

clade (e.g., the African *Kryptops palaios* and *Rugops primus*) are known from much less complete material. Consequently, the early evolutionary history of Abelisauridae remains poorly understood. Here we report a new taxon of medium-sized (body length ~5 m) basal abelisaurid collected from an exposure of the lowermost Upper Cretaceous (Cenomanian) Candeleros Formation in an area known as Aguada Pichana near the town of Añelo in Neuquén Province, northern Patagonia, Argentina. The new form is known from two individuals, one of which is represented by a largely complete, partially articulated skeleton (including much of an articulated skull and multiple teeth plus dorsal, sacral, and caudal vertebrae, dorsal ribs, hemal arches, a scapula, the forelimb lacking the manus, the pelvis, and several hind limb elements); the second individual is known only from a partial skull (consisting of the maxilla, lacrimal, jugal, quadratojugal, quadrate, pterygoid, ectopterygoid, palatine, and dentary with teeth). Notable osteological features include: (1) maxilla with 14 tooth positions (as in *Carnotaurus* and some generically unidentified abelisaurids but 3–5 fewer than in *Rugops*, *Skorpiovenator*, and *Majungasaurus*); (2) lacrimal with prominent anterior process; (3) postorbital with ‘inflated’ dorsal terminus and suborbital flange; (4) anterior caudal transverse processes with well-developed anterior projection at distal end; (5) humerus and metatarsals proportionally slender, recalling those of non-abelisaurid abelisaurids; and (6) radius and ulna ~34% length of humerus (proportionally longer than in *Aucasaurus*, *Carnotaurus*, and *Majungasaurus*). Phylogenetic analysis using two independent datasets recovers the new Candeleros form as a basal (i.e., non-brachyrostran, non-majungasaurine) abelisaurid. As such, the new taxon is herein regarded as the earliest-branching abelisaurid that is known from the greater part of the skeleton.

Technical Session I (Wednesday, October 9, 2019, 8:45 AM)

EARLY DISPERSAL FOR QUADRUPEDAL CETACEANS: AN AMPHIBIOUS WHALE FROM THE MIDDLE EOCENE OF THE SOUTHEASTERN PACIFIC

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Cetaceans originated in south Asia more than 50 Ma (early Eocene), from a small, four-limbed artiodactyl ancestor. Amphibious whales gradually dispersed westward along North Africa, eventually reaching North America before the end of the Lutetian (41.2 Ma). However, because the fossil record on both sides the Atlantic is fragmentary, when, through which pathway, and under which locomotion abilities these early whales made it to the New World remains debated.

Marine deposits dated to 42.6 Ma (Lutetian) from the locality of Playa Media Luna (Pisco Basin, coastal Peru) yielded the associated skeleton of a new protocetid cetacean, including mandibles, teeth, vertebrae, scapulae, pelvis, and many fore- and hind limb elements. The study of this unique material led to the description of a new genus and species *Peregocetus pacificus*. It constitutes the first indisputable quadrupedal whale skeleton described from the whole Pacific Ocean and Southern Hemisphere, possibly the geologically oldest from the Americas, and the most complete outside Indo-Pakistan.

Fused sacral vertebrae, the pelvis being firmly attached to the sacrum, an insertion fossa for the round ligament on the femur, fore- and hind limb proportions being roughly similar to geologically older quadrupedal whales from Indo-Pakistan, and the retention of small hooves with a flat anteroventral tip at fingers and toes indicate that *Peregocetus* was still capable of standing and even walking on land. Caudal vertebrae display bifurcated and anteroposteriorly expanded transverse processes, like those of semiaquatic mammals (e.g., marine sloth *Thalassocnus*, beavers, and otters). Although this feature suggests a more significant contribution of the tail during swimming (lift-based propulsion) than in geologically older protocetids, the large, most likely webbed feet bearing long toes indicate that strokes from hind limbs may also have contributed to underwater locomotion (drag-based propulsion), as in otters.

Sharing similarities with some western African protocetids, this new taxon from the Lutetian of the southeastern Pacific further supports the hypothesis that early quadrupedal whales crossed the South Atlantic from Africa to South America, and nearly attained a circum-equatorial distribution with a combination of terrestrial and aquatic locomotion abilities less than 10 million years after their origin in south Asia. Assisted by the paleo-South Equatorial Current, this westward oceanic migration was followed by a northward dispersal towards higher North American latitudes.

Regular Poster Session IV (Saturday, October 12, 2019, 4:15 - 6:15 PM)

ON THE HISTOLOGY AND DEVELOPMENT OF DINOSAURIAN POST-CRANIAL SKELETAL PNEUMATICITY

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At least since the 18th century it is known that diverticula of the air sacs – bellows-like protrusions of the lungs – penetrate and invade the avian skeleton, a process which is referred to as pneumatization. Similarly, also the morphological diversity of this post-cranial skeletal pneumaticity is relatively well understood on a comparative level. This, in fact, even extends to numerous non-avian dinosaurs, many of which also possessed pneumatized bones. Given the apparent functional importance and evolutionary significance of this trait – not only for extant birds, but rather for at least the entire lineage of saurischian dinosaurs – it is astonishing how little is known about the underlying mechanisms of pneumatization. Only very recent histological studies, for instance, revealed that pneumatized bones exhibit a characteristic osseous tissue: pneumosteam. Such pneumosteam bone is found in regions where the epithelium of the air sacs contacts the skeleton, is characterized as secondary trabecular or secondary endosteal bone containing numerous very fine fibers, and can be found both in extant birds as well as in non-avian dinosaurs. The aim of the present poster is to provide an overview of the histological characteristics of post-cranial skeletal pneumaticity, with a special focus on ongoing research on its developmental aspects, namely what happens when the air sacs first extend their diverticula into the bones in extant dinosaurs (i.e., birds). The poster furthermore intends to serve as a discussion forum on how this work can be expanded to extinct non-avian dinosaurs, in order to add an evolutionary dimension to understanding the origin and formation of post-cranial skeletal pneumaticity in general.

Regular Poster Session II (Thursday, October 10, 2019, 4:15 - 6:15 PM)

A RE-EVALUATION OF ‘FURO’ MICROLEPIDOTES (NEOPTERYGII, HALECOMORPHI) FROM THE UPPER JURASSIC SOLNHOFEN ARCHIPELAGO OF GERMANY

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The extinct halecomorph fish genus *Furo* has long been recognized as a ‘wastebasket taxon’ into which a number of unrelated species of uncertain taxonomic and phylogenetic affinities have been thrown. This has become especially problematic among ‘*Furo*’ from the Upper Jurassic plattenkalk regions of Germany (Solnhofen, Nusplingen) and France (Cerin), which include ‘*F.*’ *longiserratus*, ‘*F.*’ *latimanus*, ‘*F.*’ *angustus*, ‘*F.*’ *aldingeri*, ‘*F.*’ *microlepidotes*, and *Ophiopsis* (formerly *Furo muensteri*). Of these, ‘*Furo*’ *microlepidotes* stands out as one of those most morphologically distinct from the type species (*Furo orthostomus* from the Lower Jurassic of southeastern England). Preliminary results appear to confirm speculation by previous authors that ‘*Furo*’ *microlepidotes* is phylogenetically closer to Caturidae than it is to *Furo*. ‘*Furo*’ *microlepidotes* is characterized by a slender, bar-like maxilla similar to that of caturids (*Caturus*, as exemplified by the type species *C. furcatus*, as well as *Amblysemius* and *Liodesmus*) in which the ventral dentigerous border is downturned and ventrally expanded posteriorly. Other characters that ‘*Furo*’ *microlepidotes* shares with caturids include a large difference in size between the left and right parietals; well-developed sclerotic ring; deeply forked caudal fin with a symmetrical outline; and short splint-like supramaxilla occupying less than half the length of the maxilla. As in caturids, the maxilla in ‘*Furo*’ *microlepidotes* lacks the broad triangular dorsal expansion and posteroventral extension observed in *F. orthostomus* and morphologically similar forms (such as *Furo normandica* and *Ophiopsis muensteri*). However, unlike caturids, ‘*Furo*’ *microlepidotes* retains the more primitive halecomorph character of having ganoin-covered rhomboid scales, indicating a phylogenetically more basal position than other Caturidae. Preliminary results of phylogenetic analysis using PAUP place ‘*Furo*’ *microlepidotes* at the base of Caturidae (including *Caturus furcatus*, *Amblysemius pachyurus*, and *Liodesmus gracilis*), within the Amiiforms (a clade that also includes the extant bowfin *Amia calva* and its extinct relatives); whereas *Furo orthostomus* and *Ophiopsis muensteri* are basal to *Ophiopsiella*. This reevaluation sheds new light on the taxonomy of ‘*Furo*’ *microlepidotes*, distinguishing it from *Furo*. This study was supported by Volkswagen Foundation grant I/84 636 and by SYNTHESYS grant GB-TAF-950.

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