Within this context, borophagines generally depict an intermediate morphology. They have a relatively robust humerus, although optimized for parasagittal movements, and their radius is slender, showing a low mobility in the elbow joint. All of this suggests that they were not as efficient runners as the living pursuit carnivores (e.g., canine canids and hyaenids) but they did not manipulate their prey as much as the modern ambushers do (e.g., felids).

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

STORK NEOICHNOLOGY FOR A BETTER UNDERSTANDING OF LARGE CENOZOIC ANISODACTYL BIRD TRACKS

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Anisodactyl bird tracks up to 15 cm long were discovered in the Oligocene subalpine Molasse near Schangnau (Central Switzerland). The tracks are preserved as natural casts and are characterized by slender, elongated digits generally in connection with a prominent central pad. Some of them exhibit a well-preserved hallux (digit I) impression, while others do not. This striking variation can be observed within trackways, suggesting that the presence or absence of the digit I impression is related to behavior (kinematics) of the trackmaker and/or substrate properties. This also implies that this feature is not necessarily useful in ichnotaxonomical diagnoses.

The Oligocene Swiss bird tracks with a preserved hallux impression are similar to the ichnotaxon *Gruipeda* characterized by the presence of three (dII-dIII-dIV) large, forward- and one (dI) spur-like, short, backward-directed digit impressions. Tracks without hallux impression and digits not connected to the central pad, however, more closely resemble ichnotaxa characterized by the lack of a hallux impression such as *Uvaichnites* from the Miocene of Spain.

During neoichnological experiments at Vogelpark Marlow (Berlin), white storks (*Ciconia ciconia*) walked slowly over prepared areas with two different kinds of sandy substrates. On compacted wet sand, the tracks are generally well defined with clear track walls, preserving small details even in shallow tracks. On loose dry sand, the tracks are less well defined due to a partial collapse of the walls. Some tracks lack a hallux impression and are clearly tridactyl and this variation also occurs along trackways.

3D models produced with photogrammetry of the modern stork tracks were compared to those of the Oligocene *Gruipeda*-type bird tracks from Switzerland and the Miocene *Uvaichnites* holotype from Spain. Generally speaking, the Swiss tracks are most similar to the stork tracks left on compacted wet sand, and are less similar to the stork tracks left on loose dry sand and to the *Uvaichnites* holotype.

It seems likely that the trackmaker of the Oligocene Swiss tracks was a ciconiiform bird similar to a modern white stork that left both tracks with and without hallux impression. To further confirm this hypothesis, we will carry out additional neoichnological experiments, also with other ciconiiform and gruiform birds (herons, cranes) to (1) expand the range of possible track morphologies and (2) test and quantify the influence of different behaviors (wading, perching, foraging) on track morphology (e.g., presence/absence of a hallux impression).

Education and Outreach Poster Session (Poster displayed November 5 – 8)

HOW DOES TAKING A CLASS WITH SKELETAL SPECIMENS MAKE STUDENT INTEREST CHANGE? SOME REPORTS OF PRACTICE COURSES WITH HANDS-ON SPECIMENS TO A HIGH SCHOOL AND COLLEGES IN JAPAN

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In museums and schools, the use of hands-on specimens makes participant interest increase. In vertebrate paleontology, fossils and skeletons are used as hands-on specimens.

But when their specimens are used for students not studying vertebrate paleontology, how do the students feel? Does their interest in vertebrate paleontology change? In this study, we held practice courses with skeletal specimens at a high school and two colleges in Japan, then conducted questionnaire surveys of these students.

We held the practice courses at Harima High School, Hyogo prefecture; Osaka College of Eco & Animals, Osaka prefecture; and Nagoya Communication Arts College, Aichi prefecture. 31 high school students were studying subjects for university entrance exams. 146 college students were preparing for jobs involving animals, such as breeding staff and dolphin trainer. Morphology, ecology, and evolution of marine mammals, especially dolphins and porpoises, were chosen as themes of these courses. For example, students compared skulls and forelimbs of marine mammals with terrestrial animals to understand their aquatic adaptations. Students in the lecture learned how to observe skulls of dolphins and porpoises mainly with hands-on specimens and tried to put disarticulated parts into whole articulated skeleton by themselves.

In the results of the questionnaires, almost all the students had touched skeletal specimens no times or a few times before the class. The majority of students had potential interests and positive images of skeletons. On the other hand, some students, especially at high school, had negative images of skeletons. This result might come from the background of each student.

Questionnaires after the lectures reveal that about 90% of students became more interested in bones than before. It may be that direct engagement with skeletal parts with their own hands made students feel strong affinities with specimens.

In the science curriculum of elementary and junior high schools in Japan, the students have little opportunity to touch skeletal specimens in class and to become interested in comparative morphology. As a result, some students have negative images of skeletons. In this study, the practice courses with skeletal specimens could remove this bad image from the students, and inspire them to take an interest in vertebrate paleontology. In the future, we will try to hold more practice courses and to make questionnaires for these activities in order to improve them.

Technical Session II (Wednesday, November 5, 2014, 8:45 AM)

EARLY CRETACEOUS TRACKS OF A LARGE MAMMALIAMORPH, A CROCODYLOMORPH, AND DINOSAURS FROM AN ANGOLAN DIAMOND MINE

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We report the first occurrence of mammaliamorph, crocodylomorph, and dinosaur tracks from the active Catoca diamond mine, northeast Angola. The tracks were preserved in a small sedimentary basin that formed in the crater of a kimberlite pipe, dated at about 118 Ma (mid Late Aptian), using the U-Pb method on kimberlitic zircon. Tracks, mud-cracks, ripple marks, and other sedimentary features indicate a shallow lacustrine depositional environment. Sixty-nine distinct crocodile-like and mammal-like tracks were recovered from the upper portion of a section 25–30 m thick. In addition, 18 dinosaur tracks were found nearby, one of which preserves a skin impression.

The best preserved tracks are interpreted as mammaliamorph based on a mesaxonic, functionally pentadactyl, and plantigrade morphology, digit length up to 1.5 cm, divergent central digits (II–IV), shorter and more divergent lateral digits (I and V), blunt digit tips, and no claw impressions. The track sizes, proportions, digit lengths and divarications are similar to the Late Triassic to Middle Jurassic ichnogenus *Ameghinichnus*; however, the average length of 2.7 cm and width of 3.2 cm suggest the track-maker was as big as a modern raccoon. Exceptionally large for its time, it is comparable in size to *Repenomamus*, the largest known Cretaceous mammal body-fossil, with a total length up to 68 cm. The tracks are much too large to have been produced by Early Cretaceous *Abelodon* from Cameroon, or the gondwanathere reported from Tanzania.

One trackway with 10 tracks is interpreted as crocodylomorph based on a mesaxonic, functionally tetradactyl and plantigrade pes and manus, medio-distally bent digits, and claw marks. Average manus length is 3.0 cm, width 3.4 cm; pes length 5.3 cm, width 3.7 cm. The manus is laterally rotated to 118° with respect to the pes. The narrow trackway has a manus pace angulation of 148°, and manus pace and stride lengths of respectively 13.9 cm and 23.8 cm; pes pace angulation is of 145°, and pes pace and stride lengths of respectively 14 cm and 25.1 cm.

Two narrow-gauge dinosaur trackways were also found. The larger-bodied one comprised four tracks with sub-round outline, no digits visible, footprint width up to 51 cm, one with skin impressions. The trackway stride length was between 150 cm and 170 cm and the width of 116 cm, thus interpreted as sauropod. The second trackway had 14 ellipsoid tracks and undertracks, with a pace length of 75 cm, making it unclear if was a smaller sauropod or a stegosaur.

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

A CRIPPLED YOUNG WOOLLY MAMMOTH (*MAMMUTHUS PRIMIGENIUS*), FROM THE TAIMYR PENINSULA, RUSSIA: NEW DATA ON THE ONTOGENETIC DEVELOPMENT OF THE SPECIES

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The partial carcass of a male woolly mammoth, *M. primigenius* nicknamed 'Mammoth Zhenya' was found in 2012 on the Sopochnaya Karga Cape of the Yenisei River Gulf, the Taimyr Peninsula. The accelerator mass spectrometry date (bone) is about 45,000 yr BP. The articulated carcass preserved most of the skeleton, the right torso hide, fore and hind feet flesh, and some inner organs and their fragments. The specimen appears to be very important for calibrating developmental stages of the species skeleton maturation, which is yet poorly studied for the older juveniles, adolescents and sub-adults.

It has an unusual combination of dental and skeletal features, as well as abnormal molar development. The skull has all but the occipital bones fused. The cheek teeth (DP4 (ml)/M1 (m)) have normal wear development, with a more advanced (older) state than that of the mammoth Yuka (6–8 Indian Elephant years old), and younger than the Yuribei mammoth (10–12 IEYO), placing Zhenya at the 8–10 IEYO interval. The unerupted M2, which in normal individuals is composed of a higher number of plates than M1, contains unfused, rootless, and cementum-less clusters of 6–9 cones in the small alveoli.

The right permanent tusk (max curvature length 1,600 mm, max diameter 93.0 mm) had a very short pulp cavity; the left tusk was absent in the undeveloped alveoli with the abnormally small (about 25 mm in diameter) opening. The alveoli's size and asymmetry with the right tusk indicates that the tusk was not developed from the initial stages of the specimen's ontogenesis, or was gone shortly after replacing the calf's tush.

The axial and appendicular skeletal elements were developed normally, and no injuries were present on the bones. The cervical vertebral plates were not completely closed centrally, having from three-to-nine small holes (0.5–2 mm in diameter). The thoracic and lumbar vertebrae plates also had nutritional openings (up to 2 mm in diameter) in central parts.

The condition of the Zhenya skeleton (unfused vertebral neural arches, all vertebral plates, sacral vertebrae, and all but the distal humerus epiphyses of long bones; not completely ossified apophysis of rib heads and spinal processes of the thoracic vertebrae; and un-ossified apophyses of the transverse processes of all vertebrae) indicates an older juvenile specimen, with most of the bones still growing. The cause of the death has not yet been determined, but the individual age and the deposits where the carcass was found (peat lense), might suggest for fatal entrapment of the young and unexperienced individual roaming alone.