dinosaur bones while we showered them with dinosaur factoids. Friday evenings were devoted to teaching interested children basic preparation skills. After a few hours they were accomplished enough to help with the specimens and be part of the team. The program was a success and we plan to expand it in 2002.

On February 12, 2002 the prepared elements werer deposited with the Johnston Geology Museum, Emporia State University, Emporia, Kansas.

THEROPOD VS AVIAN HINDLIMB LOCOMOTION

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It has become common in some circles to refer to birds as living theropod dinosaurs. In support of this hypothesis some authors have suggested that there is no difference between the hindlimb locomotion of birds and that of theropods, whereas others cite postulated transformations in anatomy and osteology from theropods to birds. Although none of these hypotheses withstand rigorous examination, the fact that they have been proposed and the manner in which they have been proposed have led to the application of avian anatomical nomenclature to theropods. This is unfortunate, and if continued it will inevitably lead to confusion comparable to that resulting from the once widespread practice of applying human anatomical terminology to lower vertebrates.

The crux of the problem seems to lie with the fact that hindlimb locomotion in both birds and theropods has been widely misinterpreted and misunderstood. For birds, maintaining balance during bipedal locomotion in the absence of a long, muscular tail was a primary problem that had to be overcome, whereas for the ground dwelling theropods speed in the chase was likely a more critical functional problem. As a consequence of, and in response to, these different selection pressures, and undoubtedly others, these two groups of bipeds evolved two different anatomical systems for terrestrial locomotion. Although they share the same bony elements common to most vertebrates, how their respective systems function is quite different. Primary functional differences occur in the hip, knee, and ankle joints, where features unique to each group are found. To facilitate the understanding of how these two distinct systems differ, it is necessary to avoid confusion resulting from the application of avian anatomical terminology to theropod osteological features that are probably not even analogous in function. Examples drawn from the literature are used to illustrate the inappropriateness of applying avian anatomical nomenclature to theropods.

VULPES VULPES (RED FOX) REMAINS FROM STANTON S CAVE, ARIZONA: FIRST KNOWN RECORD FROM THE GRAND CANYON

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Stanton s Cave (927 m elevation; 44 m above the Colorado River) is a large solution cavern in the eastern Grand Canyon (GRCA), Arizona. The cave is best known to Quaternary paleontologists for its abundant late Pleistocene and early Holocene fossil remains of mammals and birds, including *Oreamnos harringtoni* (Harrington s mountain goat), *Ovis canadensis* (bighorn sheep), *Teratornis merriami* (Merriam s teratorn), and *Gymnogyps californianus* (California condor).

I recently examined part of the Stanton s Cave fossil vertebrate collection and found some specimens misidentified, and even unidentified. These will be the subjects of a future publication updating the collection. Of interest here are specimens originally published as *Urocyon cinereoargenteus* (gray fox). Three species of foxes live in Arizona today. *Urocyon cinereoargenteus* and *Vulpes macrotis* (kit fox) are relatively common, though of the two, the kit fox has a more restricted range. In contrast, *Vulpes vulpes* (red fox) exists only in the extreme northeastern corner of the state, and appears to have never been abundant in Arizona. In the fossil record, the red fox occurs at more than 25 Wisconsinan age sites in North America, including (but not restricted to) southern and western states such as California, Colorado, New Mexico, and Texas, but apparently not Arizona.

Two broken mandibles (left and right side) found in the Stanton s Cave collection were originally identified and published as *Urocyon cinereoargenteus*. Morphometric and morphological comparisons find the specimens consistent with *Vulpes vulpes*. The bones were originally recovered from 10-20 cm within a consolidated packrat midden inside the cave. While there is no radiometric age for this particular location, consolidated packrat middens in Grand Canyon caves tend to date from late Pleistocene to early Holocene. Material attached to the bones may allow future radiocarbon dating. While the specimens cannot be regarded unquestionably as Pleistocene in age, they do remain the first record of *Vulpes vulpes* from the Grand Canyon.

NEW INFORMATION ON AN OLD FISH: *BUNGARTIUS PERISSUS* (PLACODERMI: ARTHRODIRA)

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New discoveries of arthrodiran (Placodermi) fossils have added greatly to our knowledge of these Devonian fishes. In an attempt to understand the phylogenetic interrelationships among arthrodires these new forms are often compared with taxa from a number of classic localities from North America, Europe, the Russian platform, Asia, and Australia. The detailed anatomy of fossils from localities such as the Gogo, Western Australia, shows that our knowledge of many taxa is limited.

In the case of the North American material, much of it was initially described at the end of the nineteenth century and early twentieth century. In the 1920s to 1940s, Peter A. Bungart collected from the Cleveland shale what is now a significant portion of the Cleveland Museum of Natural History s collections. In 1965-1966, the Cleveland Museum of Natural History conducted the Interstate-71 Paleontological Salvage Project. This project nearly doubled the collections from the Cleveland shale. The Cleveland shale fauna is well known for its size and diversity of Late Devonian fishes; however, many taxa are still only known from incomplete and disarticulated specimens. Remaining work falls within one of three categories: (1) revision of taxa based on undescribed Interstate-71 material, (2) description of new forms, and (3) revision of poorly known taxa in light of current understanding.

The current analysis provides a reinterpretation of *Bungartius perissus* Dunkle. *Bungartius* is an aspinothoracid arthrodire showing similarities with selenosteids, most specifically *Gymnotrachelus*. In contrast, the enlarged orbits of *Bungartius* appear to be unique, distinct from selenosteids in that the snout is shifted forward to accommodate the increased orbit size. A fusion of the anterior superognathals is similar to the condition seen in *Mylostoma* and possibly *Paramylostoma*, although these latter taxa are poorly known. The description of *Bungartius* and the continuing work on other members of the Cleveland shale fauna shows much promise towards a better understanding of arthrodires and their phylogenetic interrelationships.

EVOLUTION OF BASAL TYRANNOSAUROIDEA FROM NORTH AMERICA

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Tyrannosauroids were the dominant terrestrial predators in Laurasia during the Late Cretaceous (K) and are among the few theropod clades with a substantial fossil record. Ghost lineages indicate Tyrannosauroidea diverged from other coelurosaurs by the Late Jurassic but the record of diagnostic fossils currently extends to near the beginning of the Late K. Recent cladistic studies of tyrannosauroids are compromised by a lack of diagnostic basal forms. New specimens from the late Campanian of Alabama and New Mexico represent new species that increase tyrannosauroid diversity in North America and provide the opportunity to reconstruct an inclusive phylogeny and historical biogeography of the clade.

A cladistic analysis of 109 morphological characters among eight ingroup- and seven outgroup taxa indicates that the new specimens are basal forms that are critical for, ultimately, identifying the sister taxon of the clade. A time-calibrated phylogenetic analysis reveals a dichotomy in tyrannosauroid phylogeny and a distribution of the clade throughout North America prior to the Albianian transgression of the Western Interior Seaway. The basal most tyrannosauroid in eastern North America is *Dryptosaurus,* from the late Maastrichtian of New Jersey. The new taxon from the late Campanian of Alabama is more highly derived than *Dryptosaurus.* The eastern forms retain a conservative morphology, such as the large forelimbs of *Dryptosaurus* and shallow maxillae of the Alabama species. The new species from the San Juan Basin of New Mexico is the sister taxon of Tyrannosauridae. These results indicate that basal tyrannosauroids, as well as basal ankylosaurians (e.g., *Nodocephalosaurus*), persisted into the late Campanian in western North America.

CERATOSAURS: A GLOBAL PERSPECTIVE

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Recent discoveries coupled with new studies of theropod anatomy and systematics provide strong support for the hypothesis that ceratosaurs (*Ceratosaurus* + abelisauroids) form a monophyletic clade exclusive of coelophysoids. In addition to resolving several inconsistencies, these studies have enabled the assignment of many incomplete remains to the ceratosaur lineage. The global evolution of this diverse theropod group can now be more clearly documented.

The earliest ceratosaurs are found in the Late Jurassic of North America (cf. *Elaphrosaurus, Ceratosaurus*), Africa (cf. *Ceratosaurus, Elaphrosaurus*) and Europe (*Ceratosaurus*). The group next occurs in Albian of Europe (*Genusaurus*) and persists there through the Maastrichtian (*Tarascosaurus*, ?*Betasuchus*). Ceratosaurs are the most common Late Cretaceous theropods in South America, where they comprise abelisaurids (*Abelisaurus, Aucasaurus, Carnotaurus*) and several poorly known taxa (*Xenotarsosaurus, Ilokelesia, Genyodectes, Noasaurus*, ?*Velocisaurus*). They were also dominant predators in Late Cretaceous Madagascar (*Majungatholus, Masiakasaurus*) and India *Lametasaurus/Indosuchus/Indosaurus, Laevisuchus*). Fragmentary remains suggest their presence in the Cretaceous of Africa (an unnamed Bahar ja form, ?*Deltadromeus*), but coeval forms appear to be absent from North America. Currently ceratosaurs are unknown from Antarctica, Australia and mainland Asia.

Although ceratosaurs cannot be documented prior to the Late Jurassic, their global distribution at that time strongly indicates a more ancient origin. The clade likely had a near-Pangaean distribution during the Jurassic that was later largely restricted to Gondwana; descendants survived in Europe only as relatively uncommon faunal elements. However, their Late Cretaceous abundances run the gamut: ceratosaurs are absent from coelurosaur-dominated faunas (North America, Asia), rare where tetanurans are common (Africa, Europe), dominant in faunas with few coelurosaurs (South America), and prevalent where coelurosaurs are lacking (India, Madagascar).

PALEONTOLOGY AND STRATIGRAPHY OF THE TECOLOTL N BASIN, JALISCO, M XICO

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The Tecolotl n Basin of Jalisco is located in the Transmexican volcanic belt, 112 km southwest of the city of Guadalajara. Paleontological and stratigraphic study in this basin over the past few years has shown that it contains important information relative to the late Cenozoic faunal and geological history of the region. The Basin is a north-south oriented graben ounded by Cretaceous limestones, Oligocene-Miocene andesites and Pleistocene basalts.