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OPEN ACCESS EDITORIAL

Tribute to Tiiu Märss and Philippe Janvier (16th International Symposium on Early and Lower Vertebrates)

The story of early vertebrate evolution is a captivating journey that spans hundreds of millions of years. It chronicles the triumph of ancient organisms as they conquered diverse all aquatic environments, including the transition from sea to land. Throughout this process, they developed intricate anatomical structures and adaptations that shed light on the foundation of the vertebrate body plan and the remarkable diversity life we observe today. In line with this, the International Symposium on Early and Lower Vertebrates (ISELV) aims to promote the study of the origin and early evolution of our own evolutionary lineage. This volume serves as an example of the most recent symposium held in Valencia, Spain, in June 2022. Since its inception in 1967, the ISELV has been organized 15 times prior to the latest conference in Valencia, which marked the 16th edition and the first time it was held in Spain in over 50 years. This symposium stands out as the sole recurring international meeting exclusively dedicated to the Palaeozoic vertebrate research community, putting special emphasis on topics concerning the origin, diversity, and early evolution of vertebrates (including the first tetrapods). The compilation presented in this volume represents the culmination of these conferences and serves as our tribute to two distinguished researchers in the field of Early Vertebrates: Dr Philippe Janvier from the Muséum National d'Histoire Naturelle in Paris and Dr Tiiu Märss from Tallinn University of Technology in Estonia. Both esteemed colleagues and exceptional individuals, who devoted a significant portion of their lives to comprehending and studying Palaeozoic vertebrates across various disciplines (please refer to the forewords written by our colleague, Dr Sue Turner).

This volume comprises the expanded versions of select works presented during the symposium. It showcases intriguing data on a diverse array of groups, including thelodonts, chondrichthyans, osteichthyans, non-tetrapod sarcopterygians, and tetrapods; including the description of two new genera and three new species. From a chronological standpoint, this volume encompasses the study of Lower Devonian (Pragian) to the Upper Carboniferous (Stephanian) vertebrates spanning various locations worldwide. Within this context, Johanson *et al*. (2023) describe a new dipnoan lower jaw discovered in the Wood Bay Formation (Pragian) of Svalbard, Norway. This remarkable find preserves a partial dentary and partial toothplates, which have been assigned to a new genus and species, *Janvierpaucidentes tuulingi*, in honor to our colleague, Dr Philippe Janvier. Continuing along the timeline, Blom *et al*. (2023) focus on slightly younger deposits from the late Emsian stage, describe a new thelodont species, *Amaltheolepis terranovi* sp. nov., coming from the Shevchenkinskaya Formation in Novaya Zemlya, Arctic Russia. This discovery allows for accurate comparisons and correlations with the Emsian "Verdalen assemblage" from Spitsbergen, supporting an Emsian age for the upper part of the Shevchenkinskaya Formation. Furthermore, their findings suggest that the type species of the genus, *Amaltheolepis winsnesi* from Spitsbergen, should be considered of Eifelian age. In a similar time-frame, Burrow and Desibiens (2023) present a significant contribution, describing new teeth and tooth whorls of the stem chondrichthyan *Doliodus* from the Emsian of the Gaspé Sandstone Group in Gaspé Peninsula, Quebec, Canada. Their study concludes that all previously known dental elements attributed to *Doliodus* are indeed conspecific with the articulated specimen from the Atholville beds, leading to the assignment of all these findings to the same species, *D. latispinosus*. Interestingly, Ginter (2023) presents a contrasting perspective, challenging this interpretation. In his work, Ginter (2023) reviews the early chondrichthyan order Omalodontiformes, delving into the validity of established taxa and highlighting the need to establish new genera for the allocation of different taxa. This alternative viewpoint introduces a fresh understanding of the subject matter, prompting further exploration and debate within the field.

Burrow *et al*. (2023) provide a detailed account of newly discovered Emsian remains of the osteichthyan *Ligulalepis* from New South Wales, Australia. These findings contribute additional characters to the existing dataset used in previous cladistic analyses. Consistent with previous phylogenetic studies, their results, incorporating post-cranial dermal skeleton characters, support and solidify *Ligulalepis* as a stem osteichthyan. From the same period, Zevallos-Valdivia *et al*. (2023) describe an exciting discovery, the earliest known locality of early vertebrates in Peru, dating back to the Emsian–Eifelian stages. This significant work unveils, for the first time outside Bolivia, the unique South American vertebrate fauna represented by the unusual stem-chondrichthyans *Pucapampella* and *Zamponiopteron*. These species characterize the vertebrate fauna of the marine "Malvinokaffric Realm" in America, expanding the palaeogeographic distribution of this assemblage.

Furthermore, this work emphasize the potential of Peruvian outcrops to contribute to our understanding of the diversity and distribution of early vertebrate faunas on the South American continent.

Finally, in addition to the intriguing Lower Devonian thelodonts, chondrichthyans, and basal osteichthyans, Dupret *et al*. (2023) provide a comprehensive account of new remains belonging to non-tetrapod sarcopterygians from the Middle Devonian (Givetian) deposits of the Valentia Slate Formation on the Iveragh Peninsula in southwestern Ireland. The study describes an isolated facial bone and a fragment of a coronoid, both attributed to the rhizodontida group, as well as scales of the osteichthyan *Holoptychius* sp. and an indeterminate Dipnoi left lower jaw toothplate. According to the authors, this unusual combination of fossils can be best explained by an early dispersal wave of certain vertebrate groups from Gondwana to Euramerica. This discovery sheds light on the faunal composition of the region during that time and provides insights into the migratory patterns and biogeographic connections between these landmasses.

Lastly, two additional contributions in this volume delve into Carboniferous vertebrates. Firstly, Itano and Duffin (2023) present compelling evidence for one or possibly two new holocephalan taxa from the Visean of Indiana, North America. Their research involves the description and comparison of various rostral cartilage and frontal claspers, leading to the identification of a new chimaeriform genus and species named *Sulcacanthus schachti*. On the other hand, our final contribution provides an update on the latest studies conducted on the Natural Monument of the Carboniferous of Puertollano, authored by Soler-Gijón and Díez-Ruiz (2023). This work showcases the extensive and diverse fossil record of vertebrates found in the area, including chondrichthyans, actinopterygians, and tetrapods. Furthermore, it highlights how this rich fossil record has played a crucial role in designating the entire area as a Natural Monument. This designation ensures the preservation of this extraordinary palaeontological heritage for future generations to appreciate and study.

To end, as Guest Editors of this volume and primary organizers of the conference, we would like to extend our heartfelt gratitude to all the contributors who have made this volume possible. Their contributions are a small yet significant representation of the remarkable advancements in this field. We would also like to pay tribute to our esteemed colleagues, Dr Philippe Janvier and Dr Tiiu Märss. Their exceptional work serves as a testament to the high-quality research being conducted by the international community in the field of early vertebrates during the last decades. The conference and this Special Volume of the Spanish Journal of Paleontology have been supported by the project PID2020-118642GB-I00 (Ministerio de Ciencia e Innovación).

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Carlos Martínez-Pérez, Humberto Ferrón & Héctor Botella (Guest Editors)

University of Valencia