WITMER, L. M.*; CHATTERJEE, S.; FRANZOSA, J.; ROWE, T.; RIDGELY, R.; Ohio Univ., Athens; Texas Tech Univ., Lubbock; Univ. of Texas, Austin; Univ. of Texas, Austin; Ohio Univ., Athens: **Neuroanatomy and vestibular apparatus of pterosaurs: Implications for flight, posture, and behavior**

Comparison of birds and pterosaurs, the two archosaurian flyers, sheds light on adaptation to an aerial lifestyle. The neurological basis of control holds particular interest in that flight demands on sensory integration, equilibrium, and muscular coordination are acute. Here we compare the brain and vestibular apparatus in two pterosaurs---a more basal form (*Rhamphorhynchus*, Jurassic, Germany) and a derived pterodactyloid (*Anhanguera*, Cretaceous, Brazil)---based on high-resolution computed tomographic (CT) scans from which we constructed digital endocasts. Although general neural organization resembles birds, pterosaurs had smaller brains relative to body mass than do birds, which probably has more to do with phylogeny than flight in that birds evolved from nonavian theropods that already had established trends for greater encephalization. Orientation of the osseous labyrinth relative to the long axis of the skull was very different in these two species, suggesting dramatically different head postures: in *Rhamphorhynchus*, the head was more or less horizontal, whereas in *Anhanguera* it strongly angled down. These different head postures probably reflect differing behaviors, perhaps in regard to terrestrial locomotion, but also, given aerodynamic effects, in regard to flight. Their enlarged semicircular canals reflect a highly refined organ of equilibrium, which is concordant with pterosaurs being visually-based, aerial predators. Their enormous cerebellar floccular lobes may suggest neural integration of extensive sensory information from the wing, further enhancing eye- and neck-based reflex mechanisms stabilizing gaze.