ated by resource availability. Specifically, bone modification was most pronounced under conditions in which both food and substrate (for pupation/shelter) were limited. Thus, the nature and extent of dermestid traces may serve as an indicator of a stressed habitat where food availability and nesting substrates are limited.

QUANTITATIVE DESCRIPTION OF SAUROPOD TRACKS–A GEOMETRIC MORPHOMETRICS STUDY

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A geometric morphometric analysis of shape variation in a sample of 22 sauropodomorph footprints of the world ichnological record was conducted. In this analysis we included 19 pes prints attributed to Sauropoda and 3 other marks attributed to Prosauropoda footprints. Generally sauropod pes prints are egg-shaped without diagnostic digit impressions. Well-preserved sauropod manus and pes prints are rare in the general fossil record. However, in some of the sauropod pes prints from the Upper Jurassic of Portugal were described 4/5 laterally oriented claw marks. These footprints present four sharp digit impressions and were analyzed together with other sauropod specimens from Middle Jurassic of Portugal, USA and Morocco, from Upper Jurassic of Spain and USA, from Lower Cretaceous of USA and England, as well as with prosauropods footprints from Upper Triassic of Lesotho. Ten landmarks and a variety of pseudo-landmarks were used in order to describe the footprint shape. Footprints were compared by superimposition (Generalized Procrustes Analysis) and deformation-based methods (Thin-Plate Spline). Quantification of the morphological differences in sauropod ichnites were obtained in order to a better characterization of the footprint morphologies that allow an improvement in the identification of the sauropod trackmakers. The quantitative results obtained with this geometric morphometric and multivariate analysis permit a better description of the sauropod ichnites than the traditional descriptive methods. The preliminary results allowed us to characterize and identify different morphological groups as well as identify portions of the footprint contour that present more changes in ichnites shape.

DINOSAUR TRACKS FROM THE LATE CAMPANIAN LAS AGUILAS LOCALITY SOUTHEASTERN COAHUILA, MEXICO

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During March of 2003, the Parras Basin Dinosaur Project conducted its second field season in the Late Campanian Cerro del Pueblo Formation, southeastern Coahuila, Mexico. Among the discoveries is a richly fossiliferous area named Las Aguilas. The area preserves remains of a diverse vertebrate fauna as well as some exceptional specimens, including several associated partial hadrosaur skeletons. In addition, Las Aguilas has yielded several new vertebrate track localities. One of these localities includes multiple trackways of theropods and hadrosaurs of varying sizes, representing the most extensive dinosaur tracksite known from Mexico. The theropod tracks at this location were made by at least two individuals of different size classes, with the trackway of the larger animal exhibiting an abrupt turn. The hadrosaur tracks, which bear well-defined, robust toes, also occur in at least two size classes and show both bipedal and quadrupedal gaits. Approximately 1 m above the main track-bearing layer is an additional track level containing natural track casts of hadrosaurs. Dinosaur skeletal remains are found in the immediate vicinity and one, a lambeosaurine skull and partial skeleton, appears to be in contact with the primary track layer.

An additional locality nearby preserves the trackway of what appears to be a large hadrosaur with an unusual gait. The animal was moving through deep mud using a quadrupedal gait. Interestingly, the alternating manus impressions are located far lateral to the pes impressions. One interpretation is that the animal was placing its hands distal to the midline in order to increase stability while traversing the muddy substrate. The Las Aguilas track localities are highly significant because of: 1) excellent preservation; 2) diversity in track size, gait, and apparent substrate; 3) potential correlations with some trackmaker taxa; and 4) paleoecological implications.

DINOSAURIAN LIFE HISTORY STRATEGIES, GROWTH RATES, AND CHARACTER EVOLUTION: NEW INSIGHTS GARNERED FROM BONE HISTOLOGY AND DEVELOPMENTAL MASS EXTRAPOLATION

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Comparisons of whole-body growth rates and life history strategies among extant vertebrates are typically achieved through the comparison of regressions of exponential stage growth standardized to body mass. In order to compare whole-body patterns between Dinosauria and extant taxa, similar quantified data are necessary. The recent merging of traditional bone histological analysis with scaling principles in a method termed Developmental Mass Extrapolation (DME) has provided the requisite tools and data to assess how dinosaurs really grew.

An analysis of dinosaurs spanning the phylogenetic and size diversity of the clade revealed that sigmoidal equations accurately describe the growth data for six diverse dinosaur taxa. The onset of somatic maturity occurred between the ages of three and 13 years, with values positively correlated with increased body size. The regression equation for Dinosauria indicates that while all dinosaurs grew at rates more rapid than those of extant reptiles, they exhibit rates below, equivalent to, or above the rates of extant mammals and did not attain the extremely rapid rates attained by modern altricial birds. Birds clearly attained a portion of their elevated growth rates from their dinosaurian precursors, but how and when they surpassed the rates of non-avian relatives has remained obscured. Our data indicate that small, non-avian maniraptoran dinosaurs were two to seven times slower growing than extant precocial birds, and that extremely rapid avian growth rates may have evolved only after the origin of Avialae.

DESCRIPTION AND INTERPRETATION OF THE PRILLWITZ MAMMOTH FROM SOUTHWESTERN MICHIGAN

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The Prillwitz Mammoth was collected in Berrien County in 1962 and is on display at Andrews University in Berrien County. Although the most complete mammoth yet recovered from Michigan, the specimen has not been adequately described or interpreted. The recovered skeleton included most of the skull (in several parts), a complete jaw, all four cheek teeth (with a vestigial alveolus on each maxilla), virtually all pre-caudal vertebrae, pectoral girdles and forelimbs proximal to the elbows, and most of the pelvis and hind limbs. Notably missing were the tusks.

One maxillary cheek tooth, fully exposed distally due to breakage, exhibited 23 enamel plates with 14 in wear. Other cheek teeth also exhibited 14 plates on the occlusal surface. Number of enamel plates falls in the range of overlap between M3 of *Mammuthus columbi* (~18-24) and *M. primigenius* (~20-29), whereas lamellar frequency (~7.5/10 cm) and enamel thickness (~2.4-2.6 mm) were within the range of *M. columbi* but not *M. primigenius*. The inferred tooth position (M3/m3) and degree of wear (about 60%) give an African Elephant Years (AEY) age of ~35-37 years.

Measurements of long bones were near or below the lower range of values obtained for *M. columbi* from Hot Springs, SD. The epiphyses of long bones were unfused or initiating fusion, with the exception of the fused distal humeri. These observations suggest a young adult (<~29 if male, <~20 if female) substantially younger than indicated by tooth wear (AEY scheme). A similar discrepancy has been noted for mastodons by others. The ratio of widths of ilium to horizontal pelvic aperture (2.48) was greater than typical for Hot Springs *M. columbi* (interpreted as males) but within the male range for *M. primigenius*. Based on these observations, we interpret the Prillwitz Mammoth as a relatively small young adult male. The taxonomic affinities of the Prillwitz specimen and other Great Lakes mammoths remain puzzling given uncertainty about the status of *M. jeffersoni* from the region. However, the Prillwitz Mammoth resembles *M. columbi* more than *M. primigenius*.

BEHAVIORAL IMPLICATIONS OF SAUROPOD STRESS FRACTURES

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The skeletal record provides evidence not only of structure, but also clues to activity. Insights, obtained from analysis of stress fracture patterns in Ceratopsia and Theropoda, allow new perspectives of sauropod behavior. Picturesque tripodal American Museum Natural History exhibition of *Barosaurus* stimulated testing the hypothesis that sauropods stood on their hind legs. Resuming normal posture from a tripodal stance would exert extreme forces on thoracic and lumber vertebrae and metacarpals or forefoot phalanges (as routinely noted in human ballet dancers), as evidenced by stress fractures.

Thoracic and lumbar vertebrae, phalanges and metapodials of sauropods were examined macroscopically for surface abnormalities. Stress fractures were recognized radiologically as oblique radiolucent knife-slice-like clefts with smudged (indistinct) periosteal overgrowth forming a surface bump.

Stress fractures were absent in forefeet (i.e., 221 metacarpals, 121 manual phalanges) and 1232 lumbar or thoracic vertebrae of examined sauropods (Chi square = 38.83, $p < 0.00001$). Pronounced anterior bulges, characteristic of stress fractures were recognized in 6% of sauropod metatarsals, with frequency indistinguishable among the genera: MT-I of *Apatosaurus*, *Camarasaurus*, MT-II of *Diplodocus*, MT-IV of *Apatosaurus* and *Brachiosaurus*, MT-V of *Apatosaurus*, and proximal pedal phalanges of *Apatosaurus* and *Nurosaurus*. While the articulatory joints of sauropods had sufficient range of motion to allow tripodal stance, absence of manual stress fractures documents that they did not actually assume such a stance. This contrasts with relatively frequent notation of pedal stress fractures. This suggests that the hindfoot provided much of the propulsive thrust of ambulation, perhaps with dry land habitat implications. Study of paleopathology permits us to discern not only what animals were anatomically capable of doing, but—in some cases—what they actually did.

REINTERPRETATION OF *REIGITHERIUM BUNODONTUM* AS A REIGITHERIIDAE DRYOLESTOID AND THE INTERRELATIONSHIPS OF THE SOUTH AMERICAN DRYOLESTOIDS

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Eighteen mammalian species have been named from isolated teeth and fragmentary jaws collected in the Late Cretaceous fauna of Los Alamitos Formation (Campanian-Maastrichtian), Patagonia, Argentina. Until recently most taxa from Los Alamitos have been interpreted as derived members of a dryolestoid radiation in South America and perhaps Gondwana. Based on a tooth-bearing jaw from the Upper Cretaceous La Colonia Formation, the original attribution of *Reigitherium* to dryolestoids was subsequently challenged and relo-