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Lower Paleozoic Biostratigraphy of South America: New contributions and advances

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The early Paleozoic was the most critical time interval for the diversification of the biota on planet Earth. This phenomenon was driven by important paleocontinental and paleoceanographic changes, caused by intensive plate tectonic and climatic processes. The Cambrian explosion of life providing bauplans, the great Ordovician biodiversification event, the second most important mass extinction of life in the Phanerozoic that occurred in the Late Ordovician, and the appearance of land plants represent benchmarks in this evolutionary process (e.g., Albanesi et al., 2003; Webby et al., 2004; Munnecke and Servais, 2007; Li et al., 2007)

The chronostratigraphic status of the lower Paleozoic, indispensable to correlate globally all of these important events, has changed dramatically in the last decade. The International Commission on Stratigraphy (ICS) of the International Union of Geological Sciences (IUGS), through the work of respective subcommissions for each time period, has made significant advances in establishing new global chronostratigraphic references. The Ordovician, Silurian and Devonian systems have been fully established and the Cambrian System is being rapidly reorganized in terms of stages, series and respective intra-systemic boundaries to accomplish the international time chart (see most recent advances at ICS-IUGS web site: www.stratigraphy.org)

This Geologica Acta issue is included in a series of them that have been published thanks to the editorial efforts carried out by research members of the CONICET who focus its activity on the lower Paleozoic record (see Aceñolaza, 2003 and 2005, and cites herein). A number of contributions on the lower Paleozoic basin research, biostratigraphy and paleogeography have been gathered in these issues and makes up a significant deal of basic knowledge on this subject. The present issue consists of a series of selected papers that were presented as abstracts in the "9º Congreso Argentino de Paleontología y Bioestratigrafía" held in Córdoba, Argentina, on September 18-22, 2006. These contributions were invited papers from the total presented in the 2nd symposium of the congress, entitled "Bioestratigrafía del Paleozoico inferior" (i.e. Lower Paleozoic Biostratigraphy). Sixteen co-authors contributed six papers that compose this varied volume on lower Paleozoic paleontological and biostratigraphic subjects.

The paper by Bordonaro et al. (this issue) proposes a biostratigraphic model for the early Marjumian (Middle Cambrian) of the Argentine Precordillera involving trilobite biofacies and biozonation. The trilobite assemblages represent three biofacies that respond to segregated environmental conditions within an essentially synchronous interval that correspond to three biozones defined previously for the Middle Cambrian of western Laurentia.

Zeballo et al. (this issue) provide new paleontological data for the Eastern Cordillera of northwestern Argentina, in particular on conodont and graptolite faunas, which allow for the refinement of regional biostratigraphic schemes. The analysis of the conodont fauna reveals a succession of the conodont zones *Cordylodus angulatus, Paltodus deltifer,* and *Acodus deltatus-Parois-*

todus proteus. Graptolites of the *Aorograptus victoriae* Zone are linked with conodonts of the *Acodus deltatus-Paroistodus proteus* Zone, and trilobites of the *Notopeltis orthometopa* Zone. The authors conclude that the Early Ordovician conodont fauna of northwestern Argentina represent a separate province in the southern South American margin of Gondwana.

An Early Ordovician (Floian) conodont fauna is reported for the first time from the Eastern Cordillera of Peru by Gutiérrez-Marco et al. (this issue). The conodont assemblage is referred to the upper part of the *Oepikodus evae* Zone and characterizes a South Gondwana Province of the Cold Domain in the Shallow-Sea Realm. Regarding previous biostratigraphic reports on the San José Formation, this conodont record in the study area indicates a highly diachronic lower boundary of the formation at a regional scale.

A conodont-graptolite high resolution biostratigraphy is presented by Ortega et al. (this issue) for Middle-Upper Ordovician siliciclastic facies of the Central Precordillera, Argentina. These records verify that the lower strata of the Sierra de La Invernada Formation are located to the east, contrary to conclusions of previous studies. The deposition of this unit developed as a response to sea level changes, which are also made evident by variations on the graptolite-conodont faunas along the revisited section. Six graptolite biozones and corresponding conodont zones are determined in this section, allowing for regional and global correlations of the upper Darriwilian, Sandbian and lower Katian stages (Middle-Upper Ordovician).

The lower Silurian Itacurubí Group exposed in the eastern Paraguay yielded an interesting graptolite fauna that is described and discussed firstly by Uriz et al. (this issue) The Llandovery monograptids of the Vargas Peña Formation from this group allows the correlation of units from the Eastern Cordillera and the Precordillera of Argentina. Regarding paleoenvironments, the association of graptolites and invertebrate macrofossils of the Vargas Peña Formation suggest an oxygen-rich environment in a shallow shelf.

Finally, an association of plants and palynomorphs from the Lower Devonian Santa Rosa Formation at Angosto de Alarache, Cinco Picachos Range in South Bolivia, is presented in the contribution by Di Pasquo and Noetinger (this issue). Taphonomic evidences from the early plant remains and preserved palynomorphs added to the absence of rooting systems allow interpreting the fossil remains as para-autochthonous to allochthonous, probably due to deposition under very low energy currents in shallow ponds, such us flooded alluvial plains or protected bays.

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