproduce fast before the pond dries up. This probably applies not only to *S. aculeata*, but also to other species present in these ponds in the Albufera Natural Park.

Reference

Ganning, B., 1971. On the ecology of *Heterocypris salinus, H. incongruens* and *Cypridopsis aculeata* (Crustacea: Ostracoda) from Baltic brackisch-water rockpools.- Marine Biology **8:** 271-279.

Acknowledgements

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TWO NEW OSTRACODA SPECIES OF *PELORIOPS* (*PELORIOPS*) FROM THE CRETACEOUS OF IRAQ

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Peloriops (*Peloriops*) is regarded as a subgenus of *Peloriops*, Al-Abdul Razzaq (1979). Two new species *Peloriops* (*Peloriops*) *almasudii* and *Peloriops* (*Peloriops*) *ibnalkasimi* are considered as belonging to the subgenus mentioned above and recorded from the Lower Cenomanian of Iraq. The material was obtained from the drilling oil wells of South Rumaila Well-104, East Baghdad Well-3, Ghalaisan Well-1, Safawi Well-1, and Kifl Well-2. The samples studied were taken from Middle Cretaceous Formations of the upper part of the Mauddud, Ahmadi, Rumaila, Mahilban, Fahad, Maotsi, Mishrif and Kifl Formations. In the present paper the genus *Peloriops* Al-Abdul Razzaq (1979) is divided into two subgenera: *Peloriops* (*Peloriops*) and *Peloriops* (*Hemipeloriops*) subgen. nov. (unpublished) which differ in the degree of development of the tubercles of the dorsal and ventral ridges, and median, anterior and posterior areas; and usually in the shape of the posterior margin. The nominate subgenus *Peloriops* (*Peloriops*) has short tuberculated dorsal and ventral ridges; the shell surface ornament is variable with microreticulation, macroreticulation, or a combination of them together with smooth and prominent pore cones or tubercles and spines. The posterior end is generally subacute with the dorsal and ventral margins converging towards the posterior. The new genus described as *Aphrikanecythere* by Damotte and Oertli (in Donze et al. 1982) is identical to *Peloriops* (*Peloriops*) Al-Abdul Razzaq (1979), on the basis of similarities in the external features as well as internally in having an Amphidont hinge with an ocular boss in the left valve and also the same type of muscle scars. This subgenus is distributed over the areas of the Middle East and Western Coast of the Arabian Gulf, Iraq, Palestine, and North Africa. *Peloriops* (*Peloriops*) *almasudii* sp. nov. is distinguished by having a smooth surface which is covered by small median tubercles and/or pore cones, and some spines, a well-developed narrow anterior marginal rim with conspicuous median tubercles along it. This species is very similar to *Peloriops* (*Peloriops*) *ulosa* Al-Abdul Razzaq (1979) from the Cenomanian of Kuwait, Iraq, and from the Upper? Aptian to Cenomanian of Oman; but differs in having a tuberculated antero-marginal rim, and in the greater prominence of the nodes or tubercles along the surface of the carapace, and the crater-like pits on the tips of tubercles or pore cones being poorly distinguished. *Peloriops* (*Peloriops*) *ibnalkasimi* sp. nov. is diagnosed as an elongate species of *Peloriops* (*Peloriops*) with coarse, subquadrate macroreticulation on median and posterior parts of the valve. An oblique ridge is present across the carapace from the posterior node to the ventral margin, bifurcating near the ventral margin. Ventral ridge of 5 tubercles and tuberculate muri; antero-marginal depression with weaker macroreticulation and two vertical, oblique ridges in the central anterior area which bears a few small mamillate spines with foveolate muri. This species is easily distinguished from other species of *Peloriops* (*Peloriops*) by the presence of the coarse macroreticulation and oblique ridges.

TAXONOMY AND PALAEOECOLOGY OF PERMIAN OSTRACODS FROM THE PARANÁ BASIN, GOIÁS STATE, BRAZIL

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Keywords: Taxonomy, Palaeoecology, Ostracods, Permian, Paraná Basin

Palaeoecological investigations of Permian strata in Brazil are focused on macrofossils and palynomorphs. There are only two articles about ostracods, both refer to the Corumbataí Formation, São Paulo State. This study reports a low diversity ostracod fauna recovered from Irati and Corumbataí formations, Permian, Paraná basin. Nine marine and nonmarine ostracod species were identified: *Bythocypris* sp. 1, *Praepilatina* sp. 1, *Darwinula* sp. 1, *Candona* sp. 1., Gen. 1 sp. 1, Gen. 1 sp. 2, Gen. 2 sp. 1, Gen. 3 sp. 1 e Gen. 4 sp 1. Based on population age-structure, the marine species *Bythocypris* sp. 1 and ?*Praepilatina* sp. 1 are interpreted as autochthonous. The nonmarine species *Darwinula* sp. 1 and *Candona* sp. 1 are interpreted as allochthonous. The autochthonous occurrence of *Bythocypris* sp. 1 in the upper portion of Irati Formation indicates deposition in a marine palaeoenviroment. In addition, the autochthonous occurrences of *Bythocypris* sp. 1 and ?*Praepilatina* sp. 1 in the lower portion of Corumbataí Formation indicate a marine or a transitional palaeoenvironment. These occurrences of *Bythocypris* sp. 1 in both formations indicate coeval deposition, which is in agreement with dating based on mesosaurids found in both formations. Despite autochthonous and allochthonous occurrences of *Bythocypris* sp. 1 in Corumbataí Formation, the allochthonous occurrences of *Darwinula* sp. 1, *Candona* sp. 1 and gyrogonites indicate a stronger continental drainage in the depositional system. This pattern of micropalaeontological occurrences seems to indicate progressive inland conditions during the Late Permian in the Paraná basin.

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INSIGHTS GAINED FROM A WEB-BASED ATLAS OF HALOCYPRID OSTRACODS OF THE SOUTHERN OCEAN

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Keywords: Halocyprid Ostracoda, Zooplankton, Southern Ocean, Zoogeography, Taxonomy

Introduction

Planktonic Ostracoda are important components of oceanic pelagic communities, occurring at all depths and are often the second-most abundant group present in net plankton samples. Yet they are consistently overlooked because of reputed difficulties in identifying them.

To ease these difficulties we have built web-based atlases, initially for the Southern Ocean and just recently for the Atlantic, making taxonomic information freely available and providing charts of the geographical distributions of the species.

Material and Methods

We compiled listings of all published data for all species that could be geopositioned. These data have been extensively supplemented with previously unpublished data, particularly from *Discovery* investigations and Russian expeditions. For the Southern Ocean Atlas we selected all species (43) that have been recorded at least once from south of 52°S (the Atlantic atlas covers 138 species). Original standardized drawings were made of every species for which specimens were available to us; for a few rarities the original drawings were scanned, but some of these are ‘inadequate’.

Over the last three decades I have been measuring lengths of all instars of all the species sampled; the results of $>10^5$ measurements are summarized in the species’s notes section. The website was built to be content-managed, enabling it to be updated easily. The site also includes a comprehensive bibliography of papers reporting on halocyprid ostracods, a complete listing of halocyprid species, as well as a regional-specific listing.

Each species entry in the regional listing links to a page which shows an outline of the species and three further options: - 1. a distribution map; 2. a set of standard drawings of a male and female; and 3. taxonomic notes together with tables of the size data. The Atlantic atlas offers a fourth choice - plots of bathymetric ranges - of many species. All these pages are available for downloads in PDF format.

Results

Little evidence emerges for the main oceanographic frontal systems delimiting the species’ distributions. Nor was the spatial coverage sufficient to demonstrate convincingly that the species can be used as indicators of the spread of watermasses, although in several examples there were indications. The majority of species have circumpolar distributions.

There were some the aberrant distributions that probably arose from either misidentifications, taxonomic confusions or both. We have resolved one such aberrant distribution by re-examining the original specimens and describing a new species. The data can be re-processed in the future to seek changes in ranges resulting from shifts in climate. There can be no excuses for plankonologists ignoring the ostracods in future.

Reference

The URL of the site is http://ocean.iopan.gda.ostracoda

VERNAL POOL OSTRACOD COMMUNITY ORGANIZATION: INTERACTION OF HABITAT AND SEASONAL GRADIENTS WITH LIFE HISTORY CHARACTERISTICS

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Keywords: Ostracod Community, Vernal Pool, Wetland, Southern California, Madrona Marsh

The ostracod fauna of North America is not well known, and California is no exception as evidenced by the recent reporting of *Cypridopsis vidua* as a new record for California, *C. vidua* being one of the most common and widely distributed of all fresh-water ostracods. In a recent California vernal pool ostracod study, King et al. (1996) reported 14 new California records and 14 probable or possible new species in a survey of 14 sites. A collection of California non-marine ostracods is being established at the Natural History Museum of Los Angeles County to resolve taxonomic questions, investigate the habitat range of individual ostracod species, and investigate the factors influencing ostracod community composition.

Ostracods from Madrona Marsh, a 17 acre seasonal wetland in Southern California, were collected between 1997 and 2003. A large number of samples were taken from different depths, different vegetation zones, different pools, and different locations within pools. Each sample was composed of several sub-samples included such microhabitats as detritus, algal mat, and emergent vegetation.

The overall ostracod community is composed of four abundant species, *Cypris pubera*, *Cypridopsis vidua*, *Heterocypris incongruens*, and *Heterocypris* sp. B, and three rare species, *Herpetocypris reptans*, *Eucypris virens*, and *Eucypris* sp. 2. The community is organized into distinct sub-communities by the interaction of a habitat gradient and a seasonal gradient, with the life history characteristics of individual species, including vegetation preference, maturation time, and recruitment period. Pool flooding duration is the main habitat gradient. The fast maturing *Heterocypris spp.* dominate the short lived un-vegetated pools, and the slower maturing *Cypris pubera* dominates the long lived pools early in the season. *Herpetocypris reptans* is a slow maturing rare species associated with fine sediments in the long lived pools. Along the seasonal gradient, *Cypris pubera* with a single short recruitment period dominates early in the season in the long lived pools, and the phytophilus *Cypridopsis vidua* with an extended recruitment period dominates late in the season in the long lived abundantly vegetated pools. *Eucypris virens* is a rare species that occurs early in the season in most pools.

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FACIES, OSTRACOD FAUNAS AND CYCLICITY OF THE LIMNIC TO BRACKISH UPPER MÜNDER FORMATION (LOWERMOST CRETACEOUS, HILS SYNCLINE, N-GERMANY)

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Keywords: Ostracoda, Lower Cretaceous, Purbeck, Oxygen Isotopes, Carbon Isotopes, Hils Syncline, Sedimentary Cycles, Palaeosalinities

Introduction

Cyclicity in non-marine ostracod faunas of the British Tithonian-Berriasian "Purbeck" is well known. Marlstones rich in ostracods and charophytes of similar age occur in the upper part of the Münder Formation of the Hils Syncline (M.E. Schudack 1993, U. Schudack 1994). These deposits have previously been regarded as freshwater deposits with minor brackish influence (Huckriede 1967, Dannapfel 1983). However, it remained unclear whether these deposits are lacustrine or marine-lagoonal in origin.

Materials and Methods

Microfacies analysis was carried out using 30 thin sections of lime- and marlstones. 200 to 800 g of 40 marlstone samples have been prepared for microfossils using a 90-µm sieve. 60 stable isotope analyses were obtained from mechanically cleaned ostracod valves (separated by species), gastropod shells and associated sediments.

Results

Sedimentary cycles are strikingly symmetric and show the following lithofacies types: (1) Redbrown massive marlstones with micrite nodules represent distal parts of alluvial plains. (2) Greenish-grey bedded marlstones have been deposited in the supralittoral zone. A characteristic wrinkled lamination reflects formerly existing microbial mats. (3) Dark-grey palustrine marlstones with abundant ostracods and charophytes are considered as littoral sediments. (4) Grey palustrine micrites with ostracods, charophytes, and scattered oncoids are interpreted as littoral sediments, too. (5) Poorly bedded light-grey micrites and (6) clayey marlstones with scattered ostracods and charophytes are interpreted as sublittoral sediments.

Ostracod, charophyte and mollusc associations indicate freshwater conditions for lithofacies types 3 and 4: Characteristic are the ostracods *Bisulcocypris forbesii* and *Cypridea dunkeri inversa*, the gastropods *Anisopsis fisheri* and *Valvata* sp. as well as charophytes of the genera *Atopochara*, *Clavator* and *Globator*. Increased salinities up to mesohaline conditions are indicated for the sub-littoral lithofacies types 5 and 6 by an ostracod association of *Mantelliana purbeckensis*, *Fabanella boloniensis*, *Scabriculocypris trapezoides* and the opportunistic *Klieana alata*. Maximum flooding is coincident with the appearance of small foraminifera in lithofacies type 5. This correlation of lithofacies types and ostracod faunas implies that salinities increased with increasing water level and *vice versa*. Consequently, a coupling of the water level of the Hils basin to short-term eustatic sealevel fluctuations must be assumed. Therefore, during the Berriasian, the Hils basin was a marine embayment with freshwater overflowing saltwater, but not a lake.

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EXTRA-LOBAL OR COMPLEX DIMORPHIC FEATURES IN MIDDLE DEVONIAN OSTRACODS: INCOMPATIBLE ODDITIES? OR, CONSIDERING THE PREJUDICE THAT EXTRADOMICILIAR DIMORPHISM IN MID-PALAEOZOIC PALAEOCOPINES SHOULD BE SOLELY VELAR IN ORIGIN

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Keywords: Morphology, Dimorphism, Evolution, Ostracoda

Extradomiciliar dimorphism, as expressed in palaeocopine ostracods, is proven to be a powerful tool in the hands of taxonomic workers. By means of external linear extensions, as placed upon the ventral

part of the domicilium and being characteristically dimorphic in aspect, a few "natural" family-group taxa are distinguished (Jaanusson 1957, Becker 1990). With respect to their relative positions on the valve surface from distal to proximal, such adventral structures are named margina, velum or histium. While recognising margina or velum generally appears unproblematic, there is sometimes serious disagreement as to whether a dimorphic structure is of velar or histial origin. The relevant literature is legion, in particular, with hollinids. However, it is possible that the truth lies somewhat in between the two views (Henningsmoen 1965). Also, it appears as if extra-lobal dimorphism is an unknown matter.
As a result of work done with Middle Devonian ostracods from western Canada, special cases of extradomiciliar dimorphism are discussed, as being unusual in hollinids and primitiopsids. (1) Since appearing multi-lobate and being lobal (histial) dimorphic in aspect, a new hollinid genus [working name: aff. *Abditoloculina*] is shown to possess extra-lobate, bulbous or spur-like protuberances, fide Henningsmoen (1965), lobal (histial) in origin. (2) In species assigned to the (to a certain extent ambiguous) primitiopsid genera *Sulcicuneus* and *Parasulcicuneus*, the ventral lobe is bordered by a narrow ridge-like extension or provided with mid-ventrally located protrusions - all clearly of histial origin, but strange to true primitiopsids. (3) Primitiopsid-like forms [working name: aff. *Gravia*] are provided with combined velar and histial structures. While it seems as if the outer antral fence is formed by both (more-or-less) coalesced velar and outer lobal (histial) structures, similar features have been attributed to hollinids (Henningsmoen 1965), but never to primitiopsids.
In terms of phylogeny, extradomiciliar dimorphism, being unique for palaeocopines, must be considered to be a discontinued concept, moreover, not explainable in terms of functional morphology. Consequently, sometimes an idea under consideration appears a "new-fashioned" concept. The inspiration of distinction and initiation/radiation interplay runs like a thread through geological times describing the motor of ostracod evolution.

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A LATE-GLACIAL OSTRACOD AND POLLEN RECORD FROM LAKE PICCOLO D'AVIGLIANA (NORTHERN ITALY)

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Keywords: Late-glacial, Ostracod, Pollen, Italy, Numerical Analyses

How did freshwater environments respond to changes affecting the surrounding terrestrial environments? To address this question a comparative study of the succession of ostracod assemblages and terrestrial vegetation was conducted along the Late Glacial - Holocene transition, a time window of rapid environmental changes.
Core AVP1 was retrieved in Lake Piccolo d'Avigliana (surface 0.6 km^2, watershed 8.1 km^2) located at 350 m a.s.l., in a lateral valley of the Val di Susa (Piedmont, northwestern Italy). The analyses were then carried out on a sequence spanning from 17 to 10 kyr cal BP. Ostracod valves were sorted from wet sediment (10-20 g) previously sieved through a 200 μm mesh. Subsequently they were cleaned and identified under a binocular microscope. Samples for pollen analysis (1 cm^3) were prepared physically and chemically and were embedded in glycerine. At least 400 pollen grains produced by terrestrial plants were counted.Variations in both ostracod and pollen records were summarized using Principal Component Analysis, after checking that linear models described data better than unimodal ones. Ostracod and pollen biozones were compared to those generated by optimal sum of squares partitioning and their significance was assessed using the broken-stick model.

The first zone (> 14,200 cal BP) was dominated by *Cytherissa lacustris* and *Candona candida*. The ostracod community indicated sublittoral to profundal zones in oligotrophic to mesotrophic environments with oxygen concentrations higher than 3 mg/l. At the same time, the pollen record showed relatively cold conditions: a gradual afforestation with *Betula* was followed by an expansion of *Pinus*.
At the onset of the second zone (14,200 – 12,750 cal BP) the total concentration of valves decreased, *C. candida* and *Cypria opthalmica* dominated the ostracod assemblages. The rise of *C. ophtalmica* and the contemporary retreat of *C. lacustris* suggested lowering oxygen concentrations superposed to increasing organic loads. Pollen analysis showed an expansion of thermophilous trees (*Quercus* and *Ulmus*) in the surrounding terrestrial environments.
A further strong decrease of both total valves concentration and species abundance occurred between 12,750 and 11,450 cal BP (Younger Dryas). The presence of *Darwinula* sp. and *Metacypris cordata* suggested shallow water-levels with aquatic vegetation.
In the terrestrial environment, adverse climatic conditions (colder - dryer?) were indicated by an increase in *Juniperus, Artemisia* and Chenopodiaceae.
At the onset of the Holocene (11,450 - 10,100 cal BP) total valve abundance increased indicating a gradual change in the aquatic environment that led to more favourable conditions for ostracods. After an abrupt increase, *C. candida* was progressively overcome by *C. opthalmica*. The ostracod assemblages indicated a gradual increase in the lake trophic state and in the lake water-level. Oak and elm were the first termophilous trees that re-expanded at the onset of the Holocene, and were followed by *Corylus*.
The total variance accounted for by the first two PCA axes was 81% in ostracod and 78% in pollen data. Although ostracod and pollen records presented good agreement, the number of statistically significant boundaries between biostratigraphic zones were 1 and 3 respectively.

OLIGOCENE OSTRACODE BIOSTRATIGRAPHY OF KACHCHH AND BOMBAY OFFSHORE BASIN, INDIA

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78 ostracode taxa are recorded from the Oligocene of Kachchh and Bombay Offshore Basin, India. Of these, *Acanthocythereis muktaensis*, *Alocopocythere waiorensis*, *Assymetrycyther kachchhensis*, *Bairdoppilata maharashtraensis*, *Bairdoppilata mumbaiensis*, *Byhtocypris mumbaiensis, Phlycetenophora ramaniaensis, Quadracythere alata* and *Uroleberis indica* are new. On their First Appearance Datum (FAD) and Last Appearance Datum (LAD), the Lower Oligocene strata in the Bombay Offshore Basin is divided into four ostracode interval zones.
They are in ascending order:
1. *Uroleberis sohni-Pokornyella kutchensis* Interval Zone
2. *P. kutchensis-Phlycetenophora ramaniaensis* n.sp. Interval Zone
3. *Phlycetenophora ramaniaensis-Acanthocythereis muktaensis* Interval Zone and
4. *Acanthocythereis muktaensis-Hornibrookella ramaniaensis* Interval Zone.

The Upper Oligocene in the holostrato type of Waior river section of Kachchh is best developed and divided into four interval zones:
1. *Alocopocythere waiorensis* Range Zone,
2. *Alocopocythere waiorensis-Alocopocythere elongata* Interval Zone,
3. *Alocopocythere elongata-Haplocytheridea manifesta/Loxaconcha keralaensis* Interval Zone and
4. *Haplocytheridea manifesta/Loxaconcha keralaensis-Uroleberis sohni* Interval Zone.

The Lower Oligocene ostracode zones of Bombay Offshore basin are fairly well correlated and traced laterally in the Kachchh Basin. Oligocene sediments in general were deposited in fluctuating environment varying from marginal marine to inner neritic with maximum bathymetry around 30-40 m.

A YEAR ROUND COMPARATIVE STUDIES ON THE POPULATION STRUCTURE OF PELAGIC OSTRACODA IN THE ADMIRALTY BAY (ANTARCTICA)

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Keywords: Antarctica, Admiralty Bay, Pelagic Ostracoda, Population Structure, Life Cycle, Seasonal Changes

The population structures of dominant Ostracoda species were studied basing on an unique collection of zooplankton samples taken every month through a whole year between February 1993 and January 1994 in Admiralty Bay (King George Island). The samples were collected from two stations: “A” situated in the central part of Admiralty Bay (350-0 m) and “B” located in the outlet of Admiralty Bay near the Bransfield Strait (400-0 m). The zooplankton samples were taken from the surface to the bottom using WP-2 net with a square mouth opening of 0.196 m^2 and 200 μm mesh size. The aim of this study was to recognise the age structure of three endemic species of Antarctic Ostracoda: *Alacia belgicae*, *Alacia hettacra* and *Metaconchoecia isocheira* from the shelf zone of the Southern Ocean. The analysis revealed similarities between *A. belgicae* and *A. hettacra* population patterns, whereas clear difference appeared in case of *M. isocheira* age structure. Moreover, populations from the station “A” seemed to be more advanced in development in comparison with these from “B” locality. Characteristic seasonal patterns of the population structures of *A. belgicae*, *A. hettacra* and *M. isocheira* are also discussed to point towards description of their life cycles. Another aspect of this investigation was to verify the hypothesis whether the populations living in the shelf zone (this study) have the same model of life cycles as the earlier described inhabitants of the open waters (Kock 1992, 1993, Blachowiak-Samolyk 2001, 2002).

SUBRECENT DEVELOPMENT OF FRESHWATER LAKE DONGGI CONA (NE TIBETAN PLATEAU)

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The presentation is part of the interdisciplinary project “Ecosystem Dynamics in Central Asia”. We studied the freshwater lake Donggi Cona, which is located on the north-eastern border of the Tibetan Plateau. The climatic conditions in this environment are dominated by the Indian and East-Asian Monsoon, and most of the annual rainfall (75%) occurs during the summer months. Owing to recent global temperature changes, the lowlands in central Asia respond with an increase in temperature and precipitation. The aim of the study is to investigate whether or not sediment cores from the shallow and deep zones of the lake also reflect environmental changes on the Tibetan Plateau. The magnitude of climate change in this environment will be compared with other paleoclimatic archives in central Asia and the Tibetan Plateau. Two cores from 30.2 m water depth (20 cm length, 20 samples) and from 0.6 m water depth (36 cm length, 41 samples) were investigated. In addition, a profile consisting of 11 surface-mud samples was taken. After initial sieving and drying the shells were picked out. The soft parts were examined in ethanol under the microscope. In addition, scanning electron microscope (SEM) images of cleaned shells were taken.
Surface water was sampled in 2002 and 2003 and analysed to determine the ionic composition. The electrical conductivity of inflowing and outflowing waters and the lake water itself was measured.
Ostracod taxonomy is based on shell morphology (SEM analyses) and soft-part morphology, determined under the light microscope. The taxonomic data permits the investigation of an ostracod species-depth distribution (maximum depth 37 m). Species abundance and association will be related to salinity, water temperature and water depth. Two species (*Leucocythere dorsotuberosa* and *Eu-*

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cypris gyirongensis) have only been described from the Tibetan Plateau, and the soft part morphology of the latter will be described for the first time.

Preliminary results indicate that the sediment cores of Donggi Cona document climatic change on the NE Tibetan Plateau during the past decades. Thus, the Donggi Cona short cores may be used to estimate the climate fluctuations at the NE border of the Tibetan Plateau. The cores record recent climate changes and further investigation might help to understand the spatial distribution of increasing temperature and precipitation.

RECENT DEEP-SEA PODOCOPA (OSTRACODA) FROM THE ATLANTIC SECTOR OF ANTARCTICA

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Keywords: Podocopa, Deep Sea, Antarctica, ANDEEP Project

The earliest Antarctic and Subantarctic Ostracoda were collected by the Swedish Eugenie (1851-1853), the British Challenger (1873-1876) and German South Polar (1901-1903) expeditions. Work on Antarctic ostracods followed with approximately 150 publications until the last decade of the 20th century, when more than 200 Podocopa species were described or recorded. Otherwise, the great majority of them were collected in shallow waters: from the 101 sufficiently described species, 96 occurred on the continental shelf (0 to 850 m), and only six species occurred in the deep sea (Hartmann 1997). Only in the last 15 years, has the knowledge on the deep-sea Ostracoda in Antarctica been considerably increased (Majoran and Dingle 2001, 2002, Whatley et. al. 1998). In the present study, ostracod samples collected during the ANDEEP project are analysed. During the ANDEEP legs I to III, epibenthic sledge (EBS), boxcorer (BXC), Agassiz trawl (AGT), and multicorer (MUC) samples were collected in the Weddell and Scotia Seas - from 41° 6,99' S to 71° 18,89' S, from 9° 56.81' E to 64° 42.45' W, from 774 to 6348 m. Almost 100 EBS, AGT, BXC and MUC samples provided more than 2,000 live Ostracoda specimens belonging to, at least, 78 species. The shallowest samples (less than 2,200m) present the highest ostracod (and also macrofaunal) abundance, and the assemblage is composed of several species usually found on the Antarctic shelf. Otherwise the deepest samples are much poorer in ostracods and show an assemblage already typical of deep waters (including, for example, *Echinocythereis* sp., *Bradleya* sp., *Pseudomanicus* sp., *Henryhowella* sp., *Macroscapha* sp., and *Macropyxis* sp.). Furthermore, as commonly observed in the deep sea, most of the species occur in only one or two samples, and only three species occur in more than five samples. Additionally, the assemblage herein analysed differs significantly from that recorded by Jellinek and Swanson (2003) on the deep sea of the Indic-Pacific Sector of Subantarctica. Not surprisingly, many species were also recorded from other authors in the deep sea of the Atlantic Sector (Majoran and Dingle 2002, Whatley et. al. 1998).

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MACROCYPRIDIDAE MÜLLER FROM THE "ANDEEP" PROJECT, ANTARCTICA

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Keywords: Ostracoda, Macrocyprididae, Antarctica, New Species

Fifteen macrocypridid species (11 of them named, and four of them left in open nomenclature) belonging to five genera have been previously recorded from the Antarctic and Subantarctic Regions. Now, with the deep-sea samples collected during the ANDEEP Project (legs I and II) on the Weddell and Scotia Seas (from 58º14.10'S to 65º59.97'S, 23º57.59'W to 60º44.43'W, and 774 to 6348 m), five new and three previously named species are described and illustrated, and a taxonomic key for Antarctic and Subantarctic species is provided.
Twenty macrocypridid specimens found in the ANDEEP samples comprise the following taxa: *Macropyxis* sp. nov. 1; *Macropyxis* sp. nov. 2; *Macropyxis* sp. nov. 3; *Macropyxis* sp. nov. 4; *Macroscapha* sp. nov. 5; *Macroscapha inaequalis* (G.W. Müller 1908); *Macroscapha tensa* (G.W. Müller 1908); *Macroscapha turbida* (G.W. Müller 1908). The distribution of most of these species is punctual, which might reflect relatively small sampling efforts on the Antarctic deep-sea. Otherwise, the occurrence of three species around the whole Antarctic continent is obviously a sign that the distribution of some, if not all, Macrocyprididae is connected to the current pattern in the Southern Ocean.

FIRST OCCURRENCE OF A RECENT PLATYCOPIDA IN ANTARCTICA

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Keywords: Ostracoda, Platycopida, Antarctica, New Species, First Record

Several studies have been published on Antarctic and Subantarctic Ostracoda, and more than 300 species have been recorded (Kornicker 1993, Hartmann 1997). In spite of that, the only previous record of a Antarctic Platycopida concerns a Campanian (Upper Cretaceous) *Cytherella* from southern James Ross Island (Fauth et al. 2003). Two samples, namely 89 and 107, collected during the EASIZ II cruise (Polarstern ANT XV/3) in the Eastern Weddell Sea, provided 25 specimens of *Cytherella* sp. nov, from 914 to 1639m. The new species is described and illustrated.

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OSTRACODE-ENVIRONMENT RELATIONS IN THE SOUTHWEST YUKON TERRITORY, CANADA

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Keywords: Ostracodes, Mg/Ca Ratio, Lake Depth, Subarctic, Yukon, Canada, Paleolimnology

Introduction

Sediment-ostracode assemblages were analyzed in relation to environmental variables in 36 lakes from the southwest Yukon Territory and northern British Columbia. The purpose of this study was to document the ostracode fauna of the region and determine the factors that influence species abundance and distribution. The ultimate goal is to quantify ostracode-environment relations for use in paleo-environmental reconstructions in this region.

Materials and Methods

Water samples were collected and analyzed in accordance with Environment Canada (1994. Manual of Analytical Methods: Major Ions and Nutrients, v. 1.) protocols. Standard methods were followed in sediment collection (Smol, Birks and Last (eds.) 2001. Tracking Environmental Change Using Lake Sediments, Vols. 1-4). To extract adult ostracode valves from the uppermost sediment, sediment was sieved through 50-µm Nitex© mesh, rinsed with deionized water and transferred to a Petri dish where valves were picked with a 0/5 brush under a 16x stereoscope (modified from Danielopol et al. 2002, in Holmes, J.A. and A.R. Chivas (eds), The Ostracoda: Applications in Quaternary Research). Identifications followed Delorme (1968-1970. Can. J. Zoolog. 46; 47; 48; 49) and others. Rarefaction-estimated species richness (Birks and Line 1992. Holocene. 2: 1) was calculated using Analytic Rarefaction 3.1 (www.uga.edu/~strata/software).

Results

A total of 29 freshwater species representing 8 genera were identified. Common species (present in > 10 lakes) include *Cyclocypris ampla*, *Candona candida*, *Cypria turneri*, *Cypria ophtalmica*, and *Candona protzi*. The most important environmental variables influencing species distributions are the Mg/Ca ratio and lake depth. The Mg/Ca ratio is an important factor determining the community composition of a lake. Greater species richness occurs in closed-basin lakes found on glacial till, with varying depths and moderate Mg/Ca ratios. *C. ampla* is widespread throughout the study area, tolerating various Mg/Ca ratios, but with a preference for water depths < 5 m. *C. candida* generally prefers depths < 7 m, but is found at depths > 9 m at high Mg/Ca. *C. turneri* appears excluded from lakes with low and high Mg/Ca ratios, but is found at depths < 10 m. *C. ophtalmica* is present in lakes with varying Mg/Ca ratio and depths > 5 m, whereas *C. protzi* is found at a wide range of depths and moderate Mg/Ca ratios.

THE CHRONOLOGICAL RECORD OF HOLOCENE OSTRACODS IN MELIDES COASTAL LAGOON (SW PORTUGAL)

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Keywords: Ostracoda, Lagoonal Environment, Holocene, Portugal

The Melides lagoon is located in the south-western Portuguese sandy coast, 80 km south of Lisbon and occupies the terminal area of the Ribeira de Melides valley. It is separated from the open sea by a sandy barrier that is periodically artificially breached. In order to reconstruct the Holocene evolution of this area, two cores were taken from both the back-barrier (MB - 40 m long) and adjacent alluvial plain (MIGM - 34 m long), and studied for sedimentology, geochemistry and palaeoecology (Freitas et

al. 2003). The interpretation of ostracod assemblages found in 152 samples (taken at every 30-40 cm) of these sedimentary columns, together with other environmental proxies, allowed the establishment of an evolutionary model for the lagoon throughout the Holocene, which includes a transgressive sequence followed by a regressive one, both developed in a positive eustatic context. In MB, the litho- and biofacies change from high-energy terrestrial, into low-energy, normal-marine (flooding of fluvial trough by the Holocene transgression) and finally into a barrier environment; the barrier has isolated the "ria" around 5500 BP, favouring the development of a lagoonal setting which, in recent times, has been progressively infilled with fluvial sediments. In MIGM, the litho- and biofacies change also from high-energy terrestrial into low-energy, normal-marine and, following the differentiation of the barrier, into lagoonal and subsequently fluvial conditions.
The ostracod fauna in both locations includes 33 species of marine littoral to sublittoral/phytal forms that clearly characterize the signature of a full marine episode, the most common being: *Loxoconcha rhomboidea* (Fischer 1855), *L. elliptica* Brady 1868, *Aurila convexa* (Baird 1850), *A. arborescens* (Brady 1865), *Urocythereis britannica* Athersuch 1977, *Carinocythereis whitei* (Baird 1850), *Pontocythere elongata* (Brady 1868), *Leptocythere muellerfabaeformis* (Puri 1963), *Basslerites* cf. *berchoni* (Brady 1870), *Semicytherura sella* (Sars 1866), *S. striata* (Sars 1866). Although poorly marked in the ostracod assemblages, the lagoonal phase is characterized by the presence of *Cyprideis torosa* (Jones 1850) and *L. elliptica.* Fluvial deposits are barren in ostracods. These data are in accordance with those obtained for other coastal sequences of nearby lowlands, namely Sto André lagoon (Cearreta et al. 2003), where the ostracods are more abundant and the record is more continuous, probably due to the fine-grained nature of the sediments.

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NEW NON-MARINE OSTRACOD SPECIES FROM THE MIDDLE CENOMANIAN OF LOUSA (LISBON REGION, PORTUGAL)

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Keywords: Ostracoda, Cyprididae, Lagoonal Environment, Middle Cenomanian, Portugal

With a few exceptions, the ostracod faunas from the Middle Cenomanian of Lisbon region have never been studied in detail. At Lousa, a small locality 12 km north of Lisbon, a hill section displays an excellent outcrop of a highly fossiliferous marl-limestone succession, locally detrital, assigned to the Cenomanian by Berthou (1973, 1984). The fossil assemblage is mostly composed of bivalves, particularly oysters, gastropods, ostracods, foraminifera (mostly benthic forms, including alveolinids), dasycladaceans and other algae, serpulids, echinoids. Recently, within the scope of an ongoing Master thesis, supervised by M.C. Cabral, the Lousa succession ostracods have been more deeply studied (69 samples from the non-indurate levels). This study has shown that most levels comprise particularly rich lagoonal, almost monospecific faunas of *Fossocytheridea merlensis* (Babinot and Colin 1976), interbedded with deposits bearing more marine faunas.
The basal level (LSA-27-B) of a 2 m-thick marly unit comprising three marl beds separated by calcareous/ferruginous crusts, with subaerial exposure features, yielded rhizocretions and a most particular ostracod association, dominated by *Fossocytheridea merlensis* but also comprising a few specimens of *Lycopterocypris*? Mandelstam 1956, and two new species of nonmarine ostracods; one

belongs to the genus *Heterocypris* Claus 1892, the other to a new genus from the subfamily *Talicypridinae.*
The genus *Heterocypris* is well known in the Recent; its oldest known fossils are of Eocene age. Its recognition in this Portuguese succession expands its biostratigraphical range into the Cenomanian, revealing an interval of around 40 My until the next documented record from the Eocene of Green River Formation, USA. The new genus *Globotalicypridea* belongs to the subfamily *Talicypridinae* Hou 1982, which has only been reported in the Upper Cretaceous-Palaeogene of Mongolia and China, and probably in the Upper Cretaceous of Argentina and in the Lower Cretaceous of Spain. It comprises two species: *G. vulcanosa* n. sp. and *G. occitanica* (Babinot and Tambareau 1986), from the Maastrichtian of southern France, Spain and Morocco (recently, D. Horne, personal comm., in Colin and Tabuce 2004, has suggested moving this species from the genus *Paracandona* into the genus *Talicypridea* Khand 1977). Therefore, the identification in Portugal of *Globotalicypridea* confirms the presence of the *Talicypridinae* in Western Europe, already known from the Lower Cretaceous (Barremian-Aptian) of northern Spain (Brenner 1976).

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PELAGIC OSTRACODS IN THE HUMBOLDT CURRENT DURING EL NIÑO 1997-98 AND IN 2001

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Keywords: Epipelagic Ostracods, Humboldt Current, El Niño 97-98

Planktonic ostracods as deep dwellers, diel migrators and detritus feeders should be distinctly affected by El Niño conditions, because of deepening of the thermocline and southward intrusion of tropical waters into the Humboldt Current off Peru (Arntz and Fahrbach 1996). Distribution and species diversity of ostracods were compared for the 1998 and 2001 summer cruises. Plankton samples were obtained in the upper 0-50 m layer by means of Hensen nets with 0.333 mm mesh size during IMARPE research cruises. Samples covered 3 latitudinal regions ca. 100 nm wide off Peru: 3.5°-6° S, 9°-12° S and 15°-18° S, a division which follows hydrography and distribution of fishery resources (Zuta and Guillén 1970, Carrasco and Lozano 1989).
Species diversity and abundances of ostracods were much higher during 1998 than in 2001. Tropical species, which did not extend south of 6° S during 2001, increased in numbers and in probability of occurrence in the entire region (3.5° - 18° S) during 1998, and particularly so in coastal locations. Here *Euconchoecia aculeata* became dominant. On the contrary, during 2001, a species associated with subsurface oxygen minimum waters, *Conchoecetta giesbrechti,* was more abundant, more frequent and with a higher relative proportion of juveniles.
Favorable conditions for ostracods (in terms of diversity and abundance) during El Niño 1997-98 may be explained by eventual reduction of predation pressure and increased availability of detritus material in the thicker and warmer upper layer compared to a normal-cold 2001 year.

Acknowledgment
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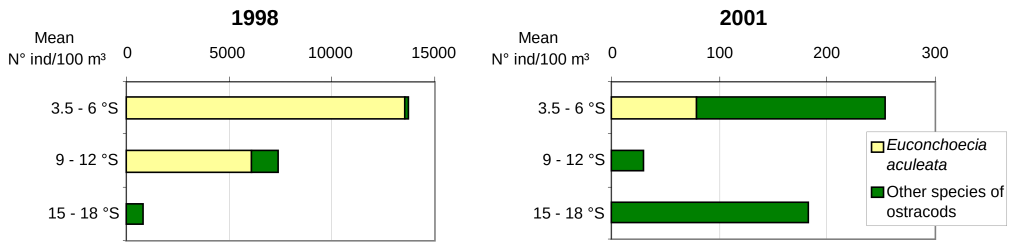

OSTRACODS AND PERMIAN-TRIASSIC BOUNDARY: SURVIVORS AND NEWCOMERS

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Keywords: Ostracods, Survivors, New Comings, Permian-Triassic Boundary, Turkey, Saudi Arabia, South China

For all the marine biota, the end Permian mass-extinction is the most dramatic event of the Phanerozoic. At the end of the Permian, 49 to 57% of the marine families, 83% of the genera and 96% of the species, disappear.
As with other marine organisms, benthic ostracods are subject to the effects of calamitous events (among others, the great end Permian regression followed by the quick and dysoxic Lower Triassic transgression, the modifications of climates and oceanic circulation, the salinity drop, the volcanism, linked with Pangaea assemblage).
The lower Triassic marine ostracods are poorly known. Some species have been mentioned, in greater or less detail, from the Early Triassic (Induan - Olenekian) of North Western Australia, Pakistan, Precaspian Depression, Nepal, Kashmir, Germanic Basin, Israel, South China, and Greece.
New Permian-Triassic sections were investigated in Turkey (Crasquin-Soleau et al. 2004a and b), Saudi Arabia (Crasquin-Soleau et al. 2005)and South China (Crasquin-Soleau and Kershaw 2005 and in progress).
The data update our knowledge on latest Permian and earliest Triassic ostracodes. The ostracods recovered in studied sections display the following characters:

- The latest Permian fauna do not exhibit nanism, as showed by Foraminifera for example.
- Several typical Mesozoic genera are already present in the latest Permian.
- A mixture of survival fauna (Palaeocopids) and typical Triassic fauna are present in the first levels of the Triassic.
- The main "turn-over" between Palaeozoic and Mesozoic fauna appears to take place in the Olenekian more probably than in the Griensbachian.

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SOME OSTRACODA FROM THE QOM FORMATION OF THE NORTH OF CENTRAL IRAN

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Keywords: Ostracoda, Miocene, Qom Formation, Iran

Introduction

The aim of this study is to document the Ostracoda of the Qom Formation in the measured section in the north of Central Iran. The Qom Formation was named by Dozy (1955), but it was subdivided to six members by Furrer and Soder (1955).

According to the latest version the rock unit includes nine members in the type area with Oligocene to Early Miocene in age (Stocklin and Setudehnia 1971). The previous works on ostracodology of the Qom Formation are restricted to a few references, such as Pourmoatamed (1967) and Hadavi (2002). Pourmoatamed studied the sediments of Dochah in the Qom area and identified 17 genera and 36 species. He suggested Aquitanian-Burdigalian age for the sediments. In the same area, Hadavi could determine 12 genera and 19 species and mentioned that the data is not sufficient for biostratigraphic analyses.

Material and Methods

The studied section is situated at the north of Deh Namak, 161 km southeast of Tehran. The sediments of this 401 m thick section consist of limestone, sandy limestone, argillaceous limestone, marl, shale and evaporates beds. From these, a total of 20 samples of 165 samples containing fossil Ostracoda were selected and examined (Figs. 1, 2).

The samples were disaggregated in hydrogen peroxide. Then the disaggregated samples were wet sieved through a 60-mesh size. Finally, 1g portions of the washed samples were picked. The genera were sorted and identified at the genus level and classified according to Scott (1973) and Siddiqui (1971). The vertical distribution of Ostracods was given in Fig. 2, where only the samples with Ostracode fauna were listed.

Results

The Ostracoda fauna of the examined section comprises 23 genera. These belong to eleven families and two sub orders, 6 genera each to the family Cytherideidae, 4 genera each to the family Trachylebrididae, 2 genera each to the families Cytherettidae, Hemicytheridae, Loxoconchidae and Xestoleberididae and 1 genus each to the families Bairdiidae, Cyclocyprididae, Paracyprididae, Pontocyprididae and Cyterellidae. The identified genera are of little use in age interpretation . But, on the basis of Ostracoda assemblages, the age of the sediments is Oligocene-Miocene, whereas, on the basis of benthonic foraminifera, Daneshian and Ramezani Dana (2004) considered the age of this section to be Aquitanian- Burdigalian (Fig. 2).

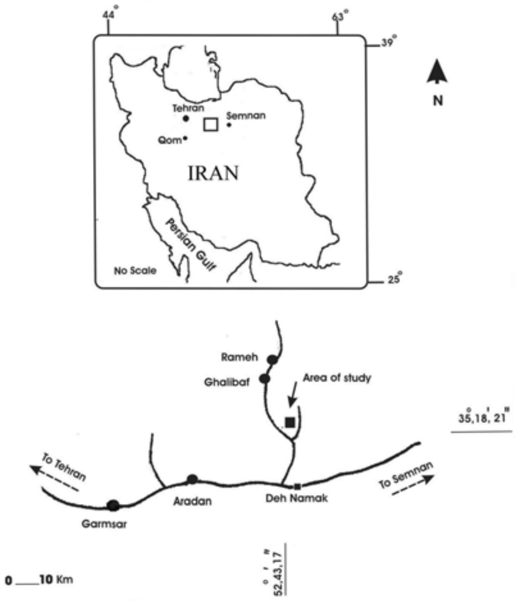

Fig. 1. Location map of the studied section, north of Central Iran

The boundary between Aquitanian - Burdigalian has been defined on the basis of the first occurrence of *Borelis melocurdica*. Then *Krithe* sp., *Pokornyella* spp., *Bairdia* sp., *Loxoconcha* spp., *Cushmanidea* sp., *Flexus* sp., *Cytheridea* sp. are present in the sediments with Burdigalian age, and *Argilloecia* sp., *Cyamocytheridea* sp., *Cytherella* sp., *Cytheretta* sp., *Cythermorpha* sp., *Echinocythereis* sp., *Haplocytheridea* sp., *Hemicythere* spp., *Paracypris* spp., *Schuleridea* sp., *Stigmatocythere* sp., *Trachyleberis* sp., *Uroleberis* sp. and *Xestoleberis* sp. occur in the Aquitanian sediments.

Conclusion

The rock units of the Qom Formation in the examined section in the north of Central Iran are composed mainly of limestone, sandy limestone, argillaceous limestone, marl, shale and evaporates beds. In order to study the ostracode fauna, twenty soft samples of a total 165 samples were considered. From these, twenty-three genera belonging to eleven families were identified.
Based on the ostracods, the age of the sediments is Oligocene-Miocene, while the benthic foraminifera assemblages show an Aquitanian-Burdigalian age.

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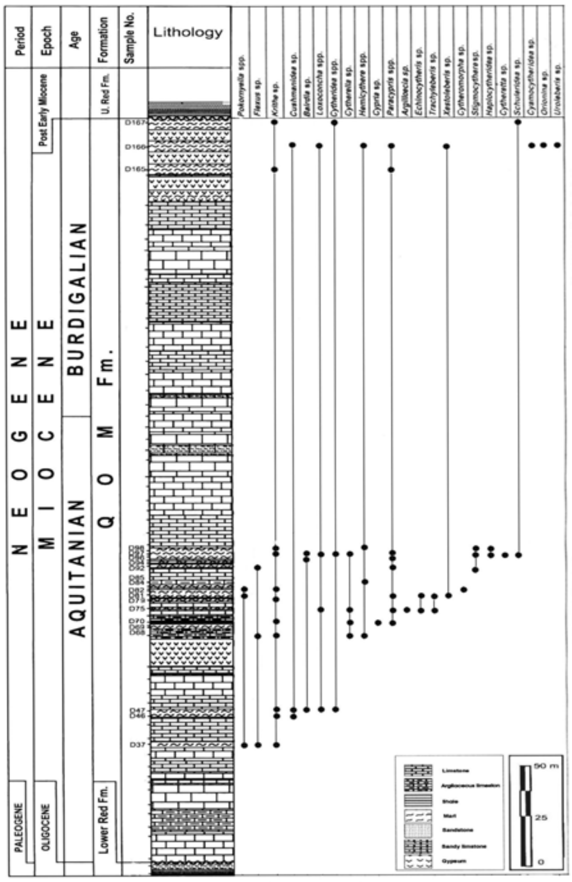

Fig. 2. Litho- and biostratigraphy of the recorded ostracods in the Deh- Namak section

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TROPICAL RECENT OSTRACODA IN THE EASTERN INDONESIAN SEAS: FROM SAHUL SHELF TO THE BANDA SEA

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Keywords: Recent, Ostracoda, Eastern Indonesia, Marine, Bathymetric Distribution

The Eastern Indonesian Seas include a unique range of different environments from the shallow part of the Sahul Shelf (less than 50 m) to the deep waters of the Banda Sea (more than 3000 m). This area is also a transoceanic gateway between the Pacific and the Indian Oceans and is passed by the Indonesian Through Flow (ITF). Oceanographically, this region is characterized by layers of three water-masses: the Indonesian Surface Waters at 0-400 m water depth, the Indonesian Intermediate

Waters at 400-1400 m and the Indonesian Deep Waters found deeper than 1400 m. While the general oceanographic parameters are known for the region, no study has focused on the link between the oceanography, bathymetry and distribution of Recent ostracoda in this area. The purpose of this study is to document the bathymetric distribution of recent ostracods of eastern Indonesia. This ostracod knowledge, while important on its own, will also strengthen previous studies on the links between oceanography and bathymetry, as for the distribution of foraminifera (e.g. van Marle 1988). The current study attempts to point out similarities and differences in the distributional patterns of ostracoda and foraminifera. Consequently, the study checks the important parameters that need to be considered for paleoceanographic and paleobathymetric reconstructions for the area. These reconstructions in turn are essential for understanding the climatic history of this region that today strongly affects global climate (Müller and Opdyke 2000).

The ostracoda from the Sahul Shelf to the Banda Sea region were studied based on fourty-three samples from three traverses: off Timor, Tanimbar and Seram Islands to the Banda Sea. These top box-core samples were collected during the Snellius-II Expedition (1984) at water depths ranging from 40 to 3070 m. More than one hundred and fifty species have been identified and of these, some are new and are left in open nomenclature due to their paucity. Generally, the number of species is very variable (2-112 species) as is the number of specimen too, between 2 and 4942 individuals per 100 cc of sediment sample. In general, their abundance and diversity tends to decrease with increasing water depth. The deeper water assemblages, on the other hand, might be related to special bottom-water environments.

The highest number of individuals (>1000) and species (>100) does not occur at the most shallow location but is found at water depths between 100 m and 210 m. This water depth zone is the most suitable environment for ostracoda. It is characterized by the occurrences of *Bairdopillata, Neonesidea, Paranesidea*, *Paracytheridea, Hemiparacytheridea, Foveoleberis, Polycope,* and *Loxoconcha*. At water depths between 400 m and 1400 m the ostracod assemblages are represented by *Argilloecia, Krithe, Bradleya, Cytheropteron*, and *Xestoleberis* and may related to the Indonesian Deep Waters. The assemblages with the low abundance and diversity are not found in the deepest parts but occur at water depths between 2197 m and 2893 m. At the deepest location (3070 m), ostracods are recorded in moderate abundance (64 specimens in 100 cc) due to the occurrence of allochthonous shallow water ostracods in the sample collected.

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ON THE TAXONOMIC STATUS OF THE LOWER CRETACEOUS NON-MARINE OSTRACOD SPECIES *CYPRIDEA AFRICANA* (KRÖMMELBEIN, 1965) AND *HARBINIA MICROPAPILOSA (*BATE, 1972)

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Keywords: *Pattersoncypris*, *Hourcqia*, *Harbinia*, *Cypridea*, Aptian, Albian

The taxonomic status of the Lower Cretaceous non-marine ostracod species *Cypridea africana* (Krömmelbein 1965) and *Harbinia micropapilosa* (Bate 1972) is discussed. These species were originally referred to as type-species of the genera *Hourcqia* Krömmelbein 1965 and *Pattersoncypris* Bate 1972, both considered herein no longer valid. *Cypridea africana* has an antero-ventral beak, muscle scars and it is in all other respects identical to *Cypridea* Bosquet 1852; therefore it should be

transferred from its original generic status. Its stratigraphic distribution is restricted to Late Barremian to Early Aptian. The subspecies originally referred as *Hourcqia africana confluens* Krömmelbein and Weber 1971 is considered a junior synonym of *Cyprideа africana*. The subtriangular to oval carapace outline, normal overlap, smooth, punctate or papillate surface, anterior dorsal hump and the characteristic cypridid central muscle scars clearly distinguish *Harbinia* Tsao 1959 from other Cretaceous genera of ostracods, and indicate that *Pattersoncypris* is a junior synonym of this genus. *Harbinia micropapillosa* has its stratigraphic distribution restricted to Late Aptian-?Early Albian. Four other subspecies originally referred to by Krömmelbein and Weber (1971) as *Hourcqia angulata angulata*, *Hourcqia angulata sinuata*, *Hourcqia angulata symmetrica* and *Hourcqia angulata salitrensis* are herein referred to as species of the genus *Harbinia*. These species have their stratigraphic distribution restricted to Late Aptian-?Early Albian.
Acknowledgement is due to FINATEC for financial support to presentation of the present work in the symposium.

SIZE VARIATION OF VESTIBULE OF *KRITHE GNOMA*: METHOD AND POTENTIAL FOR PALAEOCEANOGRAPHIC ANALYSES

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Keywords: *Krithe*, Oxygen Content, Falkland Current, Palaeoceanography, Vestibula, Recent

The species *Krithe gnoma* Do Carmo and Sanguinetti, 1999 was proposed after analyzing Holocene sediments from the Brazilian continental margin, where it occurs from shelf to slope. Carapaces and valves were recovered after sieving in current water. In shelf, this species occurs from 32º 11´ to 22º 31´ S, where its occurrence is restricted to areas under the influence of the Falkland current. Considering the hypothesis by Peypouquet (1975 1979), which establishes an inversely proportional relation between the size of vestibule and oxygen content of sea water masses, the present work was conducted in order to analyze size variation of this structure. Each sample considered for analysis was collected from areas with distinct oxygen content. Only valves of adult females were considered, and their vestibule sizes were measured and compared. Pictures from carapace and left valves, one carapace of 7th, five left valves of 7th and one of 8th instars, were taken in microscope and their vestibule size measured using the Romberg method. As a result, the hypothesis proposed by Peypouquet was corroborated. These results are the first to corroborate this hypothesis and, considering the wide stratigraphic distribution of *Krithe gnoma* (?Late Eocene/Miocene, Pelotas and Santos basins), they open a perspective for applying this relation to paleoceanographic studies, as an indicator of oxygen content.
Acknowledgement is due to FINATEC for financial support to presentation of the present work in the symposium.

PALAEOENVIRONMENTAL ANALYSIS BASED ON PALAEOECOLOGY OF EARLY CRETACEOUS NON-MARINE OSTRACODS FROM THE ALAGAMAR FORMATION, POTIGUAR BASIN, NE-BRAZIL[*]

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Keywords: Cypridoidea, Darwinuloidea, Cytheroidea, Late Aptian, Early Albian, Source Rock

Source rocks from the Alagamar Formation were analysed and fifteen non-marine ostracod species were identified: *Harbinia sinuata* (Krömmelbein and Weber 1971), *Harbinia* sp. 1, *Harbinia* sp. 2, *Harbinia* sp. 3, *Paracypria* sp. 1, *Cypridea araripensis* Silva 1978b, *Cypridea* sp. 1, *Ilyocyprimorpha berthoui* (Colin and Dépêche 1997), *Ilyocypris*? sp. 1, *Brasacypris* sp. 1, *Candona*? sp. 1, *Theriosynoecum silvai* (Silva 1978a), *Theriosynoecum* sp. 1, *Theriosynoecum* sp. 2 and *Darwinula martinsi* Silva 1978c. *Harbinia* sp. 1 is considered holoeuryhaline, *Paracypria* sp. 1 brackish stenohaline and the other are freshwater euryhaline. Foraminifers, thecamoebians, gastropods, fish teeth and incertae sedis material also occur. Among these fossils, only the foraminifers indicate deposition under marine influence. However, Limnocytheridae ostracods and foraminifers occur in intercalated beds and this pattern of changes in associations is herein interpreted as a record of temporal changes, characteristic of transitional palaeoenvironments. Previous studies on biomarkers and some articles dealing with palynomorphs also suggest that at least part of this unit was deposited in a lagoonal palaeoenvironment.

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PRAGIAN OSTRACODES FROM MAURO-IBERO-ARMORICA

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Keywords: Ostracodes, Early Devonian, Pragian, Mauro-Ibero-Armorica

Numerous benthic ostracodes of Pragian age (Early Devonian) from Mauro-Ibero-Armorica (= Ibarmarghian Faunal Province) have been described from Spain (Ossa Morena, Celtiberia, Cantabria) and France (Brittany, Normandy), whereas information on Pragian ostracodes from NW Africa is very scarce. These ostracode faunas are correlated and redated on the base of the biostratigraphical framework from Celtiberia, as many of the taxonomic works were written in the 1960´s and 1970´s. Since then, the concepts of biostratigraphical subdivisions and correlations have undergone various changes.

Close faunal relations (brachiopods, trilobites) within Mauro-Ibero-Armorica are proven throughout the entire Early Devonian. As regards Pragian ostracodes, close relations exist between Celtiberia and Armorica, whereas the relations between Ibero-Armorica and NW Africa in Pragian times are scarcely known. However, this may merely reflect poor knowledge of Pragian ostracodes from Africa, but not an oceanic faunal barrier. One third of the ostracodes described from the early Pragian of Armorica also occur in practically coeval strata of Celtiberia. *Leptoprimitia balbiniensis* Weyant 1967, *Punctoprimitia europaea* Weyant 1967, and new species of *Eridoconcha* (in press by Dojen) are known only from Ibero-Armorica. This distribution corroborates the continuity of the Ibero-Armorican Through as the backbone of the Ibarmarghian Faunal Province.

From Algeria, only few ostracodes have been reported from strata dated as “Lochkovian” and “Pragian”, whereas more are assumed to be “Emsian”. Unfortunately, no biostratigraphically relevant fossils are reported together with these ostracodes. Thus, their ages cannot be controlled. However, several Saharan brachiopod faunas of Rhenish biofacies that have traditionally been considered as "Emsian" are turning out to be even early Siegenian in the traditional German sense (Carls, oral comm. 2004). Thus, a revision of these ostracode faunas is desirable. Within this context, *Bollia?* sp. 2 sensu Weyant 1976 is of special interest, as it is only known from Mauro-Ibero-Armorica. But whereas it occurs in Ibero-Armorica within the interval from Late Lochkovian up to early Pragian, it is reported from Algeria, under the name of *Londinia?* sp. 1, from “basal Emsian”.

On the whole, the distribution of Early Devonian ostracodes does not contradict the palaeogeographical models that postulate short distances between Gondwana and Laurussia from the Early

Emsian onward. But the lack of knowledge on Pragian ostracodes from Africa forbids arguments based on ostracodes concerning pre-Emsian ages. Whether or not there was a barrier between Ibero-Armorica and Africa might only be deduced from thorough studies of age controlled Pragian faunas.

PELAGIC OSTRACODS (HALOCYPRIDIDAE) OF THE BRANSFIELD STRAIT, ANTARCTICA

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Keywords: Pelagic Ostracods, Halocyprididae, Quantitative Distribution, Population Structure, Bransfield Strait, Antarctica

The history of study of Antarctic ostracods dates back to the early 20th century (Chavtur and Kruk 2003); however, the scientific evidence available about these crustaceans is still insufficient. Owing to recently increased interest in pelagic communities of the Southern Ocean the knowledge about planktonic ostracods inhabiting this area has considerably enlarged. This report focuses on the species composition and quantitative distribution of ostracods and the population structure of mass ostracod species found in the western Bransfield Strait, which is known as a highly productive seawater area of the Southern Ocean.

Material for the study was collected at 21 stations in March 2002 during the 7th Ukrainian Antarctic expedition. Samples were taken by Juday planktonic nets with mouth diameters of 80 and 36 cm and mesh size 120 µm from standard layers: 0–25, 25–50, 50–100, 100–200, 200–500 and 500–1000 m. Maximum sampling depth depended upon the depth at which the station was located. Samples were fixed with 4% formaldehyde. All ostracods found in the sample were removed, their species composition, size and age determined. Biomass of ostracods was calculated based on the regularities obtained by Drapun (1988) and "mean population stage" ($\overline{S}$) – using the equation suggested by Marin and modified by Kock (1993).

In the western Bransfield Strait eight ostracoda species belonging to the Halocyprididae family were found. Three species, *Metaconchoecia isoheira*, *Alacia belgicae* and *A. hettacra*, dominated throughout the entire sampling depth and the fourth, *Boroecia antipoda*, at depths greater than 500 m. The remaining species, *M. skogsbergi*, *Proceroecia brachiaskos*, *Disconchoecia aff. elegans* and *Conchoecissa symmetrica* occurred in negligible numbers at 200 m and deeper. The prevailing species was *M. isoheira,* which contributed about 44% of the total abundance of ostracods in the 0–500 m layer but was inferior in biomass to less abundant large-bodied *A. belgicae* and *B. antipoda*. Deeper than 500 m, the latter contributed the major share (43%) of the total biomass. With increasing depth the share of ostracods in the total abundance of mesozooplankton increased as well as the absolute averages of numbers and biomass. Highest estimates (>1000 ind./1000 m^3 and 500-780 mg/1000 m^3) were usually registered in the depths 200 - 500 m and deeper.

In the upper 100-m layer ostracods were few (102 ind./1000 m^3 on the average), at 8 of 21 stations they had not been found at all. As high an abundance as 811 ind./1000 m^3 had been registered along the frontal zone formed under the interaction of waters from the Bellingshausen and Weddel seas. The youngest instars were present in populations of dominant ostracod species that indicated ongoing reproduction. The age structure of their populations was different at the limits of the investigation area. At stations located in the zone influenced by slightly warmer and more saline waters from the Bellingshausen Sea the younger population prevailed ($\overline{S}$ values were lower than those in the zone under the influence of the Weddel Sea; distinctions are reliable); that was probably due to differences in the development rate of species in the local environmental conditions.

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DISTRIBUTION AND ECOLOGY OF OSTRACODS IN THE SLACK ESTUARY (BOULONNAIS - NORTHERN FRANCE)

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Keywords: Estuary, Ostracod Density, Ostracod Diversity, Salinity, Non Parametric Kruskal-Wallis Test

Introduction
Through a nineteen months period (2003-2004) and twelve sampling campaigns, Recent ostracod populations were examined at five sites of the small natural Slack estuary, a conservation area of the French Channel Coast. The aim of the study was to take an inventory of the ostracod species that have colonized the estuary, and to monitor the evolution of both faunal density and diversity in relation to ecological factors.

Materials and Methods
At each sampling station (located from 1875 to 145 metres from the Slack mouth), ostracods were taken with a 250 µm mesh size hand net over an approximate area of 1200 cm^2. Water temperature, pH, salinity and dissolved oxygen were measured *in situ*. Ostracods were then counted and identified; water chloride and calcium ion contents were assayed in the laboratory.

Results
Twenty one species were found throughout the sampling stations; but for only ten of them, we collected more than two specimens per sample at least three times. Non parametric Kruskal-Wallis tests showed that faunal density was higher in sites close to the sea ($p<5.10^{-2}$) and therefore exposed to higher chloride contents, with populations mainly composed of the two well-known marine species *Leptocythere porcellanea* and *Loxoconcha elliptica* ($p<10^{-4}$). The faunal diversity as well as the number of specimen belonging to fresh or slightly brackish water species increased with the distance from the sea: it concerned *Candona neglecta, Cypria ophtalmica, Cypridopsis vidua, Herpetocypris reptans, Ilyocypris bradyi, Limnocythere inopinata, Potamocypris unicaudata* and *Prionocypris zenkeri* ($p<5.10^{-2}$ to 5.10^{-5}). Relationships between ostracod species composition and dissolved oxygen, pH and water temperature were observed but were rarely statistically significant, probably because of a preponderant tide influence upon those physico-chemical parameters within one given station. The number of ostracods per sample found ranged from 0 to 3600. Surprisingly, samples of spring 2003 were very poor compared to those collected in spring 2004. The most likely explanation would be the occurrence of floods in 2003 that might have moved the fauna. Finally, three species belonging to the genera *Cyclocypris*, *Darwinula*, and *Physocypria* are here reported for the first time from the North of France.

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PLEISTOCENE-RECENT MARINE OSTRACODS FROM THE MERSIN OFFSHORE SEDIMENTS, EASTERN MEDITERRANEAN, TURKEY

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Keywords: Ostracoda, Pleistocene-Recent, Eastern Mediterranean, Turkey

Ostracoda faunae of the Mersin offshore sediments were studied from 18 gravity cores taken from depths between 285-665 meters on three different subareas considered as mud volcanos on account of their morphological features. A total number of 54 samples, 3 samples from each core, were examined and 33 Ostracoda taxa, 20 previously described and 13 belonging to open nomenclature, have been determined. The fauna is dominated by *Argilloecia* aff. *Argilloecia acuminata* G.W. Müller and some species of *Polycope* (*Polycope* cf. *Polycope tholiformis* Bonaduce et al., *Polycope reticulata* G.W. Müller and *Polycope orbulinaeformis* Breman), but has a relatively low diversity compared to the other basins in the Mediterranean. *Bairdia conformis* (Terquem), *Cytheropteron* sp., *Macrocypris* sp., *Krithe* sp., *Pseudocythere caudata mediterranea* Bonaduce et al., *Henryhowella sarsii sarsii* (G.W. Müller), *Acanthocythereis hystrix* (Reuss) and *Pterygocythereis* sp. are the other dominant taxa in the fauna. Populations of other Ostracoda taxa such as *Loxoconcha* sp., *Bathycythere* sp., *Buntonia dertonensis* Ruggieri, *Bythocypris bosquetina* (Brady), *Xestoleberis* sp., *Cytherella* sp., *Bosquetina rhodensis* Sissingh, *Leptocythere* sp., *Buntonia textilis* Bonaduce et al., *Buntonia* sp., *Cytheropteron rotundatum* G.W. Müller, *Monoceratina mediterranea* Sissingh, *Paracytherois flexuosa* (Brady), *Xestoleberis dispar* Müller, *Callistocythere vexata* Bonaduce et al., *Semicytherura* sp., *Rectobuntonia inflata* Colalongo and Pasini, *Urocythereis* sp., *Buntonia sublatissima* (Neviani), *Bythocypris obtusata producta* (Seguenza), *Aurila* sp. are relatively few in numbers.
The determined taxa in the fauna mainly correspond to “C11: *Argilloecia acuminata* Community” established by Sissingh (1982), and co-occurrence of these taxa indicates a Holocene circalittoral to upper bathyal environment in the Mediterranean. The Ostracoda fauna of the sediments from Mersin offshore, despite being less diverse, shows a pronounced similarity particularly to Adriatic fauna and also fauna of Gela (Sicily) and the south Aegean Sea. In addition to the Ostracoda fauna, planktonic and benthic foraminifera, nannoplankton and palinomorphs were encountered in the same samples. Based on the presence of the planktonic foraminifer “*Globorotalia truncatulinoides* d'Orbigny” in the samples it can be concluded that the age of the sediments is Pleistocene-Recent. The lithology of the core samples is determined as mud.

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DISTRIBUTION OF OSTRACODA IN OFFSHORE SEDIMENT AROUND PULAU TIOMAN, PAHANG, MALAYSIA

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Keywords: Ostracoda, Pulau Tioman, Malaysia

Introduction

Ostracods are small crustaceans typically about 1 mm long (living forms range from 0.3-30 mm long) which can be found in practically every aquatic environment (Benson 1961, Brasier 1980). In today's oceans they are found living from the abyssal depths to the shoreline. They also inhabit estuaries, lagoons, freshwater lakes, ponds and streams, salt lakes, hot springs, damp vegetation and even the water which collects in bromeliad leafbases. Ostracods may be free-swimming for all or part of their life-cycle. The most common are benthonic species that live among aquatic plants or crawl on or through the sediment (Pokorny 1980).

Materials and Methods

A total of 15 samples were collected from Pulau Tioman, Pahang, Malaysia (104°07'00''E - 104°12'25''E and 02°46'51''N - 02°46'57''N). The sampling was carried out with a grab sampler of the Petite Ponar type. In the laboratory, samples were washed with a 0.063 mm sieve and preserved in formalin and later stained with rose Bengal. The species were identified with Scanning Electron Microscope (SEM). Several in-situ physico-chemical parameters such as temperature, salinity, dissolve oxygen, percentage of organic matter and sediment texture were measured in the study area.

Results and Discussion

Twenty-seven species from 10 families were found and most of them are benthic forms. The families are Trachyleberididae, Cytherellidae, Hemicythereridae, Loxoconchidae, Bairdiidae, Cytheroptheron, Paracyprididae, Cytherudidae, Pontocyprididae and Cytheridae. There were 5 genera from unknown families. The genera are *Orinina, Hermanites, Bosella, Matronella* and *Wichmannela*. The dominant species is *Loxoconcha paiki* (Loxoconchidae). The families which have the most variety of species are the Trachyleberididae and the Loxoconchidae. Statistical analysis showed that the percentage of sand negatively correlated with the abundance of ostracods while the percentage of clay positively correlated with it. Both correlations are significant at 95% level. The other parameters do not show any significant correlation.

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LATE MIOCENE OSTRACODS FROM A CORAL REEF ENVIRONMENT (MESSARÀ PLAIN, CRETE ISLAND)

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Keywords: Late Miocene, marine ostracods, coral-reef complexes, palaeoenvironmental evolution, Crete Island

In this paper, the ostracod assemblages from the coral reef complexes cropping out in the Messarà Plain (Iraklion Basin, central Crete) have been investigated. Geological and sedimentological analyses (Cosentino et al. 2004) evidenced the presence of a succession of at least 9 coral reef complexes, the first made by subspherical colonies of *Siderastrea* and *Tarbellastrea*, together with *Porites* in massive colonies and with some columnar morphs, the latter by branching *Porites*. The reef complexes are cyclically separated by fine- and coarse-grained fan delta deposits. They are followed, upwards, by silty-clayey and silty deposits that become progressively more sandy and bear *Heterostegina*. The calcareous nannoplankton of these uppermost clayey-silty deposits have been analysed. The presence of *Discoaster hamatus* and *Helicosphaera stalis* and the absence of *Minylitha convallis* lead us to refer them to the MNN 9 biozone, corresponding to the Lower Tortonian, providing an upper chrono-stratigraphic constraint for the age of the coral reef complexes. Unfortunately, no lower constraints have been evidenced by means of calcareous nannoplankton. The assemblages observed in the silty deposits cropping out beneath the lowermost coral reef are very poor and badly preserved: the specimens are generally overgrown or affected by etching. Moreover, the rare species identified are characterised by resistant long ranging forms or by certainly reworked forms.

The analysed ostracods come from samples taken both within the coral reefs and from the fine-grained deposits intercalated between the different reef complexes. Two different assemblages have been recognised:

- coral reef assemblages dominated by *Aurila cicatricosa*, *Pokorniella italica*, *Grinioneis haidingeri*, *Aurila diecii* and *Tenedocythere cruciata*;
- silt and silty sand assemblages dominated by *Xestoleberis* (*X. communis* and *X. dispar*), *Semicytherura* (*S. raulini*, *S. sanmarinensis*, *S. acuminata*, *S.* cf. *S. acuta*) *Cytheridea acuminata Neomonoceratina laskarevi* and *Aurila albicans*

Moreover, silty deposits cropping out beneath the lowermost coral reef have been analysed, and their ostracod assemblages mainly consist of *Xestoleberis dispar* and *Aurila albicans*.

The palaeoecological indications that came from the ostracod analyses point to a cyclic alternance of inner infralittoral assemblages (silty deposits) and carbonate platform assemblages.

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LATE-HOLOCENE DYNAMICS OF INTERDUNAL FRESH WATER ENVIRONMENTS AT THE SOUTHERN COAST OF BUENOS AIRES PROVINCE, ARGENTINA

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Late-Holocene environmental conditions are investigated at the south coast of Buenos Aires Province, Argentina. Laguna Olvidada and Laguna Grande sediment sequences, temporary fresh water bodies located between inactive (fossil) dunes, are analysed for ostracods and plant macro fossil remains (mainly seeds and charophyte oospores). Supplementary information is provided by sedimentological analysis. The microfauna recovered consist of abundant ostracods although with low diversity. Charophytes (mostly *Chara* spp. and *Nitella hyalina*), *Daphnia* resting eggs and abundant seeds of *Ruppia* cf. *maritima*, an aquatic submerged macrophyte, were also found. Distinct assemblages of ostracod species characterize the sediment sequences. *Heterocypris* cf. *incongruens*, *Sarcypridopsis aculeata* and *Cypridopsis vidua* are the dominant species in the Laguna Olvidada sediment record, while *Potamocypris villosa*, *Limnocythere* spp. and *Sarcypridopsis aculeata* dominate the ostracod assemblage of the Laguna Grande core. The microfossil assemblages suggest water level fluctuations and salinity changes throughout the sequences, which may have been caused by fluctuations in precipitation.

METHODS USING QUATERNARY BRACKISH WATER OSTRACODS AS PALAEOENVIRONMENTAL PROXIES - EXAMPLES FROM THE BALTIC SEA

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Ostracods are especially suitable for palaeoenvironmental reconstruction in brackish water environments because of their often high abundance and diversity under highly variable and stressed conditions. Pre-conditions for the use of ostracods as palaeoproxies are the knowledge of living association ecology as well as morphological variations and geochemical analysis of valves. A large

data set of living associations and thanatocoenoses from surface sediments of the southern Baltic Sea gives the possibility to analyse past environments more in detail now.
The methods to use ostracods as tools for palaeoenvironmental reconstruction in Holocene brackish water conditions are:

- Grouping of different ecological forms (e.g. freshwater vs. brackish water and marine forms, cold-water vs. warm water forms or proportion of phytal forms).
- Estimation of abiotic parameters by known tolerance limits of species from Recent ecological studies (e.g. salinity, water temperature, oxygen level).
- Estimation of abiotic parameters through transfer functions or modern analogue techniques based on association composition (e.g. salinity, C_{org} content of sediment).
- Morphological analysis of ostracod valves of some species (e.g water chemistry indication by noding or sieve pore shape in *Cyprideis torosa*).
- Geochemical analysis of ostracod valves (water chemistry by stable isotopes, trace elements).

Problems are the frequent dissolution of calcareous shells in organic rich sediments of the Baltic Sea, the recognition of allochthonous elements in taphocoenoses and bioturbation effects. We can discriminate allochthonous elements by studying preservation state, ecological preferences and onto-genetic composition of the assemblage. Bioturbation smoothes the signals given by microfossils from the sequences and limits the time resolution but does not destroy the information in general. A combined analysis of microfossils from different systematic groups is very useful for bridging the record gaps caused by dissolution of valves and for refining and proving results obtained from only one type of proxy.
Examples for Holocene palaeoenvironmental analysis with ostracods in sections of archaeological excavation and geological study sites from the southern Baltic Sea coastal area are given.

GRAPHIC CORRELATION BETWEEN TWO WELLS IN THE SIRT BASIN USING OSTRACODA BIOEVENTS AND GAMMA RAY LOGS

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Keywords: Graphic Correlation, Ostracods, Gamma Ray Logs, Hagfa Formation

Introduction

The graphic correlation method was devised by Shaw (1964) who used first and last appearances of fossils in several sections to build up a composite section (CSRS). The composite standard reference section chosen is usually the thickest section onto which all biostratigraphic events common to the sections are plotted on a graph with x, y axes, and the line of correlation (LOC) drawn through these points. The LOC can be used to identify relative ages of formation boundaries, to predict biostrati-graphic events in sections where they have not been found, and to determine sedimentation rate and presence of hiatuses and unconformities. Many workers have applied the graphic correlation technique. Miller (1979) applies it to subsurface biostratigraphic events obtained from well cuttings. Edward (1989) proposed the term (supplementary graphic correlation) for a technique using wireline logs events. Melnyk et al. (1991) used filtered gamma ray events to measure discrepancies in bio-stratigraphic events. The method used here closely follows that of Melnyk et al. (1991) in producing an LOC based on filtered gamma ray logs and superimposing biostratigraphic events upon it.

Methods

Graphic correlation techniques were used to produce high resolution correlation between two wells in the Sirt Basin using filtering gamma ray logs. Biostratigraphic events were then incorporated into the LOC, and the two independent sets of data used to produce a best line of correlation. The biostratigraphic events used are first down hole occurrences (FDO) of selected ostracod species. Graphic correlation was used with biostratigraphic data from the wells to test and refine the distribution of FDOs. The graph produced by the FDOs between the wells shows a wide distribution of points, so the computer drawn line of best fit may not be reliable, so it is up to the expert person in the area to draw a line of correlation. The species chosen for the analysis are those which are thought

to have reasonable stratigraphic value; however, even with these, not all have reliable FDO. This is because many species become rare in the later parts of their stratigraphic range, so their first down hole discovery has an element of chance in it. It is also apparent that there is a facies relationship between some species and lithology, which will distort the true "potential" disappearance of species. Finally, taphonomic processes result in ostracods being more commonly discovered in the shale sequences than in the limestone sequences, which again distorts the FDO. Because of these problems the primary line of correlation (LOC) was based on the gamma ray correlation. Two sets of gamma ray logs were available for correlation between wells kk1-6 and yy1-6; there were problems in defining the top boundary of the Hagfa Formation in the well kk1-6.
To resolve this we correlated the wells by filtering gamma ray logs and biostratigraphic events. Several lines of correlation were created between the wells as a result of depth changes in the well kk1-6, until we found the best fit line of correlation derived from the peaks of the filtered gamma ray and the line of correlation obtained from biostratigraphic events, which was considered to be the best correlation at depth of 11020ft in well kk1-6, so that the boundary will be located at the level where there are prominent changes in gamma ray logs, lithology and a rich diverse Ostracoda fauna.
Results of the graphic correlation:

- The top of the Hagfa Shale is deeper in well KK1-6 (11020 ft instead of 10420 ft).
- The top of the Hagfa is equal to Palaeocene /Eocene Boundary.
- The top of the Hagfa has many late Palaeocene ostracods.

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THE OSTRACOD RESPONSE TO CENOMANIAN SEALEVEL, FOOD SUPPLY AND OXYGENATION CHANGES IN THE TARFAYA UPWELLING REGION, SOUTHERN MOROCCO

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Keywords: Ostracods, Cenomanian, Sea Level Change, Upwelling, Food Supply and Oxygenation, Tarfaya Basin

The northwest African margin has been an upwelling area with an extended oxygen minimum zone in outer shelf and deeper environments since the early Cenomanian. We interpret changes in ostracod concentration and assemblage composition of Cenomanian strata of the Tarfaya Basin in order to trace the ostracod response to sea level, food supply and oxygenation changes.
The > 0.25 mm fraction of 120 samples from the "Mohammed Plage" composite section, situated approximately 100 km east of Tarfaya, was scanned for ostracods. Only 72 samples yielded ostracods, varying between 1 and 410 individuals. Approximately 50 g of rock were disintegrated with tenside. The complete assemblages were classified on species level. Assemblage counts were normalized to individuals per gram sediment. The assemblage count results were compared with results from foraminiferal studies and geochemical data dealing with the same samples (Gebhardt et al. 2004).
Most frequent genera found at Tarfaya were *Brachycythere*, *Reticulicosta*, *Veenia* and *Cytherelloidea*. Other genera do not play a significant role. *Veenia* is most frequent during peak transgressive phases and prefers shallow waters. *Brachycythere* shows highest frequencies in intermediate water depths around 100 m. *Reticulicosta* is most frequent in sediments deposited in slightly deeper waters at the onset of permanent oxygen deficiency. The relatively rare *Cytherelloidea* shows no positive correlation to oxygen deficiency and is most frequent in shallow waters or during regressive periods.
In general, highest concentrations of ostracods (max. 8.9 carapaces per gram sediment) were found in sediments with 3 to 5 % total organic carbon (TOC) and those of inner to middle shelf environments, indicating a preference for moderate food supply and shallow waterdepths. The ostracods avoid

oxygen deficiency and/or extremely high food supply to the sea floor. The inner shelf to upper bathyal succession at Tarfaya displays a succession of ostracod genera frequency maxima: *Veenia* and *Cytherelloidea*-*Brachycythere*-*Reticulicosta*. This succession might serve for a rough depth zonation in other Late Cretaceous upwelling areas.

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MULTIVARIATE ANALYSIS AS A TOOL TO INFER THE AUTOECOLOGY OF EXTINCT OSTRACODS: AN EXAMPLE FROM TWO ITALIAN LATE MESSINIAN *LAGO-MARE* ASSEMBLAGES

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Keywords: Late Messinian Lago-mare Ostracod Assemblages, Italy, Palaeoecology, Multivariate Analyses

In recent years, multivariate statistical analyses have been applied successfully to marine and non-marine ostracod assemblages to infer the (palaeo)environments (Mezquita et al. 1999a, b, Ruiz et al. 2000, Gliozzi and Grossi 2004, Mazzini 2004). As a matter of fact, more the investigated sediments are young and bear still living ostracod species with well-known autoecology, more detailed are the obtained environmental results, while when the fossil assemblages are mainly composed by extinct species; the palaeoenvironmental conclusions are more general and the interpretation of the multivariate plots is more difficult (Gliozzi and Grossi 2004). Anyway, as the multivariate analysis groups species and/or genera according to their (palaeo)ecological request, different studies that take into account similar ostracod assemblages in different sedimentary successions could help to infer the palaeo-autoecology of the extinct taxa. In this paper two different Italian late Messinian *lago-mare* ostracod assemblages, dominated mainly by extinct Paratethyan species, have been analysed by means of UPGMA and DCA. The obtained plots have been compared and, with the help of very few autoecological data on similar living species or of geochemical data on the sediments in which they were included, palaeo-autoecological data on extinct taxa such as *Tyrrhenocythere*, Leptocytheridae [*Amnicythere* and *Euxinocythere* (*Maeotocythere*)], pointed Candoninae (*Pontoniella*, *Lineocypris*, *Camptocypria* and *Zalanyiella*) and *Caspiocypris* have been inferred. In particular, it seems reliable to suppose that:

- assemblages made only by pointed Candoninae are typical of deep (more than one hundred meters of depth) and rather freshwater environments;
- assemblages mainly composed of Leptocytheridae point to shallow (probably few tens of meters of depth) and mesohaline waters;
- diversified and even assemblages made both by pointed Candoninae and Leptocytheridae are common in rather deep but oligohaline environments.

Caspiocypris pontica seems rather tolerant for brackish salinities, but prefer shallow environments. *Tyrrhenocythere* could be an indicator of shallow but mesohaline waters.

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CANDONA SP., A LIMNIC OSTRACOD FROM THE SANTANA FORMATION (LOWER CRETACEOUS), ARARIPE BASIN, NE BRAZIL: PALAEOECOLOGY AND BIOSTRATIGRAPHIC IMPLICATIONS

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Araripe basin is famous worldwide because of its important and varied Cretaceous lagerstätten. The ostracod species *Candona* sp. was recovered from an outcrop of the Santana Formation located in the countryside of Crato City, Ceará State, Brazil. This outcrop at Batateira river yielded a complete ontogenetic series with females and males. Carapaces with preserved characteristic candonid muscle scar patterns were also recovered. This species is an index fossil of Zona 011, Alagoas Stage, late Aptian/early Albian. Before the present work, *Candona* sp. was cited in biostratigraphic works as "ostracod 207" (Schaller 1969, Silva-Telles jr. and Viana 1990) or "*Cytheridea*? 207" (Moura 1987) and its occurrences are recorded in coeval strata at Potiguar, Sergipe, Alagoas and Campos basins. Considering its complete ontogenetic series, based on Whatley (1983) it is possible to identify a population age-structure Type A, indicating an autochthonous preservation in a low energy limnic palaeoenviroment. Acknowledgement is due to FINATEC for financial support to presentation of the present work in the symposium.

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HOLOCENE CLIMATIC CHANGE IN SOUTHERN AUSTRALIA BASED ON OSTRACOD ASSEMBLAGES AND GEOCHEMISTRY

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Keywords: Lacustrine, Southwestern Western Australia, Holocene, Palaeoclimate

To date, there have been very few high-resolution Holocene palaeoclimatic studies conducted in the southwest of Western Australia compared to southern and eastern Australia. This part of the continent, similarly to the east, has a Mediterranean climate with wet cool winters and hot dry summers. The purpose of this study is to provide a detailed description of the palaeoclimate of southwestern Western Australia from ostracodal species assemblages and trace metal analyses of ostracod valves.

Two Livingstone cores were taken from Barker Swamp (1.7 m and 5 m), which is a karstic lake on Rottnest Island (20 km west of Perth). Ostracods were picked and faunal assemblages as well as the taphonomic characteristics described. Geochemical analysis of the ostracod valves was performed on an Inductively Coupled Plasma Atomic Emission Spectrometer.

Barker Swamp has been preliminarily dated by Optical Stimulated Luminescence (OSL), and a slow rate of deposition of about 86 yrs/cm for the basal sands (560 to 480 cm) is suggested, and increasing to a relatively rapid 7 yrs/cm peat and calcilutite accumulation (480 to 235 cm), and then changing to 31 yrs/cm during calcilutite accumulation (235 to top).

Sampling at 1 cm intervals represented many years of deposition and therefore a mixture of saline and fresh faunas in a single sample, although, based on abundances, a broad salinity trend can be determined for such a sample. The lake first became active at about 9000 yrs BP, and dominated by a freshwater fauna comprising initially of *Ilyodromus* sp. that colonised the then temporary pool followed by a prolonged period of *Kennethia cristata* dominance and occasional freshwater *Mytilocypris mytiloides* and halobiont *Cyprideis australiensis* and *Diacypris spinosa*. The latter two species suggest an alternation between two phases: one freshwater (*K. cristata* and *M. mytiloides*), the other saline with a range of 16 to 25‰ to probably higher values.

Between about 7800 yrs BP and 7500 yrs BP, the lake underwent a fundamental change to a relatively constant, moderately saline lake, with *D. spinosa* and *M. mytiloides* dominating the ostracod fauna suggesting a salinity range of 10 to 15‰. Salinity during this period occasionally increased to above 16‰ where *C. australiensis* was abundant. Occasional fresher pulses occurred with *Limnocythere mowbrayensis* being common.

From 7500 yrs BP to 7200 yrs BP, a more saline lake was evident with the replacement of the *D. spinosa* and *M. mytiloides* fauna with that dominated by *C. australiensis* suggesting a salinity above 16‰. Then, a brief period of about 500 yrs of freshwater filled the lake resulting in a *K. cristata*-dominated fauna.

Between 6700 yrs BP and 4800 yrs BP, the lake returned to a *C. australiensis*-dominated fauna indicating a moderate increase in salinity.

From 4800 yrs BP to about 2900 yrs BP, Barker Swamp returned to a *D. spinosa* and *M. mytiloides*-dominated fauna suggesting a salinity range of 10 to 15‰, although pulses of freshwater (0.4 to 2.5‰) are evident due to the presence of *L. mowbrayensis*. This period (2900 yrs BP to 800 yrs BP) was followed by a phase of relatively constant salinity (12.5 per mil) due to the sole presence of *D. spinosa*.

During the last 800 years, the lake decreased in salinity to 8 to 10‰ as shown by *M. ambiguosa*, although pulses of freshwater entered the lake and causing salinity to decrease between 2.5 to 0.4‰ as shown by *L. mowbrayensis*. The lake is currently dry.

SPATIAL DISTRIBUTION OF OSTRACODS RELATED TO WATER CHEMISTRY IN SOUTHWESTERN AUSTRALIAN LAKES

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Keywords: Southwestern Western Australia, Multivariate Statistical Analysis, Transfer Function

Waters in most lakes in Australia are dominated by Na-Cl, although they vary in their relative proportions of minor cations and anions. As such, the fauna associated with these different chemical concentrations in the lake waters differ, and therefore, can be used to identify the evolutionary pathways of the water (Radke et al. 2002, Radke et al. 2003).

The best way to determine ostracod species associations to environmental variables is using multivariate statistical techniques. Radke (2000) used these techniques to show that log salinity and log aNa/aMg are the most important variables that affect ostracod species distributions. Radke (2000) also

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produced an ostracod-based transfer function using these variables determined from a training dataset that included lakes from southeastern and southwestern Australia. The Radke (2000) transfer function included lakes that were of low to moderate salinity, and my study aims to extend this transfer function to include different ostracod species and water chemistries from lakes that are of higher salinity.

Water samples and ostracod samples were taken from 39 lakes during two mid-Spring trips to southwestern Australia in 2003 and 2004. Physical parameters including conductivity, turbidity, pH and temperature were collected at the lakes at the time of sampling. The water samples were analysed for both major and minor cations and also for anions. Several cations, including: Ca, Mg, K, Sr, Ba and U, and the ostracod valves from the lake waters were also analysed using the Inductively Coupled Plasma - Atomic Emission Spectrometer at the Australian National University. Multivariate statistical techniques, including correspondence analyses, were applied to the "training" dataset, and from this the most important variables were calibrated to construct the transfer function.

The water analyses indicate that the predominant water chemical evolutionary pathway for thirty three lakes in southwestern Western Australia follow a Type 1b (Na-Mg-Cl-SO_4) pathway, four lakes follow a Type 2a (Na-Mg-Cl-SO_4) pathway, and one lake each follow a Type 1a (Na-Mg-Ca-Cl) and Type 2b (Na-Cl-CO_3- SO_4) pathway.

I intend to apply this extended transfer function to cores taken from a karstic lake, a saline playa lake, both from Western Australia, and two crater lakes, one freshwater and one saline, both from south-eastern Australia.

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LIMNIC OSTRACODS FROM THE SURROUNDINGS OF THE UPPER MIOCENE PANNONIAN LAKE (LOWER PANNONIAN; AUSTRIA/STYRIA)

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Keywords: Upper Miocene/Lower Pannonian, Styrian Basin/Austria, Limnic Environment, Stratigraphy, Taxonomy

At the transition from Middle to Upper Miocene times the Pannonian Basin become isolated from other parts of the Paratethys. Marine taxa like foraminifers vanish due a decrease of salinity. Endemic mollusc and ostracode faunas flourish within this "Pannonian Lake". While a huge literature exists about this brackish lake, our knowledge of the marginal freshwater environments is rather poor. Micropaleontological investigations at the north-westernmost margin of the Styrian Basin brought a remarkable ostracode fauna of Early Pannonian age into light, which is presented herein.

In the vicinity of Gratkorn (10 km NNW Graz; 15°20'55''E/47°08'15''N) an approx. 15 m thick sedimentary succession is exposed in the clay pit St. Stefan. Above 1.5 m thick matrix supported gravels - bioturbated by roots and forming the base of rare autochthonous tree trunks - 4 m thick, sometimes plant-rich clays follow and are overlain by 10 m thick clays with some lignitic and sandy layers. Several samples yielded very thin-shelled ostracode faunas with mostly fragmented valves. 11 taxa are described taxonomically. Some of them are left in open nomenclature due insufficient preservation: *Vestalenula cylindrica* (Straub 1952), *Paracandona euplectella* (Robertson 1889), *Candona* (?) sp. 1, cf. *Candonopsis arida* Sieber 1905, ?*Cypria* sp. 1, *Cyclocypris nitida* Sieber 1905, cf. *Bradleystrandesia reticulata* (Zaddach 1844), *Stenocypris* sp. 1, ?*Cypridopsis* sp. 1. One Candoninae displays a unique combination of sexual dimorphism (males with a centroventral protrusion, females

with a reticulated posterior valve surface) and outline (rounded posterior end). Therefore a new species of *Candona* (*Camptocypria*) will be erected in the proceedings volume. Furthermore the systematic position of very large ostracode fragments - called "Striated ostracode sp. 1" - with delicate longitudinal striae is discussed but neither family nor genus is known up to now. The ostracode associations point to an overall shallow, limnic environment, maybe sometimes rich vegetated. Hints to a "warm" (subtropical?) climate give cf. *Candonopsis*, ?*Cypridopsis* and especially *Stenocypris*.
The gravels at the base of St. Stefan are supposed to be sediments of the lowermost Pannonian low stand systems tract, which is followed by a rapid rise of the lake level (corresponding with the transgressive systems tract of the Central Styrian Basin) and the deposition of clays in an outermost (separated?) freshwater bay of the Pannonian Lake. Similar sequences are also recorded in the Central Styrian, the Vienna and the Western Pannonian Basin and are probably astronomically forced (cf. Harzhauser et al. 2004). Even if biostratigraphy based on ostracods is difficult up to now (cf. Gross 2004), they register facies-shifts in detail that can be linked with sedimentary sequences in wide areas.

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SURFACE WATER OSTRACODS FROM THE PILBARA REGION, NORTHWESTERN AUSTRALIA: BIOGEOGRAPHY AND HABITAT PREFERENCES

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Keywords: Pilbara, Surface Water, Physico-chemistry, Biogeography

The Pilbara region in northwestern Australia has low and highly variable rainfall, with an annual average of 250-400 mm, and among the hottest temperatures in Australia. Marble Bar in the northern Pilbara has an average December temperature of 42°C. Despite the low rainfall and high temperatures, the Pilbara contains large rivers which flow strongly for brief periods after rain events, especially cyclones. These rivers and their tributaries contain a surprising number of permanent or near-permanent pools and springs. There are also many claypans and pools on rock that hold water for a month or so after rain. The Department of Conservation and Land Management is currently surveying the aquatic fauna and flora in surface water of the Pilbara and this paper summarises the information collected on ostracods.
Prior to the current survey, few records existed of surface water ostracods in the Pilbara and adjacent areas and species richness in the region appeared to be low (Halse 2002). It is now apparent from the 70 samples processed that species richness is quite high, although it does not match the spectacular ostracod radiation observed in Pilbara groundwater (Reeves et al. 2005) and the richest samples contain fewer ostracod species than predictably filled, seasonal wetlands in south-western Australia. This is in contrast to the pattern for many other invertebrates, especially beetles and rotifers, which are much more speciose in the Pilbara. Nevertheless, several undescribed Pilbara ostracods have been collected, which is to be expected when new areas are sampled in Australia.
As a very broad generalisation, the ostracod communities of Pilbara surface water fall into three categories: most sites are dominated by surface water genera such as *Bennelongia*; giant ostracods (Mytilocpris and Trigononocypris) are prominent in the few subsaline sites; and some spring sites contain significant groundwater elements such as *Vestenula* and other darwinulids. Interestingly, many wells have been colonised by surface water species that occur together with stygofaunal ostracods in a somewhat unnatural community mix.
Pilbara surface water is mostly rich in bicarbonate and fresh (0.04-12 g L^{-1} TDS). Most claypans are very turbid (up to 36 000 NTU) and some river pools contain extensive stands of submerged aquatic macrophytes (up to 340 g m^{-2} dry weight). General relationships between ostracod occurrence and

habitat will be discussed, as well as the biogeographic relationships of Pilbara ostracods.

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DIVERSIFICATION OF CYPRIDOIDEA WITH THE PROSPERITY OF NONMARINE OSTRACODE FAUNA IN THE MIDDLE STAGE OF EARLY CRETACEOUS IN EAST ASIA

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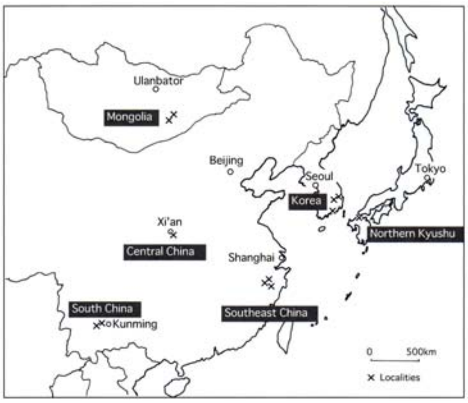
Keywords: Nonmarine Ostracoda, Early Cretaceous, East Asia, Cypridoidea, Diversification

Introduction
In East Asia, a number of regional studies on nonmarine ostracode biostratigraphy have revealed regional successions of ostracodes during the Cretaceous age. However, any useful zonation for long-distance and international correlations has not been proposed up to the present. At an early date, Hayashi (in press) will advance a new scheme of zonation for this purpose; four zones in the Early Cretaceous age, two zones with two subzones in the Late Cretaceous age. Among them, the third zone of Early Cretaceous (the middle stage of the Early Cretaceous) suggests the most thriving period on Cypridoidea. This prosperity of Ostracoda will be analyzed in my presentation.

Methods
Based on field investigations in localities shown in the figure and published literature represented by Hou et al. (2002) in China, the presumably Barremian ostracode assemblages from these localities are compared to each other for deriving common and endemic characters.



Results
All over the East Asia, lacustrine deposits in the middle stage of Early Cretaceous yield a vast amount of fossil ostracodes; the large Cypridacean assemblage in Japan, the diverse *Cypridea* assemblage in Korea, the *Cypridea-Damonella-Mongolianella-Darwinula* assemblage in southeastern China, the *Cypridea* (*Cypridea*) assemblage in central China, the large *Cypridea* assemblage in Mongolia.
Prosperity of Cypridoidea in the middle stage of Early Cretaceous is brought by the diversification of the subgenus *Cypridea* (*Cypridea*) and the genus *Mongolianella*, and most of the created new species are endemic and have a short range in time.

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SEASONAL FLUCTUATION OF ABUNDANCE AND DIVERSITY OF OSTRACODS ASSOCIATED TO *EICHHORNIA CRASSIPES* IN A PARANÁ RIVER BACKWATER, BRAZIL

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Keywords: Nonmarine Ostracoda, Abundance, Diversity, Attached Fauna, South America

Introduction

The ostracod fauna of South America remains ill known (Martens and Behen, 1994), and various habitats such as interstitial and riverine faunas, terrestrial habitats and others remain virtually unknown. A very special kind of habitat, virtually restricted to the continent, is the microcosm of the roots of floating plants. Por and Rocha (1998) indicated to the potentially high biodiversity in this type of habitat, which they called *pleustal,* in a number of lakes of the Pantanal (Brazil), but few studies have meanwhile followed up on this line of research. Here, we report on the first study of the ostracods in floating plants in a backwater of the upper Parana River (Parana State, Brazil). It forms part of a wider survey of the ostracods of the floodplain of the Parana river, including a set of c 50 lakes, backwaters and rivers (many with significantly different water chemistries) and various species of floating plants.

Material and Methods

Ostracoda samples were collected monthly between March 2004 and February 2005 at Manezinho Backwater (22°46'55''S and 53°20'59'W) situated in the floodplain of the Upper Paraná River (Brazil). Three replicate samples of fauna associated with flooting roots were taken in three different stands (S1, S2 and S3) of *Eichhornia crassipes*. The plants were placed in plastic buckets, the roots were thoroughly washed and the residu was filtered over a hand net with 160 µm mesh size. Ostracods were preserved in 70% ETOH. Roots were dried and weighted and ostracods density results were expressed as number of individuals per gram of roots dry weight.

Results and Discussion

The beta diversity results show low turnover in species composition in both spatial and seasonal analyses. Nevertheless, the results suggested that ostracods composition changed more among stands than amongst months. Moreover, beta values were higher in the flood period, evidencing that, among stands, ostracod composition was more distinct in this period. On the other hand, although the DCA results evidenced that the occurrence and abundance of the ostracods species change along the year, the seasonal patterns of ostracods richness, diversity (H') and density seems to be unrelated to the seasonal variation of hydrological level. In general, high values of richness, evenness and diversity were observed in stand S2 (central in the backwater), whereas higher abundance values were observed in the S1 stand (furthest away from the river). It suggests that the localization of stands in the backwater (from the inner part to the mouth) seems to be important to the structuring of ostracods assemblage. Among the 24 species recorded, *Cytheridella ilosvayi*, *Vestalenula pagliolii*, *'Zonocypris' hispida*, *Penthesilenula brasiliensis*, *Cypretta* sp. 1, *Cypricercus* gr. *mucronata* and *Diaphanocypris* *meridana* were the most abundant and the most frequent species in the backwater during the study period.

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A *TERRESTRICYTHERE* SPECIES (OSTRACODA) FROM AN INTERSTITIAL HABITAT AT ORITO BEACH, JAPAN SEA COAST, SOUTHERN HOKKAIDO, JAPAN

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Keywords: *Terrestricythere*, Morphology, Interstitial Habitat, Microdistribution, Japan, Hokkaido

To date, four species of *Terrestricythere* (Ostracoda: Terrestricytheridae) have been reported from supralittoral coastal habitats of the NW Pacific (*T. ivanovae*, *T. pratensis*; Schornikov 1969, 1980) and a littoral estuarine habitat in southern England (*T. elisabethae*, *T.* sp.; Horne et al. 2004). The fifth species of the genus is here reported from a littoral interstitial habitat at Orito Beach (Matsumae), Japan Sea coast, southern Hokkaido, Japan, found during a survey of marine interstitial animals of coastal Hokkaido (e.g., Hiruta 2003). Orito Beach is characterized by very coarse sand with many pebbles. Quantitative samples were taken during an intertidal transect of four stations on 30 April 2005. Sand samples (2 liters) were collected at 10 cm depth intervals to a maximum depth of about 80 cm. Animals were extracted from each sample by decanting and sieving with freshwater through a 0.04 mm sieve net.
The morphology, habitat, microdistribution, and behavior (video record) of this presently undescribed species of *Terrestricythere* are presented. The carapace is about 0.35 mm long, smaller than in the other four known species (about 0.5 mm), and has a flat ventral surface, which is a characteristic of interstitial ostracods in general. The following table shows the vertical distribution of this species at a station 5.5 m from the water’s edge; each value represents the number of individuals per 2-liter sand sample.

0-10 cm	**10-20 cm**	**20-30 cm**	**30-40 cm**	**40-50 cm**	**50-60 cm**	**60-70 cm**
0	1	9	62	75	15	

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LATE PERMIAN OSTRACODES FROM ISRAEL - AN UPDATE

Dedicated to the memory of Ephraim Gerry and Israel Gregory Sohn,
the pioneers of ostracode research in Israel

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Keywords: Israel, Permian, Ostracodes, Taxononomy, Stratigraphy, Paleoecology, Paleogeography

Gerry and co-authors published an article in 1987 on Late Permian ostracodes from Israel. This work was at that time the first report on Permian faunas from the Middle East and the Mediterranean region, except one study from Italy. In this paper, they reported an ostracode assemblages consisting of 24 species, which belong to 22 genera, and four species left in open nomenclature. Five species were new species and *Arqoviella* was described as a new genus. The *Italogeisina-Hungarogeisina* (P) assemblage zone was established, pointing to a Late Permian age (?Abadehian) for the sediments.
Affinities of the Israeli faunas could be found in Permian assemblages from Hungary, Italy, Pakistan, Japan and China. As Permian exposures are absent in Israel, the material was taken from limestones and shales of the lower and middle parts of the Arqov Formation in nine wells in southern Israel. The ostracode frequency in all these boreholes is generally low and preservation sometimes poor.
Since 1987, seven new wells in the Coastal Plain and southern Israel penetrated Permian formations. Ostracodes were reported from four of these boreholes. Also, several papers on Permian ostracodes were more recently published from our area (e.g. Greece, Turkey and Arabian Peninsula - mostly by S. Crasquin-Soleau and co-authors), thus allowing a better stratigraphic and paleogeographic correlation of the Israeli species.
Rather common occurrences of ostracodes in relatively good preservation were found in the cuttings from the Emunah-1 well drilled 1995 in the Dead Sea area, and from the David-1 well, drilled 1993-1994 in the Coastal Plain. Ostracode species diversity, as well as total number of specimens, is greater in the sediments of the Arqov Formation in the David-1 well than in the Emunah-1 well.
The assemblages of the David-1 and Emunah-1 wells consist of 35 species, belonging to 24 genera; 2 additional species were left in open nomenclature. The faunas are dominated by species, belonging to Bairdiidae and *Arqoviella permiana*. Four new forms of the genus *Arqoviella* were found, two of them were described as new species: *A. piscatoris* and *A. davidensis* (another new species of *Arqoviella*, which was hitherto respected as a genus, restricted to Israel, was reported from Turkey in 2004). Also *Richterina*? *sylvieae* was described in the present paper as a new species. The local Permian assemblage zone was renamed to Sargentina (P) zone and could not be subdivided. A Late Permian (Dzhulfian - ? Dorashamian) age attributed to it. This age definition is also in accordance with co-existing fusulinid and palynomorph zones. The ostracode faunas indicate a normal marine, shelf environment of deposition in infralittoral to circalittoral regions.
The Permian/Triassic boundary is not represented in our samples, as this boundary is situated somewhat higher in a section barren of ostracodes, and marked by a distinct "fungal spike". However, the Late Permian genus *Arqoviella* already shows distinct Mesozoic features and may be a precursor of the faunal renewal later during Early-Middle Triassic times. The ostracode occurrences from this study and those of Gerry et al. (1987) result in a total amount of 44 species, belonging to 29 genera and three species in open nomenclature, for the Israeli Late Permian assemblages. 16 species are reported in both studies. While at least nine species are restricted to Israel, the faunas show strong affinities to Mid-Late Permian assemblages from Hungary and Greece, as well as Saudi-Arabia and Oman. Similar forms were also observed in sediments from Turkey, Tunisia, China and Japan. Therefore, it can be assumed that equatorial surface currents, distributing the ostracode larvae on

floating algae, connected western Pangean and Paleo-Tethyan areas and contributed to the spreading of joint ostracode species in both regions.

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WHAT ARE OSTRACODA? A CLADISTIC ANALYSIS OF THE EXTANT SUPERFAMILIES OF THE SUBCLASSES MYODOCOPA AND PODOCOPA (CRUSTACEA: OSTRACODA)

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The higher phylogeny and classification of the Ostracoda have always been topics of contention and this has hampered inclusion of this group in general analyses of crustacean or arthropod phylogeny. Also, the inclusion of hard part characters in earlier attempts to investigate ostracod phylogeny has introduced a large degree of homoplasy in the resulting trees. Here, we present an analysis of the phylogeny of the extant ostracod subfamilies, using nearly exclusively morphological soft part characters. The homologies of these limb characters in a crustacean context are extensively discussed. The resulting maximum parsimony and distance analyses show a good resolution of the phylogeny of the myodocope subfamilies, well-supported by bootstrap values, but in neither of the two analyses are the podocope phylogenies supported.
We test the hypothesis that this discrepancy in resolution between the two subclasses is due to a difference in evolutionary tempo (punctuated in Podocopa, gradual in Myodocopa) by comparing mean distances, average branch lengths and by applying relative rate tests. None of the tests yields significant differences in past evolutionary tempo within the two groups. However, there is a significant difference in mean relative distance between the lineages leading up to the two subclasses. Puncioidea, here considered to constitute Recent representatives of the otherwise Palaeozoic Palaeocopida, have significantly different evolutionary rates from other groups, but cluster within the Podocopida. The slow-down in evolution indicates that this lineage might have experienced, and might still be experiencing, period(s) of morphological stasis.

AGE, PALAEOENVIRONMENTS AND PALAEOCLIMATE OF A MID-PLEISTOCENE HOMINID SITE AT BOXGROVE, SOUTHERN ENGLAND, BASED ON OSTRACODS

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Keywords: Pleistocene, Hominid, Ostracod, Marine, Brackish Water, Freshwater, Palaeoenvironment, Palaeoclimate, Biostratigraphy, Non-analogue Fauna

The Mid-Pleistocene Goodwood-Slindon Raised Beach sediments of Cromerian Complex age (most probably MIS 13) at Boxgrove (West Sussex, southern England) were deposited during a high sea-level event that cut cliffs in the Cretaceous Upper Chalk of the South Downs. Evidence of hominid activity, including local manufacture of stone tools used to butcher large animal carcasses, as well as a hominid tibia assigned to *Homo* cf. *heidelbergensis*, render this one of the most significant archaeological sites in Britain (Roberts and Parfitt 1999). Ostracod assemblages from the Slindon Sand Member are dominated by *Hemicythere villosa* and *Hemicytherura clathrata* and indicate shallow marine conditions (Whittaker, in Roberts and Parfitt 1999). However, there are also brackish (*Cyprideis torosa*) and freshwater (*Scordiscia marinae*) components; the latter, of which this is the first British record, was described by Krstic and Schornikov (1993) from the Pleistocene of Bashkiria (southern Urals region) and may be biostratigraphically significant. The non-analogue fauna includes not only warm water indicators (Horne et al. 1990) such as *Callistocythere curryi* and a new species of *Semicytherura* (the latter also known from the Holocene / Recent of the Adriatic Sea) but also taxa such as *Baffinicythere howei*, indicative of cold water (Horne and Whittaker 1983). The overlying Slindon Silt Member has yielded both brackish intertidal (*Leptocythere* spp.) and freshwater (*Candona*, *Ilyocypris*, *Herpetocypris, Prionocypris, Potamocypris*) assemblages, the latter indicative of shallow, weedy pool, stream and spring environments with which the rich vertebrate and artefact assemblages are associated. The palaeoenvironmental and palaeoclimatic implications of the ostracod assemblages are discussed in detail, comparisons are made with assemblages from other British Pleistocene sites and the problem of non-analogue faunas is reviewed. Preliminary stable-isotope analyses of valves of *Hemicythere villosa* and tests of the foraminifer *Ammonia batavus*, together with trace-element (Mg/Ca and Sr/Ca) analyses of shells of *H. villosa* and *Cyprideis torosa*, are used to evaluate changes in water composition and temperature at Boxgrove during the mid-Pleistocene.

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MICROEVOLUTIONARY AND TAXONOMICAL ASPECTS WITHIN THE SPECIES-GROUP *PSEUDOCANDONA EREMITA* (VEJDOVSKÝ) (OSTRACODA)

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Keywords: Groundwater Ostracoda, Recent Candonidae, Comparative Morphology, Taxonomy

The species-group *Peudocandona eremita* was redefined by Namiotko and Danielopol (2004). It is easily recognised by the triangular carapace shape as well by limbs which fit the diagnosis of the genus *Pseudocandona* Kaufmann. Species of this group are known by bisexual and parthenogenetic populations. The former ones are easily to discriminate mainly using differences in the various parts of the hemipenis. The exclusively parthenogentic populations of the widely quoted *Ps. eremita* are difficult to categorise. The description of *Ps. eremita* from the *terra typica* (localities around Prague) is based on fragmentary information (cf. Vejdovský 1882, Absolon 1978). A detailed description exists for the closely related species, *Ps. serbani* Dan. (Danielopol 1980). We compared the morphology of several populations from Romania which clearly belong to this group with those of *Ps. serbani* and with the valve morphology of *Ps. eremita* from nearby Prague (in Absolon 1978).

We used for this study material from various geographical areas in Romania. The ostracods are stygobites and were caught in wells acceding to alluvial aquifers: (1) along the river Crisul Repede in the villages Suncuius and Astileu, (2) along the Danube at the Iron Gate, wells in the former Ada-Kaleh island, as well as at Orsova and Pietrosani near Giurgiu. (3) along the Olt river, wells at Jiblea, Calimanesti and Daesti, (4) at Hotarele on the Arges river near Bucharest.

Geometric morphometrics of the outlines of the valves were done using the Linhart's B-spline algorithm (Baltanás et al. 2003) performed on adult females of both amphigonic and parthenogenetic populations from the three geographically different Romanian regions. Multivariate analysis (Non Metric Multidimensional Analysis) revealed the existence of wide variability at both inter- and intra-populational level. Furthermore, the variability of 20 limb- traits were measured for various specimens of different populations.

Discriminant traits with a taxonomical value were found in the bisexual populations, Ada-Kaleh/Orsova as compared to Suncuius and to those of the Olt valley (Jiblea/Calimanesti/Daesti). The carapace shape of the Danube populations are more triangular as compared to the other investigated populations. Hence we propose to separate the bisexual populations of the Crisul Repede and those of the Danube in two new species. We assign the parthenogenetic populations we investigated to *Ps. eremita* (Vejdovský) sensu lato. We consider this latter taxon a metaspecies, i.e. within a phylogenetic framework this is a basal taxon with groups which display no apomorphies (cf. Willmann and Meier 2000). The advantage of this solution is the possibility to assign a name to the *incertae sedis* Recent and fossils populations resembling *Ps. eremita* (Vejdovský). Additional morphometric and multivariate analysis (e.g. we used discriminant analysis will help to refine our understanding of the micro-evolutionary aspects of this Candoninae lineage.

CYCLIC PALEOBATHYMETRIC CHANGES AND OPENING OF THE SOUTHWESTERN STRAIT OF THE SEA OF JAPAN DURING CA. 3.2 TO 2.8 MA BASED ON FOSSIL OSTRACODE ANALYSES

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Keywords: *Krithe*, *Acanthocythereis*, Pliocene, MIS G15, Sea of Japan, Glacio-eustacy

Introduction

The formation of the Isthmus of Panama during the Pliocene directly affected the intensification of glaciation in the Northern Hemisphere and extensive glacio-eustacy occurred in 41-kyr orbital cycles[1)]. The Sea of Japan (SJ) is an enclosed marginal sea between the Eurasian continent and the Japanese islands and now connects to the East China Sea through the Tsushima Strait at its southwestern margin. However, land bridges formed there intermittently during the Pliocene, thus preventing warm water currents from the East China Sea or the Pacific Ocean entering the SJ[2)]. As a consequence, Pliocene marine ostracodes in the SJ were influenced by global glacio-eustatic sea level change and the formation of land bridges. Cyclic sea level changes since ca. 2.8 Ma have been recognized[2) 3) 4)]. The aim of this study is to clarify the timing of the opening of the southwestern strait and temporal changes of paleobathymetry in the SJ before 2.8 Ma on the basis of analyses of fossil ostracodes.

Materials and Methods

Samples for fossil ostracodes were obtained from the lower part of the Upper Pliocene Kuwae Formation from the northern coast of the SJ. This formation at the study site is composed mainly of massive mudstone.

Results

More than 200 ostracode species have been identified from 120 samples. After multivariate analyses, four ostracode faunal assemblages were recognized as follows:

1. Cosmopolitan deep-water (e.g., *Krithe*, *Argilloecia*, *Propontocypris*, *Falsobuntonia*)
2. Circumpolar deep-water (e.g., *Acanthocythereis dunelmensis*, *Robertsonites*)
3. Circumpolar and cryophilic shallow-water (e.g., *Elofsonella*, *Finmarchinella*, *Hemicythere*)
4. Eurythermal shallow-water (e.g., *Aurila*, *Cornucoquimba*, *Schizocythere kishinouyei*)

Species of the first and second groups are living in lower sublittoral to upper bathyal waters in the present-day SJ, but the species in the former seem to be more abundant in deeper parts than the latter[5]. Many species of the third group are now extinct, having been reported abundantly from Plio-Pleistocene deposits yielding cool–temperate molluscan faunas. The fourth group is now common around Japanese sublittoral seas. The frequency of number of specimens of the first group changes cyclically and its temporal pattern can be correlated to the marine oxygen isotope curve from ca. 3.2 to 2.8 Ma. Moreover, the frequency of the first group is highest at around 2.9 Ma (probably MIS G15). A planktonic foraminiferal species *Globigerinoides ruber*, which is a proxy for the inflow of warm water currents from the southwestern strait[2], is also found rarely only at this horizon[6]. The sea level maximum for the North Atlantic is also inferred to have occurred around this time[7]. Thus, global sea level changes led to the opening of the southwestern strait, allowing the flow of warm water currents into the SJ and producing the deepening reflected in taxa in the study area.

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OXYGEN ISOTOPE RATIO AND CHEMICAL COMPOSITIONS OF OSTRACODE SHELLS IN A BRACKISH LAKE USED TO QUANTITATIVELY EVALUATE ANTHROPOGENIC CHANGES: NAKAUMI, JAPAN

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Keywords: Brackish Lake, Oxygen Isotope Ratio, Chemical Compositions, Human Impact, Water Salinity

Introduction

Nakaumi is a brackish lake located in southwest Japan. Its environment has been changed by such human impacts as the construction of an embankment for land reclamation and the dredging of bottom sediments. The anthropogenic influences on the water conditions in Nakaumi have operated for several decades[1]. However, the damage to the lake environment has not been established. The oxygen isotope ratio and the chemical composition of ostracode shells are valuable quantitative indicators of paleoenvironments with regard to salinity, temperature, and heavy metal pollution [2]. In this study, the current relationship of the oxygen isotope ratio, the Mg/Ca, the Sr/Ca, and the heavy metals presence to water quality are verified as a first step in considering the human impact upon Nakaumi Lake.

Materials and Methods

Bottom water and sediments were collected from three points (A, B and C) in Nakaumi monthly from June 2004 until May 2005 using a Niskin water sampler and an Ekman-Birge grab. At the same time the water quality was tested by a Quanta (Hydrolab) at the lake surface and bottom. Living adult ostracode shells were picked from the sediments and the soft parts were removed. *Bicornucythere bisanensis* was used in the study because of its abundance in Japanese Quaternary sediments and its relative pollution tolerance[3)]. The ostracode shells were cleaned by hand brushing, washed in pure water and subjected to ultrasound. Samples for chemical analysis were soaked in less than 3% sodium hypochlorite solution for over four hours. The water samples were filtered using a 20 µm sieve. The oxygen isotope ratio and chemical composition of the ostracode shells and waters were respectively determined at Shimane University using a Delta S MASS and at Kanazawa University with a Thermo Electron X7 ICP-MS.

Results

The oxygen isotope ratio and the Mg/Ca in the ostracode shells have a good correlation with the bottom water samples, whereas the Sr/Ca value clearly does not. The oxygen isotope ratio in the shells illustrates a good relationship with both the temperature and salinity of the bottom water, although the error is relatively large. The Mg/Ca of the shells shows a positive correlation with salinity. The results suggest that the paleosalinity and paleotemperature in Nakaumi Lake are quantitatively recorded through the oxygen isotope ratio and/or Mg/Ca relationship in the ostracode shells. The heavy metals are probably divided into three types by the uptake proportions of the heavy metals in the ostracode shells.

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EVOLUTIONARY HISTORY OF *LOXOCONCHA* SPECIES BASED ON PORE-SYSTEMS

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Keywords: *Loxoconcha*, Evolution, Phylogeny, Pore-system, DDP Analysis

A typical cosmopolitan genus, species of *Loxoconcha* have two modes of life, phytal and bottom-dwelling, which is reflected in their carapace morphology. The genus *Loxoconcha* has a long history and is said to have appeared in the late Cretaceous. These facts make it difficult to reconstruct *Loxoconcha* phylogeny. We reconstructed the phylogeny of living *Loxoconcha* species using pore-systems.

Thirty-two fossil and Recent *Loxoconcha* species are classified into two phylogenetic groups, Groups A and B based on the arrangement of pore-systems below the eye tubercle (PBE analysis) (Ishii et al., 2005). Group B is limited to Neogene to Recent shallow marine environments around Japan, while Group A has a global distribution. The phylogeny of Group A, which consists of the majority of the genus, was examined by the Differentiation of Distributional pattern of Pore-systems (DDP analysis).As a result, living species of Group A are classified into two subgroups. One (Subgroup A2) is distributed in Europe and the Mediterranean Sea and may have evolved during the formation of the Paleo-Mediterranean Sea in the Early Miocene. The other (Subgroup A1) is distributed all over the world except for Europe and the Mediterranean Sea and its oldest fossil record so far is from the Early Miocene of Japan. Geographical distributions are clearly distinct between Subgroups A1 and A2. Both Subgroups A1 and A2 have independently adapted to two types of mode of life, and as a result, both have two types of carapace shapes. This is a clear example of convergence in ostracod carapace morphology. We believe that Cretaceous, Paleocene and Eocene "*Loxoconcha*" species described in previous works should be assigned to other genera. We documented that early to middle Paleogene species of the Gulf Coast area, USA, belong to *Sagmatocythere* and *Palmoconcha,* based on the morphology of the hingement and shape of the muscle scars. *Loxoconcha sensu stricto* is considered to have appeared after the Oligocene.

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OSTRACODE OCCURRENCE AND HYDROCHEMISTRY IN WESTERN MONGOLIA

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Keywords: Ostracodes, Hydrochemistry, Lakes, Springs, Temporary Pools

Introduction

In August of 2004, 125 samples from 111 sites in western Mongolia were collected for ostracodes. The area included the Valley of Great Lakes (ca. 1100 m ASL) and northeastern foothills of the Altai Mountains (1500~2500 m ASL). Lakes, playas, streams, springs, and groundwater seeps were sampled. Water temperature, pH, and TDS ranged from 2.5 to 25°C, 6.7 to 10.4, and 35 to 7750mg/L plus 3 sites with up to 350g/L, respectively. All 63 sampled waters had carbonate alkalinity (meq) to Ca (meq) ratio (alk/Ca) >1. Many saline lakes had shoreline deposits of carbonate indicating that lake level had been higher in the recent past (within last 1,000 years or so, judging from the presence of valves in the upper 10 cm of sediments collected by Ekman dredge), and likely had a much lower TDS and alk/Ca. The climate of the region is semi-arid with temperature extremes typical of mid-continent. The geology of the Altais and associated Jargalant Uul is characterized by Devonian granites, Paleozoic and Mesozoic siliciclastic sediments while the Valley of Great Lakes area is underlain by Mesozoic siliciclastics, Late Proterozoic to Early Paleozoic granitic rocks, Quaternary basin fill, and local Archean mafic volcanics (Yanshin 1989). Carbonate rocks are absent in the sampled region.

Results

Every spring and groundwater seep except for one at 2230m ASL in a broad flat valley contained live ostracodes. Groundwater chemistry was on the whole dilute with 8 out of 12 sites measuring <400mg/L. Four others ranged from 600 to 1000mg/L. All were characterized by alk/Ca ≤ 3. Among lakes, those with TDS 50~3500mg/L, Mg/Ca ≤10, and alk/Ca ≤ 15 had live ostracodes, whereas those with any one of the three parameters above those values had none. Eight high elevation sites (> 2000 m ASL) did not fit this pattern: 4 lakes and wetlands with TDS 47~500 mg/L and alk/Ca 1.2~3.0, and 4 sites (1 lake and 3 of the 4 stream-connected ponds) with TDS 1000~3000 mg/L and alk/Ca 1.2~3.1 had no ostracodes. For 6 of the 10 sites, there were ostracodes in nearby springs but not in the streams flowing out of them into the sampled lakes, ponds and irrigation fields. Without further study, the reason for the absence of ostracodes at these sites remains a puzzle. In the Valley of Great Lakes, 3 lakes with TDS < 150 mg/L and alk/Ca <3.0 had no ostracodes. Very low dissolved oxygen (6% of saturation) or high H_2S were noted in these 3. Three small evaporating pools with estimated TDS upward of 40g/L contained *Heterocypris incongruence* or *Limnocythere inopinata*.

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DIVERSITY OF THE AUSTRALIAN CANDONINAE (PODOCOPIDA, CANDONIDAE) WITH A CLADISTIC ANALYSIS BASED ON MORPHOLOGY

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Keywords: Candoninae, Taxonomy, Morphology, Phylogeny, Cladistic Analysis, Australia

The subfamily Candoninae counts 331 Recent species, classified in 33 genera and seven tribes. It is the most successful ostracod group in colonizing the subterranean environment. In Australia there are almost no surface water representatives of the subfamily and, until recently, only one Candoninae species was known from Australia. However, the investigation of the subterranean waters of Australia led to the discovery of a great Candoninae biodiversity. Eleven new genera, and 29 new species are described so far, all endemic to Australian subterranean waters. The material was collected from the Perth Basin, Murchison, Pilbara and Kimberley Regions (Western Australia), and Pioneer Valley (Queensland)

Australian Candoninae are classified in four different tribes: Candonopsini, Danielocandonini, Humphreyscandonini and Paracandonini, none endemic to Australia. Due to the extreme morphological diversity, the phylogenetical relationship between Australian Candoninae genera is not clear. In order to clarify it, I have performed a cladistic analysis. A total of 49 morphological characters were chosen and coded across 31 terminals as a numeric symbol that represents particular character state. As it is most common, all plesiomorphic character states were coded “0”, while apomorphic states were scores “1”, “2” or “3”. *Plictenophora mesembria* Wouters, 1999 was chosen as an outgroup taxon. It was described from the Cape Range and belongs to the Candoninae’s sister subfamily - Paracypridinae. The characters were analysed unordered and equally weighted using the default options in the computer program NONA (Goloboff 1999).

The results obtained are as follows: 10 equally parsimonious trees with L = 144 steps, Ci = 40, Ri = 74. The strict consensus of all trees was four steps longer, Ci = 39, Ri = 73. This cladogram has three clear clades: the first consisting of a monospecific genus - *Deminutiocandona* Karanovic 2003; the second clade includes three genera: *Acandona* Karanovic 2003; *Candonopsis* Vávra 1891; and *Pioneercandonopsis* Karanovic 2005, while the last clade encompasses almost exclusively Australian tribe - Humphreyscandonini. All Australian genera that belong to this tribe are endemic to the Pilbara Region. The cladogram also highlights that Perth Basin species, Murchison species, Kimberly, and Queensland species are more closely related to each other than any of them is to the Candoninae species from Pilbara.

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NONMARINE OSTRACODA (CRUSTACEA) OF BANAT (VOJVODINA, SERBIA AND MONTENEGRO)

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Keywords: Nonmarine Ostracods, Banat

The ostracod fauna of Serbia and Montenegro is poorly known. Slightly better explored parts are the Fruška Gora Mountain and Montenegro (Karanović 1996, 1999). In Serbia, south of the Sava and Danube rivers there are only a few scattered and old findings of ostracods (Petkovski 1959, Mikulić 1970), whereas in Banat district only three ostracods were registered so far (Petkovski 1964, 1969, Petkovski et al. 2000).

In order to enrich the knowledge on ostracods in our country, intensive field work was carried out in the waters of central and southern parts of Banat district, during 2002 and 2003. The samples from the collection of the Institute of Zoology, Faculty of Biology, in Belgrade were also examined. Ostracods were identified with suitable methods (Meisch 2000) that include dissection and preparation of microscopic slides, as well as drawing of delicate structures of the ostracod morphology.
In the investigated area, 23 ostracod species were found; most of them have a Palearctic distribution. *Limnocythere inopinata*, *Ilyocypris decipiens*, *Bradleycypris obliqua* and *Tanycypris* sp. are new to the fauna of Serbia and Montenegro, as well as subfamily Cypricercinae. Four species were found after more than a few decades, including a new and stable population of *Candona natronophila* (Petkovski 1969). The most frequently sampled species were *Cypridopsis vidua* and *Physocypria kraepelini*.

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OSTRACODS AND ARCHAEOLOGY IN THE ARAL SEA REGION (CENTRAL ASIA)

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Palaeolimnological investigations in the northern part of the big Aral Sea (Tsche-bas Bay) have been conducted using ostracods. The results obtained from two piston cores cover more than the last 2000 years of sedimentation. The varying distribution of three ostracod associations clearly demonstrates that five different periods of the Aral Sea were present during this time series. All of these periods can be connected to historical and archaeological results of man-made alterations in the irrigation system of ancient cultures.
This is mostly depending on the deviation of the southern tributary to the Aral Sea, the Oxus or Amu Darya. A dry period occurred during Persian Achaemenid empire and during Arab rule between 700 AD and 1600 AD, and recent desiccation during Soviet times and thereafter is also clearly demonstrated by the distribution of the ostracods in the sediments. Whether this is also a sign of changing climatic conditions is discussed.

TERTIARY OSTRACODA FROM IRAQ

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Keywords: Ostracoda, Tertiary, North, Northwest Iraq

Introduction

In Iraq Ostracoda have received little attention from micropalaeontologists owing to the shortage of ostracodologists, and most of the work on Foraminifera has been done by the oil companies. However, the present study is part of a project investigating Tertiary Estrada from North and Northwest Iraq as an attempt to fill the information gap about Iraqi Ostracoda.

Material and Methods

The studied Tertiary formations ranging in age from Palaeocene to Miocene are well represented in North and Northwest Iraq. They constitute important exposed and subsurface deposits of the stable and unstable shelf of the Iraqi basin. Surface and subsurface samples were obtained from the following formations from different localities in North and Northwest Iraq:
Aaliji Formation (Palaeocene - Lower Eocene) Khurmala Formation (Palaeocene - Lower Eocene) Akashat Formation (Palaeocene - Lower Eocene) Jaddala Formation (Lower Eocene - Upper Eocene) Avanah Formation (Middle Eocene) Serikagni Formation (Late Oligocene - Lower Miocene) Al-Fatha Formation (Middle Miocene).

Results

The studied formations have yielded fairly rich ostracod assemblages. On the basis of the ostracod genera and species recorded from these formations an attempt was made to show the faunal relationships from a palaeogeographical viewpoint, indicating that the Iraqi Tertiary ostracods represent an intermediate bioprovince between the East Mediterranean Tethys and the Indopacific Tethys, and in particular the M. Miocene Ostracoda from Iraq indicated that the final closure of Tethys might be in the M. Miocene between Iraq and Iran. Iraqi Ostracoda confirmed that the fauna in Iraq is related to the southern shelf of Tethys Ocean.

SPATIAL AND TEMPORAL CHANGES IN THE COMPOSITION OF OSTRACODA ASSEMBLAGES IN THE DIFFERENT HABITATS OF A SHALLOW LAKE (FEHÉR-TÓ, HUNGARY)

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Keywords: Ostracoda, Shallow Lake, Spatial Distribution, Habitat Preference

The Fertő-Hanság area is one of the most important wetlands in Central Europe. Limnological research has a long tradition in the Seewinkel and Lake Fertő, but only limited information is available about the hydrographically connected Hanság region. In 1998, within the frame of the Hungarian Danube Research Station, a four-year project was started to study the faunistics, temporal and spatial distribution of several microcrustacean taxa and composition of the zooplankton assemblages in the different habitats of the lake.
Lake Fehér is situated in the southeastern part of the Hanság Basin, a strictly protected area of the Fertő-Hanság National Park. Fehér-tó (Lake Fehér) (47^{o} 41’ N, 17^{o} 21’E) is small (area: 2.69 km^2, open water: 0.25 km^2) and very shallow (mean depth: 50 cm, maximum depth: 110 cm). The littoral zone of the lake is characterised by dense beds of emergent macrophytes (*Phragmites australis* and *Typha angustifolia*).
The study was carried out from March 1998 to August 2001. Samples (from the water column and from the sediment surface) were collected at monthly intervals and during three diurnal examinations

from different habitats of the lake: 1. open water (mid-lake), 2. *Najas marina* beds (mid-lake), 3. edge of the emergent macrophyte zone, 4. *Lemno-Utricularietum* (in the reed-belt), 5. *Phragmitetum communis*, 6. *Typhetum angustifoliae* (in the reed-bed). In the sampling sites macrophyte cover, temperature, pH, conductivity and dissolved oxygen were also recorded.
26317 individuals of 20 Ostracoda species were recorded from the different habitats. Of these 20 species *Fabaeformiscandona hyalina* and *Cypridopsis hartwigi* are new to Hungary. The most frequent species were *Cyclocypris ovum* (69.54%), *Notodromas monacha* (6.73%), *Candona weltneri* (5.57%) and *Physocypria kraepelini* (5.44%), but significant spatial differences were recorded in the composition and the abundance of the Ostracoda assemblages in the different habitats.
The Ostracoda assemblages on the dendrogram were separated on the basis of habitats and the five frequent species. Ostracoda abundance and species richness increased inshore. In the open water habitats 58 individuals of 8 species; at the open water-reed-belt edge 1154 individuals of 14 species were recorded, and the most frequent species was *Physocypria kraepelini*. In the reed-belt diverse and abundant assemblages occurred, 13625 individuals of 16 species were recorded. The dominant species were *Cyclocypris ovum* (72.75%), *Notodromas monacha* (8.47%), *Candona weltneri* (5.82%) and *Pseudo compressa* (5.1%). *Pseudocandona rostrata*, *Notodromas monacha* and *Cypridopsis hartwigi* occurred only in the reed-belt as well as *Physocypria kraepelini* replaced by *Cypria ophalmica* in this habitat.
Besides examination of the fauna and the spatio-temporal patterns of assemblages, abiotic (depth, temperature, pH, conductivity, oxygen content and saturation) and biotic (macrophyte cover) minimum, maximum and optimum values of the 20 species were detected on the basis of the 39 sampling occasions and 17 sampling sites.

SOME UNUSUAL OSTRACODES FROM A DARK SHALE IN THE BANGOR LIMESTONE (CARBONIFEROUS) OF ALABAMA, U.S.A.

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An exceptionally diverse and well preserved assemblage of ostracodes was recovered from a series of channel samples of a 4-meter thick dark shale within the Bangor Limestone (Carboniferous, Mississippian) near Scottsboro, Alabama. At least 50 species of ostracodes occur within this interval, belonging to such genera as *Acratia*, *Amphissites*, *Bairdia*, *Bairdiolites*, *Cavellina*, *Chesterella*, *Coronakirkbya*, *Ectodemites*, *Glyptopleura*, *Healdia*, *Hollinella*, *Kirkbya*, *Moorites*, *Oliganisus*, *Perprimitia*, *Polytylites*, *Pseudoparaparchites*, *Sansabella*, *Shleesha*, *Tetrasacculus*, *Venula*, among others. Some of the ostracodes belong to as yet undescribed genera and species.
Many of these species occur in large numbers of individuals representing numerous instars. Changes in relative abundance of species, faunal composition, dominance and morphological features all occurring within the ostracode fauna, and relationships of other invertebrate groups suggest a marine, mid- to outer shelf environment, with little or no postmortem transportation. The upper part of the sequence may represent more nearshore, shallower water environments than the lower part.
A very large species of the poorly-known ostracode genus *Coronakirkbya* occurs through most of the sequence, although it is more abundant in the lower half. Species of *Coronakirkbya* are generally known for their large size, and the specimens of this genus from the Bangor are larger (adults exceeding 4 mm) than any species so far described. Another unusual group of specimens have most of the features of paleocopid ostracodes, except that they have a calcified inner lamella.

RECENT AND SUBRECENT OSTRACODES FROM POSTGLACIAL LAKES OF THE BERLIN AREA

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Keywords: Subrecent & Recent Freshwater Ostracods, Berlin, Postglacial Lakes, Ecology

In the Berlin area nearly all lakes are the result of the last glaciation. Recent ostracodes of these lakes have been studied in part by Hartwig (1901). In his papers as well as in Brugger et al. (1989) several genera and species were reported from these lakes, especially from the Grunewaldsee and shallow parts of the Havel: *Cyclocypris laevis, Cypria ophtalmica*, *Cypridopsis vidua*, *Darwinula stevensonii*, *Herpetocypris brevicaudata*, *H. reptans*, *Limnocythere inopinata* and *Pseudocandona pratensis*. In the SSW part of Berlin (Lichterfelde) dark grey clayey sediments from the early Holocene were studied, which had accumulated in a temporary lake we called "Lichterfelder See". In these sediments we have recorded the following genera and species: *Candona candida, C. neglecta, Candonopsis kingsleii, Cyclocypris laevis, Cypridopsis vidua, D. stevensonii, Fabaeformiscandona hyalina, F. protzi, Limnocythere inopinata, Metacypris cordata, Pseudocandona hartwigii* and *P. pratensis*. Although our recent and subrecent material is of nearly the same age and of the same zoogeographical situation, the taxonomical composition of the ostracod faunas is completely different. The modern lakes in the Berlin area are dominated by *Cypria opthalmica* (more than 70% of all individuals), followed by *C. vidua*, which is one of the most common of all freshwater ostracods. *C. ophtalmica* is a species which is known to live even in very polluted lakes and indicates a lowering of oxygen concentration. This species is absent in Lichterfelder See. In contrast, *Metacypris cordata*, which dominates the Lichterfelder See faunal assemblage, could not be found in the modern lakes. However, Hartwig (1901) reported the occurrence of some few individuals in Grunewaldsee more than 100 years ago. Several candonid species characterise the Holocene sediments, while only the resistant species *Pseudocandona pratensis* is common today. We suggest that the different occurrence patterns of these faunas reflect alterations in water chemistry through time, especially through the last few decades.

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KLOEDENIA, BEYRICHIA, HELMDACHIA - THE HISTORY OF OSTRACODOLOGY IN BERLIN

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Keywords: Ostracod Research, 19th & 20th Century, Berlin, Brandenburg

Scientific research on both fossil and modern ostracods in Berlin and Brandenburg has a long tradition which can be traced back at least into the 19th century. At that time, well-known Paleozoic ostracod genera such as *Kloedenia* and *Beyrichia* were named after famous earth scientists born and living in Berlin (K.V. von Kloeden, 1786-1856 and H.E. Beyrich, 1815-1896). At the end of the 19th century it was Waldemar Hartwig (1851-1901), a former ornithologist, who studied in detail ostracod faunae in many postglacial freshwater lakes in Berlin and Brandenburg (cf. *Cypridopsis hartwigi* named by G.W. Müller in 1900). In the early 20th century the “Preussische Geologische Landesanstalt” at Berlin

published papers on Paleozoic ostracods (mainly by Egmont Kummerow), while Kurt Hucke from Templin worked on Cenozoic ostracods.
After World War II, ostracod research developed intensively at four different institutions due to the political division of the city. In the eastern part Lea Diebel, Kurt Diebel, Joachim Gründel and others worked on Meso- and Cenozoic ostracods at the "Zentrales Geologisches Institut", while at the "Museum für Naturkunde" Erika Pietrzeniuk became interested first in Jurassic and later in Eocene and Quaternary ostracods. However, owing to political suppression, publication of their results and contact to colleagues from the western world were often difficult or even impossible. In the western part of Berlin ostracod research took place at both universities. At the "Freie Universität" it was Friedrich-Franz Helmdach (1935-1994) who founded an ostracod research group at the "Institut für Paläontologie". His own work is linked to the stratigraphical position of the famous vertebrate locality Guimarota (Portugal) and other biostratigraphical studies in Spain and Morocco. Under his influence other workers such as Alexander Liebau, Wolf-Michael Rohr, Curt-Albert Schwietzer (biometrics of ostracods) and Jan-Jürgen Göttner (shell mineralogy) became interested in ostracods. In contrast, Dietmar Andres published some papers on ostracods from the Cambrian, probably influenced by K.-J. Müller from the "Technische Universität". Here, Heiner Bolz (1970ff.) published several papers on Triassic ostracods.
During "Perestroika," including the fall of the Berlin wall, Peter Luger, Wolfgang Mette and Holger Gebhardt worked on Mesozoic ostracods at the "Technische Universität". At that time, especially after the unexpected death of F.-F. Helmdach in 1994, Ulla and Michael Schudack (who introduced the genus *Helmdachia* in 1998) re-founded an ostracod research group at the "Freie Universität." Recently joined by Steffen Mischke, this group is still active today and shows a broad diversification of subjects (Recent, fossil, biogeography, paleoecology, biostratigraphy, climatology). In the last few years more than ten students have worked on ostracods for their degrees at this institute. The ostracod tradition at the "Museum für Naturkunde" was continued by I. Hinz-Schallreuter from 1995 to 1999, but has now ended.
Although the history of ostracod research in Berlin seems to be long and continuous at first sight, in fact all the work has been done independently. Obviously, the infrastructural framework of Berlin, with its museums, collections and other institutions, has led researchers to become fascinated again and again by the most wonderful animal group: ostracods.

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PALAEOENVIRONMENTAL RECONSTRUCTIONS OF THE QUATERNARY PADDENLUCH (BRANDENBURG, GERMANY) BASED ON FRESHWATER OSTRACODS

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Introduction

Freshwater ostracod faunal data are presented from a sedimentary succession of the Paddenluch (Brandenburg). Today, the Paddenluch is a boggy depression located on the Barnim Plateau, at the northern edge of the opencast pit Rüdersdorf (Brandenburg, E of Berlin). Geomorphologically, the narrow channel structure of the Paddenluch is a relict of the last glacial activity. Within this channel structure, a lake was established showing a changeful history during the Weichselian late-glacial (latest Pleistocene) until the Subatlantic (younger Holocene). Nowadays, the natural aggradation of the former lake is completed.

Material and Methods

Bulk samples were densely taken from each layer of the approx. 6 m thick section. Samples were screened for ostracods, but also for fossil remains of other organism groups to obtain additional information for a well-founded palaeoenvironmental reconstruction. Stratigraphic age determination is based on pollen analyses (Strahl 2005).

Results

Four former aggradation phases of the lake can be recognized within the succession, while each phase was followed by repeated water logging of the habitat. Nevertheless, the time period of the Boreal is lacking within the succession due to stagnant peat accumulation conditions. These different stages of development of the former lake are well-documented by the ostracod record of the Paddenluch section. According to Meisch (2000) and Frenzel and Viehberg (2005), the ostracod assemblages of the different layers are mainly characteristic for shallow and vegetation-rich freshwater lakes and small periodic bodies of water. Whereas the oldest ostracod assemblage (dominated by ilyocyprids) from the Meiendorf Interstadial indicate cold, floating waters, the younger assemblages (characterized by cypridids and candonids) show at first evidence for cold, stagnant water conditions and later a warming of the habitat from the Subboreal onwards.

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HOLOCENE FRESHWATER OSTRACODS FROM LAKE ASHENGI, NORTHERN ETHIOPIA

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Introduction

Although East African lakes have been the subject of intensive ostracod analyses (e.g. Martens 1993, 2003), previous studies have mainly focused on lakes of the great rift valleys of Ethiopia (e.g. Main Ethiopian Rift, Afar Rift), Kenya etc. To date, little information exists about the ostracod assemblages from Lake Ashengi, neither in the Recent nor in the fossil record. Lake Ashengi (12°30'N, 39°30'E) is located in the northern Ethiopian highlands, in a small enclosed basin at an altitude of ~2450 m a.s.l. Today, the lake has a surface area of approx. 14 km^2 and a maximum depth of 23 m. Fossil shorelines, cliffs, and beach terraces at different heights above the present lake-level indicate that the lake had been affected by enormous changes in water-level and water chemistry during the Late Quaternary.

Materials and Methods

Seven sedimentary sections, which are exposed around the Lake Ashengi, were intensely sampled for microfossil analyses of the ostracod fauna. The bulk samples were screened for ostracods and the valves were prepared for SEM examination. Beyond the palaeontological preparation methods, sedimentary analyses (e.g. X-ray diffraction, ICP-AES) were performed on the samples to determine mineralogical composition, clay minerals, and amount of organic matter, which provide additional information for palaeoenvironmental recontructions.

Additionally, the present environmental conditions of the lake, such as temperature, pH, conductivity, and alkalinity were measured directly in situ. Detailed studies on the fossil ostracods from Lake Ashengi will document the diversity of the various assemblages, and use their sensitivity to changing ecological conditions for palaeoenvironmental reconstructions.

Results

Composition and diversity of the ostracod assemblages may vary remarkably between the different strata, indicating changes in ecological conditions. However, overall diversity of ostracods is relatively low, the ostracod-bearing layers are mostly characterised by *Gomphocythere-Limnocythere* assemblages.

According to Cohen et al. (1983), such assemblage may be typical for a high-Ca^{2+}/high-alkalinity water chemistry. Our measurements have shown that water chemistry of the Recent Lake Ashengi is, in fact, characterized by an unusual high alkalinity (pH ≥ 9,2). Moreover, the occurrence of *Gomphocythere* in the samples is a further evidence for a wider ancient geographic distribution of this genus (comp. Martens 1993).

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PALAEOECOLOGICAL AND GEOCHEMICAL INVESTIGATIONS ON OSTRACODA OF LAKE KOUCHA (NE TIBETAN PLATEAU) - A LAKE HISTORY OF THE LAST 14 KA

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Ostracode species assemblages and shell chemistry of a Koucha lake sediment core show significant palaeoenvironmental changes during the latest Pleistocene and Holocene. Prior to 14 ka BP Lake Koucha probably represented a dynamic, oligohaline and oligotrophic aquatic environment indicated by specimens of *Leucocythere mirabilis*, which were embedded in reworked semi-lacustrine fluvial sediments. Between 14 ka BP and ~6700 a BP lake water, reconstructed from mutual salinity tolerance ranges of *Limnocythere inopinata, Eucypris inflata, Sarscypridopsis aculeata* and *Ilyocypris* aff. *bradyi*, was alternating oligohaline to euhaline (and possibly eutrophic) and correlates well with maximal molar ratios of Sr/Ca and Mg/Ca, reflecting also higher salinity accompanied by higher water temperatures.

Therefore it is assumed that warm winds were intensified above the plateau causing an increase in lake surface evaporation within this time period. From ~6700 y BP to present ostracode assemblages are dominated by *Fabaeformiscandona danielopoli, Candona candida, Pseudocandona sp*. and *Ilyocypris echinata*. Salinity (mutual ostracode ranges and Sr/Ca) and water temperatures (Mg/Ca) are lowest most possible due to an increase of monsoonal summer precipitation causing also higher lake levels than before ~6700 y BP. The Holocene Climate Optimum is probably reflected not by highest lake levels but by warmest lake temperatures, which occur between ~6000 and ~9000 y BP and coincide with strong summer insolation.

OSTRACODES AND PALEOLIMNOLOGY - EXAMPLES FROM BALKAN PENINSULA

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Keywords: Paleolimnology, Phanerozoic, Balkan Peninsula Examples

A succession of lacustrine sediments commences in the Carboniferous and terminates in the Holocene. By type, the lakes of the Balkan Peninsula differ from one another. The most thoroughly studied deposits there are Neogene sediments of Balkan Land and Middle Danube Plain, for which a number of paleogeographic maps have been made, mainly based on ostracode proxies.

Late Paleozoic: Upper Carboniferous and Early Permian lakes (Vozarova et al. 2004), were formed in intermontane depressions and contain some coal. The sediments of Westfal C, 150 m thick, lack ostracodes because the real lacustrine phase was replaced by fine-grained pyroclastics of the «tuff» turbidite type.
Another lake, during Stefan B+C, has 270 m thick lacustrine deposits, and after a swampy phase the lake was filled up with alluvial sediments. In the arid conditions and warm climate of the Lower Permian the temporary lakes, usually occuring on alluvial plains, were of the sabkha/playa type: the alluvial plain with its meandering rivers and small lakes was an environment in which red Permian sandstone was deposited.

Mesozoic and Paleogene: Lower Triassic continental facies exclusively belong to riverine sediments deposited under arid and semiarid conditions during stormy rainfall. These overlie the Permian discordantly at an angle lower than 12 degrees. A rich collection of ostracodes originates from the Rhaetian stage (Urošević 1979). The uppermost part of Rhaetian is regressive due to an uplifting of Carpathian-Balkan mountains, and the lakes, accumulating in some depressions and populated by Darwinulids and freshwater mollusks, soon became transgressed by the sea. After the Triassic the peneplainised surface was covered by very shallow sea, between ankle and knee deep. In places, small islands united into archipelagos housing bauxite accumulations, corroborated for the Kimmerigian, Barremian, Albian, and Middle Eocene. The environment there was brackish, not lacustrine (Radojičić 1982 etc.).

Neogene: A few lacustrine phases are separated from each other in space and time. The best studied are those within the Miocene: collapse (volcanic) lakes, karst subtropical (Krstić et al. 2003), mero-mictic (with designated position of the thermocline), and caspibrackish sea-lakes. During the Pliocene and Pleistocene there were stagnant-arid lakes and those having outflow. They differ depending on the wide rift part of the Pannonian suprabasin in which they were deposited. The smallest paleolimnologic units are little, late Pleistocene-to-early Holocene lakes in substructural depressions (Menković et al. 2004), and some oxbow lake remnants.

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MID-PLEISTOCENE OSTRACODES OF SREM AND MAČVA

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Keywords: Lacustrine Paleogeography, Southern Middle-Danube Plain, Pleistocene

In the frame of mapping the BGM 1:100,000 of SFR Yugoslavia, sheets of Voivodina, ostracodes were the main fossils for age determination, whereas molluscs can only indicate some ecological aspects. The environment here was reconstructed by means of ostracodes, indicating also the lake depth. A paleogeographic map of entire Voivodina during the Pleistocene, like this one of Srem and Mačva, was presented on a poster in Nica (Krtstić et al. 2004). The Mid-Pleistocene in Srem lies close to the surface. Most data were obtained from shallow drillings made for the construction of the New Belgrade suburb - on the river Sava alluvial plain. Westwards, the data got scantier, being restricted to the BGM material. In Mačva, which occupies a quarter of the lowland to the south of Frushka Gora Horst, only few drillings yielded ostracodes. In general, the toe of Frushka Gora mountain is made of the Srem Formation, a continental reddish silt having only extremely rare mammal teeth. Such a large southward washing is not explainable, having no parities north of Frushka Gora. A real lacustrine environment, housing *Candona weltneri, Neglecandona paionica, N. banatica, Ilyocypris sokači, I. monstrifica,* sometimes *Cytherisa lacustris*, and often rheophile *Scottia browniana,* extends along Mid-Srem as an irregular belt.

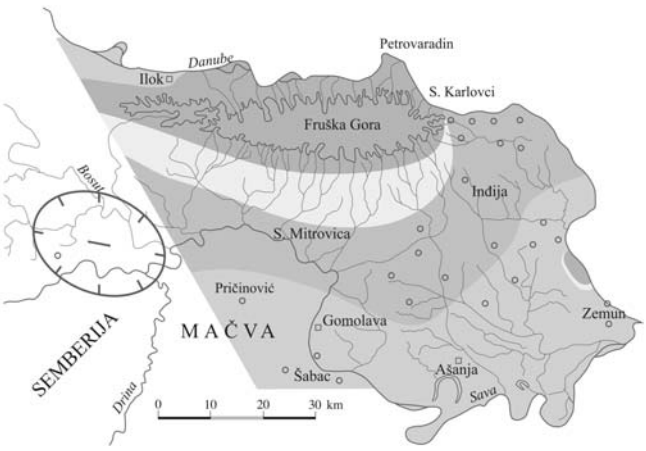

Fig. 1: Fossiliferous Middle Pleistocene sites used for the reconstruction of lacustrine environments. **Dark:** bedrock - **less dark:** lacustrine - **gray:** shallow lake - **light gray:** downwash from the mountain - **circles:** drillings - **squares:** pits (digging for houses etc.)

The shallow part of the lake covers the belt along Sava river and widens along the Danube where the island of Kapela rises out of the lake. There*, Pseudocandona compressa, P. pratensis, Cyclocypris serena, Eucandona balatonica, Laevicypris laevis ducatensis, Limnocythere inopinata pleistocenica, Cyclocypris globosa, Cypridopsis vidua* corroborate that this shallow part of the lake sometimes desiccated. There are, in places, species dwelling in streams and seepages like *Potamocypris pallida, P. villosa, Eucypris pigra,* possibly transported to the lake or indicating some springs on the lake coast. In both depth belts *Typhlocypris eremita, Cryptocandona kieferi, Pannoncandona szöszi* were collected, which live in underground water today. Environments change along the borehole columns from deeper to more shallow environments. Therefore the boundaries between belts are tentative.

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OSTRACODS AS INDICATORS OF PALAEOENVIRONMENTAL CHANGES OF THE SOUTHERN BALTIC DURING THE LATE GLACIAL AND THE HOLOCENE

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Keywords: Ostracods, Southern Baltic, Late Glacial, Holocene

This paper presents the results of the recent investigations on the changes of the paleoclimate as reflected by the composition of the fauna communities in the Quaternary bottom sediments. The investigated area was the coastal lying in the Polish Exclusive Economic Zone of the Baltic Sea. The ostracod analysis was carried out on the basis of the samples taken from 21 cores of the bottom sediments. The otained results show the changes of the palaeoclimate as reflected by the composition of the ostracod communities in the Late Glacial and Holocene bottom sediments. The results of the other previous lithological, seismoacoustical, petrographical researches and radiocarbon dating suggested, that the age of the sediments originated from western part (Pomeranian Bay), the middle part of coast and the eastern part (Gulf of Gdansk) area had been Late Glacial and Holocene ones (Uścinowicz 1999, Kramarska 1998, Krzymińska, Przezdziecki 2001, Krzymińska et al. 2003, Krzymińska et al. submitt, Przezdziecki 2004).

The results of the present micropaleontological analysis of ostracod groups suggest that the investigated sediments (clays, silts, silty sands) were deposited in lakes during Preboreal and Boreal periods. Two ostracod assemblages were distinguished from the Late Glacial deposits. One of them is the association with *Cytherissa lacustris* and *Limnocythere sanctipatricii* and points to an oligotrophic character of the lake. In the process of the further changes caused by climate in the Late Glacial the lake became an eutrophic one. The typical taxa of this period are: *Candona angulata, Candona candida, Candona neglecta*, *Cypridopsis vidua, Darwinula stevensoni, Limnocythere inopinata, Ilyocypris lacustris, Herpetocypris reptans.* This is the set of cold-adapted ostracods. This type of association may suggest that the existed water reservoir was a shallow one. Reservoirs situated on the present day Coastal zone of Baltic Sea were formed in the Late Glacial period.

During the Early Holocene, besides species characteristic for cold freshwater, also freshwater species of ostracods occurred, which needed higher temperature (*Candona compressa, Candona weltneri,* and *Metacypris cordata*). It points out the warming of the climate in Preboreal period. Lake sediments mentioned above were partly destroyed and covered by marine sands during Middle Holocene transgression of the sea. Good indicators of transition from freshwater to marine environment are appearing marine species, such as: *Cyprideis torosa, Cytheromorpha fuscata, Loxoconcha elliptica* and *Semicytherura nigrescens.*

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SPECIES DIVERSITY OF MARINE OSTRACODA COLLECTED FROM NORTHERN COASTS OF MARMARA SEA (TURKEY) AND THEIR COMPARISON WITH OTHER SIMILAR SPECIES IN THE BLACK, MEDITERRANEAN AND AEGEAN SEAS

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Keywords: Ostracoda, Marmara, Mediterranean, Aegean, Species Diversity

Introduction

The Sea of Marmara is a small (size ~ 70 x 250 km) intercontinental basin connecting the Black Sea and the Mediterranean Sea. The oceanographic features (chemical, biological) of the basin are influenced by the Black Sea and the Aegean Sea via the Bosphorus Strait and the Dardanelles, respectively. The Marmara Sea is now the recipient of a large number of wastewater discharges from land-based sources. Pollution loading from Istanbul alone, the biggest city of Turkey in population and industry, makes up the major portion (40-65%) of the total anthropogenic discharges (Tuğrul and Polat, 1995). The aim of this study is to determinate the ostracoda fauna of the Northern coasts of Marmara Sea which is geographically exceptional and under a serious threat of pollution (especially from northern coasts). Also the species compositions were evaluated (Makra and Nicolaidou 2000) and resulting data were compared to the similar species from surrounding seas effecting the Marmara Sea.

Material and Methods

Samples were taken with a hand net made of Muller fabric from the mediolittoral zone sweeping the bottom twice in an area of 3 m^2 approximately. Materials were identified. under a stereo microscope. Primary ecological parameters were measured in the field using a WTW measurement apparatus. Results gained from Spermann correlation (SPSS software) were used.

Results

This study was carried out along the coasts of North Marmara Sea in 1999 October and November and 2000 February and May from 23 stations. Surface water temperature in October is 17 ºC, in November it drops to 12-14 ºC and 7-8 ºC in February, in May warming to 15 ºC. Surface salinity values are between 19,7 ‰ and 23,3 ‰ the lowest measurement was recorded for station 12 and all other stations were recorded around 22 ‰. Surface dissolved oxygen values for October and November are between 5,9-9,9 mg/l. In February its between 8,6-10,4 mg/l and in May 11,2 mg/l. A total of 33 species belonging to 16 genera were described from the northern coasts of Marmara Sea. 8 species: *Cyprideis torosa, Acanthocythereis hystrix*, *Costa edwardsii*, *Aurila convexa*, *Urocythereis britannica*, *Loxoconcha rhomboidea*, *Paracytheridea parallia*, *Xestoleberis communis* were dominant. Occurrence of dominant species of ostracoda in the Northern coast of Marmara Sea appears to be positively correlated to temperature ($r_s = 0,585$, $p < 0,05$) rather than other ecological variables. In this study station 12 has been found in azoic zone with an average diversity of H = 1,35 and average evenness of J=0,67. Stations 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23 are in the highly polluted zone. These stations are characterised with a very low average diversity ($1,63 \leq H \leq 2,83$) and average evenness ($0,69 \leq J \leq 0,97$). Remaining stations 9 and 21 are in the moderately polluted zone, average diversity for these stations are still low but higher than previous zone ($3,28 \leq H \leq 3,29$) with a higher average evenness ($0,86 \leq J \leq 0,88$) and a higher species richness ($6 \leq S \leq 15$).

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THE LIFE CYCLE AND ONTOGENY OF *HETEROCYPRIS SALINA* (BRADY 1868) OSTRACODA (CRUSTACEA)

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Keywords: Life Cycle, Ontogeny, Ostracoda

Introduction

Recent studies on the development stages of various Ostracoda species pointed out the difference between the prenauplius and larval stages and sexual maturation time (Smith 2000). Additional experiments on *Xestoleberis hanaii* by Ikeya and Kato (2000) also revealed the development time of different stages. In this study, cultures of *Heterocypris salina* were reared in laboratory conditions in a freshwater medium. Development times and larval stages (ontogeny) of this species were observed. Dates of each individual placed in observation wells, numbers of released eggs, dead specimens at hatching stage and adults were correlated during the experiment.

Material and Methods

Experiments were carried out between 14.09.2001 and 08.04.2002 by using 24 well tissue culture plates with an average temperature of 23˚C in natural daylight (between these dates). Each female individual with 0.9-1.1 mm length was placed in a different well. The numbers of eggs and hatching individuals were counted every day and dead specimens were removed from each well. Soft body parts of removed specimens were mounted using polyvinyl lactophenol.

Whenever the last dead specimen was removed, a new single adult individual was introduced after cleaning the well. Filtered fresh water from the main culture was added to each well every day, and the specimens were not fed additionally. Results were compared using Spermann correlation.

Results

During the experiments 299 adult females were placed in wells, 106 of them ovulated and 637 eggs were released. While 22% of the eggs did not reach the hatching stage, the remaining 78% reached the hatching stage. A number of hatching larvae died in various instars, only 6% of them became adult, and 20% of these adults released eggs. The highest rate of death with 116 individuals was recorded while the specimens were 0.2 mm long. Valve lengths belonging to 8 instars are measured as follows: A8=0.1 mm; A7=0.15 mm; A6=0.2 mm; A5=0.25 mm; A4=0.3 mm; A3=0.4 mm; A2=0.5 mm; A1=0.6 mm; adult > 0.7.

Duration time (days) of instars were based on eggs released by 106 adults. The mean duration times for each length (mm) were recorded as follows: 2.45 days for 0.1 mm; 3.96 days for 0.15 mm; 5.84 days for 0.2 mm; 5.02 days for 0.25 mm; 7.39 days for 0.3 mm; 10.97 days for 0.4 mm; 9.32 days for 0.5 mm; 11.89 days for 0.6 mm; 9.36 days for 0.7 mm; 14.52 days for 0.8 mm; 8 days for 0.9 mm. Mean duration for the hatched individual to reach a length of 1 mm was 88.72 days, and a maximum lifespan of 113 days was recorded.

Analysis of the data with Spermann correlation revealed a positive correlation between the dates of each individual placed in observation wells and the number of released eggs ($r_s = 0.206$, $p < 0.05$) and the number of dead specimens at hatching stage ($r_s = 0.45$, $p < 0.05$) and the adults ($r_s = 0.578$, $p < 0.05$). Individuals observed between September 2001 and April 2002 also showed a proportional increase in reproduction capacity and successive maturation with longer daylight periods.

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ECOLOGICAL REQUIREMENTS OF OSTRACODA (CRUSTACEA) AND CONSERVATIONSTATUS OF A SHALLOW EUTROPHIC LAKE YENIÇAĞA (BOLU, TURKEY)

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Keywords: Ostracoda, Tolerance, Optimum Estimates, CCA, Conservation, Eutrophication

The area of Lake Yeniçağa is one of the potential candidates for the RAMSAR convention; however, anthropogenic factors reduce its biological diversity. This is mostly due to nutrient rich water released from both point and nonpoint sources. 13 ostracod taxa (*Candona neglecta*, *C. candida*, *Ilyocypris bradyi, Darwinula stevensoni*, *Cypridopsis vidua*, *Physocypria kraepelini*, *Cypria ophthalmica*, *Prionocypris zenkeri*, *Eucypris virens*, *Herpetocypris reptans, Pseudocandona compressa*, *Fabaeformiscandona fabaeformis* and *Potamocypris* cf. *fulva*) were found during this study. *Potamocypris* cf. *fulva* is a new record for the Turkish freshwater ostracod fauna. The first nine species have a wide distributional area, implying high tolerance levels to different environmental variables. On the basis of the estimated species optima and tolerance levels, two species (*C. neglecta* and *D. stevensoni*) showed a higher effective number of occurrences: 19.23 and 11.31, respectively. Three species (*C. neglecta, D. stevensoni* and *I. bradyi*) did not show significant correlation with any of environmental variables used. Both canonical correspondence (CCA) and Pearson correlation analyses showed that temperature was the most effective variable followed by electrical conductivity and redox potential on species occurrence, whereas pH and dissolved oxygen of water were the least effective. Overall, about 71 % of the correlation between species and environmental variables was explained by the first axis of CCA diagram with relatively low (7.7 %) cumulative variance of species. The lower (560 µg/L) and the upper (2030 µg/L) levels of ammonia (NH_3) exceeded the limits during the winter season. The levels of total coliform bacteria varied from $10x10^3$ cfu/ml to $10x10^7$ cfu/ml while lower and upper levels of *Escherichia coli* bacteria were calculated as 33 cfu/ml and $10x10^3$ cfu/ml, respectively. Results of physico-chemical measurements, microbiological counts, and species data indicate that the water quality of Lake Yeniçağa has deteriorated rapidly owing to anthropogenic factors that are the main threat not only to the lake's aquatic diversity but also to human health around the lake.

FROM SEX TO ASEX: MICROSATELLITE DEVELOPMENT IN NON-MARINE OSTRACODS

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Keywords: Asexual Reproduction, Ostracods, Microsatellites

Introduction

The paradox of sex is one of the most debated topics in evolutionary biology. In particular, strategies involving asexual reproduction are not well understood. *Eucypris virens* is a non-marine ostracod species, belonging to the family Cyprididae. Both sexual and asexual reproduction exists in this species, but whereas asexual lineages occur throughout Europe, sexuals are only found around the Mediterranean. Mixed populations of males and of sexual and asexual females occur. Although there is abundant basic knowledge about systematics, life history and ecology of ostracods in general and on this species in particular, only few genetic markers are available for this arthropod group.

Material and Methods

At the Sheffield Molecular Genetics Facility we have started developing microsatellite markers in *Eucypris virens* by a classical enrichment procedure developed at the SMGF.

Results

To date, we have obtained 17 different microsatellites. Prelimimary results on estimates of intra-specific variability from these microsatellites will be presented. They will subsequently be used for the identification of different clones and haplotypes, their reproductive modes, gender, ploidy levels and estimates of the age of clonal lineages. The obtained set of PCR primers for microsatellites will be the basic tool for an integrative approach within our multidisciplinary network.

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LATE MIOCENE LAKE DEVELOPMENT IN THE CINIGIANO-BACCINELLO BASIN (TUSCANY, CENTRAL ITALY) INFERRED FROM OSTRACOD ASSEMBLAGES

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Keywords: Brackish and Freshwater Ostracods, Late Miocene, Central Italy, Palaeoenvironmental Analyses, Multivariate Analyses.

The Baccinello-Cinigiano Basin is a post-collisional continental basin developed to the east of the Mid Tuscan Ridge, a structural high that, during the Late Miocene, divided the western basins affected by marine incursions from eastern basins in which terrestrial environments persisted. Several sedimentological and biochronological studies constrained the deposition of a 500 m thick, mostly terrigenous succession to the Middle Tortonian-Messinian and a palaeoenvironmental evolution from palustrine to lacustrine environment (Tortonian) to alluvial and again to fluvio-lacustrine conditions (Messinian) (Benvenuti et al. 1994, Benvenuti et al. 2001).

This paper reports the results of the palaeoecological analysis of fossil ostracod communities recovered in the Tortonian and Messinian deposits, carried out using UPGMA, Pco and DCA multivariate analyses. On the basis of the DCA analysis carried out on all samples it is possible to recognize several salinity variations of the basin water-bodies. Lacustrine environments from the Tortonian are characterised by salinities corresponding to the oligo-mesohaline range. The salinity of the lake water during this stage is related to the dissolution of the Triassic evaporites buried at shallow depths below the basin. Most of the Messinian fluvio-lacustrine assemblages, on the contrary, are not influenced by the dissolution of the Triassic evaporites mirroring a freshwater environment. The youngest samples, on the contrary, show a return to brackish conditions.

The DCA analysis carried out dividing the brackish assemblages from the freshwater ones gave more information about other palaeoecological parameters. In particular the brackish Tortonian lake was less deep and more salty than the Messinian one; the Messinian fluvio-lacustrine environment was probably homogeneous both in salinity and in depth, but shows a variation in the water flow and temperature. These results are in agreement with the palaeoenvironmental evolution inferred from sedimentology, adding new information on the variability of several ecological parameters such as depth, salinity, water temperature and water flow.

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HOW TO BE A GEOLOGICALLY PERSISTENT OSTRACODE: A QUANTITATIVE PERSPECTIVE

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The prolonged persistence of taxa in the fossil record is interesting because persistence is contrary to evolution, which implies pervasive change. Longevity has been explored as extinction probabilities, selectivity and risk. Taxa with wider geographic ranges seem to have lower extinction risks, at least during “background times” (Jablonski 1986). Species with less specialized feeding strategies also appear to have longer fossil durations (Baumiller 1993). The complexity of morphologies has also been suggested as a correlate of longevity (Flessa et al. 1975), as has been the degree of deviation from a general morphology (Liow 2004).

In this presentation, I compare longevities of genera of the family Trachyleberididae s.l. with their morphologies. The basic idea is that genera that are longer-lived should be morphologically more average than expected when compared with short-lived genera because a “jack-of-all-trades” may better cope with environmental perturbations. This is in contrast to some ideas about extremely long-lived taxa or “living fossils” that are thought to be special or exceptional (Parsons 1994).

I approximated genus longevities by compiling their species stratigraphic durations from the literature. I formed a discrete character matrix for genera from primary descriptions of taxa and used this multivariate data as well as outline data to summarize genus morphologies.

I found that the deviations in morphology from the group mean of long-lived trachyleberidid genera, are not significantly different from that of shorter-lived ones. This is despite the observation that longer-lived taxa often appear to plot rather close to an average morphology in a morphology-duration plot, while the shorter-lived taxa span a wider range of morphologies.

However, I did find that contemporaneous subsets of long-lived trachyleberidids are often more deviant in discrete morphology than short-lived ones living during the same time interval, especially in external morphology, than expected by chance alone. I discuss the possible significance of these findings.

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PALAEOBIOGEOGRAPHY OF APTIAN THROUGH EARLY PALEOCENE OSTRACODA IN NORTH TO EQUATORIAL AFRICA AND ARABIA/IRAN

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Key words: Palaeobiogeography, Cretaceous, Marine Ostracoda, Africa, Arabia

In the course of a study on marine Ostracoda from the Cretaceous of N-Somalia, an abrupt change of the faunal affinities between the Aptian through Cenomanian and Campanian through Early Paleocene of N-Africa/Levantine and E-Arabia/Iran/Somalia has been obser-ved; similar to what has been discussed by Babinot AND Bourdillon de Grissac (1989). Therefore about 1270 marine ostracod species of Aptian to Early Paleocene age from Central, West, North and East Africa as well as the Arabian Peninsula published and docu-mented until 2003 have been examined on their spatial and stratigraphical distribution. The palaeobiogeographical relations have been quantified based on the Jaccard-Index. The results of these comparative studies resulted in nine geographic maps for each stage (Aptian through Early Paleocene). The major results are the recognition of an increasingly uniform pan "South Tethyan Ostracod Province" (N and NE Africa and Arabian Peninsula) from the Aptian until the Cenomanian (Fig. 1 left side). Due to the emergence of major parts of the Arabian Shield during the Turonian, this pan-south Tethyan bioprovince was split into a western " *Protobun-tonia numidica* Ostracod Province" (N Africa and western Middle East) and an eastern "*Kaes-leria* Ostracod Province" (E Arabia, S Iran, Somalia) since the Coniacian (Fig. 1 right side). While the proliferation of the phylogenetic lines of the ostracod genera and species of the "South Tethyan Ostracod Province" towards the *Protobuntonia numidica* faunas into the Turonian-Coniacian was continuous, the newly developing genera and species of the *Proto-buntonia numidica* and the *Kaesleria* province of the "Senonian"-Early Paleocene had almost nothing in common.(Luger, 2003) Although most of Northeast Africa and the Arabian Shield underwent strong subsidence during the Campanian/ Maastrichtian combined with a widespread transgession, these strictly separated bioprovinces did not re-unite or show clear faunal interrelationships during these times. The reasons for these phenomena are probably largely to be sought in the palaeoecological reasons, however, the strict separation of these ostracod assemblages along a narrow N/S directed borderline running from NE Saudi Arabia across Jordan into Syria is thought to be highly unusual and to require further investigations.

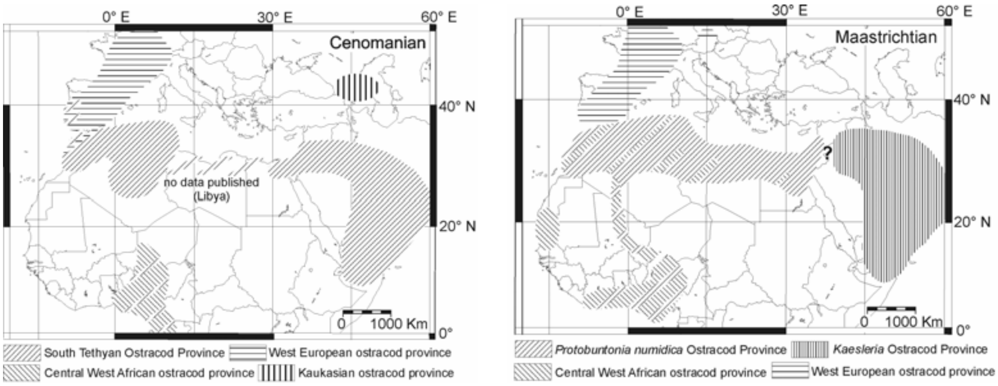

Fig. 1: Palaeogeographic distribution of some marine ostracod bio-provinces in Cenomanian and Maastrichtian times.

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SOME UPPER ALBIAN TO LOWER CENOMANIAN OSTRACODS FROM THE HONOOJ SECTION, WEST OF KERMAN (IRAN)

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Keywords: Cretaceous, Iran, Foraminifera, Ostracoda, Albian, Cenomanian, Kerman, Paleoecology, Tethys Sea

Introduction

Traditionally, biostratigraphical and paleoecological analysis of shallow shelf sediments in the Cretaceous of the Middle-East has relied almost entirely on the examination of foraminifera. However, the advantages of using ostracods are that they are numerous, morphologically diverse, often short ranging and easily recognizable. They are also sensitive to environmental factors, therefore they are among the best tools for analyzing the paleoenvironments (Puri 1971). Nevertheless, they are, like foraminifera, highly facies-controlled and, moreover, are not identifiable in thin section, so their biostratigraphic value can be diminished by the control of facies and palaeoenvironmental conditions. The use of ostracods as biostratigraphical indices in the Middle-East has been recognized by some workers (eg. Sayyab 1956, Colin and El-Dakkak 1975, Bismuth et al. 1981). In Iran, Grosdidier (1973) published a detailed illustrated manual of Cretaceous species from the coastal Fars region. This is by far the most comprehensive account of the faunas to date as it covers the entire Cretaceous interval. Unfortunately, since then no serious attempt has been made to identify and illustrate the Cretaceous ostracods in Iran.

This paper deals with some mid Cretaceous ostracods in the west of Kerman city and tries to introduce some ostracods and determine their paleoecological environment.

Material and Methods

In the studied area, we found an assemblage in green marls that are bounded at the base by an unconformity and at the top by Upper Cretaceous limestone. The samples have been collected from these green marls and washed through the sieves of 60 Ø, 80 Ø and 100 Ø. Ostracods were picked and identified from material collected from sediment traps deployed at the measured section in the west of Kerman. The ostracods in most of the samples are well preserved.

Results

As mentioned before, Honooj Marls contain a relatively diverse assemblage of ostracods, among which *Cytherella* spp. and *Pontocyprella* spp. are the most dominant elements. The presence and dominance of both platycopid and podocopid ostracods suggest an oxygenated environment during the deposition of the Honooj Marls, because in dysaerobic conditions only platycopid ostracods survive (Whatley 1991). Although of the two most living platycopid genera, *Cytherella* has been recorded commonly in bathyal and abyssal environments (Whatley 1983, Whatley and Coles 1987), on the other hand *Cytherelloidea* is thermophylic and is not found, even in low latitudes, at anywhere but shallow depths. Therefore the occurrence of different species of *Cytherelloidea* is clear evidence to conclude that a shallow and warm environment prevailed during the deposition of the strata. Huckried et al. (1962) studied the green marls and assigned them to a Cenomanian age. Dimitrijevic et al. (1973) considered them as Upper Cenomanian. However, the ostracod assemblages are nearly similar to those reported from Upper Albian and Varconian of Cameroon (Lambert 1987), although some of them are illustrated from Albian and Cenomanian of some parts of Iran as well (Grosdidier 1973). Ostracod associations, in conjunction with benthic Foraminifera, lime secreting algae, pelecypods and echinids, led us to assign Honooj Marls to an Upper Albian to Lower Cenomanian age.

Faunal similarities are very strong during mid-Cretaceous times (Albian-Cenomanian), partly because there is more information available for this interval and partly because of strong paleogeographic ties at this time (Athersuch 1994). Therefore, these ostracods can also be used as excellent index species for the correlation of Cenomanian age formations in the south of Iran, southeastern Iraq, Kuwait, the eastern coast of Saudi Arabia, Palestine, the northern part of Tunisia and Algeria. During the Cenomanian, the Tethys Sea covered all these areas where shallow to more deep water sediments were deposited containing the same fauna (Abdul-Razzaq and Grosdidier 1982). This indicates the existence of similar environmental conditions and the ability of these faunas to be distributed throughout the south shelf of the Tethys Sea.

ON THE PALEOLIMNOLOGY AND GEOCHEMISTRY OF OSTRACOD REMAINS IN THE SEDIMENTS OF COASTAL SHALLOW LAKE ALBUFERA DE VALÈNCIA (EASTERN IBERIAN PENINSULA)

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Keywords: Ostracoda, Paleolimnology, Geochemistry, Environmental Change, Lake Albufera de València, Spain

The Albufera Natural Park, with an area of 21,000 ha, embraces one of the largest coastal lagoons along the Spanish Mediterranean coast, the Albufera of València. It is now an oligohaline lagoon of c. 3000 ha, which is the historically reduced rest of a larger and more brackish water body. An 8.5 m sediment core was taken from a point in the marshland corresponding to the shore of the lake in the past, which represents the whole Holocene sequence (^{14}C dating of 6600 yr. BP at 5 m core depth). This core has been analysed in a multi-proxy approach. We focus here on the results derived from the study of ostracod remains, including the relative abundance of different species, such as the geochemical (trace elements and isotopes) analyses of shells of the euryhaline species *Cyprideis torosa*.

Cyprideis torosa is the dominant ostracod species throughout the sedimentary record of Albufera lagoon and is present in nearly all the 65 levels analysed. In most samples, together with *C. torosa*, *Loxoconcha elliptica* appears as the second most abundant and common species. These two species are nowadays commonly found together in permanent brackish waters of coastal Mediterranean Iberian wetlands, but *C. torosa* is most widely distributed and more tolerant to different salinities, from freshwater to hypersaline environments. Other common species in the core are *Aurila* sp., *Cypridopsis vidua* and *Candona angulata*. The first is usually restricted to marine waters, whilst the last two species are related to continental waters, particularly permanent freshwaters in the case of *C. vidua*. The bottom 0.5 m of the sequence are very rich in well preserved *C. torosa* shells, indicating a low energy brackish environment. From 8 m to 5.5 m the ostracod density is very low and dominated by brackish species, with punctual presence of freshwater species at the top of this interval. Between 5.5 and 3.5 m deep, the ostracod remains are either absent or very rare. From here to 1 m deep, the core is rich in ostracod shells, particularly of brackish species, but also well preserved valves of freshwater species are common here, and dominant from 1 to 0.5 m (the top 0. 5 m of sediments are excluded from the analysis because they were most probably deposited by human activities). These results are mostly consistent with the salinity changes inferred from the analyses of Sr/Ca, Mg/Ca and $^{18}O/^{16}O$ ratios in the shells of *C. torosa*. However both ostracod paleoecology and geochemical analyses show wide intrasample variability, which could be related to rapid mixing of marine and continental waters, sea level changes and taphonomic processes such as reworking of shells of marine origin.

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FROM SEX TO ASEX: A CASE STUDY ON INTERACTIONS BETWEEN SEXUAL AND ASEXUAL REPRODUCTION

(SEXASEX – contract nr. MCRTN-CT-2004-512492).

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Background

The paradox of sex remains the queen of problems in evolutionary biology. Sexual reproduction is widespread throughout the animal and plant kingdoms, but under certain conditions remains costly compared to asexual reproduction. Sex creates a wide variety of genotypes on which natural selection can act, but it also breaks up favourable gene combinations. On the other hand, asexuals have the ability to preserve their genome and to propagate genotypes that have a previous history of success. In addition, asexuals can reproduce twice as fast as sexuals, because all, rather than half, of their offspring are themselves capable of reproduction.

Although asexual reproduction offers several clear short-term advantages, ruling evolutionary theory dictates that the absence of a mechanism for rapid genetic change will direct clones persisting over long time frames into evolutionary dead ends. Several animal and plant groups nevertheless show a large incidence of asexual reproduction and some lineages might have been fully asexual for many millions of years.

Overall approach

The SEXASEX network will use the non-marine ostracod *Eucypris virens* to address the following fundamental questions:

how are gender and reproductive mode determined in non-marine ostracods? What is the mechanism of asexual egg production? What are the roles of hybridisation and polyploidy?

are the predicted (long-term) effects of reproductive mode on genetic structure and genomic features identifiable, or, if not, can special mechanisms that counter them be identified?

can asexual lineages only persist over longer timeframes through close connection with sexual roots?

what is the genetic cohesiveness of this species, which consists of a cluster of sexual and asexual lineages?

how can both types of reproductive modes persist sympatrically? Is there ecological cohesion or spatial and temporal segregation between sexual and asexual females? Are there selective advantages of either reproductive mode in different ecological conditions?

how important was historical contingency in the formation of present-day spatial patterns of sexuality and asexuality within this species, and of the distribution of clonal diversity?

The partners

Partner 1:	Isa Schön, Royal Belgian Institute of Natural Sciences, Belgium Associated partner: Claude Meisch, Luxembourg
Partner 2:	Roger Butlin, The University of Sheffield, UK Associated partner: Dave Horne, UK
Partner 3:	Giampaolo Rossetti, Università di Parma, Italy
Partner 4:	Yannis Michalakis, UMR CNRS-IRD, France
Partner 5:	Jukka Jokela, EAWAG, Switserland
Partner 6:	Tadeusz Namiotko, University of Gdansk, Poland
Partner 7:	Francesc Mezquita, Univ. Valencia, Spain
Partner 8:	Stefan Mueller and Renate Matzke-Karasz, Ludwig Maximilians Universität München, Germany
Partner 9:	Jan Zima, Institute of Vertebrate Biology, Czech Republic

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BIOGEOGRAPHY AND PHYLOGEOGRAPHY OF NONMARINE OSTRACODA (CRUSTACEA)

(Plenary lecture)

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Nonmarine Ostracoda abound in a great range of environments: streams, rivers, ponds, lakes, springs, caves, aquifers, even terrestrial habitats. Furthermore, ostracods have different reproductive and dispersal strategies. For example, parthenogenesis and resting eggs are common in Cyprididae, of which many inhabit temporary waterbodies, while Timiriaseviinae, which are sexual and have brood care, are mostly confined to permanent waters. In spite of these contrasts both groups have achieved global intercontinental distribution. We use parsimony and distance analyses to reconstruct phylogeographical histories based on the present-day distribution of about 180 non-marine ostracod genera. The resulting trees are used to test alternative continental drift scenarios and to explain modern distribution patterns. They indicate that connectivity between continents has been very different in the two hemispheres, with northern hemisphere continents showing well-supported branching, while southern hemisphere continents appear to have parted in a simultaneous burst, consistent with some scenarios for the Mesozoic break-up of Pangaea. On a regional scale, present day European distribution of haplotypes (as determined by COI and ITS sequences) in the species *Eucypris virens* shows a clear pattern of geographic parthenogenesis, with sexual lineages confined to circum-Mediterranean localities. Phylogenetic methods (Maximum Parsimony, Distance, Maximum likelihood) as well as Nested Clade Analysis (NCA) are used to reconstruct the dispersal history of these haplotypes. Post-glacial recolonisation cannot explain fully the present-day distribution of haplotypes and reproductive modes. This weakens the historical explanation for geographic parthenogenesis in this group and opens avenues to test for novel hypotheses, such as the Holocene Stability Hypothesis.

OSTRACOD SPERMATOLOGY - DOES IT NEED TO BE REVIVED AGAIN?

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Keywords: Cypridoidean Ostracods, Spermatology, Giant Sperm, Sperm-egg Interactions

Introduction

The giant spermatozoa of cypridoidean ostracods became objects of scientific interest in the middle of the nineteenth century, when Zenker started to use sperm morphology in ostracod taxonomy (Zenker, 1854). Stuhlmann (1886), G.W. Müller (1889), Retzius (1909), and Schmalz (1912) provided basic research on morphology. Then, after a break of more than 20 years, spermatology was brought up again by Lowndes (1935: motility) and Bauer (1940: histology and karyology). The next revival took place in 1960s, when several authors provided TEM and SEM studies of the sperm's organelles and their development during spermatogenesis (e.g. Tétart 1967, Zissler 1970, Reger and Florendo 1969). The so far last paper on ostracod sperm was the detailed work on sperm morphology by Wingstrand ('88). Ever since, the field of spermatology in general, and particularly the knowledge on giant sperm have undergone a sensational development. Evolution and phylogeny of giant sperm, molecular and morphological basics of sperm-egg interactions, fate of giant spermatozoa after fertilization, and paternal inheritance of mitochondrial DNA are only a few of many different aspects dealt with by spermatologists - however, unfortunately all without any contribution of ostracodologists. In contrast, many issues connected to ostracod reproduction are still enigmatic: the detailed morphology of reproductional traits, the process of mating, the storage of sperm, the place, time and mechanisms of fertilization, as well as the sperm-egg interactions during the first stages of development are just some of the open questions.

Material and Methods

Specimens of *Mytilocypris praenuncia* (DeDeckker 1977) from Lake Charra (S Australia) and *Pseudocandona marchica* (Carbonnel 1969) were dissected in Hydro-Matrix mounting media (Micro-Tech-Lab). Investigations were carried out with Leica DMLB and Leica MZ Apo microscope. For SEM (Leitz AMR 1200), eggs were fixed in 70% ethanol and then opened and dehydrated prior to critical-point drying (BalTec CPD 030).

Results

The presentation will give a short overview on the state of the art in cypridoidean spermatology, and provide some new data on morphology of reproductive organs, on spermatozoa, on eggs, and on fertilization mechanisms in cypridoidean ostracods. Hypotheses on the evolution of giant sperm in other groups will be presented and tested for their applicability to ostracods.

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IN TRIEBEL'S STEPS: LIGHT MICROSCOPY OF OSTRACOD SHELLS WITH THE MICROSCOPE MZM 1

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Keywords: Ostracod Light Microscopy, Digital Picture Processing

Introduction

During the years 1939 to 1969, Erich Triebel (1894-1971) built up the section of micropalaeontology of the famous Senckenberg Institute in Frankfurt (Main), Germany. Triebel mainly worked on Tertiary and Recent ostracods and laid the foundation of the present Senckenberg ostracod collection. However, the most impressive part of his work was the development of innovative techniques in light

microscopy of ostracods. Special protocols in ostracod valve preparation, staining, and sectioning led to informative, instructive images, which were at the same time fascinating in their beauty (eg. Triebel 1963, 1968).
The decade after his retirement, however, brought the breakthrough for (scanning) electron microscopy. With its increased magnification, resolution, and focus depth, this technique performed convincing results and did not require elaborate preparations. Palaeontologists as well as biologists who had access to an SEM replaced drawings of ostracod valves by SEM micrographs in their publications. Since those days in the early 1970s, the SEM technique has become a standard technique in presenting ostracod valves. However, although SEM micrographs of ostracod valves picture many different characters, there are two that cannot be shown: transparency and colour. Since these features may both be relevant for taxonomy, the 'old' light microscope still has not lost its purpose in depicting ostracod valves. It is definitely worthwhile to check new developments in the field of light microscopy.

Material and Methods

Valves of *Afrocypris barnardi*; Microscope MZM 1 by *Askania*, Mikroskop Technik Rathenow GmbH; Camera CANON EOS 350D; Digital processing of pictures with *Automontage*-software by "The Synoptics Group".

Results

The poster presents light microscopical pictures of a right valve of a "giant" African freshwater ostracod, *Afrocypris barnardi* Sars 1924, of ca. 5 mm length. All pictures were taken with the MZM 1 zoom-microscope and a CANON camera. The MZM 1 features a continuous magnification from 8X to 200X (with eyepiece 10X) and is equipped with an LED ring illuminator. Our pictures show that this instrument may be a valuable alternative for SEM in depicting ostracod valves, especially when colour and transparency are important characters to be shown.
Some of the photographs are the result of a digital montage of a series of pictures taken of different focus levels. These montages were carried out with the software "Automontage", which can be particularly recommended as a tool for producing well-focussed images of relatively big (=high) ostracod valves such as the here presented *Afrocypris* valve.

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AN UNPAIRED AND ASYMMETRICAL ATTACHMENT TO HEMIPENES IN MALE *AFROCYPRIS BARNARDI* SARS (CRUSTACEA, OSTRACODA, CYPRIDIDAE)

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Keywords: Copulatory Appendages, Giant Ostracods, Cyprididae, Hemipenis, Penile Attachment

Introduction

Afrocypris barnardi Sars 1924 is an African giant ostracod belonging to the subfamily Liocypridinae Martens 2003. As already shown for *Liocypris grandis* Sars (Martens 2003, Matzke-Karasz and Martens 2005), females of *Afrocypris barnardi* also have additional appendages associated with the female reproductive organ (Matzke-Karasz and Martens, in prep.). In order to set up a detailed re-description of this species, females and males were investigated with light- and scanning electron microscopy. *Afrocypris barnardi* males had an enigmatic attachment to their copulatory organ.

Material and Methods

Investigations were carried out with five males of *Afrocypris barnardi*, preserved in ethanol. The material belongs to State Museum Windhoek, Coll Nr. SMN 51306, collected March 1988 by Curtis in Makuri, Bushman Land. Light microscopy: Leica MZ Apo microscope. SEM: BalTec CPD 030 Critical Point Drying System, Leitz AMR 1200 scanning electron microscope.

Results

The attachment to the copulatory organ in *Afrocypris barnardi*, herewith called 'PA', is an asymmetrical, unpaired extension of the connection between both hemipenes and the main animal body, situated underneath the hemipenes, when they are in the relaxed position. Due to the PA, the actual point of attachment of the male copulatory organ has shifted from the base of the hemipenes to the right side of the PA. The left side of the PA is not directly connected to the main body, but at mid-length it shows an outwards pointing finger-like structure. This 'finger' is partly supported by a chitinous framework, not articulated and tapering off distally. The tip is narrowly rounded.
Our poster presents a series of SEM-pictures of the PA, and the authors discuss the putative origin and function of this unique morphological character.

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ON THE ORIGIN OF THE PUTATIVE FURCA OF THE EXTANT OSTRACODA

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Keywords: Ostracoda, Platycopida, Myodocopida, Halocyprida, Podocopida, Furca, Vibratory Plates, Endopod, Evolution, Exaptation

The posterior end of body of the extant ostracods exhibits a pair of variously shaped appendages, commonly designated as furca(e), uropods or caudal rami, used for feeding and/or locomotion. It is here shown that the putative furcae of all extant ostracods have evolved from the epipodal vibratory plates of a pair of posteriormost appendages designated as uropods. The most primitive condition, reminiscent of the ancestral state of character, is seen in the Platycopida: the uropodal vibratory plates appear transformed into lamellar plates bearing claw-like structures; the corresponding endopods of the males are modified into clasping organs, those of the females being totally reduced.
In the Myodocopida and Halocyprida only the lamellar plates subsist. The Podocopida present the most derived condition, the vibratory plates having being modified into rod-shaped structures mainly used for locomotion. The evolutionary transformation of vibratory plates, originally developed for respiration, into structures used for feeding and/or locomotion is a clear case of exaptation. The putative furcae of the Ostracoda being homologous structures, it is concluded that all extant ostracods belong to a monophyletic lineage.

MICROFOSSIL RANGE AND EXTINCTION IN THE UPPERMOST PERMIAN OF IRAN

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Keywords: Ostracods, Foraminifera, Mass Extinction, Permian-Triassic Boundary, Iran

The Permian-Triassic extinction event which was the most severe evolutionary crisis in phanerozoic life history is still poorly understood. This is particularly due to poor stratigraphic resolution and correlation of the related biotic and abiotic events around the Permian-Triassic boundary (PTB). Widespread shelf anoxia is currently regarded as a possible major cause of this mass extinction. Micropalaeontological investigations in pelagic PTB beds in central and northwestern Iran were intended to reconstruct the extinction events of foraminifera and ostracods across the PTB.

The analysis of the foraminifera from the Shareza section (Mohtat and Vachard 2005) showed that most species disappear already in the lower Dzhulfian. This range pattern is due to a significant deepening of the palaeoenvironment from shallow inner shelf to deep outer shelf. However, the evolution patterns of the foraminifera suggest also an evolutionary crisis in the late Dzhulfian. The PTB interval is characterised by the appearance of *Orthoverthella shashalensis.* The range pattern of the ostracods in the Zal section, their taxonomical diversity and taphonomy reflect a successive increase of water depth in the late Dzhulfian. The latest Permian (*Clarkina meishanensis - Hindeodus praeparvus* Zone) is characterised by a complete ostracod faunal turnover in the boundary clay (dominance of *Indivisia*). This turnover is probably also related to a drastic temperature change in this time interval which is indicated by the conodont data (Kozur 2003).

The ostracod assemblages in the upper part of the *C. meish.-H. praep.* Zone and the basal *Hindeodus parvus* Zone are dominated by a species (*Praezabythocypris* n. sp.) which has been described from the lowermost Triassic of Turkey as *Bairdiacypris ottomanensis* Crasquin-Soleau 2004 and which is interpreted as a disaster species. A closely related species shows pustulose carapace ornamentation which was probably caused by environmental perturbations (e.g. water chemistry) (Mette in prep.). The predominance of Bairdiacea and Cypridacea indicate well oxygenated conditions in the *C. meish.-H. praep*. Zone.

These results and recent studies in Oman (Krystyn et al. 2003) and Turkey (Crasquin-Soleau et al. 2004) suggest that in the Neotethys shelf anoxia did not play a major role in the late Permian-earliest Triassic extinction. The worldwide ostracod range in the Upper Permian and Lower Triassic is suggestive of a gradual extinction with extinction peaks in the late Midian, Dzhulfian, Dorashamian and Induan. Furthermore, the Upper Permian ostracods of Iran display a strong endemic character which was probably due to the biogeographical isolation of Iranian plates by neotethyan and palaeotethyan oceanic basins.

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OSTRACOD PALEOLIMNOLOGY OF LAKE LAGUNA GRANDE DE ARCHIDONA (SOUTHERN SPAIN): 1700 YEARS OF ENVIRONMENTAL CHANGES, FROM A TEMPORARY FRESHWATER POND TO A PERMANENT EUTROPHIC LAKE

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Keywords: Ostracoda, Paleolimnology, Environmental Change, Lake Archidona, Spain

In the framework of a multidisciplinary project studying the Late-Holocene environmental history of the Iberian Peninsula, focusing on the effects of climate change and human impact on karstic lakes and their surrounding landscape, we analysed 235 cm of a sedimentary record from lake Laguna Grande de Archidona (Málaga, Spain). At present the lake is permanent, with a mean depth of 13.2 m, conductivity around 3 mS/cm and water ionic composition dominated by calcium and sulphate (Rodríguez-Rodríguez et al. 2001). Besides ostracods, the sedimentology, palinology and the study of other proxies from the sediment allow for a detailed reconstruction of lake level oscillations and landscape changes. These changes were most likely related to human land use.

The bottom half meter of the sequence is dominated by ostracod species preferring temporary freshwater ponds, such as the circum-Mediterranean *Cypris bispinosa*. This species disappears completely in the sedimentary sequence on top. After that, i.e. from about 190 cm (800 yr AD) to 105 cm (1650 yr AD) the ostracod paleocommunity is dominated by *Plesiocypridopsis newtoni*, a halophilous ostracod frequently living in seasonal ponds. The top meter of the sequence is dominated by *Darwinula stevensoni* and, particularly at the top 20 cm, by *Limnocythere inopinata.* The high abundance of *D. stevensoni* is related to the permanent character of the lake. Both *D. stevensoni* and *L. inopinata* are able to withstand oxygen depletion in the sediment. Their appearance may be related to the increased eutrophy of the lake. This eutrophication hypothesis is supported by the marked decline in Charophyte remains at the top meter of the sequence and the coupled increase in the density of diatoms of the genus *Nitzschia* and *Campylodiscus*. In addition, the top 25 cm account for the unique presence through the lake history of *Cypridopsis vidua*, an eurytopic widespread ostracod species living in permanent freshwater environments.

The changes observed through the study of the ostracod community, including lake-level and salinity oscillations can be related to the changes produced in landscape use, as derived from the palinology and sedimentology of the sequence, which show a progressive intensification of agriculture practices during the last 350 years.

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OSTRACOD ECOLOGY AND DISTRIBUTION IN RIVERS PALÀNCIA AND MILLARS (EASTERN SPAIN)

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Keywords: Riverine Ostracoda, Ecology, Mediterranean Rivers, Iberian Peninsula

The ostracods inhabiting rivers and brooks on the central Mediterranean slope of the Iberian Peninsula, have been previously studied by Mezquita et al. (1999, 2001), mainly regarding species distribution and species-environment relationships. These authors have shown that major variables affecting ostracod distribution in these lotic environments are altitude, climate, water ionic composition and water quality. In order to fill the gaps in the riverine ostracod biogeography in this area, so as to increase our database on species-environment relationships, we identified the ostracod species found in more than 50 samples from rivers Palància and Millars, collected between 1995 and 2004. For river Palància, no data on ostracods were previously known. At each sampling site we analysed several abiotic factors (temperature, conductivity, oxygen, major anions), and also studied the macroinvertebrate community, to be able to calculate the biotic index IBMWP, an indication of river water quality.
Sampling sites ranged in altitude from 50 to 1400 m, conductivity varied between 250 and 1500 µS cm^{-1} and IBMWP between 5 (highly polluted) and more than 200 (not polluted). More than 30 ostracod species were found, being *Herpetocypris brevicaudata* the most frequent, particularly in river Palància. Other common species with more than 8 occurrences were the cosmopolitan species *Cypridopsis vidua*, plus *Ilyocypris bradyi, Sarscypridopsis lanzarotensis, Potamocypris villosa* and *Limnocythere inopinata*. Except *L. inopinata*, which is more frequent in river Millars, the other species do not show a clear preference for any of the two rivers studied. Some species, particularly those common in northern Europe but rare in lowland Mediterranean environments, such as *Cyclocypris ovum* and *Potamocypris zschokkei* are mainly found at the highest altitudes of these rivers. At intermediate and low altitude we found many examples of species with Meditterranean or even African biogeographic affinities, including *S. lanzarotensis* and *Cypris* sp., a species close to *C. decaryi*. It is also remarkable the presence of *Fabaeformiscandona japonica* in river Millars, a species previously known only from Japan, but also collected recently from shallow lakes close to these two Spanish rivers (Poquet 2003, as *F.* cf. *fabaeformis*).

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EVOLUTIONARY PATHWAYS WITHIN *VESTALENULA* LINEAGE (OSTRACODA, DARWINULIDAE)

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Keywords: Ostracoda, Darwinulidae, Comparative Morphology, (Palaeo)ecology, (Paleo)biogeography

Until 10 years ago the post-Paleozoic Darwinulidae were recognised through very few Recent and fossil species belonging to only two genera *Darwinula* Brady and Robertson and *Microdarwinula* Dan. The situation changed drastically following the taxonomical revision of Rossetti and Martens (1998). The family Darwinulidae contains now beside the two genera here mentioned three other genera, *Alicenula* Rossetti and Martens, *Penthesilenula* Rossetti and Martens and *Vestalenula* Rossetti and Martens.

We present a detailed analysis on the morphological variability of the adult and juvenile valves of *Vestalenula cylindrica* (Straub) from the Upper Miocene (Pannonian "F") of Goetzendorf, Burgenland, Lower Austria. We compare these data with information we collected from other Neogene sites, from Austria, Gratkorn (Styria, Upper Miocene, Pannonian "A/B"), and from Slovakia, Martin (Turiec Basin, Upper Miocene/Pliocene) and Studenka (Vienna Basin, Pannonian "E") as well as with material of a new Recent subterranean (hyporheic) species of *Vestalenula* living in the Tech Basin, Roussillon, south-eastern France.

For the morphological study of the valves we mainly used digitised microphotographs of the material examined with a transmitted light microscope. A morphometric analysis was carried on using the B-spline algorithm and the Morphomatica software (Baltanás et al. 2003). Multi-variate analysis of the morphological diversity of the valves was done using the non-metric multi-dimensional scaling algorithm (N-MDS), as well as hierarchical clustering using pair-wise Euclidean distances and ranked similarities.

Vestalenula cylindrica displays a wide morphological variability. *Vestalenula* n.sp. from southern France shows close affinities with *Vestalenula boteai* Dan.

From the comparative analysis of both the valves and the limbs we suggest that the *Vestalenula* lineage derives from *Penthesilenula*. Both regressive and progressive evolution of traits exist in the former group. We point out to the low evolvability of the valve shapes, to the inner and outer ornamentation of the valves and to those of the antennal chaetotaxy.

We present details on the palaeoecological situation of the sites Goetzendorf and Gratkorn from where we collected most of the fossil *Vestalenula* we studied.The present day ecological distribution of *Vestalenula* species fits well with the palaeoenvironment where *Vestalenula cylindrica* were sampled in Europe, respectively flood plains, marshes, littoral of lakes

We assume that *Vestalenula* representatives could since the Neogene colonised independently shallow non-marine interstitial habitats in Europe during mild (subtropical) climate conditions similar to those where today Recent *Vestalenula* species live, e.g. in Sri Lanka, New Caledonia Island, Tunisia.

AN OSTRACOD-INFERRED ELECTRICAL-CONDUCTIVITY TRANSFER FUNCTION FOR THE TIBETAN PLATEAU

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Keywords: Electrical-conductivity Transfer Function, Quantitative Reconstruction, Salinity

Quantitative environmental reconstructions can provide detailed insights into the amplitude of past environmental change and may be especially regarded as a powerful tool in regions where (1) meteorological data and historical documents are almost unavailable, (2) these data are very scanty in spatial terms or (3) these data do not reach back far into history.
These three characteristics apply to the sparsely populated Tibetan Plateau, which plays a major role in governing the northern hemisphere climate regime because of its large extension and mean altitude of about 4000 m above sea level and is therefore of special interest for palaeoclimatological or palaeo-environmental research.
In order to infer past salinity changes of Tibetan lakes from fossil ostracod assemblages a modern ostracod-electrical conductivity calibration data set has been developed. The uppermost sediments of 123 lakes on the eastern Tibetan Plateau mainly have been sampled for the Recent and sub-Recent ostracods, and electrical conductivity as well as other limnological parameters were measured.
Altogether 37 ostracod taxa were identified from these samples with *Limnocythere inopinata* as the most abundant species, clearly outnumbering the other taxa. *Candona candida*, *Candona rawsoni*, *Fabaeformiscandona danielopoli*, *Ilyocypris bradyi*, *Ilyocypris echinata*, and *Leucocythere mirabilis* were very abundant too. Measured electrical conductivities of all lakes ranged from 22 µS/cm to as much as 38,200 µS/cm.
However, only lake surface sediment samples that yielded more than 100 ostracod shells were included in the numerical analysis of the modern calibration data set. Ninety-two lakes met this requirement and were used to develop an ostracod electrical conductivity inference model. The electrical conductivity which is covered by these lakes still represents a wide range starting with 32 µS/cm and reaching as high as to 28,900 µS/cm. An ostracod electrical conductivity inference model based on a Weighted Averaging Partial Least Squares regression was developed and applied to fossil ostracod assemblages from a sequence of a NE Tibetan lake which had obviously experienced major salinity shifts during the late glacial and Holocene period.

EARLY CRETACEOUS MARINE OSTRACODS FROM PATAGONIA: CORRELATIONS AND PALAEOGEOGRAPHY

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Keywords: Marine Ostracods, Early Cretaceous, Palaeogeography, South Atlantic

Different Valanginian and Hauterivian assemblages of marine ostracods from the Neuquén Basin, in west central Argentina, are characterized and illustrated. Comparisons with similar calcareous micro-fossil-assemblages from Algoa basin (South Africa) and Austral Basin (southernmost South America) are approached. Formerly, and dealing with the palaeobiogeographical subject, Reyment and Tait 1972, had proposed the existence of a direct communication between Neuquén and Algoa basins through the South Atlantic based on shared fossil molluscs (see also Musacchio and Simeoni 1995).
The chronology of the outcrops with calcareous microfossils at El Marucho, Rio Agrio, Cara Cura, Cuesta del Chihuido (Neuquén basin) and Lago Fontana (Austral basin) is gauged in the frame of the

Global Time Scale. This attempt is based on different well represented faunas of ammonoids, previously studied by other authors, and nannofossils (Simeoni and Musacchio 1998). Comparisons with Algoa´s faunas are based on the known literature dealing with South African calcareous microfossils.

The microfossil assemblages from Neuquén and Algoa basins share species mainly belonging to the genera: *Aracajuia, Cytherelloidea, Cytherella, Procytherura, Progonocythere* and *Rostrocytheridea,* (Simeoni and Musacchio 1995, and cited literature). These similarities between Neuquén and the Algoa microfossils are stronger than those between Neuquén and Austral coeval microfaunas, reinforcing the Rayment and Tait´s hypothesis. Likewise, additional information dealing with benthonic foraminifers seems pertinent to correlations and the palaeogeographical reconstructions (Simeoni 2001).

The structural arrangement of the South Atlantic region during the Early Cretaceous should be considered. Several evidences confirm the diachronic evolution of the see floor expansion at that time: the South Atlantic Ocean decreases in age from south to north. Thus, the existence of regional strike-slip faults due to the stepped spreading seems a required fact. In this frame, a role of the Colorado-trough as a possible "corridor" between the Neuquén and the Algoa basins is discussed.

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OSTRACODA ASSEMBLAGES IN LAKES ACROSS A GRADIENT OF RADIOACTIVE CONTAMINATION

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Keywords: Chernobyl NPS Accident, ^{137}Cs Contamination, Environmental Factors

Introduction

Many lakes, rivers, peatlands and other waterbodies over a large area of Europe were impacted by radionuclide contamination from the Chernobyl accident in 1986. There is little information available on the response of freshwater invertebrate communities to such chronic radioactive contamination (Smith 2005). Therefore, we have evaluated the relationship between Ostracoda community composition in lakes and radiocaesium levels, relative to other environmental factors.

Materials and Methods

The Ostracoda fauna was sampled form the littoral zone of eight lakes (6 in Belarus and 2 in Ukraine) across a gradient of ^{137}Cs contamination from 100 kBq/m^2 (reference lake) to 37000 kBq/m^2 (lake 10 km from Chernobyl NPS). Samples were collected in spring and early autumn of 2003 and 2004. A number of morphological and hydrochemical variables were measured at each lake on each sampling occasion e.g. conductivity, total and carbonate hardness, pH, nutrients. Multivariate statistical methods were used to assess the significance of the relationship between the Ostracoda community and measured environmental variables.

Results

Ostracod assemblages contained 1-6 species; in most cases 3-4 species, per lake. The most common and abundant species (more than 78% individuals) was *Cypridopsis vidua* (O.F. Müller 1776). *Physocypria kraepelini* G.W. Müller 1903, *Dolerocypris fasciata* (O.F. Müller 1776) were also found in large numbers. We found *Plesiocypridopsis newtoni* (Brady and Robertson 1870) and *Candona neglecta* (Sars 1887) solely in the Chernobyl NPS cooling pool. *Cyclocypris laevis* (O.F. Müller, 1776) and *C. serena* (Koch 1838) were only found in Perstok Lake, while *Metacypris cordata* (Brady and Robertson 1870) was only recorded from Sviatoye - 3 Lake.

There was no significant relationship between Ostracoda community structure, species richness or abundance and ^{137}Cs contamination of lakes. A combination of conductivity and $\log_{10}{}^{137}$Cs was the optimal predictive model of taxon richness in the lakes. We have demonstrated that the ecological status of Ostracoda communities in lakes is not dominated by direct contamination from the Chernobyl accident. Natural environmental factors are still the principal drivers of assemblage structure.

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SEGMENTAL STRUCTURES RECOGNIZED IN MALE COPULATORY ORGANS OF CYTHEROID OSTRACODA

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Keywords: Biramous Limb, Male Copulatory Organ, Homology, Basic Framework, Cytheroidea

The crustacean postantennulary appendages, including the copulatory organs, are assignable to the original "biramous limb", which have evolved to perform many different functions.

The ostracod male copulatory organs are well developed and specialized, and in the Cytheroidea, they can form up to a third of the body size. Hirschman (1912) began structural and functional studies on ostracod male copulatory organs. Since then a number of studies have added to the terminology and the understanding of the structure and function of each element of the male copulatory organs in some podocopid taxa. However, it is difficult to adapt the terminology established for a certain taxon to other taxa since the male copulatory organs often show extreme morphological complexity and high variety. Furthermore, the extremely specialized male copulatory organ of Cytheroidea has not been compared with the "biramous limb" in view of homology at all.

In this study, the male copulatory organs of five cytheroid species (*Angulicytherura miii*, *Callistocythere pumila*, *Cythere sanrikuensis, Ishizakiella miurensis*, and *Pontocythere miurensis*) were examined from multiple angles by plural methods (i.e. the external and internal sides) and the inside structure including the muscle arrangements were observed using scanning electron microscopy and optical microscopy with a stereo lighting system.

As a result, the segmental structures corresponding to each podomere were recognized, allowing the homology between the male copulatory organs and the "biramous limb". Furthermore, the derivative parts on the copulatory organs were examined in terms of possible equivalents to independent podomeres, endites, or mere setae on a limb.

By comparing the five species, it became clear that the ejaculatory duct (copulatory process) originates from different parts in different taxa, e.g., the ducts of *I. miurensis* and *C. pumila* correspond to the endopod, those of *C. sanrikuensis* and *P. miurensis* to endites of the coxa, and that of *A. miii* to the endite of the precoxa. Namely the ejaculatory ducts of these species are not homologous with each other. In view of the relative position of the ejaculatory ducts, three basic frameworks of the male copulatory organ were recognized. A fourth framework is represented in *P. miurensis*, where the clasping apparatus is derived not from the copulatory organ but the base of caudal ramus.

This variation in the basic frameworks suggests high plasticity of male copulatory organs in ostracods and the "biramous limb" in crustaceans. The major morphological variation in male copulatory organs, transformed from some basic frameworks, must have caused reproductive isolation and high species diversity in the Cytheroidea.

TERTIARY SEX RATIO OF SUBFOSSIL OSTRACODA FROM DEEP LAKE HABITATS IN NORTHERN POLAND

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Keywords: Lacustrine Ostracoda, Tertiary Sex Ratio, Subfossil

The study of sex ratio may be used as a method in the examination of sex evolution allowing, for example, an understanding of why and how the bisexual reproduction mode changes into the parthenogenesis. Being a cosmopolitan and a ubiquitous group with excellent fossil record, ostracods can provide a useful insight into the evolution of sex (Martens 1998). Despite these advantages, few studies have been done on the matter (e.g. Abe 1990, Chaplin et al. 1994). Although the exact sex ratio differences change from species to species, in the majority of cases, females outnumber males. The current study focuses on the tertiary sex ratio of five lacustrine profundal species with sexual dimorphism of the valves.

The valves were extracted from subrecent sediments of the sublittoral and profundal zones in 11 Polish postglacial lakes. Sediment cores were obtained by Kajak-corer with a tube 56 cm long and 4.4 cm in diameter. The sediment columns were cut every 4 or 5 cm, after which the factions were washed using a 0.1 mm sieve, dried at 105ºC and the residues were examined using a stereomicroscope for the valves and carapaces. After species determination, adult valves were sexed. The chi-squared ($\chi 2$) test was used to test the goodness of fit to a 1:1 ratio (Sokal and Rohlf 1981).

The sex ratio was determined for two limnocytherids *Limnocytherina sanctipatricii* (Brady and Robertson 1868) and *Leucocythere mirabilis* Kaufmann 1892 and for three candonids *Fabaeformis-candona levanderi* (Hirschman 1912), *F. protzi* (Hartwig 1898) and *Candona neglecta* Sars 1887. In each species males were on average significantly outnumbered by females, nevertheless in *F. protzi* the bias was relatively small (Table).

Table: Tertiary sex ratios for five profundal subfossil species (S.D. – Standard deviation)

Species	Mean proportion of males ± S.D.	Range	$\chi 2$	p	Sample size
Limnocytherina sanctipatricii	0.273 ± 0.099	0.133-0.538	180.415	< 0.001	878
Leucocythere mirabilis	0.233 ± 0.040	0.185-0.296	55.125	< 0.001	200
Fabaeformiscandona levanderi	0.335 ± 0.141	0.194-0.476	10.606	0.001	109
Fabaeformiscandona protzi	0.436 ± 0.085	0.250-0.622	22.805	0.001	1405
Candona neglecta	0.236 ± 0.095	0.065-0.462	186.042	< 0.001	666

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FRESH AND BRACKISH WATER OSTRACODS FROM NEOGENE DEPOSITS OF ARGUVAN/MALATYA (EASTERN ANATOLIA)

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Upper Miocene rocks are characterized dominantly by fluvial and fluvio-lacustrine sediments alternating with several coal layers and associated with volcanic-volcaniclastic rocks in Eastern Anatolia. In addition, fresh-brackish water systems are widely distributed in the whole of Anatolia and in the study area. The study area is located in southern part of Arguvan (Malatya) in Eastern Anatolia. Neogene units in this area are represented by the Alibonca, Küseyin, Parçikan, Boyaca formations and Maamar volcanic units. The Alibonca Formation is characterized by reef core, reef front and lagoonal deposits including abundant benthic foraminifers in the late Oligocene-early Miocene. The Küseyin Formation consists of conglomerate and sandstone in the lower part of the sequence and red coloured mudstone in the upper part. The Parçikan Formation is represented by fine medium grained sandstone, siltstone, organic rich gray-green claystone, marl, coal and clayey limestone levels. The Boyaca Formation is composed of mudstone, silty mudstone, conglomerate and sandstone. The age of the Küseyin and Parçikan formations is late Miocene according to palynological and paleontological data. The Boyaca Formation was deposited in low-sinuosity river environments composed of red mudstone, silty mudstone, conglomerate and sandstone.
One hundred and fifty rock samples from 3 measured sections recovered from the Küseyin and Parçikan formations were studied for Ostracoda. The washed residues are dominated by well preserved ostracod fauna together with gastropods, gyrogonites and plant debris. Four genera and nine species of ostracod are identified in samples collected from the Küseyin and Parçikan formations. The fauna in these units was characterized by few ostracod species and abundant individuals. The majority of samples contain less than nine species. *Ilyocypris bradyi*, *Ilyocypris gibba, Candona (C.) parallela pannonica* and *Heterocypris salina* are described in the Küseyin Formation. *Cyprideis pannonica, Cyprideis (C.) anatolica, Cyprideis trituberculata, Ilyocypris gibba, Candona angulata, Candona neglecta, Candona (C.) parallela pannonica* and *Heterocypris salina* in the Parçikan Formation. *Cyprideis* are dominant genera in the Parçikan Formation. In addition, nodose ostracodes (*Cyprideis* and *Ilyocypris*) are obtained in different levels of the Parçikan Formation. Nodose ostracodes point to decreased salinity and increased organic matter in the study area.
According to the lithological features and fossil contents of the Neogene units, the Küseyin Formation was deposited in meandering river facies and the Parçikan Formation was formed in a shallow lacustrine environment associated with swamps.

BIOGEOGRAPHY OF LUMINOUS MARINE OSTRACOD DRIVEN IRREVERSIBLY BY THE JAPAN CURRENT

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Keywords: Biogeography, Genetic Divergence, Japan Current, Mitochondrial DNA

The biogeography of the luminous marine ostracod *Vargula hilgendorfii,* also called ‘Umihotaru’, shows this organism may have arrived relatively recently on the Japanese islands during the final glacier period approximately 10,000 years ago (Fig. 1). Phylogenetic relationships also strongly indicate that the Japan Current drove the Umihotaru ostracod northward. It is evident that the Umihotaru ostracod spread rapidly to the major Japanese islands 3000 km north, whereas its spread was slow in the southwest of the Japanese Islands, covering a distance of 400 km. The meandering of the Japan Current, where it passes by the Tokara-gap at 28° latitude, may be a barrier to Umihotaru ostracod extension.

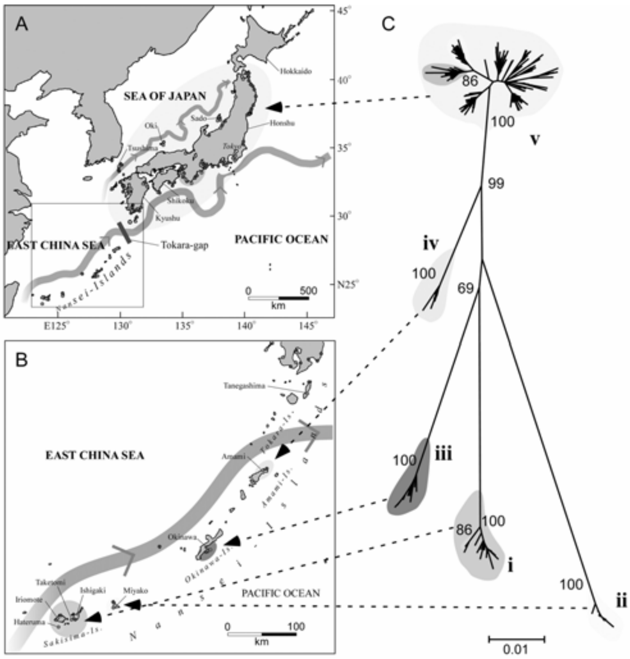

Fig. 1: A: The map of the area around Japan with sampling points (red dots: animals were collected; blue dots: collection efforts retrieved no animals). The square in this figure shows the map B. **B:** The map of around the Nansei-Islands. **C:** Neighbour-joining (NJ) tree based on genetic distances estimated from partial mitochondrial cytochrome *b* gene sequences (1134bp) of 303 haplotypes of *Vargula hilgendorfii*. Numbers beside internal branches indicate bootstrap probabilities (>80%) based on 2000 pseudoreplicates. The maximum likelihood result was consistent with the NJ result with respect to groups i-v. Sequence data are available from DDBJ/EMBL/GenBank under accession number (AB192577-872, AB193328-34).

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COMPLETE MITOCHONDRIAL DNA SEQUENCE OF THE SEA-FIREFLY, *VARGULA HILGENDORFII* (CRUSTACEA, OSTRACODA) WITH DUPLICATE CONTROL REGIONS

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Keywords: Mitochondrial Genome, Control Region, Ostracoda, Phylogenic Tree

The primary structure of the mitochondrial genome of the bioluminescent crustacean, *Vargula hilgendorfii*, the sea-firefly (Arthropoda, Crustacea, Ostracoda), has sequenced using the transposon Tn5. The genome (15,923 bp) contains the same 37 genes (two ribosomal RNAs, 22 transfer RNAs, and 13 protein-coding genes) found in other Arthropoda (Fig. 1). Interestingly, duplicate control regions (fragments of 778 bp and 855 bp) and triplicate short repeat sequences (fragments of 49 bp) occur. The AT composition of the protein-coding genes is lower than the published complete mitochondrial genomes within the Arthropoda. For gene arrangement, thirteen transfer RNA genes and two protein-coding genes have moved and inserted directly or inversely relative to the typical Arthropoda order.

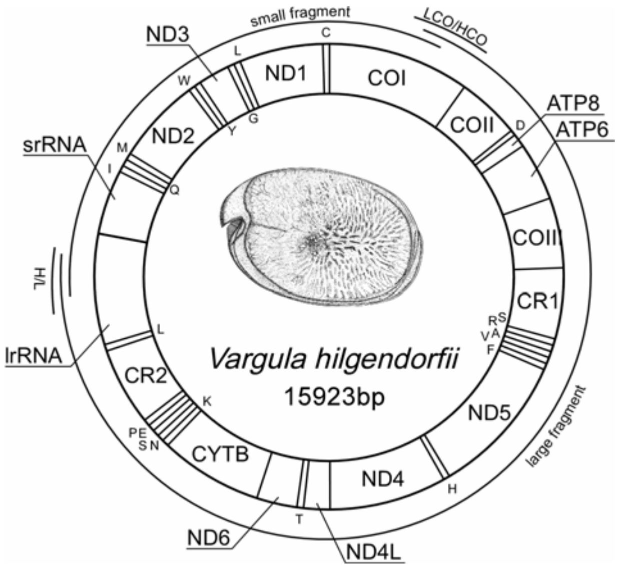

Fig. 1: Gene map of *Vargula hilgendorfii* mitochondrial DNA showing two partial sequenced regions, two long-PCR regions, and the order of the 37 genes. *ND1–6*, 4L indicates NADH dehydrogenase subunits 1–6 and 4L; *COI-3*, cytochrome c oxidase subunits I–III; *cyt b*, cytchrome b; ATP6 and 8, ATPase subunits 6 and 8. The 22 tRNA genes are identified by the one-letter code for the corresponding amino acids.

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CALCAREOUS MICRO-CONCRETIONS IN RECENT AND FOSSIL MYODOCOPID SHELLS

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Keywords: Calcareous Micro-concretions, Ostracoda, Myodocopida, Recent, Devonian

Myodocopid ostracods are now very diverse and abundant in various marine environments. However, they are very rare as fossils even in sub-recent samples. The unstable material (amorphous? or fine grained calcium carbonate) of their carapaces, and also post-mortem formation of micro-concretions (nodules), were probable reasons for poor fossilization potential and scarcity in the fossil record.

The calcareous micro-concretions were studied in some specimens of Recent myodocopid ostracods from Admiralty Bay, King George Island, West Antarctica (see Majewski and Olempska 2005) and also in the myodocopid shells from the Devonian hydrothermal venting systems of the Hamar Laghdad (Anti-Atlas, Morocco).

The calcareous nodules were described by Sohn and Kornicker (1969, 1988) as artifacts, which form after an animal's death (rarely in vivo) in carapaces of recent myodocopid shells. According to these authors the nodules are a source of calcareous particles in marine sediments. These nodules were also described as unique form of calcification of shells by Bate and Sheppard (1982), Smith and Bate (1983) and in Silurian myodocipids by Siveter et al. (1987). Calcareous micro-concretions are common components of myodocopid shells collected in Admiralty Bay (Antarctica). In myodocopid shells from the Eifelian of Morocco, structures very similar to those found in recent shells also occur.

The formation of concretions is interpreted by the present writer as a result of fluctuation and recrystallisation of unstable, fine grained calcium carbonate after animal death. The decomposition of the protein and chitin framework of the shell probably plays a leading role in the control of chemical reactions including those leading to the concretion formations.

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MYODOCOPID OSTRACODS FROM THE EIFELIAN (MIDDE DEVONIAN) HYDROTHERMAL VENT OF SOUTHERN MOROCCO

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Keywords: Myodocopida, Devonian, Hydrothermal Vents, Morocco

Fossil coquina consisting of a monospecific assemblage of myodocopid shells has been found in the Middle Devonian of a unique hydrothermal vent system of Hamar Laghdad (eastern Anti-Atlas, southern Morocco) which developed over a submarine intrusion of peperites. The volcanic and volcaniclastic rocks, Lochkovian in age, are covered by a thick pile of carbonates cut by a complex system of faults and neptunian dykes. The faults served as conduits for hot fluids migrating to the sea floor (Bełka 1998). Vents were episodically active during a time of approximately 30 m.y., from the late Pragian until the early Frasnian. The most spectacular part of the carbonate cover consists of large conical mounds, known as the Kess-Kess mounds, formed during a short episode in Emsian time. Previous studies have shown that hydrothermal seepage has contributed to the origin of the mounds (Bełka 1998, Mounji et al. 1998). But the vents of Hamar Laghdad are not a counterpart to hydrothermal vents widespread in the modern deep sea; they are related to the intraplate volcanism. This ancient vent system is also unique because during the Eifelian hydrothermal fluids contained locally thermogenic methane.

Myodocopid ostracods reported here have been found in the sediment infill of an Eifelian venting channel present in the western part of the Hamar Laghdad area, where no evidence for hydrocarbons in the hot fluids has been recognized. The investigated sample was subdivided into 3 layers: A- the basal layer of mudstone with irregularly scattered shells; B – layer of coquina, characterized by a high number of closely packed shells without any sediment between them; and C – the upper layer discordant upon B, which consists mostly of mud sediment. The assignment of the thin shells to myodocopids is made on account of well preserved specimens in the layer beneath the coquina (A). The new genus and species *Hamaroconcha kornickeri* gen. et sp. nov. is proposed.

The myodocopid layer from the Eifelian of Hamar Laghdad resembles goniatite-pelecypod coquinas interpreted as resulting from suspension currents (see Walliser and Reitner 1999). In our opinion, however, the enrichment of myodocopid shells is a product of washing away of sediment by fluids migrating to the sea floor. It is likely that an abrupt temperature increase of hot fluids was responsible for a simultaneous mass killing of large number of ostracods swarming in the venting fluids.

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OKHOTSK SEA OSTRACODS IN SURFACE SEDIMENTS: DEPTH DISTRIBUTION OF CRYOPHILIC SPECIES AND ITS RELATIONSHIP TO OCEANIC ENVIRONMENT

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Keywords: Ostracods, Cryophilic Species, Okhotsk Sea, Japan Sea, Depth Distribution, Sea Ice

Investigations into environmental factors that control the distribution of living organisms are useful for predicting geographic migrations of species in response to future climatic warming, especially cryophilic species. The study of modern benthic-ostracods and environmental factors in the Okhotsk Sea is especially significant for understanding the ecology and distribution of cryophilic organisms in middle latitudes. The goal of this study is to clarify the environmental controls on the present occurrences of cryophilic ostracods in the southern Okhotsk Sea (44-45˚N), and to compare them with related conditions in the better-studied Japan Sea. The depth distribution of ostracods in surface sediment samples of the southern Okhotsk Sea was examined using data from the continental shelf and continental slope areas between ca. 50–1,750 m depths. Ostracods are much more abundant on the shelf than on the slope, with only a few specimens present on the lower slope. Many species in this study area are identical to cryophilic species in the northern Japan Sea, which lies adjacent to the southern Okhotsk Sea. Comparison of the depth-distribution patterns of shallow-water species and deep-water species in the northern Japan Sea reveals two relationships: (1) the depth-distribution range of *Johnnealella nopporensis*, *Munseyella hatatatensis* and other species in the Okhotsk Sea (upper shelf to upper slope; 50-500 m) is greater than in the Japan Sea (upper to middle shelf; 40-120 m); (2) the abundances of *Argilloecia toyamaensis* and other species on the slope of the Okhotsk Sea are lower than on the Japan Sea slope.

A few shallow-water species such as *M. hatatatensis* with soft-parts are found from the upper slope of the Okhotsk Sea. This unusual presence is probably the result of ice-rafting. *A. toyamaensis* and other species in the Okhotsk Sea show lower abundance than the northern Japan Sea. This result reflects both lower dissolved-oxygen values compared to the Japan Sea and the shallow depth of Soya Strait that connects the two seas. The differences in environmental setting between the southern Okhotsk Sea and the northern Japan Sea, such as water-mass properties and the development of sea ice, probably cause the differences in ostracod depth-range distribution, even though these two sea areas are connected. Studying the distribution of Okhotsk Sea ostracods, with their controlling environmental factors, is significant for understanding the migration-survival of cryophilic organisms during fluctuations of marine environments not only near future but also since the Pleistocene.

THE OSTRACOD (CRUSTACEA) FAUNA OF ISTRANCA REGION AND THE EFFECTS OF DAMS ON THE OSTRACODA ASSEMBLAGES

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Keywords: Ostracoda, Water Velocity, Human Impact, Fauna

Introduction

Ostracoda can occur in every conceivable aquatic habitat from pools to large lakes, but faunal patterns can change depending on habitual aspects such as salinity, temperature, pH etc. One of the other aspects is water velocity, first underlined by Hiller (1972). In order to obtain drinking water for an increasing human population, dams were built on streams, creating reservoirs. Consequently, many natural flowing water habitats were transformed into stagnant water bodies. This study was performed to understand how the Ostracoda assemblages would be influenced by this change and how many species would be able to adapt to the new environment. In order to comprehend the relationship between water velocity and Ostracoda dispersion, Ostracoda assemblages from reservoirs were compared with those from streams that flow toward the reservoirs and spillways.

Materials and Methods

Fifteen stations from 6 reservoirs (Kazandere, Kuzulu, Papuçdere, Çilinkoz, Düzdere, Sultanbahçe), 14 stations from streams and 4 stations from spillways - a total of 33 stations located in Istranca region - were selected for the study area. All the materials were collected between September 2000 and 2001. During the collection a special hand net (mesh size is 0.025 mm) was used. 4 % formalin was added to the mud. In the laboratory, the mud was repeatedly washed with pressurised tap water using sieves of 0.25, 0.16, 0.08 mm mesh size. The Ostracoda specimens were sorted under a stereomicroscope from sediment and were preserved in 70 % ethanol. Identification was based on the soft body appendages and carapace. In order to show the differences between ostracod assemblages in flowing and stagnant water bodies, statistical tests were conducted, using SPSS and STATISTICA.

Results

In the study 20 species were determined: *Ilyocypris bradyi* Sars 1890, *Ilyocypris biplicata* (Koch 1938), *Ilyocypris decipienc* Kaufmann 1900, *Candona* sp. Petkovski 1959, *Candona angulata* Müller 1900, *Pseudocandona albicans* (Brady 1864), *Candonopsis kingsleii* (Brady and Robertson 1870), *Physocypria kraepelini* G.W. Müller 1903, *Cypria opthalmica* (Jurine 1820*), Prionocypris zenkeri* (Chyzer and Toth 1850), *Eucypris pigra* (Fischer 1851), *Heterocypris incongruens* (Rhamdohr 1808), *Psychrodromus fontinalis* (Wolf 1920), *Psychrodromus olivaceus* (Brady and Norman 1884), *Cypridopsis vidua* (O.F. Müller 1776), *Potamocypris fallax* Fox 1967, *Potamocypris variegata* (Brady and Nonman 1889), *Potamocypris arcuata* (Sars 1903) *Potamocypris zschokkei* (Kaufmann 1900), *Limnocythere inopinata* (Baird 1843), *Tyrrhenocythere amnicola* (Sars 1887), *Loxoconcha im-modulata* (Stepanaitys 1958). For the first time *P. fontinalis* were recorded in the Turkish Ostracoda fauna; only *I. biplicata, C. vidua, P. variegata, L. inopinata, P. kraepelin* and *C. opthalmic* were found in all three habitats: streams, reservoirs and spillways.

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THE LATE SILURIAN ENTOMOZOID OSTRACOD *RICHTERIA MIGRANS*: ONTOGENY, SEXUAL DIMORPHISM AND LIFESTYLE

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Keywords: Myodocopes, Entomozoid, Silurian, Bohemia, Montagne Noire, Sexual Dimorphism, Ontogeny

Richteria migrans is the Late Silurian ancestor of an important group of virtually cosmopolitan ostracodes, the entomozoaceans. Entomozoaceans have a wide geographical distribution (Europe, North Africa, North America and China; Olempska 2002a) in the Devonian and the Carboniferous. The lifestyle of entomozoaceans remains an open issue although several lines of evidence (e.g. distribution, associated faunas and carapace design), suggest that the group had colonized midwater niches. The study of *R. migrans* and its associated myodocope fauna (bolbozoids and cypridinids) is particularly relevant to the question of the pioneer colonization of the pelagic ecospace by ostracodes (Siveter et al. 1991). Richteria migrans is studied here in the light of new abundant material collected in France (Armorican Massif, Montagne Noire) and in the Czech Republic (Bohemia). The black bioclastic limestones from the Combe d'Yzarne (Montagne Noire; Ludlow) have yielded abundant 3D-preserved specimens. Additional material comes from several localities in Bohemia (Lounín, Vseradice, Koukolova Hora, and Velký Vrch; Kopanina Formation, Ludlow). Type specimens were also studied in the framework of the revision of *R. migrans*. In the Armorican Massif and some Bohemian localities, *R. migrans* is typically associated with pelagic faunas such as cephalopod and graptolites. However, this species is also found with benthic faunas (bivalves, trilobites) in the Montagne Noire and Bohemia.

The three dimensional preservation of numerous specimens made it possible to reconstruct the carapace design and the ontogeny of *R. migrans*. We recognized up to seven instars with possible adult dimorphism expressed by differences in the ribbing pattern of the valves. A comparable dimorphism was described by Olempska (2002b) in the Devonian rhomboentomozoid ostracod *Franklinella*. The ribbed ornament is absent in the front part of each valve. This triangular smooth area is enigmatic: it may correspond to the position of hypothetical underlying eyes (Early Silurian myodocopes do have lateral eyes; see *Colymbosathon ecplecticos*; Siveter et al. 2003) or, to the area where swimming antennae may have protruding. The hypothesis that *Richteria migrans* was pelagic (Siveter 1984) is analyzed.

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DIVERSITY OF THE RECENT OSTRACOD FAUNA IN RELATION TO WATER QUALITY IN LOWLAND SPRINGS FROM LOMBARDY (NORTHERN ITALY)

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Keywords: Lowland Springs, Water Quality, Freshwater Ostracods, Distribution, Taxonomy, Multivariate Analysis

Introduction

Northern Italy hosts peculiar lowland springs, locally known as "fontanili". They originate from natural resurgences occurring along the alluvial fans of the main watercourses, namely in the transition zone from the higher to lower plain which is characterised by changes in slope profile and sediment granulometry. These habitats are usually characterised by low variation in hydrologic, hydrochemical and thermal conditions throughout the year.

Materials and Methods

Sampling campaigns were carried out in 28 springs located in the province of Lodi and in the surrounding area. Each site has been visited in two different periods, respectively in July-August and in November 2004. Near to the discharge point, water samples were collected and water temperature was measured. The following parameters were determined in the laboratory: pH, conductivity, total alkalinity, ammonia, nitrite, nitrate, soluble reactive phosphorus, dissolved reactive silica, and chlorophyll-*a*. Ostracod samples were gathered using a 250 µm handnet pulled close to the sediment and through the vegetation. Both soft parts and valves were checked for species identification. Ostracod occurrence in relation to environmental factors was examined using Canonical correspondence analysis (CCA).

Results

Significant differences in hydrochemical features between sites were observed, reflecting a clear geographical gradient. Most of the springs were characterised by high concentrations of inorganic nitrogen. Fifteen ostracod taxa in three families (Candonidae, Ilyocyprididae, and Cyprididae) were identified. The most frequent species were *Cypria ophthalmica* (19 sites), *Herpetocypris reptans* (16), and *Prionocypris zenkeri* (13). The record of *Scottia pseudobrowniana*, which was found in only one spring, is new for Italy. Up to six taxa were recorded from a single site. The results of the CCA indicated that some ostracod species seem to be preferentially associated with peculiar hydrochemical conditions.

DISTRIBUTION OF RECENT FRESHWATER OSTRACODS IN SICILY (SOUTHERN ITALY)

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Keywords: Sicily, Ostracods, Distribution, GIS, Taxonomy, SEM

Introduction

From 2003 to 2005, freshwater ostracods were sampled in 62 water bodies of mainland Sicily (provinces of Palermo, Trapani, Messina, Siracusa, Catania, Ragusa, and Caltanisetta) located from sea level up to 1167 m a.s.l. This survey took into account, streams, springs, fountains, wells, but especially temporary and ephemeral habitats (e.g., rock pools and inundated meadows). The aim of this research was to give the first comprehensive picture of the regional ostracod fauna and define the relationships between habitat features and distribution of ostracod species. These data will be also used for updating the Italian ostracod checklist (Ghetti and McKenzie 1981), which is presently under complete revision.

Materials and Methods

At each sampling site, water temperature and conductivity were measured. Ostracods were collected with a handnet. Living specimens were sorted under a binocular microscopy and then fixed in 90% ethanol. Both soft parts (dissected in glycerine and stored in sealed slides) and valves (stored dry in micropal slides and used for scanning microphotographs) were checked for species identification. The environmental data were crossed with ostracod spatial distribution using a geographical information system (ArcGIS 8.2).

Results

Altogether 20 ostracod taxa belonging to five families (Candonidae, Ilyocyprididae, Cyprididae, Notodromadidae, and Limnocytheridae) were identified. A maximum of four species was found in a single sample. The most frequent species was *Heterocypris incongruens* (25 sites), followed by *Eucypris virens* (21 sites). Eight species (*Candona lindneri*, *Ilyocypris gibba*, *Notodromas persica*, *Trajancypris clavata*, *Herpetocypris brevicaudata*, *Cypridopsis vidua*, *Potamocypris villosa*, and *Limnocythere inopinata*) were found exclusively in one site.

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DISTRIBUTION OF RECENT FRESHWATER OSTRACODS IN SICILY (SOUTHERN ITALY)

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Keywords: Sicily, Ostracods, Distribution, GIS, Taxonomy, SEM

Introduction

From 2003 to 2005, freshwater ostracods were sampled in 62 water bodies of mainland Sicily (provinces of Palermo, Trapani, Messina, Siracusa, Catania, Ragusa, and Caltanisetta) located from sea level up to 1167 m a.s.l. This survey took into account, streams, springs, fountains, wells, but especially temporary and ephemeral habitats (e.g., rock pools and inundated meadows). The aim of this research was to give the first comprehensive picture of the regional ostracod fauna and define the relationships between habitat features and distribution of ostracod species. These data will be also used for updating the Italian ostracod checklist (Ghetti and McKenzie 1981), which is presently under complete revision.

Materials and Methods

At each sampling site, water temperature and conductivity were measured. Ostracods were collected with a handnet. Living specimens were sorted under a binocular microscopy and then fixed in 90% ethanol. Both soft parts (dissected in glycerine and stored in sealed slides) and valves (stored dry in micropal slides and used for scanning microphotographs) were checked for species identification. The environmental data were crossed with ostracod spatial distribution using a geographical information system (ArcGIS 8.2).

Results

Altogether 20 ostracod taxa belonging to five families (Candonidae, Ilyocyprididae, Cyprididae, Notodromadidae, and Limnocytheridae) were identified. A maximum of four species was found in a single sample. The most frequent species was *Heterocypris incongruens* (25 sites), followed by *Eucypris virens* (21 sites). Eight species (*Candona lindneri*, *Ilyocypris gibba*, *Notodromas persica*, *Trajancypris clavata*, *Herpetocypris brevicaudata*, *Cypridopsis vidua*, *Potamocypris villosa*, and *Limnocythere inopinata*) were found exclusively in one site.

Reference

Ghetti, P.F. and McKenzie, K. 1981. Ostracodi (Crustacea: Ostracoda).- Guide per il riconoscimento delle specie animali delle acque interne italiane. Consiglio Nazionale delle Ricerche, Roma, 83 pp.

TOWARDS A REVISION OF *CHLAMYDOTHECA S.L.* SAUSSURE WITH THE DESCRIPTION OF A NEW GENUS AND A NEW TRIBE (CRUSTACEA, OSTRACODA, CYPRIDIDAE)

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The extant cypridinid genus *Chlamydotheca* s.l. Saussure comprises dozens of species with very different valve morphologies. They are united by a number of synapomorphic features in the soft parts, such as the two distal setae on the first endopodal segment of the T2 and the presence of a third claw-like seta on the third endite of the Mx1. However, in other features these can differ dramatically. Some species are rounded and highly arched, others are very elongated. Some species have beak-like anterior expansions, reminiscent of the fossil *Cypridea* s.l., others have valve margins that are homeomorphic to *Herpetocypris*.
In addition, the position of the genus within the Cyprididae is unclear. For a long time, *Chlamydotheca* was seen as part of the Cypridinae. However, Martens (1990, 1992) clearly illustrated the fact that four genera in that subfamily (*Cypris, Pseudocypris, Globocypris, Ramotha*) most likely formed a phylogenetic group to which *Chlamydotheca* did not belong. Earlier, Martens (1986) had described the (mainly) South American *Chlamydotheca* as the sister-group to the (mainly) African Megalocypridinae. Therefore, both intrageneric taxonomy and taxonomic position of *Chlamydotheca s.l.* remained uncertain.
Here, we present a primer to the revision of this lineage by (1) splitting the genus into two (by describing a new genus for the large, elongated forms) and (2) re-discussing the phylogenetic position of these giant, temporary pool ostracods.

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HISTORICAL BIOGEOGRAPHY OF RECENT CENTRAL EUROPEAN FRESHWATER OSTRACODS

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Actual freshwater ostracod fauna of Central Europe comprises 158 species (Meisch 2000) which of 32 (20%) is identified in pre-Quaternary basins situated mostly in area of the Alpine-Carpathian orogenic belt. Besides of oligotitanophilic and rheophobic species, all ecological groups from the view of temperature, calcium content, salinity and water velocity are present. The holarctic and fully sexual taxons prevail. On the base of actual data the evolution of recent nonmarine ostracods starts since Early/Middle Miocene, but most of the species should evolve in Quaternary, in period with significant fluctuations of ecological conditions (Tab. 1).
First stratigraphical and geographical occurrence of recent species in pre-Quaternary deposits:

OLIGOCENE

Darwinula stevensoni (Brady and Robertson 1870) - Middle Oligocene (Meisch 2000); known from most of freshwater deposits. *Ilyocypris bradyi* Sars 1890 - reported from Melanienton (Early Oligocene) of Germany (Carbonnel and Ritzkowski 1969), Early Miocene of Turkey (Tunoglu and Celik 1995); frequently from different Late Miocene sequences but without details of ripplets in PV margin significant for species determination. Pliocene of USA and ex-USSR (Meisch 2000).

EARLY MIOCENE

Candonopsis kingsleii (Brady and Robertson 1870) - firstly mentioned from Early Miocene of Mainz Basin (Germany) by Lienenklaus (1905) and later described and drawn by Lutz (1965) from the same basin. Certainly known since Middle Miocene (Janz 1997). *Cyclocypris ovum* (Jurine 1820) - Karpatian of Southern German Molasse Basin (Witt 2000). *Ilyocypris gibba* (Ramdohr 1808) - Ottnangian of Southern German Molasse Basin (Witt 2000). *Potamocypris zschokkei* (Kaufmann 1900) - Aquitanian of the Lower Freshwater Molasse of Switzerland (Carbonnel and Ritzkowski 1969).
Cypria ophtalmica (Jurine 1820) - described from Lower and Upper Freshwater Molasse and Brackish Molasse of Germany (Early to Late Miocene) (Straub 1952) but younger works (Witt 2000) don't indicate its presence. Certainly known since Late Miocene of Vienna Basin (Slovakia) (Pipík et al. 2004).

MIDDLE MIOCENE

Paracandona euplectella (Robertson 1889), *Fabaeformiscandona fabaeformis* (Fischer 1851), *F. balatonica* (Daday 1894), *Notodromas monacha* (O.F. Müller 1776), *Cavernocypris subterranea* (Wolf 1920), *Potamocypris arcuata* (Sars 1903) - all Middle Miocene findings come from Steinheim Basin (Janz 1997).

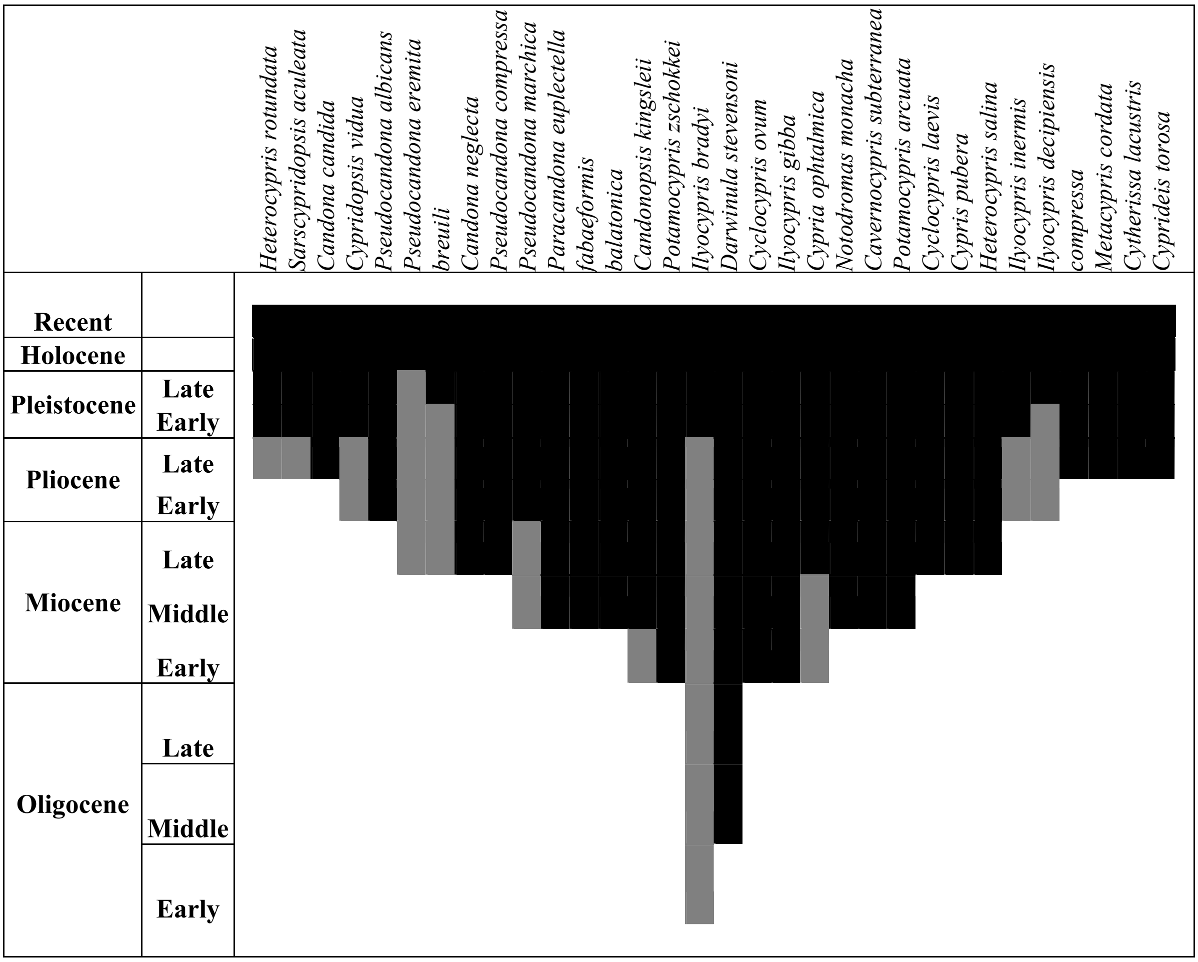
LATE MIOCENE

Candona neglecta (Sars 1887) - Rhône Basin (France) (Carbonnel 1969); Turiec Basin (Slovakia) (Pipík 2001) *Fabaeformiscandona* aff. *breuili* (Paris 1920) - Turiec Basin (Slovakia). Undoubtedly known since Late Pleistocene of Germany (Diebel and Pietrzeniuk 1984). *Pseudocandona* aff. *eremita* (Vejdovsky 1820) - Turiec Basin (Slovakia); *Candona (Typhlocypris)* ex gr. *eremita* comes from Pliocene of Serbia (Krstić 1995; juvenils of *C. (T.) eremita* are described from Pliocene of Turkey (Freels 1980). Certainly known since Holocene (Meisch 2000). *Pseudocandona compressa* (Koch 1838) - Upper Freshwater Molasse of Switzerland (Carbonnel et al. 1985); Turiec Basin (Slovakia). *Cyclocypris laevis* (O.F. Müller 1776) - Pannonian (Vienna Basin), Turiec Basin (both Slovakia).

Cypris pubera (O.F. Müller 1776) - Turkey (Freels 1980). *Heterocypris salina* (Brady 1868) - Rhône Basin (France) (Carbonnel 1969); Turkey (Freels 1980), Turiec Basin (Slovakia).

PLIOCENE

Candona candida (O.F. Müller 1776) - Late Pliocene of ex-USSR (Mandelshtam and Schneider 1963). *Pseudocandona marchica* (Hartwig 1899) - Rhône Basin (France) (Carbonnel 1969); possibly Middle Miocene of Steinheim Basin (Germany) (Janz 1997) and Late Miocene of Turkey (Freels 1980). *Pseudocandona albicans* (Brady 1864) - Early Pliocene of Dacic Basin (Roumanie) (Danielopol et al.,1990). *Ilyocypris* gr. *decipiensis* Masi 1905 - Pannonian Basin of ex-Yugoslavie (Krstić 1988). *Ilyocypris inermis* Kaufmann 1900 - Greece (Lüttig 1968). *Heterocypris rotundata* (Bronshtein 1928) - Plio-Pleistocene of Greece (Mostafawi 1988). *Cypridopsis* aff. *vidua* (O.F. Müller 1776) - Pannonian Basin of ex-Yugoslavie (Krstić 1988). Certainly known since Early Pleistocene (Meisch 2000). *Sarscypridopsis aculeata* (Costa 1847) - Plio-Pleistocene deposits of Greece (Mostafawi 1988). *Paralimnocythere compressa* (Brady and Norman 1889) - Late Pliocene of Greece (Mostafawi 1994). *Metacypris cordata* Brady and Robertson 1870 - Late Pliocene of Greece (Mostafawi 1994). *Cytherissa lacustris* (Sars 1863) - Late Pliocene of Euxinian Basin (Caspian Sea), (Danielopol et al. 1990). *Cyprideis torosa* (Jones 1850) - Late Pliocene of Greece (Mostafawi 1994).



Tab. 1: Stratigraphical distribution of actual freshwater ostracod fauna of Central Europe in pre-Quaternary deposits. **Black:** certain occurrence - **Grey:** uncertain occurrence.

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OLIGOCENE OSTRACODS FROM THE SOUTHERN UPPER RHINEGRABEN AREA: PALEOECOLOGICAL IMPLICATIONS

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Keywords: Southern Upper Rhinegraben, Paleogene, "Série Grise", Ostracod Assemblages

About 200 samples from the two boreholes Allschwil 2 (Southeast of Basel) and DP202 (North of Mulhouse) were investigated on microfossils. There are three zones particularly rich in foraminifers and/or ostracods:

The Early Rupelian "Zone fossilifère", representing the first Rupelian marine ingression into the Upper Rhinegraben (Berger et al. 2005), was only cored in Allschwil 2. The mass occurrence of brackish to marine-brackish species *Hemicyprideis* aff. *helvetica* and *Hemicyprideis* cf. *rhenana* and the rare species *Cytheromorpha zinndorfi* and *Schuleridea* cf. *perforata* confirm the influence of salt-water. As there are many (juvenile and adult) specimen of the genus *Hemicyprideis* showing tubercles, a certain influx of freshwater is indicated (Gebhardt 2004).

The Middle Rupelian second marine ingression (Berger et al. 2005) starts off in both boreholes with the fully marine "Foraminiferenmergel" (lowermost "Série grise"). Associated with a very rich foraminifer fauna, the deep-water ostracod *Henryhowella asperrima* indicates (Picot 2002) - together with the benthic foraminifer *Sphaeroidina bulloides* - water depths of about 200m and more. In the following "Fischschiefer" beds and "*Meletta*-Schichten" ostracods are missing or very rare.

The ostracod assemblages of the Late Rupelian "Cyrenen-Mergel" (uppermost "Série grise") confirm, according to Picot 2002, the transition from coastal marine (e.g. *Cytheridea pernota*, *Pterygocythereis ceratoptera*, *Loxoconcha favata*) to brackish estuarine conditions (genera *Hemicyprideis*, *Cyamocytheridea*). The occurrence of some tubercle-bearing (juvenile and adult) specimen of the genus *Hemicyprideis* in the uppermost "Cyrenen-Mergel" confirms the decreasing trend of salinity.

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LATE PLEISTOCENE OSTRACODS FROM LAKE HÖVSGÖL (MONGOLIA)

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Keywords: Species, Ostracoda, Late Pleistocene, Hövsgöl

Introduction

According to G. Mazepova (in press), there are 12 species of ostracods inhabiting recent Hövsgöl; *Cytherissa daschidorschi* described by G. Mazepova in the same paper is a single endemic, whereas others belong to Palaearctic six genera. First data on ostracods in bottom sediments of Hövsgöl were published by Fedotov et al. (2000) after analyzing core HUB-01 taken from the deep part of the lake. They found numerous valves and even intact shells of *Candona* and *Cytherissa* genera in the lower muddy segment of the core. However, the species of the ostracod shells and their quantitative distribution in different parts of the core remained unknown. This report presents the results of investigating an 11.6 m fragment of a drilling core (KDP-01) from the bottom sediments of Lake Hövsgöl.

Methods

The core fragment estimated as 230 ky of age (Fedotov et al., 2004) was analyzed totally at 2 cm intervals. About 1 g of dry sediment was taken from these intervals. Samples were washed in water through a 200 µm sieve to withdraw the fine fraction and suspension.

Results

The following ostracod species were found in the samples: *Cytherissa lacustris* (Sars 1862)*, Candona lepnevae* Bronstein 1947, *Leucocythere* sp. and *Limnocythere inopinata* Baird 1843. The last-named species was represented by female and male valves. It was impossible to identify *Cytherissa lacustris* valves either only as females or as both males and females owing to their highly diversified sizes. Three species (*C. lepnevae, C. lacustris* and *L. inopinata*) are abundant; they number up to a few hundred specimens per gram of dry sediment. Valves identified as *Leucocythere* sp. are more similar in morphology to *Leucocythere mirabilis* and have not been found in recent Hövsgöl. According to Danielopol et al. (1990), *L. mirabilis* is cold-stenothermic species with a preference for oligotrophic European waters and differs from Asia fossils assigned to *Leucocythere* genus. The taxonomical statuses of these Asia and Hövsgöl fossils are still uncertain. The valves of *Leucocythere* represent both sexes, their greatest number falling within the period of higher sulfate content in the sediment. Valves of *Leucocythere* sp. are not numerous in the sediment, their number not exceeding a few dozen per gram of sediment. This species is lacking in the core segment 11 ≈ 42 ky BP. The valve lengths of all species, except *C. lepnevae*, varied from 0.26 to 0.74 mm, and their heights from 0.16 to 0.44 mm, i.e. larvae and adult specimens. *Candona lepnevae* valves were almost twice as large, their length being 0.6-1.2 mm.

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GROUNDWATER OSTRACODS FROM THE ARID PILBARA, NORTHWESTERN AUSTRALIA: DISTRIBUTION AND WATER CHEMISTRY

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Keywords: Stygofauna, Pilbara, Groundwater, Hydrochemistry, Candoninae

The Pilbara region in northwestern Australia is best known for its iron-ore industry. The expansion of mining operations to below the watertable poses several potential problems for ecology of the groundwater, with increased salinisation and contamination of aquifers as well as destruction of habitat. In consideration of the threats to stygofauna posed by mining operations, the Department of Conservation and Land Management (CALM), Western Australia, is undertaking a survey to provide a framework for the assessment and conservation of groundwater biodiversity. The region, covering around 180 000 km^2, is hot and arid. Annual rainfall is in the order of 200-350 mm, falling largely during summer from tropical cyclones. There is little permanent surface water, however groundwater is plentiful and mostly fresh. The groundwater environment thus provides a habitat for life, and has been identified as a subterranean biodiversity "hot-spot" with a high degree of endemicity. The waters are typically rich in bicarbonate, and thus ostracods are particularly well represented. This study looks at the distribution of the ostracod species in relation to the physical constraints of the aquifers and the hydrochemistry.

Samples were collected from bores using plankton haul nets. During the first year of fieldwork (2002-2003), 355 samples were obtained from 253 bores, with many of the bores being sampled twice to assess seasonal variation. Each of three aquifer types; unconsolidated sedimentary, chemically deposited (carbonate and pisolite) and fractured rock, were targeted. Water samples were taken from

each of the bores and analysed for major ions, nutrients and other physical parameters. A suite of samples was also taken for $\delta^{18}O$, δD and trace element analyses.
Ostracod fauna have been retrieved from approximately 35 % of the samples and 41% of the bores. Twenty genera and around 90 species of ostracods have been identified. Of these, 56 are new species and a further 21 are currently in open nomenclature. The Candoninae are particularly well represented with 14 genera, some such as *Areacandona* and *Deminutiocandona* have more than 10 species each. The majority of bores are dominated by one or two species, with up to seven species at some sites. The most abundant and diverse sites occur in fresh, carbonate-rich, aquifers utilised for water extraction, such as Paraburdoo, Cane River and Millstream. Ornate and ridged-valve species are common in the Mg-HCO_3 waters of the Newman and Marillana creek area. The more saline, Na-Cl rich aquifers at the edge of Great Sandy Desert have a particularly distinct fauna including one almost triangular form. The distribution of species is confined primarily by the extent of the host aquifer. Within an aquifer, salinity, dissolved oxygen, HCO_3/Cl, Mg/Ca and pH govern the occurrence of taxa. The relationship between these patterns and species distributions will be discussed.

ERNST LIENENKLAUS - ON THE 100TH ANNIVERSARY OF HIS DEATH MAY 6TH, 1905

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Keywords: Ernst Lienenklaus, Biography, Bibliography, Ostracoda, Oligocene, Miocene

Ernst Lienenklaus, born on September 8th, 1849 in Wechte, district Tecklenburg, Westphalia, Germany, started his study of sciences in Petershagen, Westphalia, to become a teacher. After short employments at a hedge-school in the Teutoburger Wald and at the German-Protestant elementary school in London, he became teacher at the Rautenberg's private school for girls in Osnabrueck, Lower Saxony, and, in 1877 headmaster at the city high school for girls. Beside his official educational work, he was engaged in his leisure time in regional botany, zoology, and geology - especially in modern beetles (Lienenklaus 1889a) as well as on fossil and Recent molluscs and ostracodes (e.g. Lienenklaus 1889b, 1898b). In 1887, he was appointed executive committee member in the Natural Science Association of Osnabrueck („Naturwissenschaftlicher Verein zu Osnabrueck"), secretary, librarian, vice-chairman, and finally chairman (1899-1905). In addition, Lienenklaus was the curator of the collection of beetles (1885-1905), and of the geoscientific collection (1893-1905), as well as of the natural scientific collection in general (1893-1905) at the Museum in Osnabrueck (today the „Museum am Schölerberg, Natur und Umwelt. Planetarium").
Because of his curatorial contact with Tertiary fossils, he became interested in Late Oligocene fossils from the Doberg near Buende, Westphalia - a fossil site, which was already well-known at that time. In 1891, Lienenklaus published his first monograph „Die Ober-Oligocän-Fauna des Doberges", in which he described and partly figured bivalves, gastropods, echinoids, bryozoans, as well as a selection of microfossils, such as foraminifers and ostracodes. Three years later (Lienenklaus 1894), he published the „Monographie der Ostrakoden des nordwestdeutschen Tertiärs", in which he described mostly Oligocene, but also Miocene ostracodes from northwestern Germany, including 43 new species and subspecies based on nearly 8500 ostracod specimens. This work established his international reputation.
All these activities brought Lienenklaus to the notice of numerous famous palaeontologists, e.g. Professor Adolf von Koenen (1837-1915) at Goettingen University, Professor Eugen Geinitz (1854-1925) at Rostock University, Professor Karl Alfred Zittel (1839-1904) at Munich University, Professor August Hosius (1825-1896) at Muenster University, Professor Georg Friedrich Kinkelin (1836-1913) at the Senckenberg Museum in Frankfurt/Main, and Professor George Stewardson Brady (1832-1921) at Newcastle-on-Tyne College, as well as some autodidactic palaeontologists, such as Jakob Zinndorf (1878-1951) in Frankfurt and Erich Spandel (1855-1909) in Nuernberg/Frankfurt. After studying important ostracode collections and type material (e.g. v.Münster 1830, 1835, Bornemann 1855, Reuss 1855, Egger 1858, Speyer 1863), and being stimulated by the fundamental work of G. W. Müller

(1894) on Recent Ostracoda from the Gulf of Naples, he published further monographs on Tertiary ostracodes from the Paris Basin, Switzerland, Bavaria, Mecklenburg, and northern Germany (Lienenklaus 1895, 1896, 1897, 1898a, 1900). In 1902, he became the status of a senior master at his school. Three years later, after an insidious illness, Ernst Lienenklaus died on May, 6th 1905, in Ribbesbuettel near Braunschweig, Lower Saxony. His last monograph on the Tertiary ostracodes of the Mainz Basin („Die Ostrakoden des Mainzer Tertiärbeckens“) was published posthumously in 1905.

His personal collection was splitted in 1905. The first part, the Lienenklaus ostracod collection, was purchased for a price of 500 Reichsmark by Adolf von Koenen (1837-1915) for the Museum of Natural History at Goettingen University (today collections of the Geoscience Centre of the University of Goettingen), some weeks before Lienenklaus died. The second part, mainly Tertiary and some Carboniferous macrofossils, was bought by the Osnabrueck Museum (Anonymous 1907). The Goettingen Lienenklaus collection consists of more than 10,000 ostracod specimens from the Tertiary and Quaternary of Germany, France, Switzerland, Belgium, Italy, Hungary, Romania, Serbia, North Sea, and the Arctic Ocean.

The collection was forgotten for nearly fifty years. Triebel (1950, 1952) thought it to be lost during the World War II. Henri J. Oertli was the first who used the Lienenklaus collection for his dissertation (Oertli 1956). Beata Moos (1963ff.) started to rescue and reorganize the ostracode collection of Lienenklaus, including redescriptions of type material. The inventory of this collection is nearly finished.

Ernst Lienenklaus deserves well of increasing the knowledge on European Oligocene and Miocene ostracodes, and of including detailed informations of external and internal features of shell morphology (e.g. line of concrescence, radial pore canals) in his descriptions, and additional comments of altogether 380 taxa, 130 of them new to the science. He was the first to detect how amazingly diverse the ostracode fauna in many German Oligo-Miocene sites is.

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A LATE HOLOCENE PALAEOENVIRONMENTAL RECORD FROM WESTERN MEXICO

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Keywords: Holocene, Ostracoda, Ecology, Palaeoecology, Palaeolimnology, Stable Isotopes, Trace Elements, Magnetic Susceptibility, Total Carbon, Mexico

Santa María del Oro is a freshwater crater lake located near the Pacific coast of México (21.3° N, 104.5° W, 760 m a.s.l.), at the eastern end of the Trans Mexican Volcanic Belt (TMVB). The area has a warm (22-24°C), sub-humid (1600 mm/year) climate with a rainy season from June to October. The dominant vegetation is low, deciduous rainforest. Santa María del Oro is a tropical monomictic lake; it is almost round with a diameter of 2 km, a maximum depth of 60 m and a mean depth of 46m. Owing to its steep sides, its littoral zone is too narrow or non-existent. It has a shallower area on the southwest side named Agua Quieta. Four parallel cores between 4 and 9 m long were recovered in March 2002 from this shallow area (12 m deep) by means of a Usinger Piston Corer. The longest core was described, photographed and sampled for biological, physical and geochemical analyses every 10 cm and in any other evident horizon. High resolution studies have been performed in this sequence;

analyses include ostracoda, total organic carbon, total inorganic carbon, magnetic susceptibility, stable isotopes and trace elements.

These cores are laminated and consist mainly of alternate layers of brown silt and sand, but occasional layers of peat, reddish silt, or light brown, carbonate-rich silt are also present. Chronology is given by seven AMS ^{14}C datings on peat which indicate that the sequence covers ca. 2,500 yrs. B.P. At present the lake has pH 8.8, electric conductivity 1300 µS/cm, salinity 0.7 ‰, alkalinity 427 mg/l and total dissolved solids 813 mg/l. Four of the proxies, $\delta^{18}O$, $\delta^{13}C$, Sr/Ca and Mg/Ca, were measured in the same ostracod sample. Environmental changes within the lake and catchment have been interpreted from variations in a range of biological, physical and chemical proxies. The proxies, including the ostracod assemblages data, provide evidence of climate changes and suggest either a change in precipitation-evaporation rate -effective moisture- or a change in timing and/or duration of the dry and rainy seasons. A high-resolution record of environmental and climatic variability is obtained for western Mexico during the last 2,500 years B.P.

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NEOGENE RECORDS OF NONMARINE OSTRACODS FROM SPAIN

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Keywords: Nonmarine Ostracods, Neogene, Ebro Basin, Palaeobiogeography

Knowledge of nonmarine ostracods requires us not only to assess the modern ecology and distribution of their species, but also to clarify the recent geological history of their ancestors. We present here the Neogene ostracod distribution of the non-marine species described so far in Spain, and discuss the older ages assigned to several of the most common species living in modern lakes and similar environments of this region. The material studied mostly conform with recent, Pliocene and Miocene ostracods from the Ebro Basin (N. Spain), completed with data from other Iberian basins and also that of the literature (see references). For fossil species, taxonomic determinations are based on carapace morphology, but other biological features (such as singamy vs. parthenogenesis; imprints of soft parts, etc.) have been taken into account when possible. By using this approach we try to avoid the problems arising from the taxonomic assignment of live species, almost exclusively based on soft parts of these crustaceans. Fortunately, a good number of Neogene fossil species have living representatives today, and a direct comparison of fossil and live carapaces is possible.

Particularly well preserved sediments from the mid Pliocene of the Ebro Basin contain the oldest known records of some of the living species, most belonging to the Candonidae. A few of these records can be traced back to the Miocene, thus depicting an earlier palaeogeographical map of peri-lacustrine ostracod species in southwestern areas of Europe.

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REVISION OF NONMARINE EARLY CRETACEOUS OSTRACODA OF THE U.S. WESTERN INTERIOR - IS THERE A CHANCE OF BIOSTRATIGRAPHIC UTILISATION? - A PRELIMINARY REPORT

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Keywords: Ostracoda, Nonmarine Early Cretaceous, North America, Biostratigraphy

For a long time, ostracodes of the nonmarine Early Cretaceous in North America have been considered as endemic. But within the last 20 to 30 years it became clear that faunal connections between North America and other continents seem to be probable. New perceptions in ostracode biology (reproduction and dispersal mechanisms) and palaeontology (biostratigraphic record) result in the hypothesis that a faunal connection between North America and Europe (and other continents as well) is very likely. This assumption has been reinforced by the fact that in the 1990s such connections were proven for the nonmarine Late Jurassic Morrison Formation which underlies many Early Cretaceous formations in the U.S. Western Interior (see Schudack et al. 1998). Taxonomic problems, complexity of contemplated ostracode groups, too little information and misinterpretation seem to have been the primary issues in the past.

Among others, the main groups concerned are the *Cypridea* lineage and the *Bisulcocypris/Theriosynoecum* Group (both Cypridoidea), which include many species usable for biozonation in the British Purbeck and Wealden, for instance (see the publications of F.W. Anderson; and Horne 1995 and 2002). Because species of the *Cypridea* lineage are deemed to have had mixed reproductive strategies with a high asexual (parthenogenetic) rate and their desiccation resistant eggs are assumed to have been easily distributed by wind (and/or animals), it seems to be very implausible that this should not have happened several times within a timespan of about 40 Ma. Thus, based on new data (including the author's own material) a detailed taxonomic revision and faunal comparison with other continents (mainly Europe) are expected to result in utilising the nonmarine Early Cretaceous ostracodes of North America for biostratigraphy.

Application of the results to certain formations (Lakota Formation, Black Hills, South Dakota/ Wyoming - main focus; Cloverly Formation, Wyoming/Montana and Cedar Mountain Formation, San Rafael Swell, Utah) will be an initial step. Where applicable, the project will also include an integration of and calibration with charophytes. The project is carried out in cooperation with research projects, mostly about vertebrate (early mammal) evolution, at the Sam Noble Oklahoma Museum of Natural History and funded by the DFG (German Science Foundation - Schu 694/14-1 and 14-2).

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OSTRACODA AND CHAROPHYTA OF THE LATE JURASSIC/EARLY CRETACEOUS TENDAGURU BEDS AT THE TYPE LOCALITY (TENDAGURU HILL, SOUTHEAST TANZANIA) AND THEIR BIOSTRATIGRAPHIC, PALAEOBIOGEOGRAPHIC AND PALAEOECOLOGIC RELEVANCE

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Keywords: Late Jurassic, Early Cretaceous, Tendaguru, Ostracoda, Charophyta

The Tendaguru Beds at Tendaguru Hill (Tanzania, East Africa) are noted worldwide for their famous Late Jurassic dinosaur fauna. In the context of the German-Tanzanian Tendaguru Expedition in August/September of 2000 (Heinrich et. al. 2001) the newly defined standard section was sampled micropalaeontologically. Whether the Tendaguru Beds have formation status or not, has not yet been ascertained - a sedimentological definition of the proposed term Tendaguru Formation is still lacking. The Tendaguru Beds consist of three beds bearing dinosaurs (Lower, Middle and Upper Dinosaur Bed) that are intercalated into, or superposed by, beds containing mainly marine faunas (*Nerinea* Bed, *Trigonia smeei* Bed, *Trigonia schwarzi* Bed). Whereas many questions regarding palaeoecology and depositional environment could be resolved by reference to sedimentological and palaeontological data of the expedition in 2000, the exact age of the Tendaguru Beds remains controversial.

Ostracoda (and some Charophyta) from the standard section described in detail for the first time proved to be valuable for supplementary statements concerning biostratigraphy and palaeoecology of single strata. Although only few layers unevenly distributed over the section produced calcareous microfossils, the results are very promising bearing in mind that the short expedition was intended as a pilot phase. A total of 40 ostracode and 2 charophyte taxa were distinguished. Within this south-western area of the Tethys ("Somali basin", Madagascar Channel - East Africa, Madagascar and West India) the Tendaguru microfauna occupies an exceptional position regarding facies because of its nonmarine elements. The marine faunal part belongs to a relatively endemic southern (Gondwana) fauna. Although comparable faunas from the East African-West Indian-Madagascan faunal province are stratigraphically older on the average (i.e. Late Jurassic) and fully marine, a few taxa have provided additional biostratigraphic information. However, there are still some major biostratigraphic problems remaining and the results should be evaluated critically. It is noteworthy that there are nearly no connections to the ostracode fauna of Madagascar.

The micropalaeontological data suggest an (at least Middle-) Oxfordian age for the lower part of the Tendaguru Beds (Lower Saurian and *Nerinea* beds), as has been proposed by some earlier workers. On the basis of "nodosoclavatoroid utriculi" (Charophyta) the upper part of the *Trigonia smeei* Bed is considered to be of Early Cretaceous age, and the Tithonian-Early Cretaceous border is assumed to be within this bed. Alongside other fossil groups, the palaeoecologic analysis of microfauna and -flora assemblages (salinity tolerances) confirmed that the subdivision of the Tendaguru Beds into three nonmarine (Saurian Beds) and three marine layers, as proposed by earlier authors, should be recognised as general only, but is much more complex in detail.

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SOME PALAEOZOIC OSTRACODES FROM THE SPANISH PYRENEES

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Palaeozoic ostracodes from the Pyrenees are not well known. Only three papers have been published up to now, two (Groos-Uffenorde et al. 1972, Delvlové and Lethiers 1986) dealing with Devonian ostracodes and another (Requadt et al. 1977) on Carboniferous ostracodes. In recent years, the etching of Devonian limestones by one of us (JSL), looking for conodonts, yielded rather prolific ostracod faunas of Late Devonian age in the locality of the Els Castells.

In the Pyrenees, Palaeozoic rocks crop out in the Axial zone. The Els Castells unit is one of the southern upper thrusts of the Alpine antiformal stack developed in the central Pyrenees. The Els Castells Unit includes Silurian to early Carboniferous rocks. During Devonian times this unit was a part of the el Comte sedimentary domain, even though the lithological features of its succession are, in fact, intermediate between those of the el Comte and those of the Sierra Negra domains (Sanz-López 2004 and references therein). In some localities (including Els Castells) the Emsian to Famennian Comabella limestone Formation is split into two limestone parts by the shales of the Taús Beds. The upper one is made of grey to ochre nodular limestones, lime mudstone to dacryoconarid packstone. In the Els Castells section, this part has a thickness of ca 24 m, the base being considered latest Eifelian, and the top earliest Famennian in age (Sanz-López 2004).

The ostracodes we are dealing with were collected from the upper part of the Comabella Formation in the Els Castells section (at an interval of between 9.5 and 6.5 m below the top of the Formation). According to the conodonts, the samples collected 6 m below the top of the Comabella Formation are of late Frasnian age, whilst the age of samples above that level is early Fammennian in age.

Limestones were processed with 10% concentrated acetic acid, then washed, dried and picked up under a binocular microscopy. The ostracod fauna contains, among others, several species of *Aechmin*a, *Kullmannissites*, *Amphissites*, *Neochilina*?, *Tricornina*, Bythocytheridae, *Bairdia*, *Acratia*, *Bairdiocypris*?, *Rectonaria* and several undetermined hollinellids. Some of these genera, especially *Rectonaria*, *Aechmina*, *Kullmannissites* and *Tricornina*, are conspicuous elements of the "Thuringian assemblages" known mainly from Devonian and lower Carboniferous strata of different parts of the world.

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MARINE INTRUSIONS IN THE UPPER HOLOCENE OF THE RETBA AND MBAWANE LAKES (SENEGAL) EVIDENCED BY OSTRACODE FAUNAS

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Keywords: Retba Lake, Mbawane Lake, Senegal, Ostracodes, Marine Intrusions, Upper Holocene

Introduction

The senegalese great coast between Dakar and Saint-Louis is formed by juxtaposition of dunar systems of which depressions named "niayes" may be filled with sea water and/or the water table. The Retba and Mbawane lakes are in these depressions whose sediments have registered recent sea-level changes that we try to reconstitute after the ostracode faunas.

Materials and methods

Study has been led from one core of each lake. Samples taken on all 10 cm of each core have been dried, weighed and washed with 590 µm and 63 µm sieves. Ostracodes have been picked, counted and determined under 10 to 40 stereomicroscope magnifications. Microphotographs have been taken from the SEM of the Département de Biologie Animale of the Faculté des Sciences et Techniques of Dakar.

Results

A total number of 25 species have been identified and most of them are also known in the Gulf of Guinea and the adjacent lagoons. The Retba lake core is closer to the sea and yielded the richer and more diversified ostracode fauna distributed into four associations. Association 1 is dominated by *Cyprideis nigeriensis* Omatsola, *Neomonoceratina iddoensis* Omatsola and *Aglaiella* sp. 1 Pinson and characterizes a weakly opened lagoon with mangrove vegetation cover on the edges and humid climate. Association 2 with mainly *C. nigeriensis*, *N. iddoensis* and *Aurila punctoreticulata* Omatsola is the richer and most diversified with high ratio of marine species that evidence marine little gulf bordered with mangrove. Monospecific association 3 with *C. nigeriensis* is typical of a closed and hypersaline lagoon under dry climate. The oligospecific association 4 at the top with *C. nigeriensis* and *Phlyctocythere hartmanni* Omatsola extending at the top of the core is related to weakly opened and salted lagoon under arid climate. The Mbawane lake core yielded scarce and bad preserved micro-fauna splited into three intermittent levels that are correlated with the Retba core associations. Association 1 with *Leptocythere* sp. 1 Pinson and *Xestoleberis* sp. 2 Pinson corresponds to a faintly opened lagoon of which bottom is covered by sea-grass or seaweeds. Association 2 comprises *N. iddoensis*, *Pseudocytherura calcarata*, *Aglaiella* sp. 1 Pinson and *Ruggieria tricostata* Omatsola, corresponding to a more open lagoon edged with mangrove. Association 3 is not represented in the Mbawane core. The monospecific association 4 with *C. nigeriensis* is related to closed and drying-up lagoon. Marine influences have been stronger in the Retba core than in the Mbawane one during the time. The two marine incursions evidenced here may correspond to those of the Dakarian (3000 years B.P.) and Saint-Louisian (2000 years B.P.) known in the senegaleese shoreline in the Upper Holocene.

TAPHONOMY OF OSTRACODE ASSEMBLAGES IN HOLOCENE TSUNAMI DEPOSITS IN SOUTHERN KANTO REGION, CENTRAL JAPAN

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Keywords: Tsunami, Taphonomy of Ostracodes, Holocene, Paleo-Tomoe Bay, Central Japan

Introduction

Many layers of tsunami deposits are intercalated in Holocene bay deposits exposed in the southern Kanto region, on the Pacific coast of central Japan[1]. Ostracodes in these tsunami deposits have been studied to reconstruct tsunami wave processes[2) 3)]. In this study, more detailed changes of ostracode assemblages and their taphonomy were analyzed using sliced samples of tsunami deposits. At least seven Holocene tsunami layers are exposed at the study site, which is situated along the Tomoe River on the southern Boso Peninsula, central Japan. The beds are composed of gravelly to sandy deposits intercalated into massive dark gray clays to silt laid down in paleo-Tomoe Bay. Each tsunami layer comprises a stack of four units, Tna, Tnb, Tnc and Tnd.[4] We focused on ostracodes from the lower two tsunami layers (T2 and T2.1; ca. 8000 cal. yr BP) and normal sediments above and below them.

Materials and Methods

We obtained sediment samples for ostracodes and grain size analyses, using the sampling method by Abe et al.[5], from five lithological units: lower mud (LM: 140 cm thick massive clay), T2 tsunami deposit (T2: 20 cm thick laminated medium to coarse sand), middle mud (MM: 40 cm thick massive silt), T2.1 tsunami deposit (T2.1: 30 cm thick laminated medium to coarse sand) and upper mud (UM: 40 cm thick massive silt). Samples were washed through a 250-mesh sieve screen (opening: 0.063 mm) and ostracodes were picked from residue coarser than 0.125 mm. Grain size analysis was conducted by a laser diffraction particle size analyzer (Shimadzu SALD-3000) at Shimane University.

Results

Units composed of normal muddy sediments (LM, MM and UM) contain many well-preserved enclosed muddy bay species such as *Bicornucythere bisanensis*, *Spinileberis quadriaculeata*, *Loxoconcha viva* and *Nipponocythere bicarinata*. The latter two prefer deeper and oxygen-rich bottoms than the former two, and are species now living abundantly in ca. 10 to 15 m of water. Thus, the study site provides evidence that paleo-Tomoe Bay was a calm enclosed muddy bay with water depths of less than 10-15 m at the time of the T2 and T2.1 tsunami events. Some peaks of mud content and sorting indices are recognized in the tsunami deposits, suggesting the tsunami waves stopped for some periods. Coarser and well-sorted tsunami deposits contain intertidal phytal ostracodes and open nearshore sand dwellers in relatively high ratios. On the other hand, badly sorted tsunami deposits with high mud contents include abundant enclosed muddy bay species. There are at least three peaks of relative abundance of derived ostracode specimens in tsunami units Tna to Tnc of T2.1. The relative abundance of muddy bay species increased from tsunami units Tnc to Tnd of T2.1, suggesting that the tsunami waves became smaller in upward sequence. Comparing T2 and T2.1, the former includes more abundant offshore and badly preserved sandy species such as *Schizocythere kishinouyei* and phytal species such as *Aurila* spp than the latter. This suggests that waves of the T2 tsunami were stronger than those of the T2.1 tsunami at the study site.

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PHYLOGENETIC RELATIONSHIP OF INTERTIDAL *XESTOLEBERIS* ALONG THE NORTH PACIFIC COASTS

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Keywords: *Xestoleberis*, Phylogenetic Relationship, Taxonomy, Pore-system, Intertidal

The genus *Xestoleberis* appeared during the Cretaceous and is presently distributed from tropical to subarctic areas all over the world. However, the phylogenetic relationships of *Xestoleberis* and its biogeographical distribution have been little studied around Japan or other areas.

A total of twenty-three *Xestoleberis* species, collected from the intertidal zone on the east and west coasts of the North Pacific, were divided into three groups (Groups A, B and C) based on the type of morphology of the pore-systems. Each of the three groups has its own features in the shape of the frontal muscle scar, median element of hingement, morphology of *Xestoleberis*-spot and male reproductive organ, and it was considered that the three groups were phylogenetically different. The distributional pattern of pore-systems (DDP analysis; e.g. Ishii et al. 2005) of thirteen Japanese *Xestoleberis* species from the three groups (7 species from Group A, 2 species from Group B and 4 species from Group C) were examined and their phylogenetic relationships reconstructed.

Each of the three groups also has different biogeographical distributions. Group A has the widest distribution, found from low to middle latitudes (Philippines, Japan including the southern Ryukyu and Bonin Islands, Mexico and U. S. A.) and Group B is distributed in the low latitudes of the North Pacific. These two groups are Pan-Pacific or cosmopolitan. To the contrary, the distribution of Group C species is mainly limited to the middle latitudes of the middle and northern coasts of Japan. The four species of Group C have different geographical distributions related to marine climates, namely subtropical, warm-cool temperate, medium-cool temperate and subarctic. Group C seems to be a unique species group containing species that have adapted to cooler areas, possibly through the Japan Sea and the Okhotsk Sea.

Reference

Ishii, T., Kamiya, T. and Tsukagoshi, A. 2005. Phylogeny and evolution of *Loxoconcha* (Ostracoda, Crustacea) species around Japan.- Hydrobiologia **538(1-3):** 81-94.

LATE ORDOVICIAN OSTRACODES FROM HIMALAYA AND THEIR PALAEOBIOGEOGRAPHIC RELATIONS

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Silicified ostracodes from the Himalayan Pin Formation recently discovered by the second author document faunal relationships to both Australia and Baltica. The fauna consists of six species of which four are new. Two of the latter which are very rich in individuals evidence biogeographic connections to Australia: a new representative of the genus *Pilla* and a new genus and species related to *Dominina* Burrett and Laurie in Burrett et al. 1983. Until now, *Pilla* was known only from the Late Ordovician of Australia by two species (the type-species *P. piformis* Schallreuter and Siveter 1988, and *P. latolobata* Jones and Schallreuter 1990) and by another species from the Middle Ordovician of Argentina (*P. austramericana* Schallreuter 1996); the genus *Dominina* was recorded from the Caradocian of Tasmania. Recently another species of *Pilla* has been described by Wolfart (2001) from the Thong Pha Phum Formation (Caradocian/Ashgillian) of West Thailand as *Drepanella reedi*. Another three of the Himalayan taxa which are, however, rather rare show connections to Baltica even on the species level: *Steusloffina cuneata* (Steusloff 1895) which was originally described from a

'geschiebe' (glacial erratic boulder) of Northern Germany is very common in the Late Ordovician of Baltoscandia and is known also from the Late Ordovician of Anticosti Island (Copeland 1983). The other taxa are two new species of the genera *Glossomorphites* and *Vendona*. *Glossomorphites* is wide-spread in Baltoscandia - mainly in the Early and Middle Ordovician, but rare in the Upper Ordovician (*G. alveus* Schallreuter 1990) - and also known from from the Early Ordovicvian of Bohemia (*G. mytoensis* Schallreuter and Krůta 1988). *Vendona* was described only from Baltoscandia, yet. Only one of the recorded Himalayan species (*Krausella* ? *shianensis* Reed 1912) seems to be endemic.
This is a contribution to IGCP 503.

FOOD SELECTION IN *EUCYPRIS VIRENS* UNDER EXPERIMENTAL CONDITIONS

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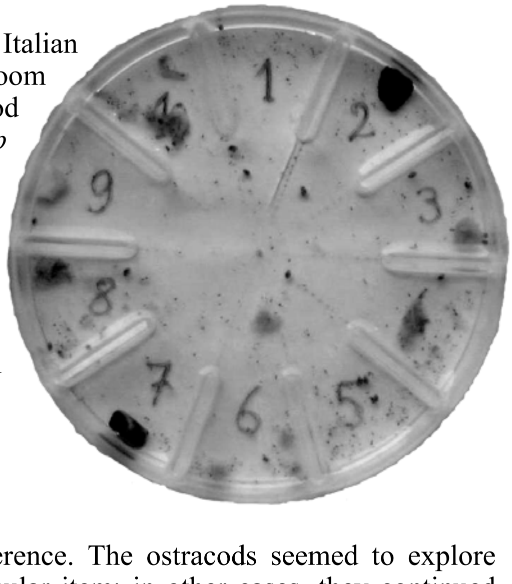
Keywords: *Eucypris virens*, Ostracoda, Food Preferences, Feeding Behaviour, Food Selection

Introduction

Eucypris virens is a cosmopolitan freshwater ostracod with both sexual and asexual reproduction. In order to conduct laboratory experiments related to the study of the evolution of sex in the framework of the Marie Curie Research Training Network SEXASEX, different mass- and individual-rearing protocols were set up to maintain populations for long periods (months-years). In this connection, the feeding behaviour of *E. virens* towards several types of food (dead animals, plants, and living algae) was assessed.

Materials and Methods

Animals (adult females) were obtained from different Italian populations. Two kinds of experiments were conducted at room temperature: i) *individual experiments* (a single ostracod observed continuously for 10-20 minutes); ii) *group experiments* (20 individuals checked every 30 minutes for 1-2 days). In both cases, plastic Petri dishes (Ø 9 cm) with 10 open sectors radiating from the centre (see picture →) were used. Different food types were offered to *E. virens*: *Artemia* sp., *Mysis* sp., and *Daphnia* sp., spinach, Brussels sprouts, "Spirulina" (a commercial food for fish containing 7 % of *Spirulina* sp.), and living bunches of the blue-green alga *Tolypothrix tenuis*. 3 gravels were added as blank items.



Results

The *individual experiments* did not reveal any clear preference. The ostracods seemed to explore randomly the dish, stopping just a few seconds on a particular item; in other cases, they continued eating the first food item they found. Possibly these experiments did not last for enough time to detect food preference in *E. virens*, or perhaps the lack of potential intra- and interspecific competitors affected the feeding behaviour of ostracods by slowing down their need to exploit a rich food source.
In the *group experiments*, animals showed a clear preference for plants, namely spinach and *Tolypothrix tenuis*. These choices can be related to the elective environments colonised by this species, i.e. temporary ponds in meadows. Periods of high motility, with at least half of the individuals being actively swimming, were also observed. Nevertheless, at each control time there were always a few animals feeding on other food types (dead animals, "Spirulina", Brussels sprouts). This suggested that the explorative behaviour remained active even if one or two food types were clearly preferred over

others. In a preliminary group experiment carried out without *T. tenuis*, some animals died overnight. Water was turbid and stank as consequence of the rather high quantity of decaying organic matter. In the experiments which included living algae, this has never occurred again. This is an important element for long standing ostracod cultures. *T. tenuis* has a triple function: (a) is a suitable food source for *E. virens*, (b) maintains an acceptable water quality through oxygen release and removal of degradation products, and (c) serves as physical support for laid eggs.

GENETIC STRUCTURE OF PUTATIVE ANCIENT ASEXUAL DARWINULIDAE

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Keywords: Darwinulidae, Ancient Asexuality, Genetic Diversity, Phylogeography, Phylogenies, Evolution

Introduction
The non-marine ostracod family Darwinulidae is one of three examples of putative ancient asexuality in the animal kingdom. Theoretical considerations about the paradox of sex predict an accumulation of mutations within such species, even between homologue alleles (the so-called "*Meselson Effect*" - ME). This effect is thought to provide a molecular test to verify the ancient asexual status.
Here, we test for the ME in several darwinulid species and in addition use the European data on *Darwinula stevensoni* to test for a predicted recent selective sweep, where one superclone could have replaced all ecologically inferiour clones. Phylogenetic reconstructions of selected darwinulids assess species concepts and estimate tempo of molecular and morphological evolution in ancient asexuals.

Material and Methods
We have obtained DNA sequence data (both direct and cloned sequences) from several darwinulid species and different genetic regions to test for the ME. Likelihood permutation tests are used to look for statistical signatures of recombination or gene conversion. DNA sequence data are also applied to a phylogeographic analyses of *D. stevensoni* to test for the selective sweep scenario. Phylogenetic reconstructions of the "*Penthesilenula brasiliensis* group" are conducted with both distance and parsimony-based criteria on molecular and morphological data.

Results and Discussion
No evidence for the Meselson Effect could be found for any screened species. Due to the asymmetry in predictive power of the test, this does not constitute evidence against ancient asexuality, because other homogenising mechanisms could be responsible. At least in one nuclear region (ITS1), gene conversion seems to be counteracting the accumulation of mutations. Phylogeographic analyses of European and South-African *D. stevensoni* provides counterevidence for the selective sweep scenario and stresses the exceptionally low intraspecific, genetic diversity of this species.
Similar morphotypes of the *P. brasiliensis* group from Europe and Brazil are genetically so close that they can be regarded as the same species. Other morphotypes (for example, with more elongated or shorter valve morphology) cluster together in some of the molecular trees only. These results reinforce the uncertainty on how to define species in fully asexual taxa.

Acknowledgements
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A REVIEW OF THE RECENT OSTRACODS OF THE GENUS *ELOFSONELLA* POKORNY 1955

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Of the originally ten assigned species to the genus *Elofsonella* by different authors only five should be included in this genus. A very wide geological and geographical distribution is attributed to the type species of the genus, *Elofsonella concinna* (Jones 1857) s. lat. Detailed comparative morphological investigation of the populations of *Elofsonella* from numerous localities was conducted in Far Eastern, Arctic and European seas. *E. concinna* s. lat. was found to be a complex of several independent species. Three new species are described. New taxonomical characters, which permit to identify clearly the species of the genus, are revealed.

A SYSTEMATICAL REVISION OF THE OSTRACODS IN THE UPPER JURASSIC AND LOWERMOST CRETACEOUS OF NORTHEASTERN GERMANY

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Keywords: Ostracoda, Upper Jurassic, Lower Cretaceous, Northeastern Germany, Biostratigraphy, Palaeobiogeography

The Upper Jurassic and basal Cretaceous ostracod faunas of northeastern Germany, which have not yet been sufficiently investigated and documented, are revised. The fauna, documented by stratigraphical tables and SEM pictures, consists of 116 species from 36 genera, two species of which are new: *Galliaecytheridea wienholzae* Schudack 2004 and *Rasthalmocythere keuppi* Schudack 2004. The biostratigraphical range of the taxa extends from the Oxfordian to the early Berriasian. A palaeobiogeographical correlation with the ostracod faunas of northwestern Germany reveals a close relationship between both faunal areas.

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THE OSTRACOD-BEARING SILURIAN HEREFORDSHIRE KONSERVAT-LAGERSTÄTTE

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Keywords: Konservat-Lagerstätte, Silurian, Myodocope, Soft-part Anatomy, Evolution

Three-dimensional preservation of non-biomineralized fossils occurs in carbonate concretions in a volcaniclastic deposit in the Wenlock Series, lower Silurian of Herefordshire, England (Briggs, Siveter and Siveter 1996). This Konservat-Lagerstätte has yielded exceptionally preserved fossils of several major groups, including a myodocope ostracod showing remarkably detailed soft-part anatomy (Siveter et al. 2003).
This discovery provides unequivocal evidence for: the occurrence of Ostracoda in the Palaeozoic; remarkable evolutionary stasis over 425 million years; the earliest unequivocal testimony for male gender in animals; and the antiquity of vital (e.g. respiratory/circulatory) systems within the group. The ostracod lived in the fully marine waters of the outer-shelf to shelf-slope and was possibly a necktobenthic scavenger/predator. The possibility exists that the Herefordshire Konservat-Lagerstätte will furnish additional finds of ostracods with soft parts.

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COPULATORY BEHAVIOUR, SEXUAL MORPHOLOGY AND LIFE CYCLE OF THREE *FABAEFORMISCANDONA* KRSTIC, 1972 (CANDONIDAE, OSTRACODA, CRUSTACEA) SPECIES FROM JAPAN

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Keywords: *Fabaeformiscandona*, Copulation, Hemipenes, Ontogeny, Life Cycle

The genus *Fabaeformiscandona* has approximately 50 living species (Meisch, 2000) and the taxonomy of the group has often relied heavily on the morphology of the carapace, male 5th limbs, hemipenes and the female genital lobes. Three species of *Fabaeformiscandona* from Japan, two of which are new, have provided an opportunity to study the development, function and interaction of some of these features. Additionally, the life cycles of two of the species are documented.
Results show that development of the sexual organs in both sexes begins during the A-2 instar. The protrusion of the female genital lobe begins to form during the A-1 instar. During copulation, the males' fifth limbs, caudal rami and 'm' processes of the hemipenes and the females' protrusions of the genital lobes play a crucial role in providing a secure interface between the sexual organs to allow for the transfer of the giant spermatozoa.
Quantitative monthly sampling of the substrate in a pond over one and a half years revealed that two species of *Fabaeformiscandona* produce one generation per year. Both the species temporarily stop developing twice a year, first in winter and secondly in summer. The time lag of the appearance between males and females within a species, the seasonal change in number of eggs produced and other ecological characters will be shown and discussed.

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OSTRACODA IN THE IRANIAN COASTLINE OF THE PERSIAN GULF

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Keywords: Ostracoda, Mangrove Ecosystem, Biocoenosis, Taphocoenosis

Introduction

Coastland studies in the northwestern Persian Gulf have displayed two different microfauna environments. One is situated in tidal shrubs - a confined environment with a special Mangrove ecosystem - the other is marine.

Material and Methods

Sampling, sedimentological and microfaunistic studies as well as water physico-chemical properties such as temperature, salinity, electrical conductivity, acidity and dissolved oxygen in water measurements were all performed.

Conclusions

Ostracod studies on the northwestern coastland of the Persian Gulf determined 10 genera and 11 species. On the basis of the determined ostracod species, the most important association is introduced: *Leptocythere pellucida* (Baird) association:

Salinity: 24.2-40 g/l
Temperature: 21.4-36.1°C
Dissolved oxygen: 0.4-6.7 mg/l
pH: 7.1-8.71
Bed: Silty clay-coarse clay

Associated species are as follows: *Paijenborchellina* sp., *Xestoleberis depressa* Sars, *Loxoconcha elliptica* Brady, *Loxoconcha rhomboidea* (Fischer) and *Falunia* sp.
The ratio of biocoenosis to taphocoenosis of Ostracoda is high, particularly in the warm season. The living specimens are more abundant than the dead ones. But they have smaller carapaces because of special ecologic conditions.

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RECENT OSTRACODA FROM THE KARA SEA

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Keywords: Ostracoda, Kara Sea, Assemblage Studies, Cluster Analysis

Introduction

Only seven publications mentioning Recent ostracod species from the Kara Sea are available up to now. None of these publications contained the photoplates of identified species. Therefore, this investigation aims to give a first detailed description of taxonomic composition and distribution patterns of this paleoenvironmentally important group of benthos in the eastern Kara Sea. In total 66 species were identified by different scientists. We identified 46 species from samples covering water depths from 5 to 295 m. Sixteen species were identified for this area for the first time and the complete species list now consists of 82 species.

Material and methods

A total of 2570 valves and 414 carapaces were collected from the entire set of 71 coretop sediment samples, which were obtained in different parts of the eastern Kara Sea during expeditions aboard r/v „Boris Petrov" in 1999, 2000, and 2001 within the frame of the joint Russian-German SIRRO project.

Results

The most evident feature in distribution of ostracods in the eastern Kara Sea is their strong dependence on the bottom water salinity variations. Inner parts of the Ob and Yenisei estuaries are occupied by freshwater assemblage. The following freshwater species were recorded here *Cytherissa lacustris* and *Candona hamsworthi*, accompanied by a euryhaline species *Heterocyprideis sorbyana*. Average annual bottom water salinity at the studied stations was about 0.

Farther offshore, in the outer estuarine zone, where bottom water salinity is about 15-18, water depth 5-26 m, freshwater assemblage is replaced by the brackishwater one, which is mainly comprised of the brackishwater species *Cytheromorpha macchesneyi*.

In the inner shelf zone northward from the estuaries, down to the depths of 20-30 m, the assemblage consists of brackishwater, euryhaline and marine species with predominance of the two euryhaline species *Paracyprideis pseudopunctillata* and *H. sorbyana*. Bottom water salinity ranges from 17 to 26 at the studied sites. The shelf zone along the Taimyr Peninsula with the depths about 40-50 m is occupied by the same assemblage, following the direction of riverine water outflow, although bottom water salinity here is about 33. The dominant taxa of this assemblage are *P. pseudopunctillata, Sarsicytheridea bradii* and *Cluthia cluthae*.

On the rest part of the studied area marine ostracod assemblage occurs, it is dominated by marine species, primarily shallow-water marine ones, such as *Acanthocythereis dunelmensis, Cl.cluthae, Semicytherura complanata, Cytheropteron elaeni*. Northernmost stations from deeper parts of the shelf and upper contineтal slope, water depths 60-295 m, are characterized by the presence of relatively deep-living species, typical for the North Atlantic waters such as *Cytheropteron tumefactum, Argilloecia conoidea, Polycope* spp.

Cluster analysis generally supported this subdivision into assemblages. The obtained dendrogram is comprised of four clusters. Cluster I represented by relatively deep-living species solely consists of samples from the depths exceeding 60 m. Cluster II includes samples from freshwater, brackishwater and shallow-water marine assemblages from the estuarine parts of the Ob and Yenisei rivers and closeby locations. Samples from this area are taxonomically poor and usually contain 1-3 species, and that is why 3 different assemblages are included in one cluster. Cluster III represents marine assemblage. Cluster IIIa includes samples with considerable amount of euryhaline species, and cluster IIIb includes stations with minor amount of the same euryhaline species. Cluster IV characterizes marine assemblage with almost complete absence of euryhaline species.

FREE CELLS IN THE BODY CAVITY OF FRESHWATER OSTRACODS

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Keywords: Ultrastucture, Freshwater Ostracods, Granulocytes, Oenocytic Cells

As in other groups of invertebrates (e.g. Mollusca, Insecta, Arachnida, Tunicata) also in freshwater ostracods free cells were recorded. Granulocytes (Fig. 1) and oenocytic cells were observed in several ostracod species, in both males and females and in juveniles as well as adults (e.g. *Candona candida, Herpetocypris reptans, Heterocypris incongruens, Notodromas monacha, N. persica, Psychrodromus olivaceus, Scottia birigida*).

For light microscopy the ostracods were fixed by modified Bouin-Brasil-Dubosque solution (Smrz 1995), embedded in parafine and stained by Masson´s Trichome or Domagk´s Azan. For TEM the animals were fixed in glutaraldehyde, postfixed in 1% OsO_4 and embedded in Spurr´s medium epoxy resin. For the fluorescent analysis lectins, acridine orange and propidium iodide were applied.

The granulocytes are of mesodermal origin (Wigglesworth 1978), in ostracods these cells with conspicuous pseudopodia were found to be migrating in dorsolateral part of body cavity, some of them were caught during phagocytosis. Oenocytic cells arise in epidermis (Wigglesworth 1978), in ostracods were recorded in huge amounts in body cavity and interlamellar space of juveniles. The functions of these cells in ostracods were evaluated - their role in cell-mediated immunity, wound healing, transportation of nutrients or metabolism products as well as their development and classification in context of invertebrate hematology.

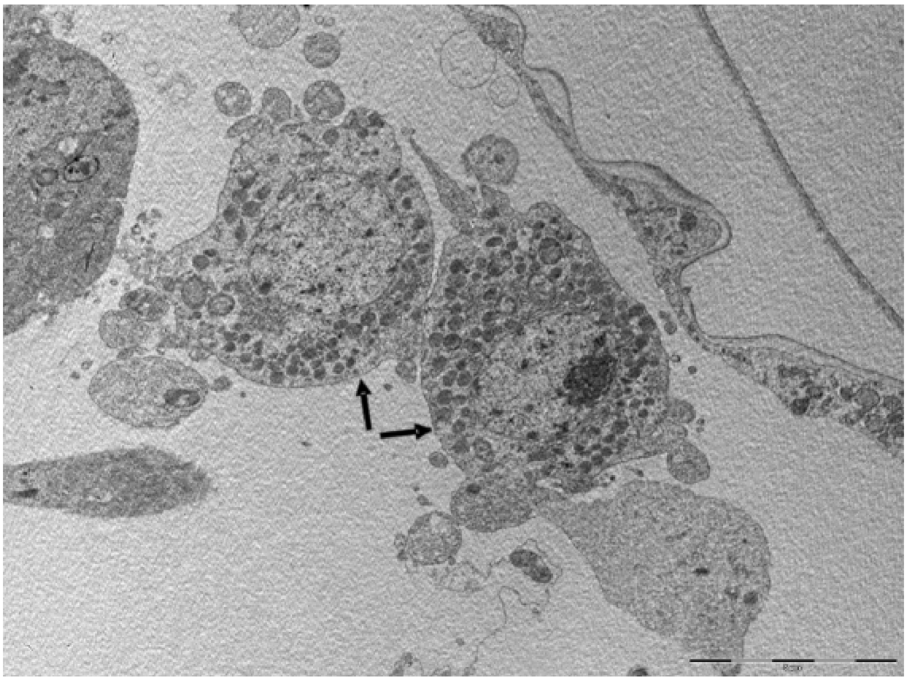

Fig. 1: Arrows indicate two granulocytes in the body cavity of *H. incongruens*. Scale bar 5µm.

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AN OLD PUZZLE REVISITED: MOLECULAR CYTOGENETICS OF SEX DETERMINATION IN NON-MARINE OSTRACODS

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Keywords: Karyology, Chromosomes, Sex-determination, Fuorescence in situ Hybridisation (FISH)

Introduction

Non-marine ostracods have a wide range of reproductive modes, from fully asexual, over mixed reproduction to fully sexual. Although most studies on chromosome morphology and chromosomal sex determination systems of non-marine ostracods were carried out in the early 1930s and 40s (e.g. Bauer 1934, 1940, Dietz 1954, 1955), they nevertheless still provide some, and for most species the only available data. The common pattern appears to be male heterogamy, with either XO- or XY-derived systems. However, apparently the X chromosome/autosome ratio and not the absolute number of X chromosomes determine the gender (Dietz 1955). The presence of one or more Y chromosomes does not necessarily imply that this chromosome is 'the trigger' for male development. The most recent chromosomal studies on non-marine ostracods by Tétart (1967, 1978, 1983) focusing mainly on female karyotypes from parthenogenetic populations, showed an evolution towards multiple sex chromosomes. Within the framework of the EU Marie-Curie RTN *SEXASEX*, dealing with the mechanisms that determine gender and reproductive modes in a species with mixed reproduction, we employ state-of-the-art molecular cytogenetic techniques for a refined analysis of chromosomal sex determination systems in non-marine ostracods.

Materials and Methods

Classical staining techniques for invertebrate chromosome provided only very limited information about the presence, number and structure of sex chromosomes. The introduction of fluorescence *in situ* hybridization (FISH) in the late 1980ies, however, marked a paradigm shift from the analysis of chromosome morphology towards chromosomal DNA content. We employ a variety of FISH based techniques for Ostracod sex chromsome identification and analysis, comprised of a) differential fluorochrome staining and replication banding for chromosome identification, c) comparative genomic hybridisation for the detection of male/female differences in the sex chromosome/ autosome ratio and d) chromosomal micro-dissection for the establishment of sex chromosome specific FISH probes. Ostracod species used in our studies: *Heterocypris incongruens* and *Eucypris virens.*

Results

We will provide an overview of the molecular cytogenetic strategy for the identification and characterisation of Ostracod sex chromosome systems. We will further present initial results of the karyological studies carried out in *Heterocypris incongruens* and *Eucypris virens*.

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PHYLOGENETIC RELATIONSHIPS AMONG THE SIGILLID GENERA FROM THE WEST PACIFIC

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Keywords: Sigillid, Hingement, Muscle Scars, Reef Crypts, Sediment Interstices, Submarine Caves

The sigillid genera from the West Pacific can be classified into two taxonomical groups, which are named here as *Cardobairdia* and *Saipanetta* groups, based on the key carapace features (Tabuki, 2001). The *Cardobairdia* group comprises *Cardobairdia*, *Kasella* and two new genera (genus A and B), and the *Saipanetta* group *Saipanetta* and one new genus (genus C). Tabuki and Hanai (1999) and Tabuki (2001) preliminarily suggested the phylogenetic relationships among the sigillid genera from the West Pacific. In this study I dealt with the investigation on the details of hingement and relevant marginal structures and of adductor muscle scars as highly valuable carapace features for understanding the phylogenetic relationships of the sigillids at generic level. The phylogenetic relationships are proposed based on the key carapace features including the details of hingement and muscle scars, in consideration of the geographical and stratigraphical distributions of sigillids. The outline of the phylogenetic relationships is as follows. The deep-sea sigillid, *Cardobairdia* (or its relatives) is supposed to be the ancestor for all the other sigillid genera inhabiting reef crypts including sediment interstices in sandy or gravelly areas and crevices of submarine caves. Two evolutionary processes for sigillids to adapt to reef crypts are postulated. One is that *Cardobairdia* arised the cavernicorous sigillid, genus A. Genus B possibly derived from genus A, and *Kasella* from genus B. The other is that *Cardobairdia* arised the interstitial sigillid, *Saipanetta*, and the cavernicorous sigillid, genus C derived from the latter.

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THE OPTICS OF A SILURIAN OSTRACOD EYE: FUNCTIONAL AND PALAEOENVIRONMENTAL SIGNIFICANCE

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Keywords: Functional Morphology, Optics, Ostracoda, Palaeocopa, Primitiopsidae

Ostracod have a long stratigraphic record and have adapted to a wide range of poor to well lit environments, but there has been little study of the eye of fossil members of the group. Here we report the morphology and optics of the eye of the primitiopsid ostracod *Primitiopsis planifrons* Jones from the Silurian of Gotland. This represents the first attempt to determine the function and light-gathering ability of a palaeocope ostracod eye. Evidence from the cuticle lens morphology and its position on the valve suggest that *P. planifrons* had a naupliar eye, which is the most common optical system in crustaceans. The characters of the eye, such as the separated cuticular lens on each valve and the strongly calcified nature of the lens and its diameter, are concordant with that of some Recent podocopids in which a divided type of naupliar eye is present (Tanaka 2005). Ray tracing of the reconstructed cuticle lens of the primitiopsid demonstrates strong spherical aberration and a very long focal length (as in the podocopid eye), which implies the presence of a spherical mirror (tapetum) below the lens. The plot of the eye parameter of *P. planifrons* on 'morphospace' reconstructed on data from Recent podocopid eyes indicates that the light-gathering ability of *P. planifrons* eye was extremely low and that, therefore, this species may have lived in a strongly lit environment such as an intertidal zone of a shallow sea. This interpretation is concordant with palaeoenvironmental conditions derived from geological evidence. Thus, analysis of the nature and functional significance of the eye give an independent test to help identify habitat and palaeoenvironment of long extinct ostracods.

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PALEOBIOGEOGRAPHICAL ZONATION OF THE NORTHERN EURASIAN SEAS IN THE KIMMERIDGIAN USING OSTRACODS

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Keywords: Paleobiogeography, Paleocurrents, Northern Eurasia, Kimmeridgian

Introduction

Paleobiogeographical zonation of the Upper Jurassic Western European seas has often been done using ostracods. In the present work all information about distribution of Kimmeridgian ostracods in Northern Eurasia (Western and Eastern Europe and Western Siberia) was summarized for the first time.

Materials and Methods

More than 50 publications were analyzed. Information on the distribution was compared the data from North America (Nova Scotia) of 70 genera and then plotted on the paleogeographical scheme of Northern Eurasia separately for Early and Late Kimmeridgian times. For this purpose lists of ostracods were used.

Results

Variations of generic diversity in the Kimmeridgian ostracods allowed us to distinguish 6 different sublatitudinal biochores (regions), each characterized by a specific taxonomic composition. The first, westernmost region is located in Nova Scotia (13 genera). The second is situated in Western Europe (45 genera); the assemblage of Southern Sweden characterizes a single subregion (10 genera). The third region encompasses the Dnieper-Don depression, as well as the northwestern Donbass, Belgorod and Kursk regions (18 genera). Strong reduction in taxonomic diversity could be due to the diminishing Tethys water inflow and increasing Arctic water influence. It is noteworthy that the genus *Cytherelloidea,* indicative of tropical shallow-water environments, was not found eastward from Poland. Further to the east bottom water temperatures decreased and in the fourth region, located in Povolzh'ye, only 9 genera were identified, all cold-water or eurythermal ones. The fifth region was established in the Timan-Pechora area (only 6 genera); where the influence of the Tethys water was minimal. The sixth region was located in Western Siberia (6 genera).
Borders between biochores are similar to those established on ammonites. Ostracods from the first region and the Crimea correspond to the super-region Tethys-Panthalassa; all the rest correspond to the Panboreal super-region. In the latter, within the Boreal-Atlantic region, two biochores are very distinct according to the ostracod data: the second region corresponds to the Western European

province; regions 3, 4 and 5 correspond to the Eastern European province. Region 6 is allied to the Arctic region. Analysis of the generic diversity during different epochs showed that the most unfavorable environments (decrease in the number of genera) for ostracods occurred in the Late Kimmeridgian in the central part of the Western European Sea, while on its margins (Denmark, Holland, southwestern France) the situation was the opposite. Only two brackish-water genera were recorded in the Early Kimmeridgian of Germany and Poland.
In Late Kimmeridgian time, the number of genera reached four and their habitat area extended to Holland and southwestern France, probably owing to the shallowing of the central part of the sea. It was also revealed that the genus *Cytherelloidea*, which was abundant all over Western Europe in the Early Kimmiridgian, was restricted to southwestern France in the Late Kimmeridgian. Consequently, the shallowing led to abrupt bottom water cooling in the central part of the sea and warming in its marginal zones. It allows us to suppose that cold waters spread over the surface and warm currents moved along the bottom. The shallowing of certain parts of the sea did not affect the distribution of cold waters, but rather prevented the circulation of warm currents and changed their directions.

OSTRACODS FROM THE TITHONIAN AND BERRIASIAN DEPOSITS OF THE EASTERN CRIMEA AS INDICATORS OF PALEOTURBIDITES

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Keywords: Ostracoda, Tithonian, Berriasian, Eastern Crimea, Turbidites, Paleoecology

Introduction
Analysis of carapace preservation, co-occurrence of juvenile and adult valves of different species, abundance and size distribution along the section allow us to obtain very detailed additional data on taphonomy and paleoecology.

Materials and Methods
Ostracods (about 100 forms) were studied from two sections of the Upper Jurassic and Lower Cretaceous deposits (Eastern Crimea). Distribution of different species and preservation of their carapaces show the following pattern. In the Dvuyakornaya Bay section distribution of ostracods is extremely uneven with alternating intervals of low (1-4 species) and high (up to 13) abundance. It was found that in every sample there were 1 to 4 species represented by well-preserved adult and juvenile specimens (autochtonous elements of orictocoenoses). Carapace length ranges from 0.3 to 1.1 mm. Thus, orictocoenoses are partly represented by autochtonous elements. The remaining specimens from the same samples are poorly preserved with distinct traces of transportation. They are represented by one dimensional group (0.3-0.5 mm), and no juveniles of these species were recorded (allochthonous elements, which have undergone distant transportation).
We exclude the effect of bottom currents on size-sorting, since the amounts of right and left valves are almost equal. Thus, in the samples with high abundance of ostracods the percentage of autochtonous specimens is low and ranges from 17 to 43, while in the intervals with low abundance of ostracods it grows to 33-100, represented by eurybathial Bairdiidae and Cytherellidae and the planktonic genus *Cypridina*; other deep-living genera were not identified. All representatives of the thermophilous shallow-water genus *Cytherelloidea* as well as all species with a pronounced eye tubercle bear traces of distant transportation on their valves. The section of the St. Il'ya Cape was studied in the same way and, in general, revealed the same pattern of ostracod distribution. Like in the previous section, intervals with low and high abundance of ostracods alternate here. All species are represented by single specimens. Associations from the intervals with high abundance of ostracods contain up to 90% of allochthonous ostracods. Species which occurred *in situ* are mainly represented by Bairdiidae-Cytherellidae association, but Macrocypridae, Acrocytheridae, Eucytheridae and Protocytheridae are also present.

Conclusions

A high percentage of poorly preserved ostracods in the intervals with high taxonomic diversity points to considerable pollution of these orictocoenoses with allochtonous elements. Absence of juveniles and size-sorting among allochtonous ostracods evidence that the latter were transported over a long distance. An almost equal amount of right and left valves excludes the possibility of this assortment being a result of a constant bottom current. Alternation of intervals with high and low taxonomic diversity and predominance of allochtonous elements in high-diversity intervals are evidence of the uneven character of sediment influx, most likely due to turbidites.

Ostracods proved to be good indicators of turbidites possibly triggered by periodic storms or earthquakes. Environmental preferences of autochtonous ostracods allowed us to conclude that both sections were formed at great water depths; the section from Dvuyakornaya Bay was located on the continental slope and the section from St. Il'ya Cape - closer to the coastline, in the upper part of the slope.

INCONGRUENCE OF FOSSIL AND MOLECULAR ESTIMATES OF EVOLUTIONARY DIVERGENCE TIMES IN OSTRACODA

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Dating evolutionary origins of taxa is essential for understanding the history of life on Earth and often incites intense debate when molecular estimates clash with first fossil appearances. Here, we investigate divergence times of multiple families within the Crustacean class Ostracoda, often considered to have among the best fossil records of any metazoan. Despite very high preservation potential of Ostracoda as fossils, we find considerable variability in the congruence of fossil and molecular divergence time estimates. These results have broad implications for the reliability of both fossil and molecular estimates of evolutionary divergences.

Here we use the principle of congruence in various ways to evaluate the reliability of multiple divergence time estimates. We first used recently described cross-validation tests to establish a set of congruent and presumably reliable fossil calibration points (*1*). Next, we used those reliable calibration points along with relaxed molecular clock methods to examine the amount of congruence between molecular estimates and the remaining fossil appearance data. Our results indicate that fossil and molecular divergence time estimates are often highly incongruent, even for Ostracoda, thought to have one of the most complete fossil records of any metazoan.

We determined a molecular phylogeny of Ostracoda from 18S rDNA. Next, we used cross-validation analyses to find a set of congruent to each other fossils, which we used subsequently as calibration points for relaxed clock analyses to estimate molecular divergence times among all other major lineages of ostracods. Our results indicate that the degree of congruence of molecular and fossil divergence times is highly variable, and can be summarized by dividing estimates into three classes:

(i) taxa with molecular estimates and first fossil appearances that are in good concordance, falling into the calculated range of molecular time estimates.

(ii) taxa with longer fossil ranges than indicated by relaxed molecular clock analyses.

(iii) taxa where the known fossil range is considerably shorter than estimated by relaxed molecular clock analyses.

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DOMESTIC SEWAGE IMPACT ON OSTRACOD AND BENTHIC FORAMINIFERAL PATTERNS: A CASE STUDY FROM KASTRO GULF (ANDROS ISLAND, MIDDLE AEGEAN SEA, GREECE)

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Keywords: Ostracoda, Benthic Foraminifera, Coastal Environment, Sewage

Introduction

A combined study of recent ostracod and benthic foraminiferal assemblages was conducted in July 2003 at Kastro Gulf, Andros Island, in order to investigate the impact of domestic sewage on epiphytic microfaunas.

Materials and Methods

Twenty samples were studied: 13 samples from the northern part and 7 from the southern part of the gulf, the latter being constantly affected by domestic sewage. Approximately a total of 32 ostracod and 58 foraminiferal species were identified. Sampling was completed by collecting different algal species.

Results

In the northern part of the gulf the epiphytal ostracod fauna is represented mainly by *Xestoleberis* spp., *Loxoconcha* spp. and *Paradoxostoma* spp. The dominant species is *X. decipiens,* ranging between 8% to 74%. The foraminiferal fauna is represented by *Amphistegina lessonii* (0.9-57.7%) which shows a negative trend towards miliolids and small rotaliids. A dramatic decrease in diversity and abundance of both ostracod and foraminiferal populations is featured at the southern part of the gulf. Epiphytal ostracod assemblages are characterized by the dominance of three species: *X. parva* (21-100%), *Aurila convexa* (26-49%) and *Paradoxostoma* spp. (13-28%); whereas *Loxoconcha* spp. occurs sporadically and very rarely. Foraminiferal assemblages are characterized by the total absence of *A. lessonii*, and the intense presence of miliolids (45-82%) and small rotaliids (7-21.5%).

Consequently the decrease in abundance and diversity (Ward et al. 2003, Zarikian et al. 2000, Bodergat et al. 1997) of ostracod and foraminiferal assemblages at the affected area, associated with the absence of *A. lessoni* - a species considered as a healthy conditions biomarker (Hallock 2000) - are here suggested as proxies of anoxia, eutrophication and salinity changes.

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OSTRACODA AND ASSOCIATE FOSSIL GROUPS FROM THE CAMPANIAN-PALEOCENE DAVUTLAR FORMATION, DEVREKANI (KASTAMONU), NW TURKEY

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Keywords: Ostracoda, Campanian-Paleocene, Davutlar Formation, Devrekani, Turkey

The investigation area is located at the Devrekani Town of Kastamonu City, NW Turkey. The aim of this study is to determine the Ostracoda fauna as well as the other fossil groups from the Late Cretaceous-Paleocene Davutlar Formation. So far, this is the first detailed paleontological investigation carried out for this formation. In the circumstances of this study, 450 samples were collected from 18 sections in the Davutlar Formation. 22 genera and 92 taxa belonging to these genera were determined by a detailed investigation on the Ostracoda fauna. The described Ostracoda fauna includes 14 new species and 53 taxa belonging to open nomenclature. Within the fauna, specimens of *Bairdia, Cytherella, Brachycythere, Krithe, Paracypris* and *Xestoleberis* are dominant, while specimens of *Macrocypris, Pterigocythereis, Hazelina, Favoleberis, Rificythere, Pontocyprella, Acanthocythereis, Loxoconcha, Limburgina, Centrocythere, Veenicythere, Nucleolina* and *Dordoniella* are present in minor amounts. The determined Ostracoda fauna obtained from the Davutlar Formation reveals a Campanian-Maastrichtian age, and co-occurrence of the Ostracoda taxa indicates a shallow marine environment. The Davutlar Formation also contains planktonic Foraminifera, dinoflagellates, inocerames, ammonites, and nannoplankton faunas, and results acquired from the Ostracoda fauna are correlated with the results obtained from these faunas. Within these faunas, planktonic foraminifers, inocerames and ammonites also indicate the Campanian-Maastrichtian interval. Within the planktonic Foraminifera fauna, 16 species of 10 genera belonging to three different biozones (Late Campanian *Globutruncana aegyptica* Zone, Late Campanian-Early Maastrichtian *Gannserina gannseri* Zone and Late Maastrichtian *Abathomphalus mayorensis* Zone) were identified. Inoceramites and Ammonites were also observed from two different levels in the Davutlar Formation and their ages are assigned as Middle Campanian to Maastrichtian. Within these faunas, the age assignation from nannoplankton differs from those of the other fossil groups, probably related to reworking in the Davutlar Formation. In addition to these groups, *Mosasaurus hofmanni,* an important reptile group of the Late Cretaceous, was also discovered from the Davutlar Formation and dated as Late Maastrichtian.
Based on these data except the data from nannoplankton, it can be concluded that the age span of the Davutlar Formation is Campanian-Paleocene and that this formation was deposited in a shallow (ephineritic to infraneritic) marine or oceanic environment.

THE LIENENKLAUS COLLECTION DEPOSITED IN GOETTINGEN AND THE OSTRACODE TYPE LOCALITY BUENDE (CHATTIAN, NW GERMANY)

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Keywords: Ostracoda, Oligocene, Miocene, Sequence Stratigraphy, Germany, Suisse, Paris Basin

At the centennial of the death of Ernst Lienenklaus (8.9.1849 - 6.5.1905), a short review is given on the ostracode collection of one of the most outstanding German ostracodologists of the late 19th and beginning 20th century. Lienenklaus started a remarkable (extra-professional) career, studying ostracodes from the Doberg marl pits near Buende (app. 40 km ESE of his home town Osnabrueck). His search for ostracodes was so successful that he could report on 30 n. sp. and 4 n. var. within a fauna of altogether 77 Late Oligocene taxa from this site in his monograph (Lienenklaus 1894). Therefore, Buende remains the most prominent Late Oligocene ostracode type locality in Germany. However, as this site is the neostratotype of the Chattian (Anderson et al. 1971) and a palaeontological geotope, the place is now strictly protected. Therefore, it is difficult to get additional samples from the assumed, presently not accessible type horizon (Lower Doberg Formation, Bed No.7 of Hubach, 1957, acme of *Asterigerina guerichi*). During the last decennial of his life, Lienenklaus completed five more ostracode studies (Lienenklaus 1895, 1896, 1897, 1900, 1905). Including his monograph he described altogether 130 new taxa (123 n. sp. and 7 n. var.). The ostracode collection was transferred to the Geological-Palaeontological Institute in Goettingen already in 1905, but soon it became forgotten until Erich Triebel got knowledge of its existence in the 1950s. A parallel suite of specimens from the work of Lienenklaus (1905) was deposited in the Senckenberg Museum in Frankfurt/Main.

B. Moos (Hanover), S. Ritzkowski, students, and the author undertook the task to save and transfer the ostracode specimens into modern slides; the re-identification, registering, and digitally documenting the collection and its preservation is still going on. First results are: (1) the recognition of a small parallel suite of the collection of Egger, 1858 (see Lienenklaus 1897) from the Miocene of Ortenburg; the main suite was destroyed in Munich. (2) Many taxa urgently need redescription and refiguring, and (3) a selection of a lectotype or (4) even a selection of a neotype, because many syntypes were heavily damaged by efflorescence and/or recrystallization, subordinately by pyrite oxidation. The embedding of many syntypes in Canada balsam (most of the figured specimens) is in many cases problematic for a present-day definition. (5) Due to the lack of knowledge of the existence of the Lienenklaus collection or part of it and (6) due to misinterpretations of the morphology of the new taxa of Lienenklaus (partly because of misleading drawings), there are quite a number of nomenclatural and taxonomic errors in younger publications.

Samples from trenches in the *Asterigerina guerichi* beds at Buende, which are needed for the selection of neotypes, have been found in the micropalaeontological collection in Goettingen and in the Geological Survey in Hanover. However, the value of the samples especially from the latter collection for this purpose is limited, because they contained a lesser diverse shallow marine association (*Cytheridea pernota*-Ecozone) than Lienenklaus found in his time. Only one sample seems to be close to the ostracode horizon of Lienenklaus containing *Henryhowella asperrima*, assumed to be indicative of the earliest Chattian maximum flooding surface.

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CLIMATIC CHANGES AND SEA-LEVEL FLUCTUATIONS IN THE DANIAN/SELANDIAN BOUNDARY INTERVAL OF TUNISIA: AN OSTRACOD PERSPECTIVE

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Keywords: Danian/Selandian Boundary, Tunisia, Southern Tethys, Biostratigraphy, Ostracoda

During the early Paleogene (65-40 Ma) greenhouse climate prevailed and large ice caps were presumably non-existent. Recent studies suggest that between 60 and 50 Ma up to six brief intervals of extremely warm oceans (hyperthermals) may have occurred. The one that is best known is the Paleocene-Eocene Thermal Maximum (PETM). The earliest one of these hyperthermals correlates with the middle Paleocene Danian/Selandian (D/S) boundary. On the other hand, it is generally accepted that the early Paleogene was marked by a series of high-amplitude (50-150 m) global sea-level fluctuations, amongst others within the D/S transition. In the absence of waxing and waning ice caps it remains unclear how the two aspects of climate and sea-level fluctuations of the Paleogene world can be matched. The Danian/Selandian boundary received little attention in the past and this is reflected in the lack of a guide event and a GSSP for this stage-boundary.

The current project is part of a larger integrated research programme that aims at 1) constructing a rigid high-resolution stratigraphic framework for the D/S transition in two basins located in Egypt and Tunisia; 2) providing detailed understanding of paleoenvironmental changes, particularly with respect to amplitude and rate of relative sea-level change; and 3) placing the results in the context of global signatures of climatic and sea -level change during the middle Paleocene by combining field analysis, micropaleontology (ostracods, foraminifera, calcareous nannofossils, dinoflagellate cysts), sedimentology and geochemistry. The current study investigated the ostracod content of the Sidi Nasseur section near Kalaat Senan in central Tunisia (Steurbaut et al. 2000), a Paleocene section of which a 17m thick interval spanning the D/S boundary was studied. This interval was sampled once every meter on average. More than 300 ostracods in the fraction >180µm were picked from the samples. 51 species have been recognized, 8 of those have only been found in one sample. The fauna is dominated by *Parakrithe crolifa, Cytheropteron ventroliratum, Xestoleberis tunisiensis* and *Eucytherura* aff. *hassanieni*, dominantly found within the fraction between 250 and 180µm. The studied faunas all fall within the South Tethyan Type (outer shelf, deep infraneritic) association as defined by Bassiouni and Luger (1990) in Egypt. Shallow water species only have minor occurrences. Isotope and trace element studies are foreseen to quantify the environmental changes around the D/S boundary.

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STRATIGRAPHY AND PALAEOENVIRONMENT OF THE UPPER CRETACEOUS, DINOSAUR-BEARING IREN DABASU FORMATION (INNER MONGOLIA, PEOPLE'S REPUBLIC OF CHINA)

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Keywords: Erlian Basin, Inner Mongolia, Late Cretaceous, Charophyta, Ostracoda, Hadrosauroidea

The Iren Nor site (Iren Dabasu Formation) is the oldest known dinosaur locality in Central Asia and it is the type-locality of the primitive Hadrosauroidea *Bactrosaurus johnsoni* and *Gilmoreosaurus mongoliensis*. This important dinosaur site near the Chinese-Mongolian border was discovered in 1922 during the Central Asiatic Expeditions of the American Museum of Natural History. In spite of its long tradition of palaeontological expeditions (see Currie and Eberth 1993 for an overview), the age of this dinosaur site was uncertain and three possible age estimates were defended: 1, Cenomanian-

Turonian based on the primitive nature of the hadrosaurs (Godefroit et al. 1998 and references therein); 2, Coniacian-Santonian-?Early Campanian based on the occurrence of evolved theropods (Currie and Eberth 1993, Jerzykiewicz and Russell 1991); 3, in the Chinese literature the Iren Dabasu Formation is dated as Campanian-Maastrichtian, but it has never been explicitly specified for the Iren Nor site. Classically the Iren Dabasu Formation has always been correlated with the Bayn Shire Formation in the Gobi Basin. Three ostracod- and charophyte-rich samples allowed the first age estimate of the Iren Nor site based on micropalaeontological evidence. The ostracod fauna comprises eight species of which *Cypridea irennorensis* Van Itterbeeck et al., in press is new. It is dominated by endemic Asian genera like *Mongolocypris*, *Talicypridea*, *Altanicypris* and *Ziziphocypris*. Based on the ostracods, the Iren Dabasu Formation can be correlated with the Nemegt Formation and must be Campanian-Maastrichtian in age. Both the age and correlation are confirmed by the charophyte data. This new age estimate for *Bactrosaurus johnsoni* has important implications for dinosaur evolution in the Chinese-Mongolian border region.

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NONMARINE OSTRACOD RICHNESS ASSESSMENT IN TEMPORARY PONDS: AN EVALUATION OF METHODS

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Keywords: Diapausing Egg Bank, Measuring Species Richness, Ostracoda, Temporary Ponds, Spain, Sampling

The simplicity of the definition of species richness, being the number of species present at a site, often contrasts with the complexity of its measurement. This is particularly true for many groups of small-sized animals. These organisms are often short-lived, with highly variable community composition even over short periods of time. Some species also reside at places that are difficult to sample quantitatively. Consequently, accurate richness assessments of small organisms usually require either repeated sampling, or sampling at a lot of locations, or both. This study compares assessments of contemporary ostracod richness obtained by three alternative methods. We complemented the more traditional analysis of active community samples with two types of analysis of sediment samples: identification of both remnants of active individuals and individuals obtained after activation of diapausing stages. Samples were taken in the Albufera Natural Park (Valencia, Spain). In total, twenty temporary ponds were studied, with contrasting ecological characteristics as to allow for a generalized evaluation of the methods applied. Our results highlight some potentials and limitations of all three methods, and stress the need for reliable tools to assess species richness of small animals. Analysis of active community samples is recommended to study short-term changes in richness, whereas sediment sample analysis yields a more integrated picture, both over time and space. Furthermore, the collection of sediment samples can also be performed during the dry phase.

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BIOSTRATIGRAPHICALLY USEFUL OSTRACODA OF THE NORTH AMERICAN PALEOGENE

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Keywords: Gulf Coast Paleogene, Ostracodes, Biostratigraphic Markers

Correlation and characterization of reservoir units from well to well or across fields can be difficult because of the limited number of biostratigraphic markers available (especially in estuarine or marginal-marine depositional systems) and often the limited availability and high cost of onshore seismic data. Often geoscientists must rely solely on electric wire-line logging tools, limited cores, and side-wall cores. None of these provide useful information on the ages of the stratigraphic units that are the actual reservoirs or the stratigraphic units that seal or encase the reservoirs. Biostratigraphic markers are essential to discriminate whether lithologic units with similar log signatures and characteristics are potentially either continuous flow units or separated genetically by time or sealing shales. Current biostratigraphic markers in transitional depositional settings of the U.S. coastal plains are chiefly benthic foraminifera. Among the standard markers from the Gulf Coast Paleogene listed by the Minerals Management Service of the U. S. Geological Survey and commonly used by consulting paleontologists, there are only two ostracodes: *Haplocytheridea stenzeli* and *Cytheridea sabinensis*. There are actually more than 100 useful ostracode species over this interval. These important stratigraphic markers have not been widely used, because most industry paleontologists have a limited knowledge of ostracodes, and their laboratories use processes that expedite the recovery of benthic foraminifera. Those methods are both harsh and effective at eliminating ostracodes, resulting in residues with depauperate ostracode assemblages. Hence, the providers of biostratigraphic data are unaware of the potential usefulness of ostracodes for correlation and reservoir identification. This is especially unfortunate because in most transitional settings ostracodes are far more abundant and diverse than benthic foraminifera.
We have developed a scaled-solution biostratigraphic and magnetostratigraphic model for the Paleogene, which calibrates many North American ostracode taxa to planktic foraminifer, calcareous nannoplankton, and dinocyst datums and zonations, and to the sequence of magnetic reversals. The calibrated ranges of many of the biostratigraphically important genera and species found in the Atlantic and Gulf Coastal Provinces are documented and incorporated within the scaled-solution model. In addition, the stratigraphic ranges presented offer higher biostratigraphic resolution than previously available. This not only allows their better use in biostratigraphy and in the identification of reservoir units within this major petroliferous geologic and biogeographic province but also enhances the comparison of evolutionary and migrational events with other biogeographic provinces.

COLLECTING OSTRACODS AND THEN? - A MODEL-DATABASE

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Keywords: Relational Database, Ostracodes, Ecology, Biogeography, Collection

Every investigation starts with gathering new material or evaluates collections which once were new. There are several references on collecting ostracods in the field and preparing them properly for identification (e.g., Athersuch et al. 1989, Meisch 2000, Holmes 2001, Danielopol et al. 2002), but there are almost no references on how to store the data for further proceeding. The present database contributes to an easy accessibility of the laboriously gained results and the possibility to exchange and/or store field-data more efficiently. It is common fact, that it is almost impossible to excerpt additional information from published data, but it would be desirable to refer to older data files for biogeographical or (palaeo-)ecological objectives, as they depend highly on large datasets to verify hypotheses or to develop precise transfer functions. The use of the present relational database does not only speed up the evaluation of large datasets, but can also make the data easily available for future research groups and form an interface to existing databases.

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A HOLOCENE OSTRACOD THERMOMETER - A QUANTITATIVE PALAEOLIMNOLOGICAL TRANSFER FUNCTION FOR NORTHEAST GERMANY

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Keywords: Canonical Correspondence Analysis, Freshwater Ostracods, Palaeolimnology, Palaeotemperature, Transfer Function, Training Set

A calibration dataset for non-marine ostracods from 96 localities throughout Mecklenburg-Vorpommern, Germany is evaluated using multivariate statistical methods. Special emphasis is put on the phenology of single species to gain information on the water characteristics at the time of their last moult. Canonical correspondence analysis (CCA) reveals that water temperature, pH, mean water depth and conductivity are statistically significant to account for the proportion of variation in the distribution of ostracod assemblages (Viehberg 2005). A transfer function is presented based on a weighted-averaging (WA) model to calculate water temperature from the relative abundances of 15 ostracod species *Candona candida* (O.F. Müller 1776), *C. neglecta* Sars 1887, *Fabaeformiscandona fabaeformis* (Fischer 1851), *F. fragilis* (Hartwig 1898), *F. holzkampfi* (Hartwig 1900), *F. hyalina* (Brady and Robertson 1870), *F. levanderi* (Hirschmann 1912), *F. protzi* (Hartwig 1898), *Herpetocypris chevreuxi* (Sars 1896), *H. reptans* (Baird 1835), *Ilyocypris decipiens* (Masi 1905), *Metacypris cordata* (Brady and Robertson 1870), *Notodromas monacha* (O.F. Müller 1776), *Physocypria kraepelini* G.W. Müller 1903 and *Potamocypris unicaudata* Schäfer 1943. The model is able to infer seasonal lakewater temperature from ostracod assemblages collected from lacustrine deposits. The new palaeolimnological tool is implemented to Holocene deposits from two coring sites (Lake Krakower See [Viehberg 2004] and Pudagla lowland [Viehberg et al. in review]) in northeastern Germany.

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EVOLUTION OF UPPER LIP IN MYODOCOPA

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Myodocopids secrete many kinds of granules: such as digestive enzyme, mucus, luminous enzyme and substrate from its upper lip. Upper lips have morphological variety according to phylogeny. In the case of myodocopids, function of upper lips is closely related to ecology and physiology. So detailed study about upper lips and its contents might clarify evolutionary pathway of myodocopids.
Some species which closely related to *Vargula hilgendorfii* were used in this study. Morphological and histological analysis were carried out for studying upper lips. Molecular methods were used for studying granules. Placement, kind and feature of each granule were revealed. By the results, new perspective on evolution of myodocopids were found out.

RECENT FRESHWATER OSTRACODES FROM THE LENA RIVER DELTA (NE SIBERIA)

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Keywords: Freshwater Ostracodes, Lena River Delta, Siberian Arctic

Little is known about freshwater ostracodes in Siberia, particularly from Arctic periglacial regions. Summaries on recent ostracodes from the former USSR were published by Bronshtein (1947) and Kurashov (1995). However, Arctic species are only briefly mentioned. The aim of our research is to describe freshwater ostracodes, their habitats and life conditions in Arctic periglacial environments, located in the southern part of the Lena River Delta on three islands: Samoylov, Tit Ary and Kurungnakh. Recent ostracodes were found during limnological research in 40 lakes and ponds, which were formed by the interplay of permafrost processes and fluvial activity. The studied basins were grouped into the following types: polygon ponds, thaw lakes, thermokarst lakes and old branches of the Lena River.
The ostracodes were caught using an exhaustor system, preserved in alcohol and finally counted and identified by soft body and valve characteristics under binocular microscope. Hydrochemical investigations included analyses of water parameters such as anions by Ion Chromatography, cations by ICP-OES and hydrogen carbonate by titration. Furthermore, pH, carbonate and total hardness of the waters as well as the contents of nutrients and oxygen content were analysed during fieldwork by means of a compact laboratory. Water temperature and conductivity were measured by a conductivity meter. On surface sediment samples analyses of nitrogen, organic and total carbon contents by CNS-Analyser as well as grain-size distribution by Laser-Granulometry were carried out.
Among 16 observed ostracode taxa, 12 taxa were identified down to a species level and 3 down to a generic level. One taxon comprises juvenile stages of the subfamily *Candoninae*. The ostracode species in the Lena River Delta mainly consists of typical Arctic species like *Candona harmsworthi*, *Candona muelleri-jakutica*, *Fabaeformiscandona pedata* and *Eucypris glacialis* and, otherwise of cosmopolitans like *Candona candida*, *Limnocytherina sanctipatricii* and *Cypria ophtalmica*. The hydrochemistry of the waters is characterised by low ionic concentrations with dominance of Ca^{2+}+(Mg^{2+})–HCO_3^-. The lake bottom sediments are mainly composed of minerogenic, sandy deposits with an organic overlay. Several types of the water basins can be distinguished neither by hydrochem-

ical nor by sedimentological parameters. Therefore, compositional differences in species assemblages seem to be related to the size of the studied basins, and the ostracode species composition of the small polygonal ponds can be differed from them of larger lakes. This study was conducted under the auspices of the Russian-German science cooperation "SYSTEM LAPTEV SEA 2000" in summer 2002. In future, our research on freshwater ostracodes in Arctic Siberian environments will be used to support the interpretation of Pleistocene fossil assemblages from permafrost deposits, and completed by stable isotope and trace element studies on ostracode valves.

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THE INFLUENCE OF RAPID ENVIRONMENTAL CHANGE ON EARLY APTIAN OSTRACOD FAUNAS IN THE WESSEX BASIN, SOUTHERN ENGLAND

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Keywords: Ostracoda, Aptian, Wessex Basin, Palaeoenvironmental Change

A phase of transgression in the Wessex Basin (southern England) during the earliest Aptian resulted in the collapse of the generally fresh water Barremian environment and the initiation of the marine mileu. The age of this transgressive event can be determined with some accuracy, for the M0 magnetic reversal identified in the upper part of the Vectis Formation marks the base of the Aptian.

Strata in southern England preserve the effects of this abrupt change from fresh to marine conditions. The non-marine Shepherd's Chine Member at the top of the Vectis Formation and the Upper Weald Clay Formation (believed to equate with the marine *P. fissicostatus* Zone *P. bodei* Subzone,) are overlain by the Atherfield Clay Formation (*P. fissicostatus* Zone, *P. obsoletus* Subzone, and *D. forbesi* Zone).

Ostracod assemblages from the uppermost Vectis Formation of the Isle of Wight, are dominated by *Sternbergella cornigera* and *Mantelliana mantelli.* Species of *Cypridea,* which dominate faunas lower in the succession, were absent, perhaps suggesting that salinities had passed from fresh-oligohaline to meso- and pliohaline. There is also a suggestion that the introduction of non-*Cypridea* faunas occurred when ephemoral water bodies were replaced by more widespread, permanent, lagoonal waters. The ostracods from the highest part of the Vectis Formation, therefore appear to be heralding the major transgression that was about to engulf the Wessex Basin. The marine incursion into the region during the *obsoletum* Subzone brought with it newly formed environmental niches that were rapidly occupied by microfaunas. The earliest marine ostracod faunas were recorded from the Perna Bed Member, Isle of Wight, and include abundant *Asciocythere albae* and frequent to common *Schuleridea derooi, Neocythere gottisi, N. bordeti* and *Cytherelloidea* sp. Other species include rare *Cythereis geometrica, C. semiaperta, Cytheropteron stchepinskyi* and *Protocythere croutesensis*. There is little difference in the faunas throughout the Perna Bed Member, except *Cythereis* tends to become more common up sequence at the expense of *Neocythere* and *Cytherelloidea*. The relationship of this earliest Aptian population with that of the Paris Basin cannot be mistaken.

In Sussex and Surrey, southern England, the Atherfield Clay Formation yields a diverse ostracod fauna, including *Asciocythere albae, Neocythere (N.) gottisi, Neocythere (C.) bordeti, Protocythere croutesensis, Protocythere mertensi langi, Cythereis geometrica, Eocytheropteron stchepinskyi, Schuleridea derooi, Dolocytheridea intermedia* and a number of species of *Paranotacythere* including *P. (P.) oertlii* and *P. atypica*. The assemblage is in many respects, similar to the faunas recovered from the Perna Beds. Several ostracod species are euryhaline, but others - e.g. *Paranotacythere (P.) oertlii* and *Protocythere mertensi langtonensis* - appear to have been restricted to marine or near marine salinities.

BIOSTRATIGRAPHICAL AND PALAEOECOLOGICAL APPLICATIONS OF LATEST KIMMERIDGIAN AND PORTLANDIAN OSTRACODA IN SOUTHERN ENGLAND

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Keywords: Ostracoda, Biostratigraphy, Palaeoecology, Kimmeridgian, Portlandian, Southern England

The late Jurassic was a time of rapid change in palaeoecology and palaeogeography of southern England, and the gradual change from marine conditions during the late Kimmeridgian (*sensu anglico*) to transitional and more marginal situation during the late Portlandian, culminating in the fresh water conditions at the end of the period. Stratigraphical, facies and palaeoenvironmental changes are reflected in the ostracod populations.

Three cored boreholes at Hartwell (near the classic Bugle Pit locality, National Grid Reference SP7926 1223), Tisbury (at the eastern end of the Vale of Wardour, Dorset, National grid reference 9359 2907) and Fairlight (a short distance from Hastings, National Grid Reference TQ8592 1173) have been studied to determine the distribution of ostracods through the latest Kimmeridgian and Portlandian of southern England.

The Upper Kimmeridge Clay yields rich, but low diversity ostracod faunas, characterised by stratigraphically restricted species of *Aaleniella, Galliaecytheridea, Klentnicella, Macrodentina, Mandelstamia, Micrommatocythere, Paralesleya* and *Prohutsonia.* Other species that first appeared during the late Kimmeridgian, range through to the Portlandian, including species of *Dicrorygma*, *Hechticythere,* and *Procytheropteron.* Several species appear for the first time in the Portlandian, belonging to genera such as *Cytherelloidea, Paracypris, Fabanella, Klieana, Paraschuleridea, Eocytheridea, Paranotacythere* and *Rectocythere*.

The upper Kimmeridgian and Portlandian in southern England examined during the present study can be subdivided biostratigraphically on the basis of their ostracod content:

Theriosynoecum forbesi Zone
Cypridea dunkeri Subzone
Wolburgia visceralis Zone
Galliacytheridea compressa Zone
Paraschuleridea buglensis Subzone
Eocytheridea eusarca Subzone
Galliaecytheridea polita Zone
Galliaecytheridea spinosa Zone
Aaleniella inornata/ Aaleniella gracilis Subzone
Hechticythere serpentina /Macrodentina (P.) rudis Subzone
Mandelstamia (*X.*) *tumida* Subzone
Eocytheropteron aquitanum Zone

This slightly emends the published zonal scheme recognised in the late Kimmeridgian of Dorset and eastern England, and extends it into the Portlandian. However, biostratigraphy is made difficult by provincialism caused by decreasing salinities during the latest Portlandian.

Marine and near-marine forms such as species of *Protocythere, Macrocypris, Paraschuleridea* and *Paranotacythere,* were replaced by euryhaline forms, such as species of *Fabanella* and *Mantelliana*, and oligohaline species of the genera *Cypridea, Klieana, Scrabiculocypris, Darwinula* and *Rhinocypris,* typical of the Purbeck and Wealden associations.

COLONISATION OF BRACKISH WATER MILIEU BY EARLY CARBONIFEROUS OSTRACODS

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Keywords: Ostracoda, Palaeoecology, Carboniferous, Ballagan Formation, Scotland

The Ballagan Formation (Late Tournaisian-Early Viséan) of central Scotland yields an ostracod fauna of 14 species (in the genera *Beyrichiopsis, Cavellina, Glyptolichvinella, Glyptopleura, Knoxiella, Paraparchites, Sansabella, Shemonaella, Silenites* and *Sulcella)*. Three informal assemblage zones can be calibrated with well-known palynomorph biozones:

1. a lower interval with poorly diverse ostracod assemblages including *Shemonaella scotoburdigalensis* (sub-CM palynomorph Biozone).
2. a succeeding interval where several species first appear, including *Cavellina coela, Cavellina incurvescens*, *Sansabella amplectans* and new species of *Knoxiella* and *Paraparchites* (intra CM palynomorph Biozone).
3. an upper interval, marked by the appearance of *Sulcella affiliata*. At least locally in central Scotland, *S. affiliata* permits a level of resolution equivalent to a sub-zonal upper division of the CM Biozone.

Ostracod faunas include

1. Cytherellacean and kloedenellacean species, known from marginal marine sites elsewhere, but probably also tolerant of brackish water,
2. Podocopid species such as '*Bythocypris*' *aequalis* that may have been adapted for brackish water settings on coastal flood plains (ephemeral lakes and lagoons), and
3. Paraparchitacean-dominated assemblages that may signal harsh (hypersaline or desiccating) environments.

These assemblages suggest that during the Early Carboniferous of central Scotland, ostracods were colonising brackish and hypersaline ecologies on a coastal flood plain; a developmental stage that may have encouraged colonisation of limnetic environments during the later Carboniferous. This notion is supported by the stable isotope composition ($\delta^{18}O$, $\delta^{13}C$) of biogenic (ostracod, mollusc) and authigenic carbonates in the Ballagan Formation. These divide into three clusters: a diagenetic field defined by low $\delta^{18}O$ (<-11‰ VPDB); an intermediary field ($\delta^{18}O$ –11 to –9‰) composed of a mixture of primary and secondary carbonates; and samples within the range of –9 to –4‰ which are largely unaltered. No samples give typical Early Carboniferous $\delta^{18}O$ marine values: average marine carbonates from Europe have $\delta^{18}O$ between -4 to -3‰. The Ballagan Formation carbonates were probably deposited in evaporated freshwater and/or brackish water, supporting the argument that this formation was deposited in a coastal flood plain setting, in brackish (0.5<30‰ NaCl) and hypersaline (>40‰ NaCl) waters, but in the absence of persistent normal marine conditions.

Other evidence comes from the evaporites and desiccation-cracked surfaces, which suggest fluctuating salinity in ephemeral water bodies, and non-haptotypic palynmorphs resembling fresh to brackish water algae.

A NEW CONCEPT OF PODOCOPAN OSTRACODE HINGE STRUCTURE

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Keywords: Carapace, Hinge Structure, Hingement, Ligament, Ultrastructure, SEM, TEM

The ostracode carapace covers the whole body and is composed of two valves, which connect with each other along the dorsal margin. Calcified teeth/sockets arrangements (=hingement) and a flexible organic ligament develop along this margin, forming a hinge. Since the calcified structure is well preserved as fossil, many paleontologists' attentions have concentrated on it and so far, it has been used for higher taxonomy. The conventional studies on hingement, however, are mere morphological classifications of the hinges' lateral views (up to about 30 types) and there are only a few discussions on the evolutionary relationships among the types.

In this study, ostracode hinges (2 orders, 6 superfamilies, 22 families, 30 genera, 32 species) were examined utilizing SEM and TEM, and classified into 4 types (Fig. 1) by the relative position of teeth arrangements and ligaments, i.e. by this new classification, ostracode hinges can be compared with each other based on their structural homologies. As a result, it was elucidated that all examined hinges consist of one or a combination of the 4 types. Moreover, evolutionary pathways of ostracode hinges were inferred by the structures of the 4 types and the fossil record.

According to this new concept, at least 3 types (Type A, B and D) can be recognized in cypridoid hinges that have been hitherto identified as "adont" due to their simple structure. This fact obviously shows that cypridoid hinges have diversified in structure similar to those of cytheroid ones.

Furthermore, formation of the hingement and ligament at the final molt was clarified in detail by TEM observation of cuticular phases at the various "crustacean molt stages" (e.g., Stages A, C and D1-4). The formation of the ostracode ligament is completed by a series of epidermal cells and it finishes by Stage D4 at the premolt. The teeth arrangement is probably made just before the formation of the membranous layer.

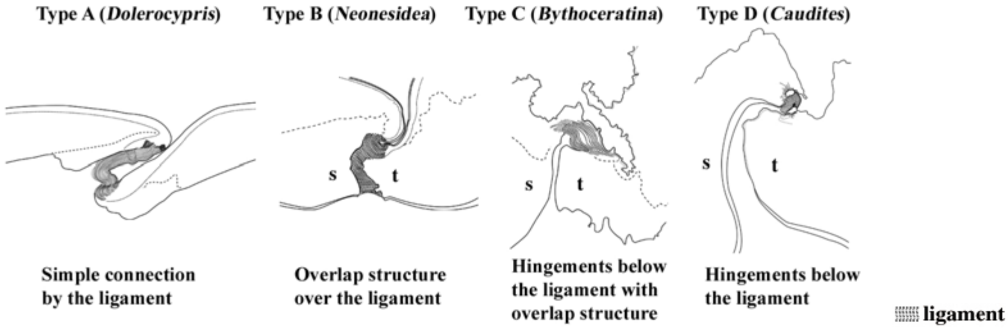

Fig. 1: A new classification of podocopan ostracode hinges. t =teeth s = sockets

EOCENE-OLIGOCENE SHALLOW-MARINE OSTRACODE FAUNAL CHANGE IN SOUTHWESTERN JAPAN

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Keywords: Eocene, North Pacific, Oi1 Event, Oligocene, Ostracoda, Southwestern Japan

Many ostracode species were believed to have become extinct at the Eocene/Oligocene boundary (E/O boundary) (e.g., Ducasse and Peypouquet 1986, Keen 1990). On the other hand, the foraminiferal oxygen isotope records from drilling cores in the DSDP and ODP show a significant positive spike at

33.5–33.1 Ma, shortly after the E/O boundary. This spike is called the "Oi1 event", and is regarded to correspond to the Antarctic ice sheet's expansion or rapid climatic cooling (e.g., Zachos et al. 1996). Previous studies on the E/O boundary ostracode extinctions are restricted to regions along the Atlantic and the relationship between the extinctions and global environmental changes has seldom been discussed. Our aims are to examine Eocene-Oligocene ostracode faunal changes in southwestern Japan and discuss the relationship between the faunal changes and global environmental changes.
Fossil ostracodes were studied from the middle-upper Eocene Okinoshima and Funazu (ca. 38–35Ma), the lower Oligocene Itanoura (33.3–32.8 Ma), and the Waita formations (29.4–28.5 Ma) in Kyushu, southwestern Japan. These formations have been dated by planktic foraminifers, calcareous nannofossils, dinoflagellate cysts, and zircon fission-tracks of pyroclastic rocks (e.g., Okada 1992). Depositional environments were estimated in this study by lithofacies, molluscs and planktic/total foraminifer ratios by TY.
At least 63 ostracode species occur from 40 samples of the formations, and they are thought to have inhabited outer shelves. The shallow-marine ostracodes show a change between ca. 33 and 29 Ma after the Oi1 event. Middle Eocene-early early Oligocene ostracode faunas were dominated by *Acanthocythereis volubilis*, *Cytherella* spp., and *Eopaijenborchella sinensis*, while the late early Oligocene fauna was dominated by *Palmoconcha* sp.
This faunal change is contemporaneous with the molluscan faunal changes, which indicate climatic cooling, in both Kyushu of southwestern Japan and the West Coast of U.S.A (e.g. Mizuno 1964, Squire 2003). These ostracode and molluscan faunal changes were delayed for 1 million years or less after the beginning of the Oi1 event. We conclude that the ostracode faunal change was not directly influenced by the Oi1 event but influenced by the regional climatic cooling at mid-latitudes of the North Pacific following the Oi1 event.

HOLOCENE OSTRACODE HISTORICAL BIOGEOGRAPHY OF THE SETO INLAND SEA, JAPAN: IMPACTS OF THE OPENING OF STRAIT ON INNER BAY BENTHOS

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Keywords: Ostracoda, Holocene, Historical Biogeography, Opening of Strait, Macroecology, Seto Inland Sea, Japan

Distributions of inner bay Ostracodes are controlled by various environment factors, and especially by water depth (and its related factors). However, Yasuhara et al. (2004) found a major faunal change independent from water-depth change in Osaka Bay, the Seto Inland Sea, Japan: this faunal change was triggered by the opening of the strait (abrupt historical event). However such faunal change is confirmed only in Osaka Bay, not in other areas even in the Seto Inland Sea. Thus this study is intended to reconstruct the Holocene ostracode historical biogeography of the Seto Inland Sea to show universality and significances of such faunal change events. We reexamined published data of temporal changes in the Holocene ostracodes in the Seto Inland Sea. We focus attention on temporal changes in relative abundance (%) of five dominant species to detect major faunal change.
As a result, five faunal changes (Horizons 1–5) caused by the openings of straits and formations of bay areas were recognized. This result shows importance of millennial-scale historical perspective based on high-resolution Holocene microfossil record on biology (e.g., macroecology, biogeography), because these faunal changes show that the distributions and faunal compositions of ostracodes are controlled not only by gradual natural environmental changes (e.g., water depth, temperature) but also by abrupt historical (geological) events (e.g., opening of strait) during the Holocene. Some parts of distributional patterns of modern fauna may be explained by these abrupt historical events. I will discuss in more detail on biological (ecological) and paleontological (paleoecological) significances of this phenomenon.

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THE NONMARINE OSTRACOD FAUNA OF THE BALEARIC ISLANDS

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Keywords: Nonmarine Recent Ostracoda, Balearic Islands, Biogeography

The wide habitat diversity of the Balearic archipelago, including four main islands (Majorca, Minorca, Ibiza, Formentera) differing in climatic and geological features, provides an excellent scenario for the study of ostracod ecology and biogeography.

In a previous study on the microcrustaceans of the Balearic Islands, one of us (Pretus 1993) discussed the main ecological and historical factors affecting the species distribution of Anostraca, Conchostraca, Anomopoda, Notostraca and Copepoda Calanoida, and showed how water chemistry and dispersal abilities markedly influenced the distribution of species belonging to these crustacean groups. In contrast to these groups, the distribution of Ostracoda on the Balearic Islands is poorly known, as the scarce information comes from studies published by Margalef in the fifties (see the list reviewed by Baltanás et al. 1996)

On the basis of the analysis of more than 100 samples collected by Pretus (1993) in 1988, plus more than 50 other samples collected in 2003 in the island of Minorca, we provide a reviewed account of the nonmarine ostracod fauna present in this archipelago. The most common species encountered in the Balearic Islands, each present at more than 20 localities, are *Sarscypridopsis aculeata*, *Heterocypris salina, H. incongruens, Eucypris virens, Ilyocypris gibba, Cyprideis torosa* and *Loxoconcha elliptica*.

This list reflects either the seasonality of the habitats, in the case of the first five species, which can tolerate desiccation, or the marine influence, as the last two species are usually living in permanent brackish waters, or both, as the species inhabiting temporary ponds are tolerant of some degree of salt content variability.

Our study of these samples has revealed a richer continental ostracod fauna for the Balearic Islands than previously acknowledged, with more than 20 species being newly recorded for the whole archipelago. Among these, some are widely distributed in mainland Europe (e.g. *Candona neglecta, Cyclocypris ovum*), others have a more or less wide circum-Mediterranean distribution (e.g. *Eucypris mareotica*, *Trajancypris clavata, Notodromas persica*, *Heterocypris* cf. *bosniaca, Herpetocypris brevicaudata*), and others are of African origin (*Cypris decaryi*).

The study is still under way, continuing the analyses of samples collected in the archipelago in the past. With this work, we expect to provide a detailed account of the nonmarine ostracod biogeography of the Balearic Islands, and hints to understand the processes underlying colonisation and maintenance of ostracod populations in Mediterranean islands.

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OPEN PLATFORM ON PALEOBIOLOGICAL ANALYSES (OPPA) OF NONMARINE OSTRACODS FROM THE LOWER CRETACEOUS

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Keywords: Access Database, Paleobiology, Statistical Analyses

Open Platform on Paleobiological Analyses - OPPA - is an Access database developed within the framework of a current Diplom thesis. This thesis - "A Paleobiological Database (OPPA) of non-marine ostracods from the Lower Cretaceous and data analysing especially for biogeography“ is supervised by Michael Schudack.

The database is open source, which means the user can change the program as necessary. It currently includes the taxonomy, synonomy, diagnosis, description, distribution, ecology, biostratigraphy, references, citations and figures of non marine ostracods from the Lower Cretaceous. The collected data can be used for statistical analyses, e.g. biogeography. All facts are separately retrievable. The data can be analysed by integrated functions for data visualisation, or be exported into special tools for statistical analysis, e.g. SPSS. New attributes can be added dynamically at runtime and can then be administrated by a separate tool.

OPPA is now in internal use by the members of the “Berlin Ostracodology Group” at the “Freie Universität Berlin”. In the distant future, OPPA will be published in the World Wide Web. It is a noncommercial database and can also be used for other organisms.

In conclusion, OPPA is a useful universal information system for all kind of paleobiological data. It makes it easy for the user both to capture a large amount of data and to handle a large number of different paleontological facts within a short time.

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MID-SYMPOSIUM EXCURSION: METROPOLITAN OSTRACODS FROM THE SPREE RIVER

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Introduction

The mid-symposium boat trip of the 15th Symposium on Ostracoda in Berlin provides not only the chance for sightseeing in the city centre of Berlin but also for sampling freshwater ostracods living in the Spree river. To find out which kind of ostracods may be expected to live in the metropolitan section of the Spree river, surface sediments were collected in the Treptow harbour region near the eastern city centre (Fig. 1) in September 2004 and analysed for their ostracod content.

General situation of the urban Spree river

The harbour region in Treptow represents a river lake or lake-like broadening of the watercourse which potentially suffers from urban water pollution more intensively than narrower river sections. Inner-city river lakes like those of the Treptow harbour section of the Spree river are usually characterized by an extremely low flow velocity, shallow water depths, warming of water caused by power plants and the continuous supply of nutrients from discharges of large sewage treatment plants. The Berlin-Rummelsburg power station is situated directly at the bank of the river within the Treptow harbour section of the Spree. However, owing to the shallowness of the river (usually less than 10 m) and to wave-induced mixing of the water column caused by wind and larger freight barges or excursion boats, the dissolved oxygen content remained relatively high and stable at about 5 to 6 mg/l throughout the 1991-2001 observation period in the Spree river section under consideration (source: Senate). In the same period, nutrient levels decreased considerably owing to the closure of a number of upstream factories following the changeover to a market economy after the unification of FRG and GDR in 1990 and measures to improve the efficiency of sewage treatment plants. For example, overall phosphorus declined from 0.2-0.3 mg/l in 1991 to 0.15-0.2 mg/l in 2001 in the Treptow harbour Spree region (Senate) corresponding to a significant decrease in ammonium nitrogen contents from >2.4 mg/l in 1991 to 0.3-0.6 mg/l in 2001. Thus, the nutrient loading of the Spree river water in the city centre has experienced a remarkable improvement in recent years, although certain parameters are still far above estimated natural background values.

Sampled sites

The uppermost few centimetres of river sediment were sampled at four sites in the Treptow harbour section of the Spree using an Ekman-Birge grab. Sites A and B (Fig. 1) were chosen close to small islands with a water depth of 1.3 m at the former site and 2.7 m at the latter. Site C is situated very close to the Berlin Cement Works and has a depth of about 5 m. The largest depth of about 7 m was measured at site D a few hundred metres further upstream. Coarse-grained sandy and gravelly sediments with a light colour and a relatively low organic content were sampled at the first three sites (A-C) whereas finer-grained and dark-coloured muddy sands with a higher organic content were collected at site D. Shells of bivalves and gastropods were abundant in the sediments of the sites A, B and C, but less frequent at site D.

Results and discussion

The following 11 taxa were recorded at the four sampled sites:

Candona neglecta Sars 1887
Cypria ophtalmica (Jurine 1820)
Cypridopsis vidua (O.F. Müller 1776)
Darwinula stevensoni (Brady and Robertson 1870)
Fabaeformiscandona fabaeformis (Fischer 1851)
Fabaeformiscandona levanderi (Hirschmann 1912)
Fabaeformiscandona protzi (Hartwig 1898)
Ilyocypris sp.
Limnocytherina sanctipatricii (Brady and Robertson 1869)

Physocypria kraepelini G.W. Müller 1903
Pseudocandona compressa (Koch 1838)

Whereas shells of *C. neglecta, C. ophtalmica, D. stevensoni, F. levanderi, L. sanctipatricii, P. kraepelini* and *P. compressa* were present in large numbers at all four sites, those of *Cypridopsis vidua* were generally rare. One carapace of *F. fabaeformis* and a single shell of *F. protzi* and *Ilyocypris* sp. were recorded among the more than 1000 ostracod shells picked from the samples. The ostracod assemblages at the four sampled sites did not show significant site-specific differences although a more detailed study was necessary to reveal whether this statement applies to living specimens in addition to sub-Recent empty shells.
Most of the recorded taxa are remarkable tolerant of a wide range of environmental factors (see review in Meisch 2000) and are therefore known from various types of continental aquatic habitats. Somewhat surprising is the high abundance of *Limnocytherina sanctipatricii* shells which are considered to indicate oligotrophic conditions (e.g., Scharf 1981).
Although the Spree river in the city centre of Berlin is a completely channelled watercourse with a low variety of habitats and with extremely slow-flowing water supplied by large sewage treatment plants rather than natural inflow (Senate), ostracods seem to maintain comparatively diverse assemblages with a relatively high number of individuals. Future studies - more detailed and extensive in terms of spatial and temporal scale, e.g., with a focus on living specimens exclusively or on longer time scales - will shed more light on the distribution and environmental conditions of metropolitan ostracods in space and time.

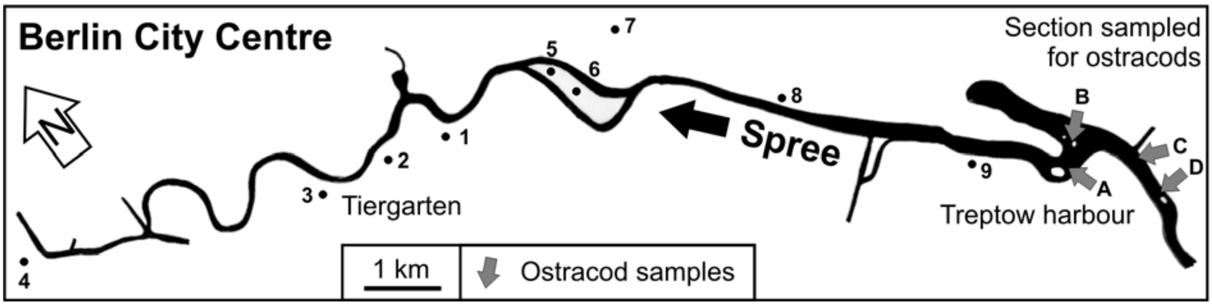

Fig. 1. Sketch map of the Spree river in the centre of Berlin. Main sights along the river and ostracod-sampling area are as follows: **1** Reichstag, Government district with the Federal Chancellery, **2** House of the World's Cultures, Congress Hall, **3** Bellevue Palace, the official residence of the federal president, **4** Charlottenburg Palace, **5** Museums Island with the Pergamon Museum, the Old National Gallery and the cathedral Berliner Dom, **6** ruin of the Palace of the Republic and the seat of the former GDR government, **7** TV Tower, **8** East Side Gallery, former Berlin Wall, **9** Treptow harbour, excursion boat marinas and site of ostracod sampling

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PLATE 1
Fabaeformiscandona levanderi (1-5); *Candona neglecta* (6-9); *Cypria ophtalmica* (10, 11); *Physocypria kraepelini* (12, 13); and *Cypridopsis vidua* (14-16)

Fabaeformiscandona levanderi
1: Left valve (LV) external (ext.), length 924 µm (M44). **2:** Right valve (RV) ext., length 914 µm (M38). **3:** RV internal (int.), length 1080 µm (M41). **4:** LV int., length 1020 µm (M42). **5:** Carapace (C) dorsal, length 993 (M55).

Candona neglecta
6: ♂LV ext., length 1020 µm (M21). **7:** ♀RV ext., length 1010 µm (M14). **8:** ♂RV int., length 1090 µm (M39). **9:** ♂LV int., length 1110 µm (M24).

Cypria ophtalmica
10: LV ext., length 591 µm (M51). **11:** LV int., length 556 (M48).

Physocypria kraepelini
12: LV ext., length 587 µm (M50). **13:** LV int., length 599 (M46).

Cypridopsis vidua
14: RV ext., length 630 µm (M34). **15:** LV int., length 636 µm (M31). **16:** C dorsal, length 611 (M33).

(All specimens housed in the Institute of Geological Sciences of the Freie Universität Berlin.)

PLATE 2
Limnocytherina sanctipatricii (1-6); *Pseudocandona compressa* (7-10); *Darwinula stevensoni* (11, 12); *Fabaeformiscandona fabaeformis* (13); *Fabaeformiscandona protzi* (14); and *Ilyocypris* sp. (15)

Limnocytherina sanctipatricii
1: ♀LV ext., length 809 µm (M09). **2:** ♀RV ext., length 820 µm (M10). **3:** ♀C dorsal, length 812 (M53). **4:** ♂LV ext., length 895 µm (M11). **5:** ♂RV ext., length 844 µm (M08). **6:** ♂C dorsal, length 830 (M52).

Pseudocandona compressa
7: LV ext., length 757 µm (M18). **8:** RV ext., length 812 µm (M19). **9:** C dorsal, length 745 µm (M54). **10:** Zenker organ within ♂LV, valve length 811 µm (M06).

Darwinula stevensoni
11: RV ext., length 660 µm (M17). **12:** RV int., length 671 (M15).

Fabaeformiscandona fabaeformis
13: RV ext., length 1000 µm (M05).

Fabaeformiscandona protzi
14: LV int., length 936 µm (M04).

Ilyocypris sp.
15: RV ext., length 852 µm (M12).

(All specimens housed in the Institute of Geological Sciences of the Freie Universität Berlin.)

Plate 1

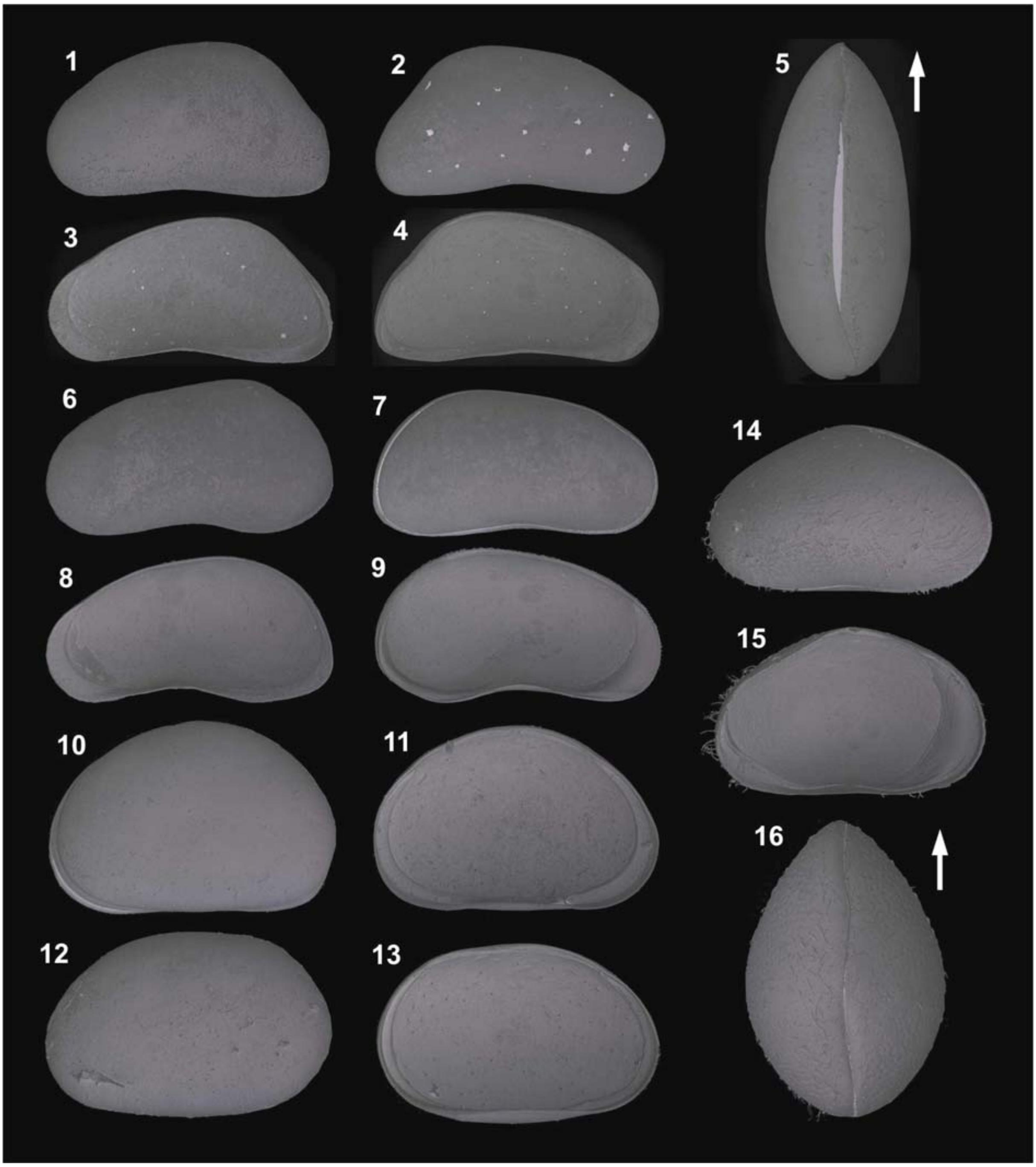
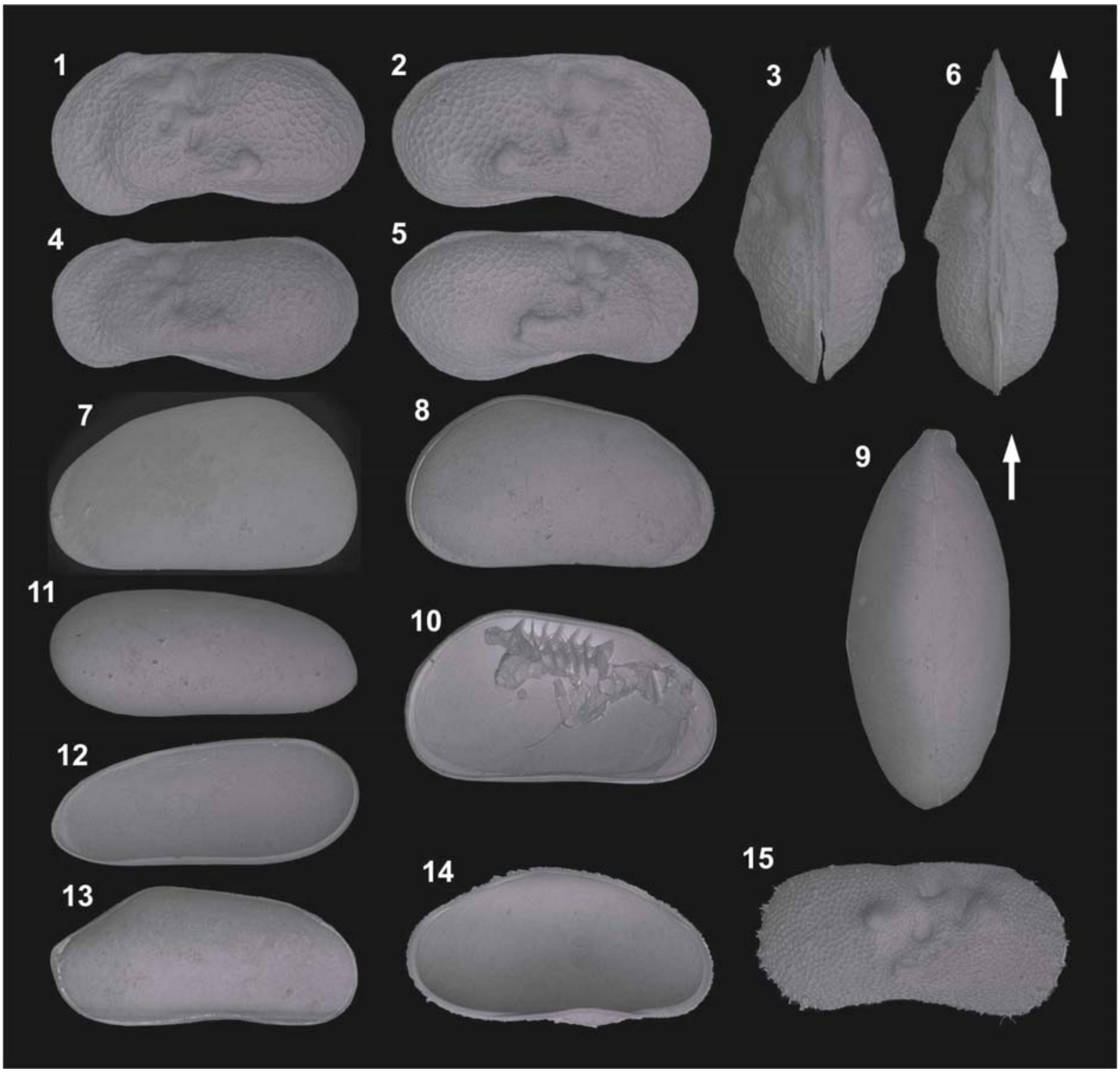


Plate 2



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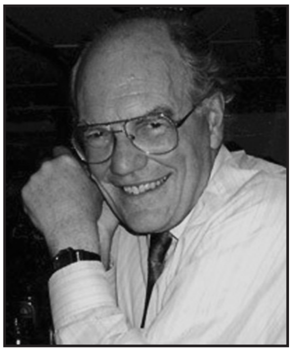

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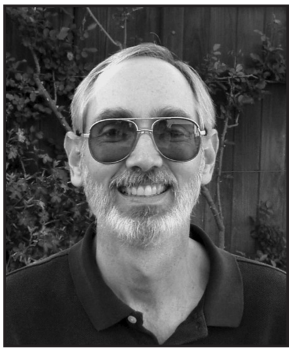

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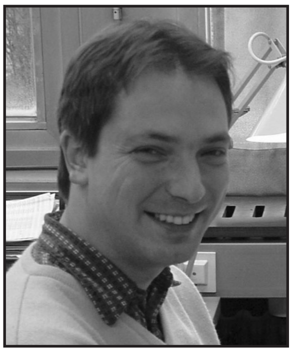

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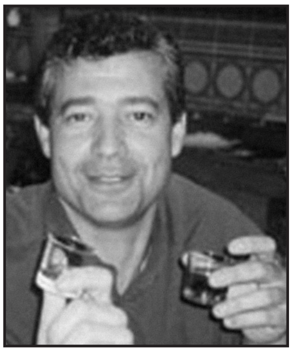

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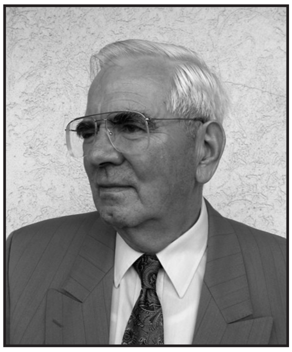

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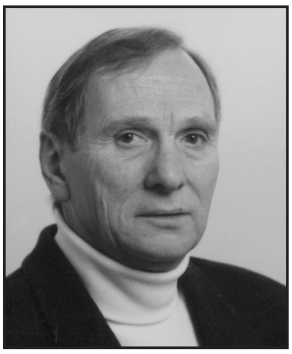

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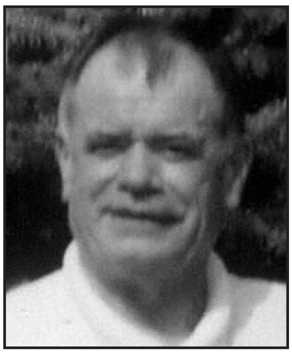

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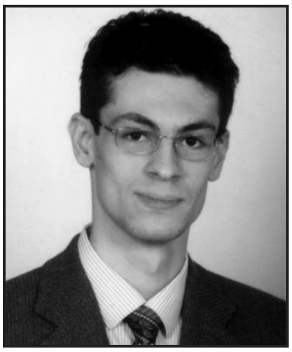

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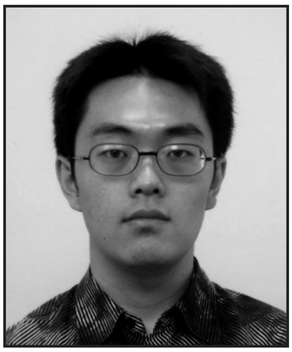

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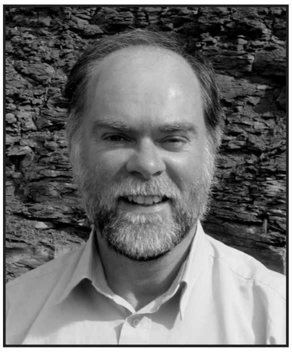

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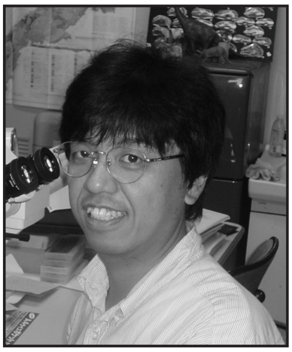

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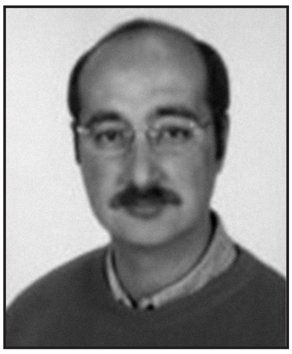

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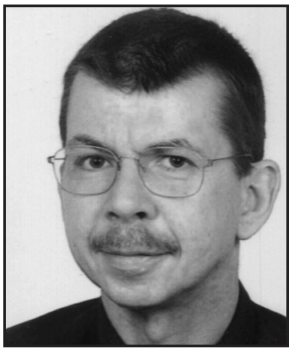

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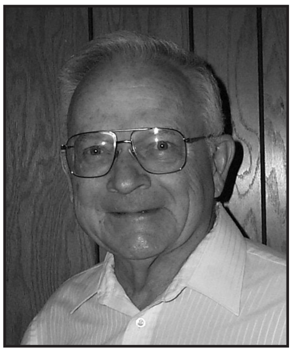

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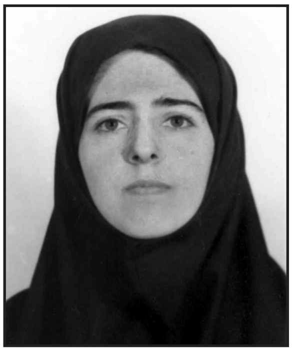
page: 69



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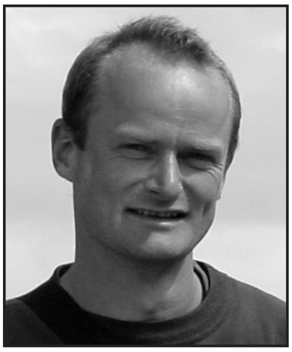

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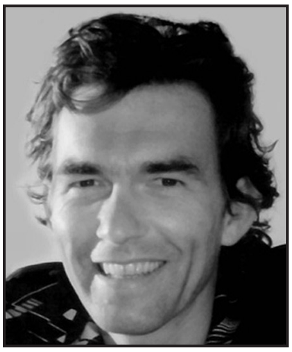

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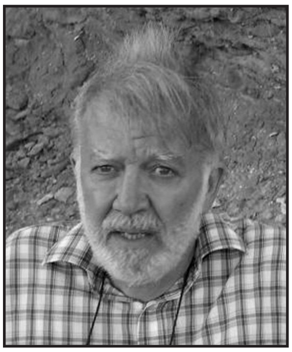

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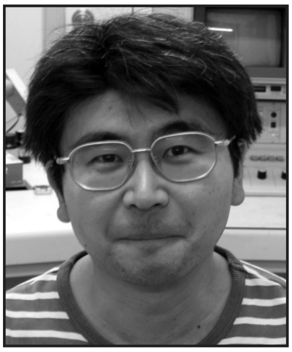

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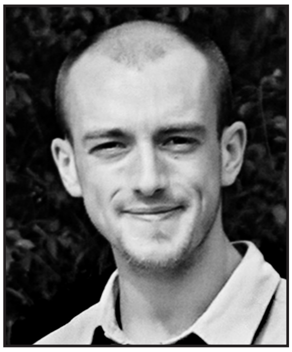

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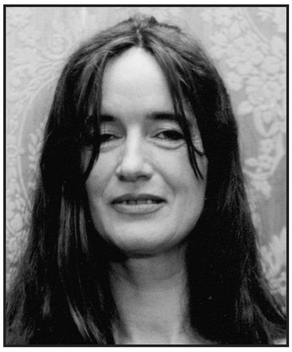

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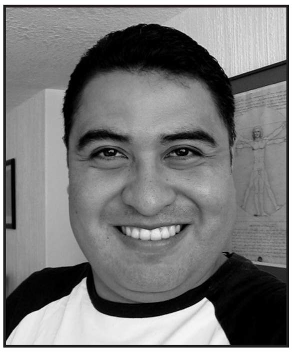
page: 100



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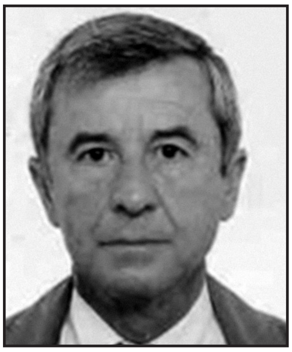

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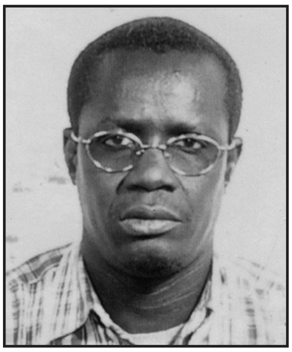

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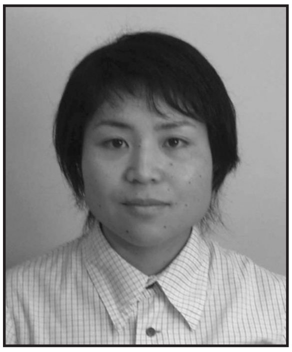

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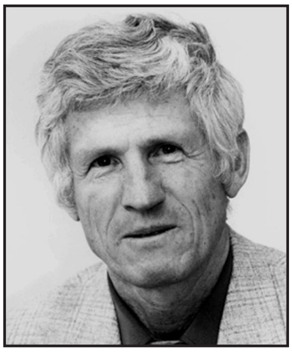

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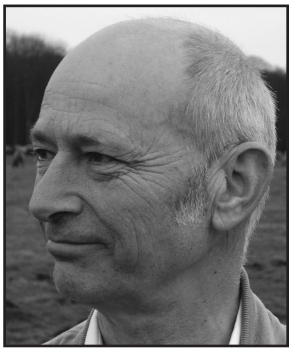

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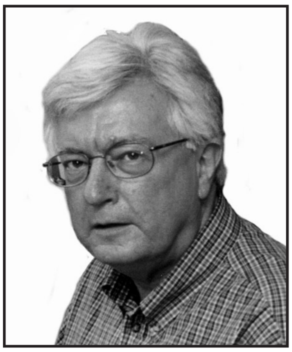
pages: 56, 110



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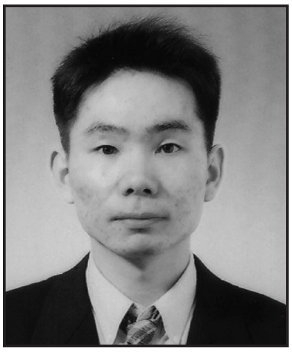

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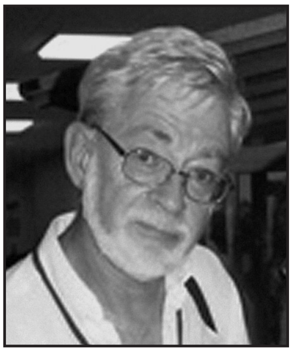

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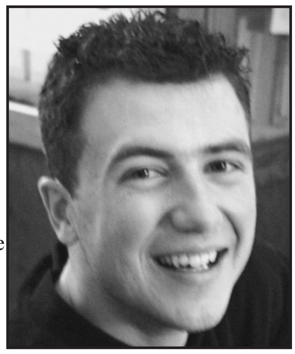

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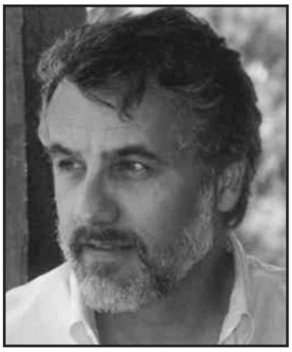
pages: 122, 123



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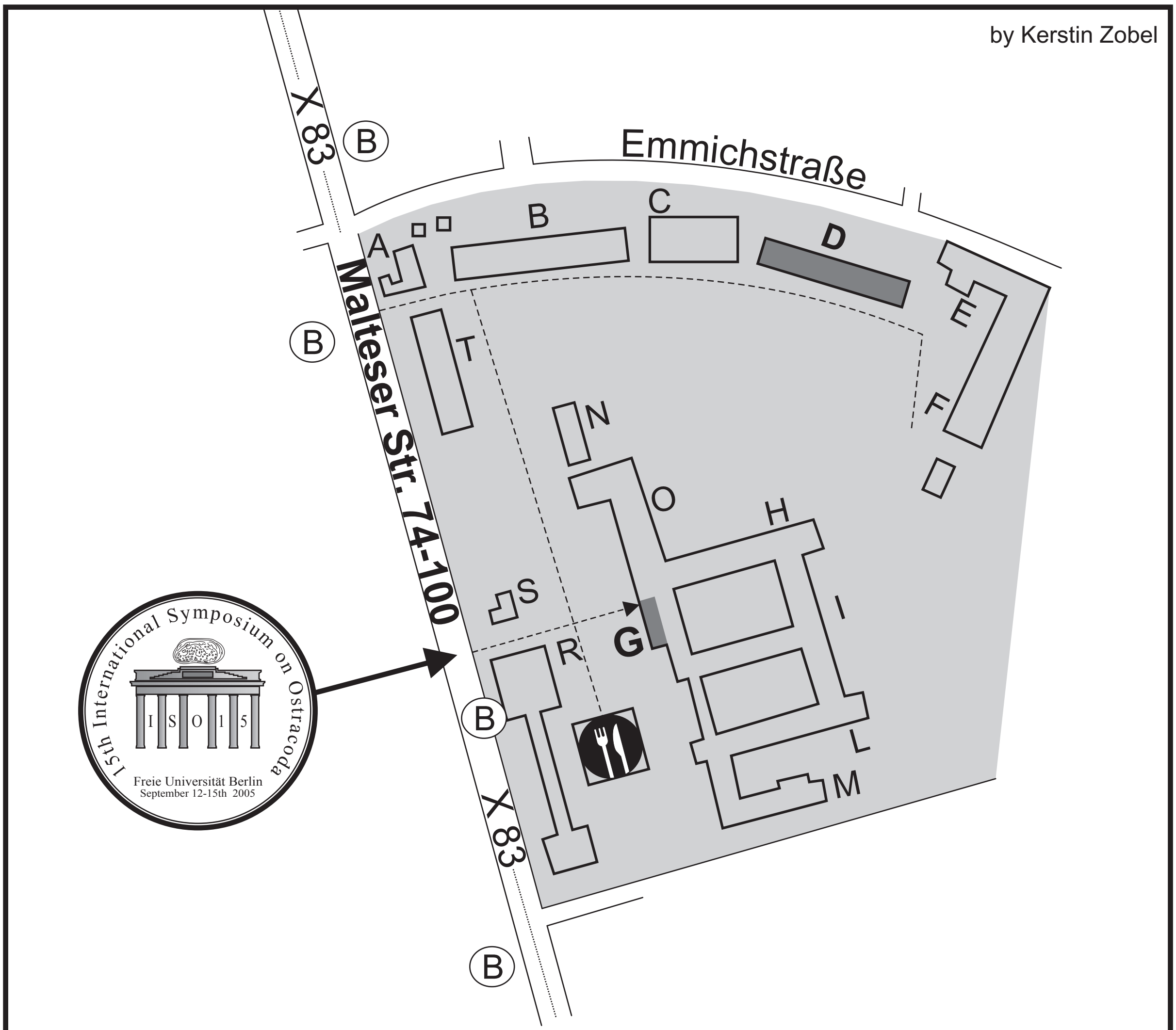

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