(anteroposteriorly thick) vertebrae, well-developed neural spine of the axis, large transverse process of atlas, and median ridge on the dorsal dens. On the contrary, cervical vertebrae in *M. yabukii* (very short vertebrae, small transverse process of atlas, lack of hyapophyses on the ventral surface, no median ridge on the dorsal dens) appear more derived than the cervical vertebrae in the geologically older edentulous mysticete *Eomysticetus* (e.g., thick vertebrae, median ridge on the dorsal dens). The disparity in the cervical vertebrae could suggest that *Morawanocetus* is placed phylogenetically more crown-ward than *Eomysticetus* and therefore the family Aetiocetidae is not monophyletic. We tested the phylogenetic position of *Morawanocetus* using the published analysis with addition of postcranial characters. The preliminary result indicated that the family Aetiocetidae is monophyletic, but the robustness of the aetiocetids clade expressed by GC value of standard bootstrap resampling (1000 replicates) was much lowered from the original result. Interestingly, the exclusion of *Eomysticetus* from the analysis placed *Morawanocetus* as a sister taxon of the crown mysticetes.

Symposium 1 (Wednesday, October 30, 2013, 9:15 AM)

THE CLANDESTINE ROLE OF HETEROCHRONY IN CERATOPSIAN EVOLUTION AS REVEALED BY JUVENILE *TRICERATOPS*

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The upper Cretaceous Hell Creek Formation (HCF) of Montana has produced a large sample (n>100) of the chasmosaurine ceratopsid *Triceratops*, including representatives of previously rare or unknown early growth stages. Comparative osteology and stratigraphic data confirm that major features of the skull underwent transformation throughout the HCF. Juvenile specimens collected from the upper third of the HCF possess characters (including morphology of the premaxilla and nasal) typically observed in more mature individuals collected from lower in the formation. These character states are absent in more mature *Triceratops* from the upper third of the HCF. Many of the cranial features which are restricted to early ontogeny in *Triceratops* (including recurved postorbital horn cores, morphology of the supracranial sinus, and contribution of the supraoccipital to the foramen magnum) have been suggested to be phylogenetically informative in more basal ceratopsian taxa. New details of the cranial anatomy of juvenile *Triceratops* indicate the persistence of additional characters used to diagnose taxa that predate the latest Maastrichtian. For example, the chasmosaurine *Anchiceratops* and several centrosaurine taxa exhibit a pronounced ridge on the lateral surface of the dentary. A homologous feature has not been previously reported in *Triceratops*, however at least one juvenile specimen (Museum of the Rockies [MOR] 1199) clearly preserves this character. Similarly, a bony flange on the posterior surface of the narial strut of the premaxilla has been described in several chasmosaurine taxa (including *Chasmosaurus* and *Pentaceratops*) and used to distinguish these clades from *Triceratops* and its close relatives. Several specimens of immature *Triceratops* are found to exhibit this flange, though it is absent in more mature specimens. The transitory nature of these characters in *Triceratops* illustrates the potential problems of including immature specimens in phylogenetic analyses and designating juveniles as holotypes. The fact that primitive characters, though previously undetected, are present in early *Triceratops* ontogeny reveals that they were still subject to selection and suggests the potential for 'Lazarus characters' in the dinosaur fossil record. This is consistent with the hypothesis of clandestine evolution and indicates that heterochrony played a critical role in ceratopsian evolution.

Poster Session I (Wednesday, October 30, 2013, 4:15 - 6:15 PM)

ANCIENT DNA AND THE ROLE OF ISLAND FRAGMENTATION IN DIVERGENCE OF LIZARDS OF THE GENUS *AMEIVA*

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The episodic fragmentation of islands during the Pleistocene and into the Holocene from rising sea levels serves as a unique system to study how changes in habitat connectivity and island size facilitate or inhibit genetic divergence and, ultimately, speciation and extinction. Furthermore, the use of ancient DNA allows us to accurately assess genetic diversity through time and the spatiotemporal distribution of species. In warm, humid regions, such studies are limited by the poor preservation of fossils and ultimately, aDNA. Here, we report the first mitochondrial aDNA sequences from fossils of the lizard *Ameiva* collected from Anguilla, a Caribbean island in the northern Lesser Antilles. The teiid genus *Ameiva* is found throughout Central and South America but its primary distribution occurs in the West Indies. There are two species endemic to the Anguillan bank (*A. plei* and *A. corax*), while a separate species (*A. corvina*) is endemic to the small, nearby island bank of Sombrero. We integrate the ancient genetic data with modern genetic data, island bathymetry, and sea level curves to determine which species are present on Anguilla since the Pleistocene, to characterize genetic diversity through time in these Anguillan bank species, and to understand their phylogenetic relationships. Our study provides a framework through which molecular divergence in other insular taxa can be assessed, and documents the waxing and waning of diversity in this group of lizards in response to changing island area and connectivity.

Technical Session V (Wednesday, October 30, 2013, 4:00 PM)

BONE HISTOLOGY OF PLACODONT MARINE REPTILES (SAUROPTERYGIA) FROM EUROPE

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Placodonts are the sister group to all remaining eosauropterygians within Sauropterygia, one of the most successful and long-lived radiation of Mesozoic marine reptiles. The placodont skull is characterized by a highly specialized crushing dentition. Basal forms are unarmored (*Paraplacodus*, *Placodus*), whereas more highly nested forms (e.g. *Cyamodus*, *Psephoderma*) show extensive body armor. Based on their body shape, conserved limb morphology and sedimentary data, both armored and unarmored forms are characterized as slow swimmers or bottom walkers inhabiting near-coastal environments along the northern margins of the Triassic Tethys ocean.

Long bone microstructure is known to be influenced by heritage, as well as structural and functional aspects, and by comparison with extant animals phylogenetic and ecological signals can thus often be inferred in fossils. In contrast to other marine reptile groups (e.g., eosauropterygians and ichthyosaurs), however, little is known about the bone microstructure of placodonts. Preliminary accounts noted derived histological features in long bones such as fibro-lamellar bone tissue with high degrees of plexiform or irregular vascularization. Here we survey the bone microstructure of selected unarmored and armored placodonts, including the basal-most taxon *Paraplacodus broilii* (Besano Formation, Anisian-Ladinian boundary, Monte San Giorgio, southern Switzerland), to better understand the evolution of limb bone microstructures in Sauropterygia as a whole, the potential conservation of such among placodonts, and whether unarmored and armored taxa exhibit diverging ecological signals.

Results show that bone histology is variable among placodonts and that there is no clear signal between armored and unarmored forms. *P. broilii* limb bones indicate that the previously described histology represents a derived condition, which has developed from a dense lamellar-zonal tissue characterized by low vascularization. *Placodus* and *Cyamodus* share similar limb bone histologies with highly vascularized fibro-lamellar bone tissue, whereas the last representative of placodonts, the armored *Psephoderma* (Upper Triassic, Alps) shows a reversal to lamellar-zonal bone tissue in dense cortices but increased amounts of secondary remodeling of the internal-most primary compact layers. This study indicates an unexpected degree of divergence in bone microstructure in a highly specialized clade, and shows that fibro-lamellar bone has independently evolved at least twice in Sauropterygia.

Poster Session II (Thursday, October 31, 2013, 4:15 - 6:15 PM)

PALEONEUROANATOMY AND BRAINCASE MORPHOLOGY INDICATES THE PRESENCE OF AT LEAST TWO DIPLODOCINE TAXA (DINOSAURIA: SAUROPODA) AT HOWE RANCH (WYOMING, USA)

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The Howe Ranch, north of Shell (Wyoming, USA), has been known for its abundant and excellently preserved dinosaur finds since the 1930s. The five sites on the Howe Ranch produced numerous diplodocid, camarasaurid, allosaurid, stegosaurian, and ornithopod dinosaurs from the Morrison Formation (Kimmeridgian, Late Jurassic). Surprisingly, almost all of these taxa are also represented by either partial or complete skulls, which are generally rarely found in the Morrison Formation.

For the current study, three braincases (Sauriermuseum Aathal [SMA] 0004, SMA D16/3, and SMA O25/8) from the Howe Ranch were CT scanned, and 3D renderings of their cranial endocasts and osseous labyrinths were generated.

The braincase morphology indicates the presence of a second diplodocine taxon different from *Kaatedocus* (as represented by the holotype SMA 0004, consisting not only of a braincase but rostral elements and partially articulated neck elements, too, and a second braincase SMA D16/3). The reduced participation of the basioccipital in the dorsal surface of the occipital neck, the slightly concave caudal surface of the basal tubera, and their concave rostral margin distinguish SMA O25/8 from that of *Kaatedocus*. Based on as yet undescribed postcranial material with very elongate mid-cervical vertebrae (compared to *Kaatedocus*), the previously proposed presence of *Barosaurus* is probable. The braincase may belong to this taxon. If confirmed, it would be the first reported cranial remains of *Barosaurus*.

Observations of preliminary endocast reconstructions of the braincases of these specimens suggest similarities with other diplodocids. The endocranial cavity of this possible *Barosaurus* braincase has a relatively shorter hypophyseal fossa than that of *Kaatedocus*, despite being larger overall. Furthermore our investigation suggests that a reduction of brain and inner ear sizes relative to body mass took place during diplodocid evolutionary history, which was possibly related to the space restrictions in the small skull and predominantly horizontal neck movements in diplodocids.

Technical Session XVI (Saturday, November 2, 2013, 2:30 PM)

EVOLUTIONARY DRIVERS OF GIANT EYES IN LARGE OCEAN PREDATORS

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The eyes of giant and colossal squids are the largest of all living organisms, with adult individuals reaching 27 cm in eye diameter. Eyes of similar size are only found in ichthyosaurs, a group of Mesozoic marine reptiles. Direct observations of the biology of giant and colossal squids are extremely rare and are impossible for fossils, thus the function of large eyes is not well understood. Hence, theoretical models offer a