

heterodonty; however, the shape changes from the anterior to posterior and between the upper and lower jaws are subtle, making it exceedingly difficult to confidently and accurately identify tooth position.

To resolve this issue, a novel method for estimating body length in lamniform sharks is proposed based solely on associated dentitions. The proposed method uses a simple mathematical concept referred to as the rule of three and essentially assumes direct proportionality between the ratio of summed crown width to body length in fossil and modern taxa. Summed crown width is used as a proxy for jaw size and, for the most part, eliminates the necessity of identifying teeth to their original position. This method is applied to 10 fossil dentitions representing five lamniform taxa: *Carcharocles chubutensis*, *C. megalodon*, *Carcharodon hastalis*, *Carcharodon hubbellii*, and *C. carcharias*. A total of 19 modern dentitions representing three lamniform taxa (*C. carcharias*, *Isurus oxyrinchus*, and *Isurus paucus*) are used as analogs. Summed crown width for each of these dentitions was segmented into four regions: upper left, upper right, lower left, and lower right. The rationale for segmenting the summed width into these four regions is due to the partial preservation of many of the fossil dentitions.

Our results found that estimates based on the lower jaw tend to be higher than the upper jaw, likely due to differences in the dental formula between fossil and modern taxa. Unsurprisingly, estimates derived from Mako sharks, *Isurus*, were always greater than those derived from modern Great Whites, which can likely be attributed to different feeding ecologies and corresponding narrower teeth of Mako sharks. Our best estimate for an average adult *C. megalodon*, based solely on Great Whites and after removing outliers, is 16.68 m (54.7 ft).

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Poster Session IV (Saturday, October 20, 2018, 4:15 – 6:15 PM)

THE SINGULAR UPPER CRETACEOUS VERTEBRATE SITES OF THE GUADALAJARA PROVINCE (CENTRAL SPAIN): NEW DATA ON THE FAUNAS FROM THE CENOMANIAN OF ALGORA AND THE UPPERMOST CRETACEOUS OF POYOS

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The Cretaceous vertebrate fauna of the Guadalajara Province (Castilla-La Mancha, Central Spain) was unknown until a few years ago. In fact, the systematic excavation campaigns in Guadalajara began in 2013, those carried out in 2016 and 2017 being especially relevant. These works were performed in two fossiliferous areas, separated from each other by about 60 km, both located in the Castilian Branch of the Iberian Ranges: the Cenomanian area of Algora, especially the ALG-B site (Algora municipality); and the uppermost Cretaceous outcrops of the western margin of the Buendía Reservoir, especially the Poyos site (Sacedón municipality).

Localities with fossil vertebrates from the lower part of the Upper Cretaceous are very scarce in Europe and, to date, the locality of Algora shows the highest concentration of vertebrate remains recognized in the Cenomanian of this continent. Thus, the fossils from Algora add important data for the understanding of the faunal turnover recognized when the Lower Cretaceous and the uppermost Cretaceous faunas are compared. The study of the new remains presented here allows us to analyze in more detail the fauna of fishes, characterize the primitive turtle members present in this locality, know new anatomical characters for the oldest European pleurodiran turtles, identify and describe remains of elasmosaurs, recognize the presence of eusuchian crocodyliforms, describe the oldest lithostrotian titanosaurs of the Iberian Peninsula, and perform a detailed analysis of the theropod fauna. Several lineages from this site show a Gondwanan origin.

Poyos is an uppermost Cretaceous site located in one of the worldwide largest dinosaur nesting areas, found in 2016. Thus, these fossiliferous levels extend over more than 10 km. With the exception of an isolated vertebral centrum of a titanosaur sauropod, no other specimen from this locality has been published so far. The preparation of the fossils found in 2006 and 2017 allows us to analyze both oological and osseous remains. Not only isolated sauropod eggshells, but also complete eggs and several dinosaur clutches, have been found. They show several singularities relative to both the microstructure of the eggshells and the disposition of the eggs, in relation to those previously found in other uppermost Cretaceous Iberian regions. In addition to elements of bothremydid turtles and probably allodaposuchid crocodiles, the remains of dinosaurs are abundant in this region, including several partial skeletons. Among them, a probable new middle-sized theropod is identified.

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Poster Session III (Friday, October 19, 2018, 4:15–6:15 PM)

AN EXTINCT SPECIES OF *TRICHECHUS* LINNAEUS, 1758 (SIRENIA, TRICHECHIDAE) FROM THE LATE PLEISTOCENE OF SOUTHWESTERN AMAZONIA

PERINI, Fernando A., Universidade Federal de Minas Gerais, Belo Horizonte, Brazil; COZZUOL, Mario A., Universidade Federal de Minas Gerais, Belo Horizonte, Brazil. The genus *Trichechus* (Mammalia, Sirenia, Trichechidae) harbors a modest diversity, comprising only three living species of manatees, with no full species currently recognized as fossil. Herein we report a new extinct species of *Trichechus* from the late Pleistocene of the Brazilian Amazonia. The new species comes from the deposits of the Rio Madeira Formation along Madeira River, state of Rondônia, Western Brazil, and is represented by two right dentaries and a partial palate with both molar series. The new species shows a mosaic of characteristics resembling other manatee species, as well some unique characters. It resembles *T. inunguis* and *T. senegalensis* by having a slender mandible

lacking a deep mandibular symphysis and keel, like *T. manatus*, and by having smooth enamel. However, it differs from *T. inunguis* by having relatively larger and fewer erupted molars, as well by having only two mental foramina. It differs from all other *Trichechus* species by possessing a wide space between the lower tooth row and the ascending ramus of the dentary, and by having the anterior border of the ascending ramus covering the posterior end of the tooth row in lateral view. The results of morphometric analyses, including principal component analysis and discriminant analysis, highlight the distinction of the new species. A phylogenetic analysis recovers the new species in a polytomy with *T. inunguis* and the clade formed by *T. senegalensis* and *T. manatus*. The levels from which the remains were recovered produced a radiocarbon date of $44,710 \pm 880$ years before present, suggesting that, until recently, at least two species of manatees coexisted in the fluvial systems of western Amazonia.

Technical Session I (Wednesday, October 17, 2018, 11:30 AM)

A REAPPRAISAL OF THE BASAL SAUROPODOMORPH *ANCHISAURUS POLYZELUS* AND ITS IMPLICATIONS FOR HETEROCHRONY IN SAUROPOD SKULL EVOLUTION

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After decades of study, the evolutionary history of sauropod dinosaurs, the largest land-dwelling vertebrates to ever have evolved, is far from resolved. In particular, several questions regarding body size evolution and the phylogenetic relationships characterizing the divergence of the branches in basal Sauropodomorpha are still unanswered. Here, we present a comprehensive study of the Early Jurassic taxon *Anchisaurus* with implications for our understanding of the evolution of Sauropodomorpha. Compared to its closest relatives, *Anchisaurus* is a slender and lightly built sauropodomorph. Moreover, *Anchisaurus*' phylogenetic position within Sauropodomorpha, traditionally at the base of the derived basal sauropodomorph clade Anchisauria, was recently challenged when it was placed among the more basal massospondyliids. Skeletochronological analysis of thin sections from femora, humeri, and ribs of three *Anchisaurus* specimens housed at the Yale Peabody Museum found two sexually mature and one adolescent individual. MicroCT scan data enabled the reconstruction of the skull morphology for the youngest and second oldest individuals. Based on these new data the diagnostic cranial features of *Anchisaurus* are reevaluated; we found an interesting mosaic of basal and derived characters expressed in this taxon. We performed geometric morphometrics on a dataset of 60 taxa and 80 individuals, including early archosauromorphs, crocodyliids, theropods, and sauropodomorphs, including all available ontogenetic stages per taxon. Our results suggest a heterochronic event in *Anchisaurus* that also shaped the general sauropod skull morphology. Based on our own evaluation of its phylogenetic position in combination with its small body size in comparison to the closest sister taxa, we hypothesize that *Anchisaurus* is a dwarfed basal sauropodomorph, the first one recovered in the basal branches of Saurischia.

Poster Session III (Friday, October 19, 2018, 4:15–6:15 PM)

A LEATHERBACK TURTLE (TESTUDINES, DERMOCHELYIDAE) FROM THE MIOCENE OF THE WESTERSCHDELDE, THE NETHERLANDS

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The Westerschelde Estuary in The Netherlands is known for its rich vertebrate fossil content. In a recent trawling campaign aimed at sampling a late Miocene marine vertebrate assemblage, over 5000 specimens were retrieved, all currently stored in the Natuurhistorisch Museum Rotterdam. One specimen is a well preserved fragment of a dermochelyid sea-turtle carapace. The Westerschelde specimen is an addition to the scant hypodigm of dermochelyids from the Miocene North Sea. The carapace fragment is described and identified as *Psephophorus polygonus*. The various secondary marks present on the fragment are suggestive of both predatory and scavenging origin. Based on the assumption that *P. polygonus* had a similar carapace structure as recent *D. coriacea*, the minimal size of the complete carapace is estimated to have been 168 x 126 cm. Furthermore, based on the physical traits of the Westerschelde specimen and a re-examination of *P. polygonus* specimens, including the neotype stored at the Naturhistorisches Museum Wien (Austria), it is argued that previously assigned characteristics cannot be used as discriminative taxonomic properties of dermochelyids in general, and of *P. polygonus* in particular. An improved cladistic analysis on dermochelyids is performed based on previously defined and new taxonomic characters. Using this analysis it is argued that *Psephophorus calvertensis* is a junior synonym of *P. polygonus*. Hence, a new diagnosis of *Psephophorus polygonus* is defined. The 'addition' of *P. calvertensis* to the species *P. polygonus* confirms its presence on both sides of the Atlantic Ocean. Therefore, we suggest *P. polygonus* to have had a cosmopolitan distribution, similar to the extant species *Dermochelys coriacea*.

Poster Session (Wednesday–Saturday, October 17–20, 2018, 4:15–6:15 PM)

HUMAN ORIGINS SCIENCE FOR MIDDLE AND HIGH SCHOOL STUDENTS AND TEACHERS: BUILDING AN ONLINE COMMUNITY OF LEARNING

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The quality of K–12 science education in the United States has deteriorated in recent decades. For example, US 15-year-olds ranked 23rd in the world in science literacy, according to a 2012 assessment by the National Center for Education Statistics. As measured by a 2011 National Assessment of Educational Progress, 68 percent of 8th graders lack proficiency in basic science. Intimately connected to these statistics is the sizeable percentage of American adults who accept a creationist, as opposed to