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FOREWORD

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Guest Editor

One of the most spectacular groups in the fossil record is the Class Foraminifera, which first drew the attention of scientists in the beginning of the Nineteenth Century. The evolution of this magnificient group, widely used in stratigraphical, paleogeographical and depositional environment interpretations, occurred basically in three steps in the Phanerozoic Eon. The Paleozoic Era is the first major interval during which Foraminifera flourished and expanded across the wide continental shelves as the sea transgressed toward the continental interiors.

A recent meeting, 'International Conference on Paleozoic Benthic Foraminifera, PaleoForams 2001', was a gathering of Paleozoic foraminiferal specialists held in August, 2001 in Ankara, Turkey. The specialists who attended this meeting discussed current interpretations, ideas and data on Paleozoic Foraminifera. Diverse topics focused mainly on taxonomy, biostratigraphy, phylogeny, paleoecology, interpretation of depositional environments, sequence stratigraphy involving foraminiferal studies, and paleogeography.

This special issue of the Rivista Italiana di Paleontologia e Stratigrafia consists of 14 papers presented at the PaleoForams 2001 meeting. The papers are grouped into two categories.

The **latest Devonian-Carboniferous** papers are mainly based on data from Asia (Kazakhstan, Uzbekistan), European Russia (Urals and Russian Platform), Turkey, Central Europe, Western Europe (Ireland, Spain) and South America (Brazil). **Brenckle & Milkina** present a time-stratigraphic framework based on Foraminifera for the Late Devonian (Famennian) through Middle Pennsylvanian (Bashkirian) carbonates of the Tengiz platform, Kazakhstan. Twelve foraminiferal assemblages that they discovered are expressed in terms of Russian horizons containing several quasiendothyrid, endothyrid, tournayellid, eostaffellid, archaediscid, bradyinid, lasiodiscid, biseriamminid, ozawainellid and fusulinid foraminifera associated with algae. Based on breaks in the foraminiferal record, they recognize three major depositional hiatuses in the platform corresponding to the Kosvinsky Horizon (Late Tournasian), Mississipian-Pennsylvanian boundary, and Bashkirian (cessation of platform deposition). According to the authors, the platform growth occurred basically in two major intervals of time: from the Tournasian to the late Visean, and in the Bashkirian. **Gallagher & Somerville** correlate several upper Visean successions in southern Ireland using high resolution foraminiferal/algal biostratigraphy and detailed lithostratigraphic analysis. They recognize two stratigraphic intervals, the lower Asbian characterized by platform mudbank and intrabank facies deposited on a rimmed ramp, and the upper Asbian to Brigantian consisting of well bedded carbonates deposited on a shallow, unrimmed platform showing progradation through a series of shallowing-upward minor cycles. These cycles are meter-scale and capped by paleokarst surfaces and paleosols. Three distinctive foraminiferal biofacies recognized in the cycles occur in the lower transgressive phase, in the middle deepest transgressive phase corresponding to deep subtidal paleoenvironments, and in the shallow water deposits appearing toward the top of cycles. **Kulagina et al.** describe the zonal subdivisions of the Lower Carboniferous (Tournaisian, Visean, Serpukhovian) in Russia and correlate their revised foraminiferal scale to conodont zones and equivalent zones in Western Europe and North America. The Lower Carbonifeorus subdivisions are based on the evolution of various groups of Foraminifera including Tournayellidae, Loeblichiidae, Endothyridae, Pseudoendothyridae, Endothyranopsidae, Archaediscidae, Eostaffellidae, Janischewskinidae, Bradyinidae and Howchiniidae. One new conodont species is described, *Clydagnathus burliensis.* **Orlov-Labkovsky**, based on the data obtained from measured sections from the Middle Tien-Shan basin (Uzbekistan), studies the species similarity in five Serpukhovian and two Lower Bashkirian zones characterized by different facies. The diversity and number of species of the foraminifers attain a maximum during Early Bashkirian times. **Altiner et al.**, based on the material obtained from the Amazonas and Solimões basins (Brazil), demonstrate that *Hemigordius harltoni* is a polytypic species with several morphotypes. These

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morphotypes are grouped into two main assemblages, and dominant morphotypes are represented by narrowly discoidal to discoidal forms. Lenticular to subglobular morphotypes are rare, sporadic and atypical and considered unsuccessful generations which could not breed. They state that if one introduces a species in a typological sense, and such a taxon belongs to an atypical and unsuccessful generation, the recognition of the taxon becomes highly subjective and useless. Most of the Carboniferous and Permian hemigordiopsid taxa are poorly described, and type definitions are based on few specimens. Considering morphologic variations and the polytypic nature of *H. harltoni,* the authors question the validity of most of these species. **Kulagina & Sinitsyna** discuss the origin and evolution of the family Pseudostaffellidae on the basis of the fauna from the stratotype and reference sections of the Bashkirian Stage of the southern Urals (Russia). They distinguish two lineages in the Bashkrian, *Plectostaffella-Semistaffella-Pseudostaffella* and *Plectostaffella-Variostaffella*, n. gen. The Syuranian Substage is marked by the appearance of *Semistaffella,* whereas the base of Akavassian is defined by the appearances of *Variostaffella* and *Pseudostaffella*. The lower boundary of the Askybashian Substage is defined by the appearance of *P. praegorskyi* and *Staffellaeformis*. The base of the Arkhangelskian is marked by the first appearance of *P. gorskyi*. **Baranova & Kabanov** describe the facies distribution of fusulinoid genera from an Upper Moscovian (Myachkovian) cyclic shallow marine carbonate succession of the southern Moscow region (Russia). Three main paleoenvironmental assemblages of fusulinoids are distinguished in a gentle ramp setting of a vast epiric sea. Biofacies 1 contains the most tolerant genera, *Fusiella* and *Schubertella,* that lived in restricted peritidal conditions. The highest diversity of fusulinoids occurs in normal shallow marine settings where *Fusulinella, Fusulina* and *Schubertella* are most abundant. Biofacies 3, recognized in distal tempestites and skeletal mudstones, represents the deepest depositonal environment and is charaterized by the dominance of *Hemifusulina bocki* associated with less common other fusulinoids. The authors indicate that some of infrequent fusulinoids may be allochthonous, and the original diversity might have been even lower. **Villa et al.** report that the youngest fusulinacean faunas of the Cantabrian Zone (NW Spain) are recorded in the Puentellés Formation, which is subdivided into two members. The lower member is late Kasimovian in age and contains *Ferganites* which sometimes occur with *Schubertella* and *Staffella.* The upper member of early Gzhelian age contains *Rauserites, Tumefactus, Jigulites, Quasifusulina,* as well as certain *Ferganites* species. According to the authors, the composition of fusulinaceans shows the biogeographic affinity of the Cantabrian Zone with the Carnic Alps and Central Asian regions, but not with the Russian Platform and the Donets Basin, suggesting that these areas were not well connected with the Paleo-Tethys. The abundance of *Tumefactus* species provides information for reconstructing the geometry and understanding the function of phrenothecal wall structure. The absence of *Triticites* in the Cantabrian Zone and most Eurasian areas suggests that American and Eurasian *Triticites* may not have derived from a common ancestor. **Kalvoda** distinguishes four foraminiferal paleobiogeographic realms in the Carbonifeorus. Based on foraminiferal faunas, he states that both the Istanbul and Anatolide-Tauride zones distinctly differ from Cimmerian terranes and the Perigondwana domain and show close affinity to the North Paleotethyan Realm. According to the model that he presents, the Anatolide-Tauride Zone was either a part or located close to Laurasia whereas the Istanbul Zone represented an equivalent of the Rhenohercynian Zone of the Central Europe. He further suggests that the Anatolide-Tauride Zone may have been separated from the Eurasian mainland by the Karakaya back-arc ocean. Although the conclusions of this paper seem to be original both referees and the editor of the journal do not share the author's view and the author alone is responsible for the views proposed in this paper.

The **Permian** papers in this special issue deal with data coming from Tethys in general, including Iran, Turkey, Greece and United States. **Leven** explains that the diversity curve of Permian fusulinacean genera shows two peaks corresponding to the Asselian-Sakmarian and Midian times. He recognizes two subsystems on the basis of significant genus-group appearance and extinction events: the Cisuralian, corresponding to Asselian-Bolorian; and Tethysian, comprising Kubergandian-Dorashamian. Moreover, he proposes four series, Uralian, Darvasian, Yanghsingian and Lopingian, which correspond to the Asselian-Sakmarian, Yakhtashian-Bolorian, Kubergandian-Midian, and Dzulfian-Dorashamian stages, respectively. These subdivisions are related to extensive transgressive and regressive events in the Tethys that controlled the distribution of marine biota. Leven's scheme differs from the recently adopted Standard Global Chronostratigraphic Scale. **Ross & Ross** analyse the fusulinid sequence evolution and sequence extinction in the Permian Wolfcampian and Leonardian Series of West Texas in the United States. The Nealian and Lenoxian stages of the Wolfcampian, and the Hessian and Cathedralian stages of the Leonardian consist of several third-order and fourth-order depositional sequences with different fusulinid species diversity and abundance. Although many provincial faunal differences exist between the late Paleozoic Tethyan belts of Asia (Darvas, Pamirs) and West Texas, a few distinct genera and similar species seem to be common to both and suggest that correlation with the Tethys Lower Permian is possible. This correlation places the Nealian as equivalent to the Asselian and Sakmarian. The Lenoxian is probably equivalent to the lower and middle parts of the Yakhtashian. The Hessian is equivalent to the upper part of the Yakhtashian and the Bolorian, and the Cathedralian seems to be equivalent to the Kubergandian. **Kobayashi & Ishii** report 56 fusulinacean species, including three newly described species, *Parafusulina tarazi*, *Skinnerella abadehensis* and *Sphaerulina iranensis*, from the Surmaq Formation in the Abadeh region, central Iran. The formation is divided into six biozones: *Darvasites ordinatus* from the Yakhtashian, *Pseudofusulina quasifusuliniformis* from the Kubergandian, *Eopolydiexodina persica*, *Afghanella schencki*, *Neoschwagerina occidentalis* from the Murgabian, and *Chusenella abichi* from the Midian. Middle Permian fusulinacean faunas from the Surmaq Formation are paleobiogeographically assignable to Province A (Western Tethyan Province), which differs from Province B (Eastern Tethyan Province) by the rare occurrence of typical *Colania* and *Lepidolina*, and from Province C (Panthalassan Province) by the presence of *Afghanella* and *Sumatrina*. **Vachard et al.** describe about 40 taxa of algae, microproblematica, smaller foraminifera and fusulinids from the late Permian olistoliths found in Tertiary flysch sequences in Peloponnesus (Greece). Three important Permian markers occur in this association: *Paradunbarula (Shindella) shindensis*, *Hemigordiopsis* cf. *luquensis* and *Colaniella* aff. *minima*. The presence of *Shindella* signifies late Wuchiapingian/Dzhulfian age, although previous work proposed latest Capitanian and late Changhsingian ages for the unit. The similarity of the Greek microfauna to those of South China and south-eastern Pamirs supports paleogeographic reconstructions that proposed the proximity of these now disjunct areas. **Ünal et al.** describe the Permian-Triassic boundary beds from the central Taurides, Turkey. The P-T boundary is detected by the first appearance of *Rectocornuspira kalhori* above the latest Permian (late Dzhulfian-Dorashamian) *Paradagmarita* Zone. The uppermost Permian carbonates, which consist of meter-scale upward shallowing subtidal cycles, are represented by oolitic limestones of regressive character at the top and are overlain with a sharp contact by Lower Triassic stromatolites. The P-T boundary is an unconformity corresponding to both minor erosional and nondepositional hiatuses. The gap is interpreted to correspond to the shelf-margin systems tract and partly to the transgressive systems tract of the overlying third-order sequence. Stromatolites are considered as transgressive systems tracts deposits.