dorsally and ventrally to form a shovel-headed structure, and its ungual phalanges are hoof-shaped. The specializations of the jaws and dentition indicate that the reptile may have been adapted to a way of bottom-filter feeding in water. It is obvious that such delicate teeth are not strong enough to catch prey, but were probably used as a barrier to filter microorganisms or benthic invertebrates such as sea worms. These were collected by the specialized jaws, which may have functioned as a shovel or pushdozer (the mandible) and a grasper or scratcher (the rostrum). A detailed phylogenetic analysis suggest that *A. unicus* is a sauropterygian, most probably related to the Placodontia.

Poster Session II (Thursday, November 6, 2014, 4:15 - 6:15 PM)

TYPE OF MESOWEAR UTILITY BY EXTANT RUMINANTS WITH WELL-DOCUMENTED ECOLOGICAL FEATURES

YAMADA, Eisuke, The University of Tokyo, Tokyo, Japan; KUBO, Mugino, The University of Tokyo, Tokyo, Japan

Dietary composition of herbivores is closely related to the vegetational condition they live in. Therefore, dietary reconstruction of fossil ungulates provides important paleoecological information. Fossil teeth, especially, have been thought of as a main source of paleodietary reconstruction because it is most likely to be preserved. Mesowear analysis, a method used to reconstruct diets based on facet development on the occlusal surface of cheek teeth, has been mainly applied to reconstruct the paleodiet of extinct species. However, detailed information of food habits and habitat environment is normally limited for skeletal specimens of extant ruminants used in mesowear analysis.

In order to test the validity of mesowear analysis, mesowear variables were examined in two extant ruminants, sika deer (*Cervus nippon*) and Japanese serow (*Capricornis crispus*). The deer are relatively opportunistic feeder but the serow are selective. The deer show browsing diet in an evergreen broad-leaved forest whereas the deer in a deciduous broad-leaved forest mainly rely on graminoids that dominate forest floor. On the other hands, the serow populations show typical browsing diets in forest habitats. Their contrastive feeding ecology is expected to be expressed in tooth wear. Fortunately, previous ecological studies well documented quantitative dietary compositions of each population by stomach content or fecal analysis. We scored 621 specimens from 15 populations of the deer and two of the serow populations.

Hierarchical cluster analysis using mesowear variables placed the deer and serow separately within a dietary continuum of extant ruminants. The deer in south and west Japan were classified into browsers, and the deer in north and east Japan were into mixed feeders. The serow were classified as browsers though the deer from the same habitat as mixed feeders. These results were concordant with the quantitative dietary analyses. Regression analysis using mesowear score, diets, and annual precipitation in habitat of 15 populations of the deer also indicated that the graminoid proportion in their diets is the most important factor determining mesowear. Furthermore, other extant ungulate datasets calculated from previous studies indicated that species with greater dietary variation showed higher standard deviation of mesowear score. These results suggested that mesowear is under strong influence of dietary variation, providing further confidence for mesowear analysis as a paleodiet reconstruction method.

Romer Prize Session (Thursday, November 6, 2014, 8:00 AM)

RESOLVING THE LOCOMOTORY ECOLOGY OF THE ANCESTRAL SNAKE: LISTENING TO WHAT THE EAR TELLS US

YI, Hongyu, American Museum of Natural History, New York, NY, United States of America, 10024-5192

Major evolutionary transitions often involve dramatic locomotor specializations, as seen in the origin of tetrapods, whales, and birds. The debate over the origin of another such group, the snakes, has long centered on whether they first evolved a limbless condition in a terrestrial fossorial or an aquatic habitat. For the few stem snakes that are known, empirical data needed to reconstruct their locomotory ecology have remained elusive, largely reflecting the incompletely preserved nature of the postcrania. This study develops locomotion indicators in the vestibular portion of the snake inner ear, an endocranial balance apparatus present in all vertebrates and preserved in several fossil snakes. To test the hypothesis that shape of the inner ear indicates locomotion in snakes, I reconstructed virtual models of the bony labyrinth (ossified inner ear) from computed tomography (CT) scans of 44 extant species including 35 snakes and nine lizards and amphisbaenians. The majority of families of extant snakes were sampled, and three locomotor groups were represented: terrestrial fossorial, terrestrial generalist, and aquatic. Based on 28 three-dimensional and 17 two-dimensional shape variables, geometric morphometric properties of the bony labyrinths were analyzed using Principal Component Analyses (PCA) and MANOVA statistics, to test shape separations among locomotor groups. Results show that fossorial species demonstrate expansion in the horizontal plane of the vestibule, whereas aquatic species demonstrate reduction in the vestibule. In PCA analyses of three-dimensional and two-dimensional morphometric data, separation is distinct between typical terrestrial burrowers and marine agile swimmers on the first principal component, despite overlap of the generalist group with some locomotor specialists in the morphospaces. MANOVA test using Procrustes scores found significant ($p < 0.05$) difference in the shape of the vestibule among the three locomotor groups, whereas phylogenetic signal is insignificant ($p = 0.063$) among all samples. Using published CT images, a stem snake *Dinilysia patagonica* was included in the two-dimensional geometric morphometric analysis, and was estimated as an active burrower due to its extremely large vestibule resembling modern burrowers, especially the sunbeam snake (*Xenopeltis unicolor*). *Dinilysia patagonica* is found from the Late Cretaceous of South America; its fossorial habit provides new evidence of adaptations to subterranean environments in the early evolutionary history of snakes.

Poster Session I (Wednesday, November 5, 2014, 4:15 - 6:15 PM)

A NEW MARINE VERTEBRATE OUTCROP FROM THE LATE CRETACEOUS (CAMPANIAN) OF SOUTHEASTERN ANATOLIA, TURKEY

YILMAZ, Ismail Ömer, Department of Geological Engineering, Middle East Technical University, Ankara, Turkey; HOSGOR, Izzet, Department of Geological Engineering, Middle East Technical University, Ankara, Turkey; TUNOGLU, Cemal, Geological Engineering Department Beytepe, Hacettepe University, Ankara, Turkey; VINCENT, Peggy, Sorbonne Universités CR2P CNRS-MNHN-UPMC, Museum National d'Histoire Naturelle, Paris, France; HOUSSAYE, Alexandra, CNRS UMR 7179, Museum National d'Histoire Naturelle, Paris, France; BARDET, Nathalie, Sorbonne Universités, CR2P CNRS-MNHN-UPMC, Museum National d'Histoire Naturelle, Paris, France

The Cretaceous succession in southeastern (SE) Anatolia (Turkey) consists of thirty formations included in four stratigraphical Groups, characterized by carbonate, partly clastic and evaporitic facies. These deposits are of particular economical importance as they host some main/major hydrocarbon reservoirs in SE Turkey. In the Mardin-Mazidag region located in the SE of Anatolia, just near the Syrian border, several stratigraphical units of the Cretaceous sequence rest unconformably above Paleozoic rocks, among which the Karabogaz Formation (early-middle Campanian). This formation, overlain unconformably by the Germav Formation (Late Campanian-Maastrichtian), is characterized by an alternance of calcareous and marly levels with cherts and includes important phosphate deposits that had been mined in this region for many years. It is the equivalent of the phosphatic Soukhne Group of Syria, which has yielded many marine vertebrate remains. The Karabogaz Formation contains marine fossil remains such as planktonic foraminifera, fish teeth and scales, as well as marine reptile teeth and indeterminate bone fragments. The marine reptile teeth can confidently be identified as belonging to the Mosasauridae, a successful squamate group with a global distribution during the Late Cretaceous. The remains indicate that at least two different mosasaurid clades are represented. This is the first time that marine vertebrate remains are found and identified in this area of Turkey. They add to our knowledge of the Arabian Platform Late Cretaceous marine vertebrate faunas.

Poster Session II (Thursday, November 6, 2014, 4:15 - 6:15 PM)

CENOZOIC MARINE BIRD COMMUNITIES IN THE SOUTHEAST PACIFIC OCEAN: NEW LOCALITIES AND FOSSILS ADDRESS WHETHER THE HISTORY OF MARINE CURRENTS IS THE ONLY EXPLANATION OF RECENT AVIAN DIVERSITY

YURY-YÁÑEZ, Roberto, Universidad de Chile, Santiago de Chile, Chile; SOTO-ACUÑA, Sergio, Universidad de Chile, Santiago de Chile, Chile; GUTSTEIN, Carolina, Universidad de Chile, Santiago de Chile, Chile; RUBILAR-ROGERS, David, Museo Nacional de Historia Natural, Santiago de Chile, Chile; SALLABERRY, Michel, Universidad de Chile, Santiago de Chile, Chile

Neogene marine vertebrate localities are abundant along the western margin of South America. Recent fieldwork has recovered several new fossil birds from different localities in the Atacama Desert, Northern Chile. These fossils raise questions about the differences between fossil bird communities and extant diversity. The fossil record shows that several bird species are found at Miocene localities in southern Peru (Pisco Formation) and northen Chile (Bahía Inglesa Formation). Fossil penguins of the extant genus *Spheniscus*, such as *S. muizoni*, *S. megaramphus*, and *S. urbinai* are reported from both units. Sulid species are also shared between both geological units, including the recently recognized *Sula sulita*. Especially interesting is *Spheniscus urbinai,* which is the best-represented penguin species in the Bahía Inglesa Formation. This species was recovered from localities ranging from 14°S (Pisco Formation, southern Peru where the holotype was recovered) to 31°S (Coquimbo Formation, north-central Chile), an almost 2000 kilometer range. Juvenile penguin fossils of uncertain taxonomical affinities are reported from the Pliocene locality 'Los Negros' of the Bahía Inglesa Formation; these are most likely referable to the extinct species *Pygoscelis grandis*. All families of birds studied from the Bahía Inglesa Formation show higher generic and specific diversity than extant communities. The study of a new unit late Pleistocene in age, that overlies the Bahía Inglesa Formation, shows that over the Plio-Pleistocene boundary, a reduction in bird diversity took place. Penguins were strongly affected; from the four species reported in the Bahía Inglesa Formation, only one penguin referred to the extant species *Spheniscus humboldti* is reported in the late Pleistocene. The first record of Laridae and the diving petrel *Pelecanoides* are also reported from this locality, indicating a faunal turnover at the end of the Neogene. The fossil record of birds indicates that during the Neogene, no major differences exist over the latitudinal range studied. During the Pliocene, the influence of a cold current is hypothesized, but changes in sea level over the Plio-Pleistocene boundary should also be considered responsible for the reduction in diversity. For example, the loss of breeding areas for certain species could explain local extinction, and together with the emergence of the Humboldt current system, could explain the differences between present and past avian diversity.

Poster Session II (Thursday, November 6, 2014, 4:15 - 6:15 PM)

SABER-TOOTH ORIGINS: A NEW SKELETAL ASSOCIATION AND THE AFFINITIES OF MACHAEROIDINAE (MAMMALIA, CREODONTA)

ZACK, Shawn, University of Arizona College of Medicine Phoenix, Phoenix, AZ, United States of America, 85004

Machaeroidinae is a clade of highly derived, saber-toothed hypercarnivorous eutherian mammals known from the late early to middle Eocene of North America. The group is notable for representing the first appearance of a saber-tooth morphology among carnivorous mammals. Because of their highly derived craniodental morphology, machaeroidine affinities have long been unclear. Consensus has focused on two Paleogene carnivorous groups, oxyaenids and limnocyonine hyaenodontids, but it has not been possible to securely establish a relationship to one or the other group. Because material has been very limited, postcranial morphology has not been considered in studies of machaeroidine affinities.

A newly recognized skeletal association from the Uinta Formation of Utah significantly improves knowledge of the machaeroidine postcranium and provides new evidence for the affinities of the group. Collected early in the twentieth century, the specimen of interest lacks meaningful dental material, obscuring its affinities. Fortunately, even though preserved maxillary fragments are edentulous, their alveolar pattern is unique to Machaeroidinae among Uintan carnivorous mammals, an identification supported by the morphology of other cranial fragments that match Bridgerian *Machaeroides eothen*. The new specimen preserves portions of both girdles, all long bones, and elements of the pes, including the first known machaeroidine tarsals.