other groups. This biogeographic pattern can be explained through either greater rates of diversification or greater species accommodation in topographically complex regions.

We compared Neogene diversification of rodents for three regions in North America. The Columbia Basin of the Pacific Northwest and the northern Rocky Mountains were tectonically active over much of the Cenozoic and feature high topographic complexity today. The northern Great Plains have been tectonically quiescent with low relief over the Cenozoic. These three regions have distinctive geologic histories and substantial, well-documented fossil records. All three regions showed significant changes in diversity and faunal composition over the Neogene. Rodent faunas from the three regions differed in composition almost completely at the species level, although most families and many genera were shared among the regions, indicating greater provincialism than in modern faunas. In the two montane regions, originations and extinctions peaked at the onset and close, respectively, of the Miocene Climatic Optimum (17-14 Ma), with significant changes in faunal composition accompanying these episodes of diversification. In the Great Plains, rodents showed considerable turnover, but infrequent diversification (i.e., significant change in species diversity). The highest Neogene diversity occurred during the cooling that succeeded the Miocene Climatic Optimum. These histories suggest that climatic changes interacting with topographic complexity intensify macroevolutionary processes. Moreover, the middle Miocene and modern elevational diversity gradients appear to be unusual biogeographic configurations for the Neogene, suggesting caution in inferring past ecogeographic patterns from modern distributions.

Technical Session XVII (Saturday, October 20, 2:30 pm)

THE ORIGIN OF THE AVIAN BRAIN BASED ON A VOLUMETRIC ANALYSIS OF ENDOCRANIAL EVOLUTION WITHIN COELUROSAURIA

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It has long been thought that, relative to other living reptiles, a distinct increase in endocranial volume diagnoses crown group birds. The common conclusion is that this volumetric jump is tied, at least in part, to the formidable coordination and cognitive requirements of avian powered flight. The intricacies of what may be a dynamic and complex transformational pattern, however, are poorly understood and cannot be established without dense and detailed sampling of the phylogenetically long avian stem. We undertook this task by concentrating on volumetric patterns of endocranial change within Coelurosauria, especially in the relatively narrow portion of the tree bracketing the origin of avian flight. Our novel approach uses high-resolution computed tomography to divide the endocranial cavity into homologous neuroanatomical partitions. These partitions correspond closely to the major regions of the brain, including the olfactory bulbs, cerebrum, optic lobes, cerebellum, and brain stem. Using a recent hypothesis of coelurosaurian relationships we inferred patterns of volumetric change, not only with regards to how these individual partitions are transforming relative to body size but relative to each other. This greatly expands on previous attempts whose scope was limited either to total endocranial volume or at most two regional partitions (cerebrum and non-cerebrum).

Our results confirm previous findings that total endocranial volume relative to body size does increase dramatically along the coelurosaurian backbone of the avian stem. We also found that this trend is driven primarily by at least three phases of cerebral volumetric expansion, none of which coincide with a phylogenetic position typically associated with the origin of avian flight. When the fossil record is considered, a volumetrically avialan brain is not readily apparent because *Archaeopteryx*-level endocranial volumes were established at a much earlier phylogenetic position—a pattern congruent with a host of other character complexes historically identified with birds (e.g., feathers, furcula). The acquisition of a "flight-ready" brain at a more inclusive position on the tree is congruent with the possibility that other non-avialan paravians may have been capable of some type of volant activity.

Poster Session III (Friday, October 19, 4:15 - 6:15 pm)

DIETARY BEHAVIOR AND RESOURCE PARTITIONING AMONG LARGE CARNIVORANS OF LATE PLEISTOCENE RANCHO LA BREA

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The processing of food causes distinct patterns of microscopic wear on tooth enamel, patterns that represent indirect evidence of tooth use and diet. We examined dental microwear features of seven species of carnivorans from the late Pleistocene asphalt seeps at Rancho La Brea (Los Angeles, California, United States) to infer dietary resource use in the large-carnivoran assemblage. For a comparative database, we documented microwear features for seven species of extant North American carnivorans in order to characterize microwear differences among five dietary categories: hypercarnivore + bone, hypercarnivore, carnivore, omnivore, and herbivore/omnivore. Counts of total scratches, total pits, coarse scratches, fine scratches, large pits, small pits, and gouges were documented on light-microscopy photomicrographs of the anterior shearing facet of the lower first molar (carnassial). Length and direction of scratches were also recorded for the modern species. Among modern carnivorans, greater densities of microwear features, as well as greater length and consistent directionality of scratches, characterized more carnivorous versus more omnivorous diets. Among the Rancho La Brea carnivorans, *Smilodon fatalis*, the saber-tooth cat, was distinct in having a markedly low density of all features; *Panthera atrox*, the American lion, exhibited a high density of all features; and the remaining carnivorans clustered together in the intermediate range for most microwear variables. Discriminant analysis based on microwear variables of modern species classified *Smilodon*; the short-faced bear, *Arctodus simus*; the coyote, *Canis latrans*; the gray wolf, *Canis lupus*; and the cougar, *Puma concolor*, as omnivores. Like modern omnivores, these five Rancho La Brea carnivorans had more gouges and fewer fine scratches, large pits, and small pits. This surprising result may be the effect of the small size of the comparative database or an indication that the diet of the large carnivorans of Rancho La Brea, because of this locality's unique faunal composition and taphonomy, is not well described by the dental microwear of modern analogs.

Poster Session IV (Saturday, October 20, 4:15 - 6:15 pm)

VARIATION WITHIN MODERN CHINCHILLID POPULATIONS AND IMPLICATIONS FOR TAXONOMY OF FOSSIL POPULATIONS

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Chinchillids (Family Chinchillidae) were among the earliest caviomorph rodents to differentiate in South America, dating back to at least the early Oligocene. Their present distribution is across the Andean and sub-Andean aspects of Argentina, Bolivia, Chile, Peru, Ecuador, and Paraguay. These generalist herbivores have a strong association with dry, high elevation environments. They appear in the Tinguiririca and Deseadan South American Land Mammal Ages (Oligocene) but are a major constituent of most Miocene and younger localities in the southern two-thirds of the continent. These rodents can be recognized in the fossil record by their hypselodont cheek teeth organized into transverse laminae. Identifying genera and species has proven more difficult as it is unclear which criteria are most useful for distinguishing genera and species. Today, only three genera and six (possibly more) species remain. Assessing morphological variation that distinguishes these species should provide a more robust way to distinguish extinct species. The goal of this study is to use variation in modern chinchillids to clarify the taxonomic identities of chinchillids at Quebrada Honda, Bolivia and other middle Miocene localities.

Seventy-nine modern chinchillid specimens from all three genera, five species and eight subspecies were examined. Several cranial characters were found to be useful in distinguishing genera: the size of the auditory bullae (enlarged in *Chinchilla*), shape of the external nares (consistently and strongly flared in Lagidium, occasionally and slightly flared in *Lagostomus*) and rostrum length (longer in *Lagidium* than *Chinchilla*). Useful dental characters were the number of laminae per cheek tooth (three for *Chinchilla* and *Lagidium*, two for *Lagostomus* save M3) and the morphology of the laminae. *Lagostomus* has rectangular-oval shaped laminae; the laminae of *Lagidium* are curved with especially large posterior laminae; laminae fusion is common in *Chinchilla* – the anterior two laminae of p4 express this consistently. Data suggest that the angle of the upper and lower tooth rows relative to the sagittal plane and relative tooth sizes may also be useful distinguishing characters. Among *Lagidium* species, variation was most evident in relative sizes of the posterior laminae (larger in *L. peruanum* than *L. viscacia*), morphology of the glabella (always flat in *L. peruanum*, often depressed in *L. viscacia*), and morphology of the supraorbital and nearby processes; *Lagidium* often has processes along the superior margin of the infraorbital foramen. Supraorbital processes are pronounced in *L. viscacia cuvieri* and *L. viscacia tucumanum* but reduced in *L. viscacia viscacia* and *L. viscacia famatina*.

Romer Prize Session (Thursday, October 18, 8:00 am)

LOCAL ENVIRONMENTAL CONDITIONS DROVE VERTEBRATE DIVERSITY IMMEDIATELY PRIOR TO THE K/PG EXTINCTION: EVIDENCE FROM CENTRAL CANADA

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The causes and timing of the Cretaceous mass extinction have been the subject of much debate for decades. Preservational, geographic and taphonomic biases render trends in biodiversity difficult to assess, and complicate the coupling of these trends with abiotic drivers. Here a multidisciplinary approach is used to elucidate spatial and temporal relationships between vertebrate diversity and paleoenvironment during the last 300,000 years of the Cretaceous period. Stratigraphic surveys of the latest Maastrichtian (65.5Ma) Frenchman Formation in Grasslands National Park, SK, Canada reveal three distinct, successive depositional cycles. Each cycle is considered a 'time slice' across which vertebrate diversity and paleoclimate signals can be assessed. From these time slices, some 8,000 fossils from twenty-eight vertebrate microsites were collected. A further 7,000 fossils were collected from nine microsites near Eastend, SK (ca. 200km west) for use in spatial diversity analysis. Fossils were identified and catalogued, and this data was used to calculate abundance-based diversity metrics. Paleotemperature fluctuations were determined using stable $\delta^{18}O$ isotope data, while paleoclimate data was estimated from plant macrofossil assemblages. Vertebrate diversity was found to be highest in the oldest time slice. Diversity declined sharply in the middle time slice, then recovered to a second peak at the base of the youngest time slice, 10m below the K/Pg Boundary. Following this peak, there was a marked decrease in diversity towards the boundary. Sites with the highest diversity were often found in mudstones, associated with paleoenvironmental indicators such as fossil leaf impressions, charcoal deposits and desiccation horizons. Analyses of isotope data linking temperature fluctuations to the peaks in diversity are as of yet inconclusive. Spatially, the Eastend sites had consistently higher diversity than contemporaneous Grasslands sites. These results demonstrate that biodiversity does not show a consistent decreasing trend towards the K/Pg