The fine-grained, indurated matrix lends itself well to mechanical preparation. After the block is opened in the lab, removal of overburden rock is achieved with a small hammer and chisel and/or pneumatic scribe, followed by detailed exposure of the bone with a pneumatic scribe and/or small hand tools. Several problems commonly encountered during preparation of these fossils and their solutions are as follows: 1) numerous cracks run through the blocks, including the fossil bone. This is remedied by filling the cracks with polyethylene glycol. 2) Postdepositional chemical weathering of some of the bone has left it with a spongy texture that lacks surface detail and good separation from the surrounding rock. Polyvinyl butyral, cyanoacrylates, and polyethylene glycol have been used in attempts to consolidate the spongy bone, but none of them has proved to be entirely satisfactory and/or time efficient. 3) Occasionally bone is lost during the process of discovering and collecting a fossil. Casting epoxies have been applied to remaining natural molds in the rock with some success.

Poster Session II (Thursday, November 3)

HYAENIDAE: DIVERSITY AND PHYLOGENETICS IN THE LATE CENOZOIC
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The Hyaenidae is a diverse family of carnivores that originated in the early Miocene (circa 22 million years ago) with four species surviving to the present day. The group has ranged as far north as Russia, as far south as the southern tip of South Africa, and from western Europe all the way eastward around the globe to North America. I looked at the environmental factors relating to diversification and extinction in hyenas by looking at species diversity through time, modeling the relation of living species to modern climate, and analyzing phylogenetic differentiation. To examine the diversity of this family over time, point occurrences of fossil specimens from the online Neogene Old World Database were analyzed. Although this family originated at least 22 million years ago, their diversity rose sharply between 10 and 7 million years ago, declining slowly since then. Their peak diversity was associated with onset of cooling after the Miocene climatic optimum, a period when C4 grasslands expanded, but they did not reach their full geographic diversity until the Pliocene and Pleistocene when their species diversity was beginning to decline. Geographic diversity was analyzed for extant hyenas (dated to after 1900) downloaded from the Global Biodiversity Information Facility online. The geographic range of extant hyenas is mainly restricted to the African continent with only one species (the striped hyena, *Hyaena hyaena*) extending to the Middle East. This limited distribution is in stark contrast to the aforementioned wide geographic range for the family during the Miocene, and continued climate warming is likely to reduce these habitats further based on a future climate model. Lastly, a phylogenetic analysis based morphologic characters of Hyaenidae, both extinct and extant, was conducted using Phylip. Results indicate a phylogenetic separation of the civet-like genera, the cursorial meat-and bone-eaters, and the bone-crushers. The former group was established at the onset of the Hyaenidae family, but the latter two groups appear in the later Miocene. Therefore, morphologic and ecological diversification occurred during the time of peak genera diversity.

Poster Session II (Thursday, November 3)

MESOWEAR ANALYSIS APPLIED TO LOWER MOLARS OF HORSE SPECIES
HERNESNIEMI, Elina, University of Helsinki, Helsinki, Finland; FORTELIUS, Mikael, University of Helsinki, Helsinki, Finland

It is possible to gain information about the dietary habits of fossil animals by studying the wear patterns of their teeth. Here we test whether a new wear-based reconstruction method developed by us can be used to deduce the diet of horse species from the wear patterns of their lower molars. This method, where the wear facets of buccal enamel bands are examined, is derived from classical mesowear analysis. Although both methods are based on a study of the facet development on the occlusal surfaces of the teeth, lower molars of horses are not suitable for classical mesowear analysis. In our method we digitally measure the angle between the surface of the enamel edge and the buccal side surface of the teeth from 3D reconstructions of the relevant parts of the lower molars. We compared our method to the classical mesowear method by analysing the lower molars and the upper molars, respectively, of multiple species from the middle Miocene *Anchitherium*, the upper Miocene *Hipparion* and the Pleistocene and Recent *Equus*. We also compared these results to results obtained in earlier studies of Pleistocene and Recent rhinoceros species, where we have previously used our method successfully. The results suggest that the angle between the surface of the enamel edge and the buccal side surface of lower molars approximates a combined effect of relief and roundedness of classical mesowear analysis and our method consequently appears suitable for mesowear scoring in horse species from lower molars. We find that *Anchitherium* species had the largest amount of browse in their diet, *Equus* species had the largest amount of graze in their diet and the dietary range of *Hipparion* species falls between the *Anchitherium* and *Equus* species.

Poster Session IV (Saturday, November 5)

EARLY MIOCENE TERRESTRIAL VERTEBRATE FAUNA FROM CENTRAL KUTCH (GUJARAT), WESTERN INDIA
HIERONYMUS, Tobin, Northeastern Ohio Universities College of Medicine, Rootstown, OH, USA; BHANDARI, Ansuya, Wadia Institute of Himalayan Geology, Dehra Dun, India; TIWARI, Brahma, Wadia Institute of Himalayan Geology, Dehra Dun, India; BAJPAI, Sunil, Indian Institute of Technology at Roorkee, Roorkee, India

New vertebrate localities in the Khari Nadi Fm in Western India provide an opportunity for comparison with more extensively studied faunas in western Asia that span the Oligo-Miocene boundary. The new finds extend the existing faunal list for the Formation, as well as providing new comparative material of reported taxa, including suids, ruminant artiodactyls, teleocerotine rhinos, and proboscideans. Bone is found in concentrated pebble conglomerate horizons containing shark teeth, together with abundant intraformational rip-up clasts. Many of the rip-up clasts are identifiable as heavily cemented *Thalassinoides* burrow traces. The larger terrestrial vertebrate elements show varying degrees of post-fossilization wear, suggesting redeposition after transport, and extensive time-averaging. The fossiliferous deposits are tentatively identified as marine tempestites, and the terrestrial vertebrate fauna are most likely aggregated from the fan of the nearby Indus delta. Terrestrial vertebrates from the Khari Nadi Fm thus provide a concentrated sample of the fauna from the distal Indus delta in the Early Miocene. This sample provides a new point comparison with the more thoroughly studied Gaj, Manchar, and Siwalik faunas

Technical Session IV (Wednesday, November 2, 2:30 pm)

PALEODIET AND PALEOENVIRONMENT OF FOSSIL GIANT RODENTS FROM URUGUAY
HIGGINS, Pennilyn, University of Rochester, Rochester, NY, USA; CROFT, Darin, Case Western Reserve University, Cleveland, OH, USA; BOSTELMANN, Enrique, Museo Nacional de Historia Natural, Montevideo, Uruguay; RINDERKNECHT, Andrés, Museo Nacional de Historia Natural, Montevideo, Uruguay; UBILLA, Martin, Facultad de Ciencias, Montevideo, Uruguay

South America is home to many of the world's most unusual rodents. Among these is the largest extant rodent, the capybara or carpincho (*Hydrochoerus hydrochaeris*; Caviidae or Hydrochoeridae) which averages about 50 kg. The largest fossil rodents also come from South America, and several species, all dinomyids, have been recorded in Uruguay: *Arazamys castiglionii* (late Miocene), *Isostylomys* (late Miocene and Pliocene), and *Josephoartigasia monesi* (Pliocene). Among these, *Josephoartigasia* stands out as the largest-known rodent.

The goal of this study is to better understand the paleobiology of these enormous rodents using evidence from carbon and oxygen isotopes. This is part of a broader investigation of giant rodent paleobiology that is using a variety of techniques to accurately characterize their ecology and life history. We compare isotopic results from fossil tooth enamel (mostly incisors) to those from four modern capybaras collected throughout Uruguay. Although capybaras are not the closest living relatives of these extinct rodents, their biology is much better known than that of the sole living dinomyid, *Dinomys branickii*. They also are better ecological analogs in terms of body size.

Capybaras, despite being grazers and living where vegetation is dominated by plants utilizing the C4 metabolic cycle, are mixed C3-C4 feeders. Capybaras selectively eat available C3 grasses, only consuming C4 vegetation when water is seasonally scarce and C4 plants dominate. Based upon serial isotopic analysis of capybara incisors, it appears that C4 vegetation is an important component of capybara diets only during and just after dry seasons. When the wet seasons begin, C3 grasses dominate capybara diets.

Giant fossil rodents also appear to have had diets dominated by C3 vegetation, so much so that they are arguably exclusively C3 feeders. Given our capybara data, it cannot be assumed that C4 vegetation was not available. Instead, it is likely that the fossil rodents also selectively ate C3 grasses. Testing this hypothesis will require examining other fossil mammals and/or paleoenvironmental proxies to fully understand the environment in which the fossil rodents lived.

Poster Session II (Thursday, November 3)

THE EVOLUTION OF EXOSKELETAL OSSIFICATIONS IN NOTOSUCHIAN CROCODYLIFORMS
HILL, Robert, New York College of Osteopathic Medicine, Old Westbury, NY, USA; O'CONNOR, Patrick, Ohio University College of Osteopathic Medicine, Athens, OH, USA

Notosuchians are becoming increasingly well-known for their diverse craniodental specializations, many of which deviate drastically from typical crocodyliform anatomy. Postcranial apomorphies, while somewhat less bizarre, nevertheless appear to be important adaptive features of the axial and appendicular skeletons. In particular, notosuchian osteoderms exhibit great variability in surface morphology, histology, and three-dimensional structure.

Using paleohistology and microCT, we characterized osteoderm anatomy in several notosuchians and closely allied crocodyliforms in an effort to explore patterns of character evolution in the dermal skeleton. In contrast to proximate outgroups (e.g., *Araripesuchus*), notosuchians such as *Baurusuchus, Notosuchus,* and *Pakasuchus* are characterized by a general trend toward reduction of dorsal osteoderms, typically associated with an expansion of the caudal osteoderm shield. One notable exception is *Simosuchus*, in which the dorsal shield is extensively developed. Other trends in Notosuchia include reduction of surface ornamentation and increased internal cavitation of osteoderms.

Among notosuchians, *Pakasuchus* exhibits the most extreme reduction of dorsal osteoderms, but possesses a robust, articulating shield of osteoderms completely surrounding the tail. Near the dorsosacral transition, reduced osteoderms appear as elongate, fusiform elements with crenulated edges. Other ossifications are tentatively reinterpreted as ossified tendons or intramuscular septa, based on their subtriangular cross-section and incipient development of longitudinal canals. Their arrangement indicates bifurcating or intersecting fibers, as seen in the ossified tendons of other archosaurs. Another ossification is fused to a neural spine,