intraspecific variation to overwhelm potential apomorphies that were traditionally used to separate species. We then collapsed recent specimens into species-level terminals and fossil specimens into locality-level terminals. That approach resulted in traditionally recognized clades.

Our results indicate that the complement of species- and specimen-level analyses provides a starting point for elucidating different sources of variation that affect systematic resolution. In this case, we find that currently recognized apomorphies for species of *Terrapene* are insufficient for specimen-level identification against the backdrop of broad intraspecific variation. In this context, reliable, apomorphy-based identification of isolated specimens in the fossil record is currently impossible. Adding extinct 'species' known from only single specimens to an analysis presents a comparable situation. Some currently recognized species and subspecies are not immune to this problem.

Poster Session II (Thursday, October 18, 4:15 - 6:15 pm)

INSIGHTS FROM A NEW SPECIMEN OF THE GAVIALOID CROCODYLIAN *THORACOSAURUS NEOCESARIENSIS* FROM THE MAASTRICHTIAN-DANIAN HORNERSTOWN FORMATION, SEWELL, NJ

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A recently discovered specimen of the gavialoid crocodylian *Thoracosaurus neocesariensis* from the Inversand Company glauconite pit in Sewell, NJ, yields new phylogenetic and ontogenetic information about this rare taxon. Collected from the end-Cretaceous Main Fossiliferous Layer (MFL) thanatocoenosis of the Hornerstown Formation, these fossils represent a disarticulated but associated subadult individual, roughly half the size of those previously published. This new specimen includes a nearly complete lower jaw and the first well preserved articular, tibia, and ischium for *T. neocesariensis*. Novel taxonomic insights from the lower jaw include: 1) the angular-surangular suture passes broadly along the ventral margin of the external mandibular fenestra; 2) uniform size of teeth alveoli in the dentary posterior to the 4th alveolus; 3) anterior processes of the surangular are unequal in length; 4) surangular does not extend posteriorly to the tip of the retroarticular process of the articular; and 5) presence of a dorsoventrally oriented sulcus between the articular and surangular anteriorly. The later three features are synapomorphic with congeneric *T. macrorhynchus*. With respect to previously described larger *T. neocesariensis* specimens, this smaller individual possesses two unique features: 1) a linear frontoparietal suture between the supratemporal fenestrae instead of a concavoconvex suture, and 2) the 3rd and 4th dentary alveoli are not confluent and are equal in size, instead of separated with the 4th alveolis larger than the 3rd. The linear frontoparietal suture of this specimen is similar to that of *T. macrorhyncus*. In addition, the lingual foramen for the articular artery and alveolar nerve is solely on the articular in this individual, while for close phylogenetic relatives, including *T. macrorhyncus*, the lingual foramen is on the surangular entirely. These differences may reflect ontogenetic variation within *T. neocesariensis* and possibly independent evolution among gavialoids in the case of the location of the lingual foramen.

Symposium: Phylogenetic and Comparitive Paleobiology: New Quantitative Approaches to the Study of Vertebrate Macroevolution (Friday, October 19, 12:00 pm)

THE IMPACT OF CORAL REEFS ON FISH DIVERSIFICATION

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Coral reefs harbor spectacular organismal diversity in a wide range of metazoan groups. Perhaps nowhere is this more conspicuous than teleost fishes where one in every six species lives on reefs and a stunning range of ecotypes and morphological specializations are found. But, did this diversity accumulate on reefs or have reefs been the site of this evolutionary creativity? We set out to explore the impact of reefs on ecomorphological diversification in two major reef radiations of teleosts. Over 500 of the approximately 600 labrid species live on reefs, and the group includes spectacular ecological diversity, including detritivorous parrotfishes, cleaner wrasses, coral mucous feeders, zooplanktivores and a wide range of generalized invertivores. Patterns of diversification in the iconic labrids were contrasted with Haeumulidae, which, although an important component of New World reef faunas, is actually more species rich in non-reef habitats and shows modest trophic diversity on reefs. Using an analysis pipe-line that accounted for phylogentic relationships among species, the time available for diversification and model uncertainty we compared the rate of evolution of functional morphological traits associated with feeding and locomotion in reef and non-reef lineages. We found that reef labrids occupy 68.6% more trophic morphospace than non-reef species and have rates of trait evolution that are on average twice as fast as non-reef lineages. Remarkably, when we remove species representing niches only found on reefs we get about the same difference in rates of trait evolution. Such a pattern might be expected in the quintisciential radiation of reef fish, but we find an even stronger pattern in Haemulidae where trophic traits evolve up to 12 times faster in reef lineages, in spite of the fact that there are no niches unique to reefs have evolved in this group. In haemulids, locomotor traits evolve faster on reefs, but the difference is not as pronounced as we find in trophic traits. Together these analyses present a strong signal that reef habitats cause a higher rate of morphological diversification in fishes. Exactly why this is cannot yet be determined, but the extremely high physical and biological complexity on reefs may offer tremendous ecological opportunity that drives diversification.

Technical Session I (Wednesday, October 17, 11:00 am)

A NEW OVIRAPTORID SPECIMEN FROM THE UPPER CRETACEOUS OF SOUTHERN CHINA

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Oviraptorid theropods were previously restricted in their distribution to the Late Cretaceous Gobi Area of central Asia, but several new oviraptorid species have been recently reported from southern China. Here we report a new oviraptorid based on a specimen recovered from the Upper Cretaceous Nanxiong Group (Campanian-Maastrichtian), Hongcheng Basin, Ganzhou City, Jiangxi Province, southern China. The new specimen preserves a partial mandible, three articulated caudal vertebrae, nearly complete articulated right pes, a piece of the right ilium and the middle part of the shaft of the right femur. This new oviraptorid differs from other oviraptorids in having a unique combination of plesiomorphic and derived features: relatively shallower dentary with a weakly downturned mandibular anterior end (this portion is strongly downturned in *Nemegtomaia* and *Heyuannia*); the external mandibular fenestra is relatively posteriorly located, and its anterior margin located posterior to the downturned curve of the dentary (extends beyond the anteroventral corner of the dentary in *Banji*). The lateral surface of the dentary is smooth (lacks the anterior fossa in *Gigantoraptor*). A weak ridge is located on the anterior margin of the external mandibular fenestra, thus the dentary forms a depression or shelf around the anterior margin of external mandibular fenestra but this is much shallower than the corresponding portion of *Nemegtomaia* and *Heyuannia*. The slender posteroventral branch of the dentary slightly twists ventrally (horizontally oriented in *Citipati*, *Khaan* and *Banji*). The angular forms most of the ventral border of the external mandibular fenestra, and bears a longitudinal groove along its ventrolateral edge. The groove receives the posteroventral branch of the dentary, and gradually becomes shallower posteriorly, a feature unknown in any other oviraptorids. Phylogenetic analysis based on 185 osteological characters indicates that the new Ganzhou specimen falls within the derived oviraptorids, together with *Heyuannia huangi* from the possibly correlative beds in Heyuan County in nearby Guangdong Province, and *Nemegtomaia* and *Ingenia* from the Gobi Desert of Mongolia. Both the previously known *Banji* and this new specimen were collected from the Nanxiong Group in Ganzhou, but they differ significantly in their osteological morphology.

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

ASYMMETRIC VANES OF LIVING AND FOSSIL BIRD FEATHERS INDICATE MECHANICAL FUNCTION RATHER THAN FLIGHT ABILITY

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In modern bird feathers, vane asymmetry is caused by the rachis lying towards the leading edge, which is thicker, narrower and stiffer. Asymmetry is thus found in feathers with leading edges in close contact with the airflow in flight. A great deal of attention has been directed at the aerodynamic function of vane asymmetr,y and it has been suggested that degree of asymmetry is related to flapping flight. The mechanical role that vane asymmetry plays has never been explored.

We measured vane asymmetry (trailing-vane width: leading-vane width) at 25%, 50% and 75% of feather length from first or second primaries in the wings of 38 living species. Species were grouped by different flight styles, wing beat frequency, and flexural stiffness. ANOVA was conducted to determine if these parameters can be predicted from asymmetry.

Results show that neither mean vane asymmetry (mean asymmetry value of the three points) nor vane asymmetry at any of the three points we measured is significantly different in birds classified with different flight styles (P=0.13) or wing beat frequency (P=0.64). However, mean vane asymmetry and vane asymmetry at the 25% point do differ significantly between birds that have markedly different feather flexural stiffness.

This research does not support the long-held dogma, "*Archaeopteryx* must have been a flapper because it has asymmetric feathers"; alternatively, data suggest that the less asymmetric feathers of this fossil bird, compared with those of modern birds, indicates that *Archaeopteryx*'s feathers were relatively more flexible. Because direct correlations between flight style and vain asymmetry cannot be established, conclusions about dinosaur flight capabilities from the vane asymmetry of fossils should be treated with caution.

Poster Session II (Thursday, October 18, 4:15 - 6:15 pm)

EXPLORING UNCERTAINTY IN THE CALIBRATION OF THE MOLECULAR CLOCK

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Calibration is a critical step in every molecular clock analysis but it has been the least considered. Bayesian approaches to divergence time estimation make it possible to incorporate the uncertainty in the degree to which fossil evidence approximates the true time of divergence.