Cervus remains are relatively rare in the Pleistocene fossil record of California, but three elk subspecies occur in the state today: Rocky Mountain elk (*Cervus elaphus nelsonii* Bailey 1935) which are restricted to a small portion of the northeastern Sierras; Roosevelt elk (*Cervus elaphus roosevelti* Merriam 1897) which prefer the northwestern Coastal ranges and redwoods; and the endemic Tule elk (*Cervus elaphus nannodes* Merriam 1905) which utilize open country such as the perennial grasslands, marshlands, scrublands and oak scrublands of the Central Valley. To understand how current and historic distributions of these subspecies compare with prehistoric distributions, I examined published records and museum collections of *Cervus* from the Pleistocene of California, along with associated faunal assemblages and environmental indicators including pollen and sedimentological records. I found that Pleistocene localities with remains of *C. elaphus* in California are distributed along the length of the Central Valley and are associated with an environment that would have ranged from temperate oak scrubland to semi-arid open scrubland, often with indicators of nearby (< 50km distant) closed woodlands. This environment is similar to that utilized by extant Tule Elk, which suggests that by the late Pleistocene the *C. elaphus* population in California may have already differentiated into the *nannodes* subspecies.

Poster Session IV (Saturday, October 17, 2015, 4:15 - 6:15)

FIRST RECORD OF PROCYONIDS FROM THE THOMAS FARM FOSSIL SITE, GILCHRIST COUNTY, FLORIDA

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The first occurrence of procyonids in North America is stem-procyonid *Amphictis* sp. from the early Miocene Anderson Ranch Formation, Nebraska. By the early Hemingfordian, fossil New World procyonids were widespread from Panama (~9°N) to the northern Gulf Coast (~30°N) and Nevada (~39°N). Procyonids colonized South America during the late Miocene via island hopping before the final closure of the Panama Isthmus during the Pliocene. The Thomas Farm Fossil Site (TF) is one of most fossiliferous early Hemingfordian (~18.5 Ma) localities in the world. Excavations at TF have been ongoing since the early 1930s, but new species are still being described. The increase of screenwashing in the last few years has uncovered a wealth of small-sized fossil specimens, including isolated carnivoran teeth. Some of these teeth were originally referred to *Phlaocyon*, a borophagine canid that has dental characters thought to be convergent with procyonids due to their very similar hypocarnivorous dentition. The TF specimens are identified as procyonid based on the presence of an upper P4 with a more developed parastyle, a metacone blade that is shorter, and a protocone that is more posterior than in the stem-procyonid *Broiliana*. In comparison to *Phlaocyon*, the upper P4 of the TF procyonid has a more labially oriented paraconule but lacks the distinctive prominent external cingulum of *Phlaocyon.* The upper M1 has a reduced metaconule and lacks the paraconule. It has an enlarged protocone subequal in height to the metacone and paracone. A robust postprotocrista connects the highly reduced hypocone with the metacone. The parastylar shelf is labially expanded in relation to *Phlaocyon* but not as in the extant *Bassariscus astutus*. The lower m1 has a highly reduced anteriolabial cingulum, a prominent hypoconid, and a slightly posterointernal hypoconulid. In comparison to *Phlaocyon*, the relatively shorter trigonid basin opens lingually with a paraconid being the shortest cuspid while the metaconid and protoconid are relatively subequal in height. The mesoconid of TF specimens is in contact with the hypoconid and both are located on the lingual side and more distinct than in *B. astutus.* The talonid basin is wider and the trigonid basin is less expanded posteriorly than in *B. astutus*. Because the specimens from TF are remarkably different from those of the *Phlaocyon* holotype and are more similar to *B. astutus*, we tentatively refer the TF specimens to *Bassariscus*.

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Poster Session IV (Saturday, October 17, 2015, 4:15 - 6:15)

A NEW SPECIMEN OF *ANZU* (CAENAGNATHIDAE, OVIRAPTOROSAURIA): IMPLICATIONS FOR THE PROPOSED CAENAGNATHINAE/ELMISAURINAE DIVISION AND FOR CURSORIALITY IN CAENAGNATHIDS

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A new medium-sized theropod dinosaur was discovered by field crews of the Burpee Museum in mudstones of the lower Hell Creek Formation (latest Maastrichtian) of Carter County, Montana, in June 2013. Additional material was recovered during the field season of Summer 2014. This individual has provisionally been referred to the oviraptorosaurian species *Anzu wylei*, previously known from partial skeletons from coeval beds in North and South Dakota and tentatively from Saskatchewan. This specimen includes elements (including both nearly complete metatarsi) previously unrecovered in *Anzu*, which allow for a more complete understanding of the taxon, its position within oviraptorosaur phylogeny, and its paleobiology.

Recent work based on new specimens from Asia and North America has suggested a split within the Campano-Maastrichtian species of the oviraptorosaur clade Caenagnathidae into Caenangathinae and Elmisaurinae. The latter have been characterized by fusion of the distal tarsals and proximal metatarsals and by a pair of pronounced cruciate ridges on the plantar surface of metatarsal III. The new *Anzu* specimen possesses character states for both these traits intermediate in morphology between typical "caenagnathines" and Elmisaurinae. Whereas the distal tarsals and proximal metatarsals II-IV are fused together in Elmisaurinae, in *Anzu* only distal tarsal IV is fused to its metatarsal, and the proximal metatarsals are separate. The new *Anzu* specimen demonstrates two clear pronounced cruciate ridges as in specimens of Elmisaurinae but not as in other caenagnathoids, creating a trapezoidal cross-section; however, these do not extend to the proximal end of the plantar surface of metatarsal III as they do in elmisaurines.

The metatarsus in this specimen confirms the presence of an arctometatarsus in this taxon as in other caenagnathids. The relative completeness of the individual allows its measurements to be incorporated in a larger allometric study of theropod hind limb proportions. Unlike other theropods with an arctometatarsalian pes, the length of metatarsal III does not fall among the trend of elongate-footed taxa such as tyrannosaurids, ornithomimids, derived troodontids, and oviraptorosaurs such as *Avimimus*, *Gigantoraptor*, and other caenagnathids. Instead, it falls along the plesiomorphic trend present in the majority of non-avian theropods. Given the phylogenetic position of this taxon, this appears to be a reversal in terms of metatarsal elongation: the first such identified in a taxon with an arctometatarsus.

Poster Session II (Thursday, October 15, 2015, 4:15 - 6:15)

ONTOGENETIC DIFFERENCES IN TOOTH REPLACEMENT RATES IN ADULT AND JUVENILE DIPLODOCIDS

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An important factor in sauropod evolutionary success was their specialized feeding apparatus, which enabled efficient food intake. High feeding efficiency results in extensive tooth use and fast wear, which was accounted for in sauropods by high tooth replacement rates. Sauropod dentition varies morphologically among clades; diplodocoids, for instance, have markedly elongate teeth, and even more elevated tooth replacement rates than other lineages. However, whereas tooth replacement is well understood in adults, the effects of ontogeny on this adaptation have not been studied thus far.

Because of varying skull morphologies between young juveniles and adults (e.g., shorter muzzle, larger orbits), it is possible that there was less accommodation space for replacement teeth in juvenile tooth-bearing bones. In non-sauropod dinosaurs, tooth count increases during ontogeny, thus implying a change in feeding behavior and diet. Although this has not been clearly observed yet in sauropods, evidence from microwear studies also points to dietary niche changes through ontogeny in neosauropods.

Four well-preserved tooth-bearing bones (one premaxilla, two maxillae, one dentary) from diplodocid specimens in early ontogenetic stages from the Upper Jurassic Morrison Formation at Howe Ranch, northern Bighorn Basin, Wyoming, USA, are compared with an exceptionally preserved adult diplodocid skull from the same locality, and with other known diplodocid skull material from various ontogenetic stages from similar strata from the USA. To calculate tooth replacement rates, micro-computed tomography data is used, which has been post-processed in Avizo to produce digital three-dimensional models.

The juvenile teeth show a size range intermediate between that of diplodocids and camarasaurids, indicating a difference in tooth size and shape through ontogeny in diplodocids. The tooth replacement rates of juveniles and adults vary as well, showing three generations of teeth in the juvenile tooth-bearing bones, and up to five generations in adult elements. Calculated tooth replacement rates based on the computed tomography data are higher in adults than in juveniles. This implies a difference in use and wear of teeth between juveniles and adults, and a possible gradual change in dietary niche from an early ontogenetic stage to later stages.

Technical Session VIII (Thursday, October 15, 2015, 1:45 PM)

CARNASSIAL TOOTH MORPHOLOGY IS STRUCTURED BOTH BY ECOLOGY AND PHYLOGENY AMONG MAMMALIAN CARNIVORES (MAMMALIA: CARNIVORA)

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The morphology of the carnassials in Carnivora have been widely used to reconstruct diets of extinct carnivorous mammals. The diversity of diets among living carnivores allows the robust examination of the correlations between dental morphology and diets that range from large vertebrate prey to insects, fruit, and even bamboo. The modified upper fourth premolar and lower first molar (carnassial teeth) in most Carnivorans are generally the teeth most important to food processing, as well as the ones most easily identified in the fossil record, although the posterior molars can also be an important line of evidence for diet. Vertebrate flesh-dominated diets are associated with well-developed shearing blades on P4 and m1. The crushing function of the talonid basin is retained in some species but not in others and bears have completely re-evolved a broad, flat-crowned carnassial molar in association with their relatively omnivorous diets. While these correlations are strong in extant species, we examine the role of phylogeny in constraining the relationship between diet and dental morphology in living Carnivora. We infer the evolutionary history of the carnassial morphology across living carnivorans and separately within each sub-order (cats: Feliformia and dogs: Caniformia), which have been evolving independently for approximately 55 million years. We estimated carnassial morphology across 114 terrestrial species of living Carnivora, using three linear morphometric proxies from the lower carnassial and four geometric morphometrics landmarks on the occlusal view of the upper and lower carnassial. The upper and lower carnassials show very different relationships among phylogeny, diet and morphology. It is clear that a great deal of the relationship between dental morphology and diet is a reflection of phylogenetic structure to both diet and dental morphology. Ecological and evolutionary patterns are particularly evident in the lower tooth. Across Carnivora, the main axis of variation in the lower carnassial is elongation, with more elongated teeth associated with a greater proportion of vertebrates in the diet. However, cats and dogs primarily achieve this shape change through different means. Carnassial morphology is more labile within caniforms, with stronger phylogenetic signal within feliforms. According to their lower carnassial morphology cats and their relatives appear to have evolved through a series of ecomorphological radiations, primarily partitioning the ecomorphospace early in their evolutionary history.