

Fossil Invertebrates in Stratigraphy

Bivalves in Late Devonian to Early Mississippian biostratigraphy

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Bivalves of the former “*Posidonia venusta*” group occur widespread in Late Devonian to earliest Mississippian strata within low latitude pelagic environments (Hercynian and Kulm facies). Today, these taxa are assigned to the bivalve genus *Guerichia* proven by SEM observations of the shell microstructure. The form group can be subdivided into several taxa at the species level, which appear to be biostratigraphically important and indicate biostratigraphic zones in the pelagic Late Devonian. Former attempts at a biostratigraphical zonation in Kazakhstan are successfully adopted to comparable facies in Europe. Close to the Devonian/Carboniferous boundary of Hercynian (i.e. basinal) Facies, *Guerichia venusta s. str.* characterizes the Late Famennian, whereas *Guerichia ratingensis* (= *G. venustiformis*) indicates the D/C boundary interval and *Guerichia mariannae* probably the early Mississippian. Future correlation with conodonts will be carried out soon.

Keywords: Bivalvia, *Guerichia*, “*Posidonia venusta*”, Late Devonian, Early Mississippian, biostratigraphy.

Fossil Bryozoans in Stratigraphy of Mongolia

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The taxonomic diversity and distribution of the Paleozoic bryozoans from well studied Paleozoic type sections are analysed and 34 local biostratigraphic units, beds with bryozoans, are established.

Keywords: Paleozoic, bryozoans, Mongolia.

Nautiloids from the Toarcian of the Iberian Peninsula, Spain and Portugal

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The study of the Lower Jurassic nautiloids held in the Universidad Complutense de Madrid and the Instituto Geológico y Minero, Spain, and the Universidade de Coimbra and the Museu Geológico e Mineiro, Portugal, has revealed the presence of numerous and diverse representatives of the genera *Cenoceras*, *Ligeiceras*, *Ophionutilus* and *Digoniceras* in the Toarcian of the Iberian Peninsula. Specifically, the taxa *Cenoceras robustum*, *C. fontannesi*, *C. semistriatum*, *C. astacoides*, *C. jourdani*, *C. toarcense*, *C. ciryi*, *C.?* *beirense*, *Ligeiceras fourneti*, *L. inornatum*, *L. anomphalum*, *L. jurense*, *L.?* *globulum*, *Ophionutilus* sp., *Digoniceras* sp. 1 and *D.* sp. 2 have been identified and described, and their stratigraphic distributions have been determined for this region of South-Western Europe.

Keywords: Nautiloidea, Toarcian, Systematics, Biostratigraphy, Iberian Peninsula, Spain, Portugal.

Morphological evolution of *Claraia* species from the Late Permian (Changhsingian) to the Early Triassic (Induan) and the response to the Permian-Triassic stressed environment

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Claraia ranged from the Late Permian to the Early Triassic. From the early Changhsingian to the Induan, byssal notches of *Claraia* species become narrower, and gradually change from being ventrally extended to being horizontally extended. As the byssal notches narrowed, many *Claraia* species also lost most of their radial ornamentation. This resulted in a higher ratio of *Claraia* species with only concentric ornamentation to *Claraia* species with both concentric and radial ornamentation. *Claraia* experienced a rapid diversification and geographic expansion from the early Changhsingian to the Early Triassic. The rapid diversification of *Claraia* during the Permian - Triassic transition is related to a change in the genera's morphology, making *Claraia* better adapted to the stressed environment near the PTB, and as a result leading to a successful disaster genus.

Keywords: *Claraia*, morphological evolution, Permian-Triassic.

Mississippian-Pennsylvanian boundary beds in the South Urals

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The Mississippian-Pennsylvanian (Serpukhovian-Bashkirian) boundary beds are studied in boreholes in the eastern Russian Platform and in the Uralian Foredeep and in natural outcrops in the South Urals. In the Russian Platform, the Upper Serpukhovian includes the Protvian and Zapaltyubian substages. The lower portion of the Bashkirian includes the Voznesenskian and Krasnopolyanian substages. In the South Urals, there are two subregional stratigraphic schemes for the Lower Carboniferous for the West Uralian and East Uralian subregions. The West Uralian Subregion includes the Cisuralian, West Uralian and Central Uralian facial zones. In the West Uralian Subregion, the Upper Serpukhovian is subdivided into the Protvian and Staroutkinskian (= Yuldybaevian in the Central Uralian facial Zone) regional substages, and in the East Uralian, into the Sunturian, Khudolazian, and Chernyshevskian substages. The Syuranian Substage (lower Bashkirian) in the Urals is subdivided everywhere in the Bogdanovkian and Kamennogorian infrastages. In the West Uralian facial Zone (Lakly, Yakhino, Zigan, Sim, Askyn and Verkhnebikkuzino sections in the Belaya River), the boundary deposits are represented by shallow-water coral-brachiopod facies, poorly characterized by conodonts. The sections of the Central Uralian Zone are the most stratigraphically significant (Muradymovo, Bogdanovka, Kugarchi, Bolshaya Karsakla), as they are composed of deep-water slope facies with foraminifers, ostracods, ammonoids, and conodonts. The Upper Serpukhovian includes the following zones: ammonoid *Fayettevillea-Delepinoceras*, conodont *Gnathodus bollandensis*, foraminifera; *Eostaffellina paraprotvae* and *Monotaxinoides transitorius* Zones. The Syuranian Substage contains the *Homoceras-Hudsonoceras* and *Reticuloceras-Bashkortoceras* ammonoid zones, *D. noduliferus* conodont zone (with two subzones – Early and Late) and *Idiognathoides sinuatus* conodont zone, *Plectostaffella varvariensis*, *Pl. bogdanovkensis*, *Semistaffella minuscularia* and *S. variabilis* foraminiferal zones. Zonal schemes based on different groups are correlated based on the South Urals sections. Based on ammonoids, the Mississippian-Pennsylvanian boundary is recognized by the impoverished taxonomic composition of assemblages and by appearance of a new morphotype of ribbed homoceratids. In practice, this boundary is drawn by the first appearance of the genus *Isohomoceras* and the species *Ramosites corpulentus*, which is observed in the most informative section Muradymovo above the entry of *D. noduliferus*. The *Homoceras – Hudsonoceras*

Genozone is subdivided into two zones: *Homoceras coronatum* and *Hudsonoceras proteum*. The *Homoceras coronatum* Zone is subdivided into the *R. corpulentus* Beds and *H. coronatum* Beds. Based on foraminifers base of the *Pl. varvariensis* zone is drawn by the appearance of the index species against the background of an impoverished assemblage. In the Muradymovo section, the first appearance of *Pl. varvariensis* is recorded above the entry of *D. noduliferus*. However, the species *Pl. varvariensis* in sections of other regions is reported from different levels within the Upper Serpukhovian. The most significant changes on the foraminiferal assemblage are observed in the *Pl. bogdanovkensis* Zone, which correlates with the Late *D. noduliferus* conodont Zone. This zone shows the disappearance of the Viséan foraminiferal species and the appearance of various *Plectostaffella* and *Millerella*. The sections of the Urals correlate with the sections of the Peri-Caspian, Donets Basin, Uzbekistan, Western Europe, and North America.

Keywords: Mississippian, Pennsylvanian, Serpukhovian, Bashkirian, Syuranian, foraminifers, ammonoids, conodonts.

Stratigraphic and palaeogeographic distribution of the Ordovician eocrinoid *Ascocystites* BARRANDE, 1887 (Echinodermata, Blastozoa)

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All available data on the stratigraphic range, palaeobiogeographic distribution, and systematics of the blastozoan genus *Ascocystites* (Echinodermata) are reviewed and discussed. Its stratigraphic extension appears to be limited to the Darriwilian-Sandbian time interval. Its palaeogeographic distribution is restricted to high-latitude peri-Gondwanan regions of the Mediterranean Province (Algeria, Bohemia, France, Morocco, and Portugal). *Ascocystites* is reported herein for the first time in the Darriwilian (Middle Ordovician) of Central Anti-Atlas, Morocco. The species *A. micraster* BARRANDE, 1887 and *A. barrandei* JAEKEL, 1918 are both reinterpreted as junior synonyms of *A. drabowensis* BARRANDE, 1887.

Keywords: Blastozoa, Echinodermata, Eocrinoidea, Gondwana, Ordovician, Palaeogeography.

Community dynamics of Upper Sinemurian macrobenthic groups (bivalves, brachiopods) preserved in organic-rich facies of the Lusitanian Basin (W Iberia)

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Bivalves and brachiopods are the most abundant macrobenthos of the Upper Sinemurian marine communities preserved in the Lusitanian Basin (Portugal). The large variety of life habits of the bivalves and the taxonomic diversity of both groups, indicate these elements should be taken into account for marine community analysis. Although the basin contains many Upper Sinemurian outcrops, those in the S. Pedro de Moel and Peniche areas are exceptionally fossil-rich. The palaeontological content of the basin's Água de Madeiros Formation is well preserved and has provided taxonomic and quantitative data regarding the abundance of bivalves and brachiopods. This lithostratigraphic unit shows two distinct sequences of biofacies: (i) shallow water and soft-bottomed communities, and (ii) hemipelagic communities associated with organic-rich facies. The shift between them corresponds to faunal turnover in the basin, recorded in the *Raricostatum* Subchronozone, and it is particularly clear in the S. Pedro de Moel area, but does not seem to be synchronic with that seen in the Peniche area.

Keywords: Macrobenthic communities, Bivalves; Brachiopods, Organic facies, Upper Sinemurian, Lusitanian Basin.