Preface

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Conodonts are elements of a feeding apparatus of jawless eel-like animals belonging to the clade Vertebrata. They are very important microfossils, ubiquitous in the Paleozoic and Early Mesozoic marine sequences, and they occurred in different habitats, from deep-ocean to shallow-shelf waters. Because of their great abundance, worldwide distribution and rapid evolution, conodonts play an important role as index fossils. Furthermore, due to their mineralogical composition, consisting of biogenic apatite, and their strong resistance to metamorphism, they are highly attractive environmental archives. All these features make conodonts reliable tools for biostratigraphic and geochemical investigations, and they have been proven to be one of the primary fossils for chronostratigraphic studies, particularly for the definition of GSSPs, and for studies of paleoclimate and environmental changes.

During the Third International Congress on Stratigraphy (STRATI 2019) (July, 2019) in Milano, Italy, the Chief Panderer, Prof. Xulong Lai organized a conodont business meeting. In this meeting, we discussed and decided to organize a special issue on conodonts in *Journal of Earth Science* (JES), which was planned to be published before the ICOS 5 in Wuhan during late June, 2021. As the Chief Editor of *Journal of Earth Science*, Prof. Xulong Lai invited we three (Haishui Jiang, Manuel Rigo, Martyn Lee Golding) to handle the conodont special issue as guest editors. We sent out two rounds of invitations to the Pander Society members for calling for papers. This invitation was also posted in the Pander Society Newsletter 2020. We received many contributions from the Pander Society members. After the peer-review, 17 articles have been accepted to be included in this special issue: three Ordovician conodont articles, two Silurian ones, one Permian and eleven Triassic ones.

ORDOVICIAN CONODONTS

Seven conodont Middle Ordovician biozones are recognized in the carbonate-dominated shelf-marine successions and the deep-water slope and turbidite successions from Australia and New Zealand respectively by Zhen in “Middle Ordovician

Conodont Biostratigraphy of Australasia”. These biozones provides direct correlations with other regions, enabling confident calibration against the well-established international biostratigraphic units of the Middle Ordovician.

In “Conodont Biostratigraphy of Ordovician Deep-Water Turbiditic Sequences in Eastern Australia—A New Biozonal Scheme for the Open-Sea Realm”, Zhen et al. proposed a new conodont biozonal scheme to divide the Ordovician turbiditic successions into 12 superbiozones and biozones, based on the conodont faunas from deepwater turbiditic sequences of the Lachlan Orogen in central and southern New South Wales, Australia. This new conodont biozonation scheme spanning the upper Tremadocian to middle Katian interval permits precise age-dating and correlation of deep-water siliciclastic rocks that characterize the Ordovician Deep-Sea Realm regionally and internationally.

In “Zooming in REE and Other Trace Elements on Conodonts: Does Taxonomy Guide Diagenesis?”, Medici et al. detected the uptake of high-field-strength-elements (HFSE) in conodont elements recovered from a single stratigraphic horizon in the Upper Ordovician of Normandy (France), and assessed whether conodont taxonomy (and morphology) impacts HFSE uptake and crystallinity index. They found that all conodont elements are characterized by a clear diagenetic signature, with minor but significant differences among taxa. These distinctions are evidenced also by the crystallinity index values which show positive correlations with some elements and, accordingly, with diagenesis; however, correlations with the crystallinity index strongly depends on the method adopted for its calculation.

SILURIAN CONODONTS

Simpson et al. provided a “Summary of East Gondwanan Conodont Data through the Ireviken Event at Boree Creek”. The five sequential conodont zones recognized in this paper cross the Llandovery-Wenlock boundary, encompassing the entirety of the Ireviken Event, and the authors suggested that the Boree Creek section provides the best record of this faunal turnover in the Tasman fold belt of eastern Gondwana.

In “Age of the Silurian Lower Red Beds in South China: Stratigraphical Evidence from the Sanbaiti Section”, Chen et al. reported the conodont fauna from the Paiyuan Formation, together with the graptolites from the underlying Lungmachi

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Formation in the Sanbaiti Section, Huaying, Sichuan Province. Based on these materials, they assigned the Paiyunan Formation to an interval from the *Spirograptus guerichi* graptolite biozone to the *Pterospadodus eopennatus* conodont superbiozone and indicated that the Lower Red Beds at Sanbaiti correspond to the lower Telychian age. Comparative analysis indicates that most of the Lower Red Beds in the Upper Yangtze region can be assigned to the Telychian Stage.

PERMIAN CONODONTS

In “Roadian-Wordian (Middle Permian) Conodont Biostratigraphy, Sedimentary Facies and Paleotemperature Evolution at the Shuixiakou Section, Xikou Area, Southeastern Qinling Region, China”, Wu et al. described a diverse new Permian fauna from the Qinling region of China, that allows the recognition of the *Jinogondolella nankingensis* and *J. aserrata* zones in this region for the first time. The Roadian-Wordian of this section exhibits a sea level drop, that the authors link to global regression on the basis of a decrease in temperature recorded by oxygen isotopes from conodont apatite.

TRIASSIC CONODONTS

In “New Findings of Latest Early Olenekian (Early Triassic) Fossils in South Primorye, Russian Far East, and Their Stratigraphical Significance”, Zakharov et al. provided additional information on the systematic composition of latest Smithian ammonoids, as well as conodont and brachiopod assemblages from the recently identified ammonoid *Shimanskyites shimanskyi* Zone. This zone is characterized additionally by some fossils common for the overlying upper Olenekian *Tirolites-Amphistephanites* Zone: ammonoids of the genus *Kamenushkaites*, the brachiopods *Bittnerihris margaritovi* and *Lepismatina* sp. and the conodont ‘*Neogondolella*’ *jubata*. While in other upper Smithian localities in the world (Salt Range, Spiti, Tibet (Xizang) and South China), where contemporaneous *Shimanskyites shimanskyi* assemblage is lacking, there may be a hiatus between upper Smithian and lower Spathian, which was presumably caused by a cooling or volcanic event. This is also supported by isotopic data, although there are discrepancies that need to be further discussed.

In “Early Anisian (Middle Triassic) Conodonts from Romania and China, with Comments on Their Role in the Recognition and Correlation of the Base of the Anisian”, Golding reported some conodont species from the GSSP candidate section for the Olenekian-Anisian Boundary (OAB) at Deşli Caira of Romania, and from an additional OAB section at Guandao of South China. He proposed that the conodont *Neogondolella curva* appears just below the first Anisian ammonoids in Deşli Caira, and just above the first appearance of conodont *Chiosella timorensis* in both Deşli Caira and Guandao, and may serve as a suitable alternative proxy for the OAB.

Middle Triassic conodonts were described from the northwest end of the Nanpanjiang Basin by Qin et al. in “Middle Triassic (Anisian) Conodont Biostratigraphy at the Shaiwa Section, Guizhou, South China”. Six conodont zones have been established in the Shaiwa Section, promoting a better understanding of the Middle Triassic conodont succession in South China and providing potential local and regional correlation.

Abundant Anisian conodont collections from Turkey are

described by Kiliç in “Anisian (Middle Triassic) Conodonts of the Kocaeli Triassic, Western Turkey”. Alongside typical Anisian species such as *Chiosella timorensis* and *Gladigondolella tethydis*, the author also described several new species that will help to correlate these strata more precisely. The fauna as a whole is shown to resemble that of Bulgaria, and is contrasted with that of North America during the Anisian.

In “Microbially Induced Carbonate Precipitation in a Middle Triassic Microbial Mat Deposit from Southwestern China: New Implications for the Formational Process of Micrite”, Luo et al. mainly dealt with an Anisian microbial mat deposit. Considering its stratigraphic framework is constrained by the conodont assemblages, we also include it into this special issue.

In “First Records of Late Triassic Conodont Fauna and $\delta^{13}\text{C}_{\text{carb}}$ from the Dengdengqiao Section, Dangechang County, Gansu Province, Northwestern China”, Li et al. provided the first report of Carnian conodonts from the Qinling Basin. Although the fauna is small, the recovery of *Mosherella praeubdaensis* indicates the presence of Julian strata in the section. Carbon isotopes from the same strata exhibit a small excursion in the middle part of the Dengdengqiao Formation that the authors tentatively correlate with that seen during the Carnian Humid Episode elsewhere.

In “Revision of the Conodont *Mockina slovakensis* and Its Paleogeographic Implications for the Upper Triassic Intraplatform Basins of the Alps”, Du et al. updated the description of *Mockina slovakensis*, an important species of the Norian (Upper Triassic), and discussed its comparisons and occurrence based on the new conodont investigations in Dolomia di Forni and the data from previous literature. They described two morphotypes of *M. slovakensis* on the basis of the shape of the lateral profile.

In “Evolutionary Process from *Mockina bidentata* to *Parvigondolella andrusovi*: Evidence from the Pizzo Mondello Section, Sicily, Italy”, Du et al. investigated the phylogenetic relationship between the conodont genera *Mockina* and *Parvigondolella*, proved by transitional forms belonging to the *Mockina bidentata*-*Parvigondolella andrusovi* morphocline collected from the upper part of the Pizzo Mondello Section, Sicily, Italy. They also investigated the oceanic conditions at the time by using redox-sensitive elements (Mn, Fe, V, Cr, and Ni) and seawater temperatures from biogenetic $\delta^{18}\text{O}_{\text{phos}}$ to understand the possible environmental influences on the phylogenetic evolution between *Mockina* and *Parvigondolella*. These analyses indicate that the ocean conditions were stable during the evolution of genus *Parvigondolella*.

In “New Advances in Biostratigraphy of the Lower/Middle Norian Transition: Conodonts of the Dovško Section, Slovenia” Karádi and co-authors described a detailed conodont biostratigraphic study of the eastern part of the Slovenian Basin, providing new insights into evolutionary trends of conodonts across the Lacia/Alaunian boundary (mid Norian, Upper Triassic). The documentation of the diversity, morphological variability and temporal distribution of the described conodont faunas allow a fine subdivision of the Lacia to lower Alaunian interval. Seven new species and two new subspecies are also established.

The evolutionary trends and the morphological variations of the genus *Ancyrogondolella* described by Karádi in “Evolu-

tionary Trends of the Genus *Ancyrogondolella* (Conodonta) and Related Taxa in the Norian (Late Triassic)” allow new phylogenetic interpretations of Norian conodonts. The approach, which is based on Tethyan assemblages, is fundamental for a fine biostratigraphic subdivision of the Upper Triassic, allowing comparisons and correlations at a global scale.

Finally, new Late Triassic conodont clusters are presented in “Late Triassic (Norian) Conodont Apparatuses Revealed by

Conodont Clusters from Yunnan Province, Southwestern China” by Zeng et al. The arrangement of elements in these clusters allow the authors to reconstruct the multielement apparatus of *Mockina*, an important genus for Norian stratigraphy, and to discuss possible evolutionary relationships between *Mockina*, *Parvigondolella* and *Misikella*.

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