

82ND ANNUAL MEETING

SVP 2022 Program Guide

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centered in the West Tethys. The presence of similar faunal elements in the ancient Indo-Pacific can help to constrain models of shifting biodiversity hotspots during the Cenozoic. Such hotspot migration is supported by fossil evidence as well as patterns of relationships among some extant groups. Integration of putative fossil ephippids, including the new form from Pakistan, into a phylogenetic framework with living examples will be critical for determining what—if any—bearing spadefishes might have on these broad biogeographic questions.

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Regular Poster Session 3 (Friday, November 4, 2022, 4:30 - 6:30 PM)

A NEW EARLY CRETACEOUS ASSEMBLAGE OF IGUANODONTIAN DINOSAURS FROM WESTERN GERMANY

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The Lower Cretaceous (Barremian-Aptian) fissure filling at Balve in North Rhine-Westphalia (Western Germany) has yielded a diverse vertebrate fauna, comprising selachians, osteichthyes, amphibians, squamates, crocodiles, turtles, pterosaurs, theropod, sauropodomorph, and ornithischian dinosaurs, as well as mammals. The locality has been excavated since 2002 by the LWL Museum of Natural History in Münster and regular field seasons still provide new material every year. Within the past two decades a variety of ornithopod remains were uncovered at Balve. These comprise cranial remains (a partial dentary and isolated teeth) as well as postcranial material, including vertebrae, ribs, a sacrum, a scapula, pollex claws, and pelvic, and limb bone elements. The specimens can be largely assigned to *Iguanodon*-grade styracosternans. While most elements are isolated and show taphonomic wear, at least some equally sized vertebrae and the sacrum were found in close association and may belong to a single, immature individual. Larger elements (e.g., a vertebral centrum) match the size of adult *Iguanodon bernissartensis* specimens. Peripheral skeletal elements (pedal bones and caudal vertebrae) dominate quantitatively. Large bones are prone to be fragmented. The material potentially includes a robust and a gracile morphotype, but the disarticulated preservation and the presence of various ontogenetic stages require further investigation. The potential co-occurrence of a robust and gracile form would mirror coeval occurrences from England, Bernissart (Belgium), and

the geographically close Nehden locality in Brilon (Germany). The depositional setting at Nehden likewise represents a subterranean fissure system in uplifted, karstified Paleozoic limestones. Two styracosternan taxa, interpreted as *Iguanodon* and *Mantellisaurus*, occur in the lower Aptian strata of Nehden. However, the preservation of the Nehden and Balve material differs significantly. The specimens from Balve are almost exclusively isolated and fragmentary, while those from Nehden comprise isolated bones and partially associated skeletal parts. The preservation at Nehden is also more homogeneous but the associated fauna from Balve is more diverse. Even though the preservation complicates the taxonomic assessment, the abundance of iguanodontian fossils found at Balve (being continually enriched each year), represents a significant addition to the European Early Cretaceous ornithopod record.

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Regular Poster Session 4 (Saturday, November 5, 2022, 4:30 - 6:30 PM)

FUNCTIONAL DRIVERS OF EVOLUTIONARY RATES IN MANDIBLE SHAPE OF CARNIVOROUS THERIAN MAMMALS: A STUDY USING BIOMECHANICAL MODELING AND GEOMETRIC MORPHOMETRICS

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Evolution of the mandible in mammalian carnivores is influenced by ecological demands and the phylogenetic history of a clade. Because of this, analysis of functional morphology of the mandible has been used to infer the ecology of extinct mammal species and how mandible shape has evolved in regards to these factors. This study uses geometric morphometrics to assess relative rates of evolution in different parts of the mandible during acquisition of carnivory in several therian clades including Metatheria, Mesonychia, “Creodonta,” and Carnivoramorpha and uses biomechanical modeling to partition the evolution changes into several potential functional biomechanical drivers. Functional variables analyzed include maximum bending force, relative mandibular force in bending (both using the concept of beam theory), and bite force exemplified in measurements such as mechanical advantage. The analysis of the evolution of the shape of the mandible of therian carnivores shows an integrated relationship between the horizontal ramus and the coronoid body of the mandible where the coronoid body shows higher rates of evolution and may be a greater driver of mandible shape than the horizontal ramus. Measured functional variables support that the coronoid body is a greater influence on the overall shape of the mandible. Specifically, mechanical advantage (which measures the in-lever provided by muscle attachments around