

sample permits recognition of species-specific patterns during growth.

Histological specimens (100 micron thick ground sections) were examined using transmitted and circularly polarized light microscopy, facilitating a detailed identification of bone tissue types and preferred collagen fiber orientations (microanatomical features), and trabecular architecture and cortical geometry (macroanatomical features). When examined in species specific contexts, the differences may be considered in light of bone tissue responses to the demands of growth trajectories, physiologies and localized loading environments. Tissue type distributions, combined with trabecular and cortical geometric variables, were compared to earlier studies of mammalian taxa. Other features (e.g. collagen fiber orientation) have not previously been examined in a broad range of species. Data acquired for these variables were interpreted in light of results presented in the human, and the more limited mammalian literature. Findings were analyzed in terms of their biological and phylogenetic significance.

NEW SKELETON OF NODOSAURINE ANKYLOSAUR FROM LANCE FORMATION (UPPER CRETACEOUS) IN WYOMING: TAXONOMY AND MORPHOLOGY OF THE ARMOR

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A well preserved skeleton of a nodosaurine ankylosaur was unearthed from the Lance Formation (Maastrichtian) in Greasewood Creek, Wyoming, and at present is stored in the Hayashibara Museum of Natural Sciences. The specimen consists of a badly-preserved skull, well-preserved lower jaws, a series of cervical and dorsal vertebrae, partial caudals, and forelimb and hindlimb complexes. The manus, pes, and pelvic portion with the sacrales are missed. A series of dermal armor (= scutes) is abundantly represented, including three cervical-thoracic armor rings, and other isolated scutes with variable size and shape.

Dental morphology (large size, development of cingulum) and scute morphology (bifurcated lateral spine of the third armor ring) suggests that the specimen belongs to *Edmontonia rugosidens*. The pattern of variation of the vertebral series (cervical to dorsal) is similar to that of other quadrupedal dinosaurs such as *Chasmosaurus* (Ceratopsia).

The main lateral spine on the third armor ring is oriented in a ventral direction, rather than to anterolaterally. This is based on the observation of well-preserved articulated scutes on the third armor ring that are located above the pectoral girdle of the animal. This condition reflects the function of the large lateral spine that projects from its shoulder region. The ventrally-oriented spines would not have been an obstacle when the animal was moving through bushy environments.

The scutes bear variable pathological traces on their outer surface. These surface traces are classified as chips, pits, and melting, and were probably formed by predator attack or disease. This well-preserved skeleton will increase the anatomical information of nodosaurine ankylosaurs that have been until now poorly known.

NEW NEARLY COMPLETE SKELETON OF THE BIRD-LIKE THEROPOD, *AVIMIMUS*, FROM THE UPPER CRETACEOUS OF THE GOBI DESERT, MONGOLIA

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In 1996, the Hayashibara Museum of Natural Sciences - Mongolian Paleontological Center Joint Paleontological Expedition team found a nearly complete skeleton of the bird-like theropod *Avimimus portentosus* with a skull from the Upper Cretaceous beds of Shar Tsav, Eastern Gobi region.

The specimen includes many of the anatomical elements that were not preserved in the type material of the taxon. These elements include an articulated forelimb (scapulacoracoid, humerus, radius, ulna, and fused carpometacarpal), and an articulated tail. The skull with the premaxilla is also preserved with the postcranium.

The skull has a very narrow premaxilla with a depression for the narial fossa, and a relatively very large orbit. There are small teeth in the premaxilla. The preserved cervical - dorsal vertebrae have a well-developed hypapophysis. The forelimb is a new discovery. The complete ulna has a very sharp and thin keel (crista) on its posterior margin, and the complete radius has a very narrow, rod-like form. The carpometacarpal is completely fused. The scapula is narrow but elongate, and the coracoid is large.

The metatarsus shows a very advanced arctometatarsalian condition. The unguals of the three digits are claw-like, straight, and the long axis of those of second and fourth digits are angled laterally. Preserved caudal vertebrae are anteroposteriorly elongated without evidence for the existence of a pygostyle.

The discovery of this new skeleton confirms the validity of the original description by Kurzanov of the animal. The features recognized in the new specimens show bird-like adaptations in a small Late Cretaceous theropod that inhabited heterogeneous environments. Shar Tsav locality also provides several thousand dinosaur footprints of very small, bipedal, tridactyl footprints that occur as gregarious trackways, attributable to this taxon.

POPULATION GENETICS OF ICE AGE CARNIVORANS

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The Pleistocene was a dynamic period for holarctic mammal species, complicated by episodes of glaciation, local extinctions and intercontinental migration. The genetic effects of these events are difficult to resolve from the study of present-day populations. To provide the first direct view of population genetics in the late Pleistocene, we measured mitochondrial DNA sequence variation in seven permafrost-preserved brown bear (*Ursus arctos*) specimens, dated from 14,000 to 42,000 years ago. Approximately 36,000 years ago the Beringian brown bear population had a higher genetic diversity than any extant North American population, but by 15,000 years ago genetic diversity appears similar to the modern day. The older, genetically diverse, Beringian population contained sequences from three clades now restricted to local regions within North America, indicating that current phylogeographic patterns may provide misleading data for evolutionary studies and conservation management. The late Pleistocene phylogeographic data also indicate possible colonization routes to areas south of the Cordilleran ice sheet. Finally, we provide preliminary data on genetic diversity in wolf-like canids of the Arctic permafrost.

NEW MATERIAL OF SAUROPOD DINOSAURS FROM THE CLOVERLY FORMATION

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The Wolf Creek quarry, a recently discovered fossil vertebrate locality in the Cloverly Formation (Aptian-Albian) of Montana, has produced new material of sauropods and other dinosaurs. The quarry is located in an outcrop of fine-grained claystone, in Unit V of the Cloverly Formation. The complete disarticulation of skeletal elements in the quarry, together with the prevalence of exploded vertebrae and unidentifiable chunks of 'rolled' bone, suggest significant fluvial transport.

The crocodylian *Gontopholis* and the chelonian *Naomichelys* are represented by teeth and scutes, respectively. In addition, at least three taxa of dinosaurs are present at the locality. A velociraptorine theropod, probably *Deinonychus antirrhopus*, is represented by a single tooth. At least one carnosaur is also present, based on a large tooth and caudal vertebra. All other material identified to date pertains to a moderate-sized sauropod of uncertain taxonomic affinities. This material includes humeri, tibiae, an ischium and other fragmentary pelvic elements, a metatarsal, and numerous partial vertebrae and vertebral fragments. General morphology of both axial and appendicular elements suggest titanosaurian affinities, but this cannot be confirmed at this time. Vertebral elements include a nearly complete, uncrushed cervical vertebra which indicates a relatively short-necked sauropod. The morphology of this vertebra contrasts sharply with that of YPM 5294, a very elongate cervical centrum found in Unit VII, and demonstrates that at least two sauropods are present in the Cloverly Formation, albeit in different units.

In addition to the elements described above, numerous bony plates have also been recovered from the quarry. These plates are small (2-10 cm in diameter), roughly pentagonal or hexagonal, and pitted on both faces. They do not correspond well with previously described osteoderms of either ankylosaurs or titanosaurs.

BARBECUED BONES IN CENTRAL WYOMING: EVIDENCE OF A WILDFIRE NEAR THE END OF THE CRETACEOUS?

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Probable wildfire deposits have been identified in the Upper Cretaceous of Central Wyoming. The fire burned trees and the creatures associated with them, resulting in an associated catastrophic death assemblage of both plant and vertebrate material. Reconnaissance studies result in identification of a bone layer occurring over a faulted geographic area of central Wyoming, in the Bighorn Basin region. The bone assemblage occurs in poorly indurated siliclastic units, within a lithologically constrained interval. Due to regional faulting, further study is ongoing to better constrain relative stratigraphic position of the barbecued bone interval. Taphonomically, there are at least three types of preservation identified during initial reconnaissance: 1) burned bone in association with burned tree stumps and ash in possible bentonitic clay; 2) burned bone associated with ferruginous crusts in lithic sandstone; 3) burned bone contained in laminated mudbaffs found in shale immediately overlying the lithic sandstone. Skeletal articulation varies from isolated but articulated bone to disarticulated and dispersed bone. Frequency of bone occurrence suggests that there could be a larger accumulation of bone than that evaluated during initial reconnaissance as spatial density over geographic area is relatively high. Diagenesis and weathering results in friability of the bone found near or at the surface. Bone preserved in shale mudbaffs tends to be less friable. Identification of a North American Upper Cretaceous "barbecued bone interval" provides a rare window of opportunity to study trophic relationships and raises the question as to the frequency of wildfires occurring during the Upper Cretaceous.