Abstracts of the 73rd Annual Meeting of the American Association of Physical Anthropologists; Tampa, Florida, April 2004. Amer. J. Phys. Anthropol., Supp. 38, 2004
From the NYCEP Morphometrics Group

Paradolichopithecus: A large-bodied terrestrial papionin (Cercopithecidae) from the Pliocene of western Eurasia.

E. Delson[1,2,3,4,5], S.R. Frost[5,6]. [1]Anthropology, Lehman College/CUNY; [2]Anthropology, City University of New York Graduate School; [3]Vertebrate Paleontology, American Museum of Natural History; [4]New York Consortium in Evolutionary Primatology (NYCEP); [5]NYCEP Morphometrics Group; [6]Anatomy, New York College of Osteopathic Medicine.

Paradolichopithecus arvernensis is known by crania and postcrania from Senèze (France), Graunceanu (Romania), and Vatera (Lesvos, Greece), all of late Pliocene age. Partial crania from Kuruk (Tajikistan) have been named *P. sushkini*, while fragmentary (often juvenile) remains occur in earlier sites across southern Europe. It is generally thought that this genus is a sister taxon to *Macaca* which was strongly adapted to terrestriality (see abstract by Ting et al.). However, Mashchenko reviewed the Kuruk fossils and suggested that they were best placed within genus *Papio*, which would imply an out-of-Africa dispersal. Here we seek to determine the phylogenetic affinities of *Paradolichopithecus*, based on analyses of the entire craniodental sample.

Proportions of crania and dentitions were studied using traditional morphometric methods, while geometric morphometrics were applied to craniofacial morphology. Although *Paradolichopithecus* superficially resembles *Papio* in cranial proportions, its morphology is in fact more like that of *Macaca* when allometric factors are considered. For example, the small anterior dentition, rounded muzzle dorsum and perhaps the lack of a clear anteorbital drop in the midline profile all distinguish *Paradolichopithecus* from African *Papio*, and most link it to Eurasian *Macaca*, suggesting in-situ divergence. The dental size of the earlier Pliocene sample is intermediate between that of the late Pliocene populations and large macaques and may imply a size trend. The relatively large size of the Senèze female cranium (ca. 2 Ma) compared to males from Graunceanu (ca. 2.3 Ma) may also reflect this temporal size increase or indicate a low level of sexual dimorphism.

Funding: NSF DBI 9602234 (NYCEP) and ACI 9982351 (NYCEP Morphometrics Group); PSC-CUNY.

Cranial allometry, phylogeography and systematics of baboons inferred from geometric morphometric analysis of landmark data.

S.R. Frost[1,2], L.F. Marcus[2,3,4], F.L. Bookstein[5,6], D.P. Reddy[2,7], E. Delson[2,3,4,8]. [1]Department of Anatomy, New York College of Osteopathic Medicine; [2]NYCEP (New York Consortium in Evolutionary Primatology) Morphometrics Group; [3]Division of Paleontology, American Museum of Natural History; [4]City University of New York Graduate Center; [5]Institute of Anthropology, University of Vienna; [6]Institute of Gerontology, University of Michigan, Ann Arbor; [7]Radiologic, Inc.; [8]Department of Anthropology, Lehman College/CUNY.

Cranial morphology of the African Old World monkeys *Mandrillus*, *Papio*, and *Theropithecus* (i.e., the baboons) has been the subject of numerous studies investigating their systematic relationships, patterns of scaling, and growth. In this study, we use landmark-based geometric morphometrics and multivariate analysis to assess the effects of size, sex, taxonomy, and geographic location on cranial shape. Forty-five landmarks were digitized in three dimensions on 452 baboon crania and subjected to generalized Procrustes analysis. The resulting shape coordinates were submitted to regression analysis, principal components analysis, partial least squares analysis, and various clustering techniques, with findings visualized by 3D thin-plate spline.

Scaling was the largest single factor explaining cranial shape variation. For instance, most (but not all) of the shape difference between the sexes was explained by size dimorphism. Yet central tendencies of shape clearly varied by taxon, both specific and subspecific, even after variation in size and sex was adjusted for. Within *Papio*, about 60% of the size- and sex-adjusted shape variation was explained by the coordinates of the specimen's geographic provenance, revealing a stepped cline in cranial morphology with the greatest separation between northern and southern populations. Combined with evidence from genetic studies and the presence of at least two major hybrid/interbreeding zones, we interpret the phylogeographic pattern of cranial variation as implying that these populations are best ranked as subspecies of a single species, rather than as two or more distinct biological species.

Funding: N.S.F. ACI-9982351; CUNY Collaborative Incentive Award 9-91980; Wenner-Gren Foundation (Grant 6436); L.S.B. Leakey Foundation.

Description and analysis of postcranial elements of _Paradolichopithecus arvernensis_: A large-bodied papionin from the Pliocene of Eurasia.

N. Ting[1,2,3], W.E.H. Harcourt-Smith[2,4], S.R. Frost[4,5], E. Delson[1,2,3,4,6]. [1]Anthropology, City University of New York Graduate School; [2]Vertebrate Paleontology, American Museum of Natural History; [3]New York Consortium in Evolutionary Primatology (NYCEP); [4]NYCEP Morphometrics Group; [5]Anatomy, New York College of Osteopathic Medicine; [6]Anthropology, Lehman College/CUNY.

The Plio-Pleistocene cercopithecid *Paradolichopithecus arvernensis* is best known from Seneze (France), Valea Graunceanului (Romania), and Vatera (Lesvos Island, Greece). Of these sites, Graunceanu and Vatera have yielded postcranial elements assigned to this species that have been said to be similar to those of *Papio*, while the craniodental remains from all sites have suggested a relatedness to *Macaca*. Description and analysis of the postcrania was conducted to test hypotheses concerning the locomotor behavior and phylogenetic affinities of this fossil monkey. The postcranial material assigned to *P. arvernensis* includes partial humeri, ulnae, radii, femora, a distal tibia, an astragalus, third metatarsal, and several phalanges. These postcrania are compared to those of extant cercopithecids using traditional measurements, as well as 3-D coordinate data. Measurements were analyzed using standard ratios and statistical analyses, while the coordinate data were analyzed using geometric morphometric techniques.

The results indicate that *P. arvernensis* practiced a form of terrestrial locomotion similar to that of modern baboons, which is consistent with previous hypotheses and paleoenvironmental reconstructions suggesting open savannah woodland at both sites. The overall morphology of *P. arvernensis* resembles *Papio* and *Theropithecus* more than *Macaca* or *Mandrillus*, although the implications of this result are still unclear because separating size, phylogeny, and function remains problematic in cercopithecids. The 3-D data presented will also be used in future studies to help address this complex issue and hopefully provide more information on the evolutionary history of the Plio-Pleistocene large-bodied cercopithecid radiation.

Funding: NSF DBI 9602234 (NYCEP) and ACI 9982351 (NYCEP Morphometrics Group).