

**FOREWORD**

**PROCEEDINGS OF THE 8<sup>TH</sup> INTERNATIONAL BRACHIOPOD CONGRESS  
BRACHIOPODS IN A CHANGING PLANET: FROM THE PAST TO THE FUTURE  
MILANO, 10-14 SEPTEMBER 2018**



The 8<sup>th</sup> International Brachiopod Congress took place in the prestigious venue of the University of Milano, Italy, in September 2018, after the previous edition held in Nanjing, China, in 2015.

150 participants from universities and research institutes from all over the world attended the meeting, from Argentina, Armenia, Austria, Belgium, Canada, China, Czech Republic, Denmark, France, Germany, Hungary, Iran, Israel, Italy, Japan, New Zealand, Poland, Russia, Slovakia, Spain, Sweden, United Kingdom, and United States of America.

Besides oral and poster scientific sessions, pico-presentations of young researchers, and two prestigious plenary lectures, the Congress was preceded and followed by three field trips (Spain, United Kingdom and Sicily), and by two mid-congress day excursions at Castell'Arquato and Grigna Mountains.

During the congress, all the topics and the recent advances in the study of brachiopods, marine invertebrates that have dominated the Palaeozoic seas and had an important role in the Phanerozoic benthic communities, have been touched: from systematics and evolution to biostratigraphy, pala-

eoecology, palaeobiogeography, mass extinctions, and the biology of recent taxa. One of the novelties of this edition was a session dedicated to brachiopod shells as biomineral archives of fundamental importance to understand the evolution of marine calcifiers during climate and environmental changes in recent and deep time. So, also biomineralization and geochemistry were among the topics of the event.

The high scientific level, activity and wide and interdisciplinary interests of the brachiopod researchers' community are testified by the numerous contributions received for the Proceedings of the 8<sup>th</sup> International Brachiopod Congress, 16 of which are published open access in issue 125/3 of *Rivista Italiana di Paleontologia e Stratigrafia*.

The first paper published in this issue is by Donald MacFarlan, who describes a large Lower Jurassic terebratulid collection from New Caledonia and New Zealand. He recognizes seven genera and twelve species, eight of which are new, and discusses their stratigraphic and geographic distribution, enhancing the biostratigraphic potential of these taxa and offering new insights on the TJB and Toarcian faunal changes.

The paper by Aleksandra Bitner investigates a brachiopod fauna collected in the Tonga Islands in the South-West Pacific Ocean, identifying species never reported before from those islands. The author also compares the affinity and the biodiversity of the Tonga fauna with those from Fiji, New Caledonia, New Zealand and French Polynesia, providing new data on the distribution of recent taxa.

Hui-Ting Wu and co-authors describe a brachiopod fauna from a mixed nearshore clastic–carbonate setting in the Changhsingian Longtan Formation and the Griesbachian Yelang Formation of the Liuzhi section (Guizhou Province, South China). They classify 33 species and 16 genera and discuss the end-Permian extinction magnitude in different localities and palaeoenvironments, with a particular emphasis on shallow water clastic vs carbonate settings.

Emma Taddei Ruggiero and co-authors discuss and propose a solution to a long-standing nomenclatural problem related to the definition of the species *Terebratula sinuosa*. Following an error of Linnaeus, this species was considered by subsequent taxonomists a synonym of *Terebratula terebratula*. The authors now provide stratigraphic and morphological evidence that *T. sinuosa* deserves the full rank of a species and that the stratigraphic distribution of *T. terebratula* should be amended and limited to the Pliocene-Pleistocene.

Studying internal molds and steinkerns, Jisuo Jin and co-authors investigate Pentamerida brachiopods from Lower Silurian rocks of the Michigan Basin to clarify the taxonomy of several virgianids. After proposing a new genus and revising the biostratigraphic and palaeobiogeographic distribution, and the type of shell deposits of several *Virgiana* palaeocommunities, they discuss the factors controlling their composition, providing very valuable palaeoecological and palaeobiological data.

Fernando Lavié and co-authors describe and illustrate a collection of micromorphic linguliform brachiopods from the middle-upper Ordovician of the Argentine Precordillera. They recognize nine linguliform families and propose two new acrotretid species: *Conotreta andina* n. sp. and *Biernatia rhapsody* n. sp., providing new and interesting biostratigraphic data.

Elizabeth Harper and coauthors provide quantitative data concerning patterns of shell

breakage predation and repair in rhynchonelliformean brachiopods collected from a New Zealand fiord. The authors observe that only a few individuals show signs of having been able to repair damage and that the proportion of individuals showing unrepaired, and hence presumably fatal, breakages was higher. The authors provide new and important data on brachiopod ecology and in general on predation.

Daniel Stadtmauer and Susan Butts describe the skeletal microstructure and morphology of a unique Permian brachiopod genus, *Pirgulia*, from the Permian Sosio Limestone of Sicily. In this taxon, the ventral valve forms a cone that fully encloses the lobate structure which replaces the dorsal valve. Based on a functional morphology approach, the authors reconstruct the lifestyle and the dynamics of water flow of this heteromorphic brachiopod, providing very valuable palaeoecological information.

Zhiwei Yuan and co-authors provide a detailed palaeoecological analysis of an in situ preserved brachiopod palaeocommunity from the Lower Carboniferous of Guizhou, South China. The authors also erect a new spiriferide species, *Weiningia ziyunensis* n. sp., describing in detail its population dynamics and explaining why this was a dominant species in the palaeocommunity, forming dense clusters attached to living and dead shells.

Attila Vörös and co-authors present a compilation of brachiopod genus-level diversity through the Phanerozoic and compare the traditional extinction events, the so-called ‘Big Five,’ with the episodes of synchronous termination of multiple orders, named ‘clade extinctions.’ Their compilation reveals that three of the five episodes are recognized both as mass and clade extinctions. The paper proves how these episodes are relevant to shape the history of the clade, as for instance in the Early Jurassic, when spire-bearing brachiopods disappeared.

Yuchen Zhang and co-authors describe the Upper Ordovician atrypide genus *Rongatrypa*, expanding its distribution from the Kazakh terranes, from which it was previously known only, to South China, and providing important palaeobiogeographic implications. A detailed analysis of its ontogenetic variation provides an interesting explanation for its allometric growth pattern.

Ulrich Jansen discusses and interprets the biodiversity changes of Lower Devonian brachiopods from the Rhenish Massif, in the framework of a regional palaeoenvironmental evolution. In the paper, a new genus, *Ingentistrophia* n. gen., and two new species, *Fascistropheodonta? wiltzensis* n. sp. and *Pachyschizophoria amygdala* n. sp., are proposed. Patterns of extinction and speciation are interpreted in terms of the interplay of sea-level fluctuations, subsidence rates and siliciclastic input in a very interesting reconstruction.

Florencia Leone and Juan Benedetto describe the morphology and ontogeny of the rhynchonellide *Clarkei antinsiensis* from the Upper Silurian Tarabuco Formation of Bolivia and compare the ontogenetic stage of the species with *Harringtonina australis* and *Anabaia paraia*. They demonstrate that, throughout the Silurian, these species represent an evolutionary lineage characterized by increasing peramorphic characters, providing an interesting case study of heterochrony in brachiopods, with implications on the current taxonomic classification of the studied taxa.

Uwe Brand and co-authors propose an updated brachiopod-based oxygen-isotope thermometer, that can be applied to most Rhynchonelliformea, both recent and fossils, from cold to warm and shallow to deep water settings. Based on a very large dataset, the authors record a -1 ‰ offset of brachiopod shells oxygen isotopes from abiogenic calcite. This paper, a milestone in brachiopod-based

geochemical studies, underscores that brachiopods are excellent archives of past and present oceanographic conditions.

Bernard Mottequin and Gabriela Cisterna reinvestigate in detail *Histosyrinx vaurini*, the type species of *Histosyrinx*, a poorly known Carboniferous spiriferinide genus from North Africa. The study of new material from Lybia and Algeria allows to improve the knowledge of the variability of the internal characters at the subfamily level and to compare *Histosyrinx* with allied genera, some of which still inadequately known.

Gabriela Cisterna and co-authors open up about the opportunity to elucidate some aspects of the Late Palaeozoic Ice age demise by performing a comparative study of the *Eurydesma* faunas and associated brachiopod assemblages from the Bonete (East Argentina) and Wasp Head (East Australia) formations. Providing a very interesting palaeoecological investigation, the authors demonstrate that the faunas show similar composition, but differences in the relative abundance of taxa. They conclude that several factors controlled the faunal composition, arguing for more in-depth analyses in the next future.

The Guest Editors of the 8<sup>th</sup> International Brachiopod Congress Proceedings Volume

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