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Expression of paranasal sinuses in New World monkeys:

Application to phyletic evaluation. S MARQUEZ^{1,4,5,7}, PJ GANNON^{2,5}, E DELSON^{4,5,6,7}, TC RAE^{6,8}, T KOPPE⁹, A SILVERS³, W LAWSON², and JT LAITMAN^{1,2,4,5,6}. Cell Biology & Anatomy¹, Otolaryngology², Radiology³ Mt Sinai School Med, NY; CUNY⁴; NYCEP⁵; AMNH⁶, Lehman College⁷; NY; Univ Durham, UK⁸; Institute of Anatomy, Univ Griefswald⁹.

Patterns of morphology represent an important component for understanding systematic relationships in primate evolution. In platyrrhines, for example, many components of craniofacial morphology have been utilized to assess phylogenetic relationships. One potentially important suite of craniofacial traits, however, has not received a similar level of attention, the paranasal sinuses (PNS) within the nasal complex. Although others have reported on PNS anatomy in platyrrhines using sagittally sectioned dry museum skulls, this technique cannot distinguish between PNS *sensu stricto* and other kinds of air chambers, such as enlarged cells of spongiform tissue. To properly evaluate PNS in New World monkeys (NWM), we used CT imaging to track their presence and distribution to assess the potential for application of PNS morphology to phyletic analysis.

A sample of adult dry crania (n=55), representing 20 species from 16 genera of NWM was obtained from the American Museum of Natural History, the Natural History Museum (London) and the University of Griefswald (Germany). PNS identification, description, and quantification was performed with multiplanar reformatting and virtual 3D reconstructions based on CT scans obtained with GE HiSpeed Advantage and Siemens DTR scanners using helical fast track evaluation. All platyrrhine crania possess definitive maxillary sinuses, but frontal and sphenoid sinuses were variably expressed. Surprisingly, four genera *Callimico*, *Cebus*, *Callicebus* & *Alouatta* exhibit ethmoid sinuses; previously, the ethmoid sinus had been demonstrated to be present only in great apes and humans (Marquez et al., 1999).

This study shows that, unlike other methods, CT imaging easily discriminates between PNS and other pneumatizations. Since the nasal complex is a highly conservative region in primate evolution, variation in NWM PNS expression may indicate environmental adaptations. In contrast to the phyletic pattern of differential PNS development in catarrhine clades, platyrrhines appear to present convergent evolution in isolated lineages. Alternatively, these features may represent isolated primitive retentions. These powerful imaging techniques allow a more complete appraisal of both PNS presence and magnitude, which contribute to our understanding of nasal complex function and evolution.

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The newly recovered Poloyo hominin (PL-1) from Java. K. Mowbray^{1,2}, S. Márquez³, S.C. Antón⁴, C.C. Swisher III⁵, T. Jacob⁶, G. J. Sawyer¹, D. Broadfield³, J.T. Laitman³, R.L. Holloway⁷, E. Delson^{1,8}, and I. Tattersall¹. ¹American Museum of Natural History, NY, NY 10024; ²Rutgers University, New Brunswick, NJ 08901; ³Mount Sinai School of Medicine, NY, NY 10029; ⁴University of Florida, Gainesville, FL, 32611; ⁵Berkeley Geochronology Center, Berkeley, CA 94709; ⁶Gadjah Mada University, Yogyakarta, Indonesia; ⁷Columbia University, NY, NY 10027; ⁸Lehman College, Bronx, NY 10468.

In recent months, a fossil hominin calvaria (PL-1) lacking most of its basicranium and face turned up at a natural history curio shop in New York City. Prior to its return to Gadjah Mada University, Indonesia, we obtained CT images and made detailed comparisons with other Asian and African hominins. At this time, we report on the affinities of the newly recovered fossil human and discuss its possible geologic age.

The calvaria was obtained near Poloyo, Java, which neighbors Sambungmacan along the Solo River some 50-km north of the Sangiran Dome. Associated sediments extracted from PL-1 suggest that it may be of relatively young age for *Homo erectus*, perhaps contemporaneous with Ngandong and Sambungmacan. Cranial features that include frontal breadth and postorbital constriction, conformation of the mastoid, supramastoid crests, and the occipital torus suggest affinities to the geologically younger Ngandong specimens, but its estimated cranial capacity of 900 ml is more reminiscent of some of the Sangiran hominins. Importantly, PL-1 exhibits traits that are not typically seen in Javanese *H. erectus* specimens. These include a high vertical forehead that rises quickly from the midline, a somewhat greater cranial breadth relative to its length, and a non-barlike supraorbital torus that is midsagittally deficient. Preliminary comparative analyses on the arcs and chords of both the frontal and occipital with other adult *H. erectus* (n=20) and modern humans (n=281) show that PL-1 falls within the range of *H. erectus*. The combination of traits exhibited by PL-1 may serve to bridge the geologically older and younger Javanese *H. erectus* fossil specimens previously thought to be morphologically distinct. Yet, the unexpected combination of Ngandong-like characters with the relatively small brain exhibited by PL-1 may ultimately represent a morphologically distinguishable Ngandong/Poloyo population.