of many large pits and small puncture pits is expected for didelphids in the Carnivore-Vertebrate group. The Omnivore-Insectivore group has a mixed microwear signal: high large pit and fine scratch amounts with various small pit and small puncture pit counts, due to the variation of insectivory/frugivory within the group. Didelphid frugivores have a highly pitted microwear signal. Our analysis for the Omnivore-Generalist group indicates that large pits and small puncture pits are the most frequent microwear features for this group; however, the species in this group also have varying amounts of small pits, gouges, and all types of scratches.

Symposium 4 (Friday, November 4, 9:30 am)

THE TAXONOMIC DIVERSITY AND MORPHOLOGICAL DISPARITY OF PTEROSAURS: UNTANGLING SAMPLING BIASES, THE IMPACT OF LAGERSTÄTTEN, AND DIVERSIFICATION TRAJECTORIES

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Recent work on shallow marine invertebrates and both marine and terrestrial tetrapods has highlighted close correlations between observed taxonomic diversity counts and sampling of the fossil record. The interpretations of such correlations and how best to correct for them if they reflect sampling biases remain controversial. Pterosaurs have played a prominant role in this debate among vertebrate paleontologists, with sharply conflicting views as to the extent to which the pterosaur record is biased by sampling and the relative importance of Lagerstätten deposits. Here we present revised comparisons of species-level pterosaur taxonomic diversity and fossil record sampling, based upon an extensive revision of pterosaur distributional data within the *Paleobiology Database* (>550 collections, 145 species). Moreover, we calculate temporal trends in morphological diversity (disparity) for pterosaurs using a new phylogenetic dataset (100 species, 183 characters) and make the first explicit quantitative comparisons between disparity and fossil record sampling. We utilise a variety of sampling metrics, rigorous data transformations to remove trend and autocorrelation, and recently developed multiple regression modelling approaches to 'correct' diversity estimates and explore the effect of uneven bin lengths. For comparisons involving disparity, we find that range-based disparity metrics are strongly influenced by uneven sampling, whereas variance-based metrics are more robust and can be more confidently interpreted as reflecting true biological signals. Our analyses support proposals of a substantial 'Lagerstätten effect' on some biodiversity metrics for pterosaurs. We argue that careful consideration of sampling may allow genuine patterns in pterosaur evolutionary history to be identified, such as a decline in diversity and disparity in the Late Cretaceous.

Poster Session IV (Saturday, November 5)

GEORADAR APPLICATIONS IN VERTEBRATE TAPHONOMY AND ICHNOLOGY

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Ground-penetrating radar (GPR or georadar) is a rapid and effective high-resolution, subsurface imaging technique with promising applications to site prospecting and quantitative analysis of vertebrate remains and traces. Low- to mid-frequency GPR antennas (50-500 MHz) aid in visualizing bounding surfaces, with large (>20 cm) vertebrate fragments and traces producing diagnostic point-source reflections. Imaging of paleochannels in Quaternary sediments and some older semiconsolidated rocks establishes the sedimentary context for locating large bones (channel thalweg) and track surfaces (channel margins). GPR records often reveal sediment deformation associated with buried targets and allow imaging below the water table, where resolution typically increases at the expense of penetration. In the upper 1-2 m of the subsurface, high-frequency antennas (500-2,300 MHz) allow detection and resolution of such decimeter-to-centimeter scale features as individual bones, skeletal accumulations, and decomposing carcasses, as well as large tracks and trampled surfaces. We present examples of identification, mapping, and measurement of vertebrate traces in the field and laboratory using a spectrum of GPR antenna frequencies: unfilled burrows and tunnels in alluvial deposits (diameter: 5-30 cm), excavations in aeolian sands (15-20 cm), and ungulate (equid and cervid) tracks (8-10 cm). Whereas fine-grained material attenuates the electromagnetic GPR signal in unconsolidated sediments and soils, the dielectric contrast with the surrounding sand-rich matrix is sufficient for detecting biogenic structures. In some coastal areas, heavy-mineral concentrations produced during high-energy storm events may also have associated vertebrate remains and traces. Such mineralogical anomalies provide strong dielectric contrast that accentuates subsurface structures in geophysical records. In addition to its application in vertebrate taphonomy and ichnology, our work suggests that caution must be taken when interpreting point-source and irregular reflections as primary (inorganic) physical structures.

Poster Session I (Wednesday, November 2)

BITING OFF MORE THAN THEY COULD CHEW: A GEOMETRIC MORPHOMETRIC APPROACH TO THEROPOD FEEDING ECOLOGY

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Non-avian theropod dinosaurs represent a case of evolutionary tinkering: while the overall body plan is conserved, the amount of skull morphological diversity suggests a possible selective force. In theropods, there is an apparent trade-off between skull robustness and the importance of forelimbs. In extant mammalian predators, there are correlations between skull morphology and the ability to subdue various types of prey. If changes in theropod skull morphology are a direct result of interactions with potential prey, then we should observe a relationship between the different morphologies and the changes in relative abundances of prey. The maxilla is a large bone along the lateral margins of the skull and contains the teeth that would be important in subjugating potential prey and absorbing bite forces needed for predatory behavior. Maxillary shape is quantified across multiple taxa using sliding semilandmarks. Relative abundances of coexisting sauropods, theropods, marginocephalians, ornithopods and thyreophorans are estimated and a multivariate linear regression is performed to test for correlations between maxillary deformation taxa abundances. Preliminary results indicate that a small amount of variation ($r2 \leq 0.2$, $p < 0.05$) in maxillary shape is correlated with the changing abundances of coexisting taxa. The most striking correlation is with the abundance of sauropods, where trends indicate a more elongate skull and flatter ventral border ($r2=0.14$, $p=0.009$) and thicker ascending ramus of maxilla ($r2=0.2$, $p=0.002$). Other trends observed include an elongation of the snout with higher abundances of marginocephalians ($r2=0.1$, $p=0.04$) and thyreophorans ($r2=0.1$, $p=0.03$) and deeper, more robust skulls with higher abundances of other theropods ($r2=0.21$, $p=0.001$) or ornithopods ($r2=0.1$, $p=0.03$). More robust skulls may have been stronger and better suited to biting and holding on while more elongate skulls were better suited to a 'slash and run' technique. This diverse morphology suggests that specific approaches may have evolved in response to the relative abundances of coexisting organisms and potential prey.

Poster Session III (Friday, November 4)

CENOZOIC FOSSIL TURTLES FROM THE PANAMA CANAL BASIN

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Based on extensive collections made over the past 50 years, three distinct fossil turtle assemblages are recognized from the Panama Canal area that span the Eocene through Middle Miocene. The first, from the middle to late Eocene Gatuncillo Formation, is composed of panpodocnemid pleurodires. The second, from the Early Miocene Culebra Formation, is also composed of panpodocnemids, as well as trionychid and testudinid cryptodires. The third, from the Early to Middle Miocene Cucaracha Formation, is composed of a new species of the geoemydid *Rhinoclemmys*, a new species of the kinosternid *Staurotypus*, a testudinid, trionychid, and panpodocnemids. Analysis of these turtle assemblages indicates an early interaction between North-Central American and South American herpetofauna at the easternmost tip of the Central American Peninsula, before the emergence of the Panama isthmus. Specifically, we document North American cryptodires in the same assemblage with pleurodires in the new world tropics. These fossils further document some of the earliest occurrences of *Rhinoclemmys* in Central America, a wider past distribution for *Staurotypus*, and an earlier occurrence of giant tortoises into the new world tropics than previously known.

Technical Session XIII (Friday, November 4, 3:00 pm)

FRUIT PROPORTION AND CONSUMPTION OF HARD ITEMS IN THE DIETS OF PRIMATES CORRELATE WITH MICROTEXTURES

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The 3D dental microtexture analysis is powerful in reconstructing the diets of extinct primates. This method is based on the comparison of fossils with extant species with known diets. The diets of primates are highly diversified but fruits remain the main component. Two methods of microtexture analysis, the Scale-Sensitive Fractal Analysis (SSFA) and the Dental Areal Surface Texture Analysis (DASTA) are applied. Besides of revealing diets, DASTA is highly useful to describe tooth function. Eight extant primate species (*Alouatta seniculus, Gorilla gorilla, Lophocebus albigena, Macaca fascicularis, Pan troglodytes, Papio cynocephalus, Pongo abelii, Theropithecus gelada*) are included. These species largely differ in the mean annual fruit proportions (from 0 to 90%) in their diet, as well as in their consumption of other hard items (seeds, bark, and insects) and of grass. First we tested if the proportion of fruits consumed can be estimated by microtextures and second how the other components in the diet impact the microtexture. The complexity and its heterogeneity (SSFA) correlate with the proportion of fruits in the diet. However, the ingestion of all hard items (fruits, seeds, bark, and insect cuticles) contributes to an increase in the textural fill volume (SSFA). Moreover, the anisotropy (SSFA) reflects the consumption of grass. ISO/