

been described as having very thick, fast formed enamel (Martin, 1995). In the reported condition of "very thick" enamel, *A. turkanensis* appeared to differ from other early and middle Miocene apes and to show similarities to *Graecopithecus freybergi* and *Paranthropus*. This study focused on quantifying enamel thickness, and examining enamel microstructure and development in this early Miocene ape in comparison with *G. freybergi* and *Paranthropus*. Recent studies of enamel in *Proconsul* provide a basis for comparison with a contemporaneous Miocene hominoid (Beynon *et al.*, 1998).

Two previously prepared teeth were examined using Scanning Electron Microscopy (SEM) and Polarized Light Microscopy (PLM). Enamel thickness was measured following established procedures. Measurements of cross-striation repeat intervals and counts of cross-striations between Retzius lines were made where possible using both SEM and PLM. Angles of intersection were measured between the striae of Retzius and the enamel dentine junction in the cervical and lateral enamel on both teeth.

The results of this study show that Martin (1995) miscalculated relative enamel thickness for *A. turkanensis*, which does not have the extremely thick enamel seen in *G. freybergi* or *Paranthropus*. Rather, *A. turkanensis* has enamel of a thickness comparable to the Paşalar hominoids or *Sivapithecus*, which have been characterized as having "thick enamel". *A. turkanensis* has thicker enamel than *Proconsul africanus* and *Proconsul major*, but does not differ much from what has been reported for *Proconsul nyanzae* and *Proconsul heseloni* (Beynon *et al.*, 1998). An examination of enamel microstructure shows a pattern of development similar to that reported for *P. heseloni* and *P. nyanzae* in terms of cross-striation repeat intervals and the periodicity of Retzius lines. These findings suggest that the enamel of *A. turkanensis* is not as distinct from other early and middle Miocene hominoids, including *Heliopithecus*, as had been previously argued.

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Prosimian hypometabolism revisited: The influence of body composition. J.J. SNODGRASS, W.R. LEONARD, and M.L. ROBERTSON. Northwestern University, Evanston, IL 60208.

Prosimians differ from other primates in having depressed metabolic rates. That is, prosimians tend to have resting metabolic rates (RMRs) lower than those predicted for their size based on the Kleiber scaling relationship. While a number of explanations have been offered for hypometabolism in prosimians (e.g., phylogenetic inertia, dietary stress), the phenomenon has not been systematically studied. Thus, the purpose of this paper is to examine differences in RMR between prosimians and anthropoids, and to evaluate alternative explanations for those differences.

Data on body mass (kg) and RMR (kcal/d) were obtained for 17 prosimian and 23 anthropoid species. Metabolic rates in the prosimians average (\pm SE) $38.6 \pm 4.7\%$ below that predicted by the Kleiber

relationship, whereas anthropoids are $3.5\% \pm 3.6\%$ above predicted values. Additionally, the scaling relationship between RMR and body mass significantly differs between the two groups. For anthropoids the relationship is: $RMR = 68.7(Wt)^{0.78}$, which is almost identical to the Kleiber relationship (i.e., $RMR = 70[Wt]^{0.75}$). In contrast, the relationship in the prosimians is: $RMR = 36.3(Wt)^{0.56}$.

The differences in metabolism between prosimians and anthropoids appear to be partly attributable to differences in body composition. Given that there are large differences in mass-specific metabolic rate among tissues, differences in the mass of these tissues can greatly shape total metabolic costs. Prosimians are less encephalized than anthropoids. Additionally, prosimians also appear to have lower levels of skeletal muscle mass than anthropoid species. Some of the differences in muscularity and metabolic intensity reflect differences in locomotor patterns or habitat use, as arboreal species have lower metabolic rates than terrestrial species (deviation from predicted = $-22.1 \pm 4.6\%$ vs. $+3.8 \pm 8.6\%$; $P = 0.017$). However, even after controlling for dominant habitat, arboreal prosimians have lower metabolic rates than arboreal anthropoids (deviation = $-36.6 \pm 4.6\%$ vs. $-2.7 \pm 4.9\%$; $P < 0.001$).

Cancer incidences in Europe related to ethnohistoric and genetic distances. R.R. SOKAL, N.L. ODEN, M.S. ROSENBERG, and B.A. THOMSON, Ecology and Evolution, SUNY at Stony Brook, NY 11794-5245.

We have previously shown that geographic differences in cancer mortalities in Europe are related to (in order of importance): geographic distances (reflecting environmental differences), ethnohistoric distances (encompassing cultural and genetic attributes), and genetic distances of the populations in the areas studied. In this study, we analyzed the same three factors in geographic differences for European incidences of up to 45 cancers for each sex. Differences in cancer incidences are correlated moderately, first with geographic distances, then with genetic distances, but not at all with ethnohistoric distances.

Comparing these findings to the earlier ones for cancer mortalities, we note the reversal in the importance of ethnohistory and genetics between the two cancer rates, and the generally lower correlations of incidence differences with the three putatively causal distance matrices. A path diagram combining the two studies demonstrates the lack of cultural carcinogenic effects, but suggests cultural influences on procedures such as the registration of deaths in different political entities. In addition to these cultural differences, the relatively large correlation between ethnohistoric distances and mortality differences is due to common factors behind the correlation of ethnohistoric and geographic distances. Geographic proximity results in similar ethnohistories. The direct effects of genetic distances are negligible and only their common effects with geographic distances play a role, accounting for the weak to

negligible influence of genetics on incidence and mortality differences. Apparently, the genetic systems available to us do not substantially affect cancer incidence or mortality.

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Identification of cystic lesions in prehistoric skeletal remains from New York State. M.C. SOLANO and C.N. AYOTT, Department of Anthropology, University at Albany, State University of New York.

Paleopathological diagnoses are useful for assessing health and diseases in human skeletal populations, although difficulties lie in creating associations between paleopathological conditions and modern clinical descriptions of disease. Systematic analysis of skeletal collections from the New York State Museum has resulted in the discovery of a specific, tumor-like lesions in five individuals. The lesions, however, are not clearly identifiable from either the paleopathological or medical literature.

The five skeletons (4 male, 1 female) come from four prehistoric Native American sites from New York State, dating between the Late Archaic (3100 B.C.) and Late Woodland (1300 A.D.) periods. The lesions are characterized as small (<1 cm), round or ovoid depressions on the periosteal surface of the bone, fine granularity of internal surface, sharp margins, and mild or no activity of the surrounding bone. Four of the five individuals possess lesions in the orbits and/or on the frontal, while one lesion is present on a tibial diaphysis.

Based on the medical literature, the lesions can be best identified as circumscribed osteoma (or osteoid osteoma), although the clinical manifestations are difficult to compare to dry bone. While the paleopathological literature contains many examples of tumor-like lesions, descriptions and documentation of these pathologies are largely insufficient for identifying them in other skeletal analyses. Nevertheless, both medical and paleopathological data are combined in order to make a differential diagnosis of this neoplastic condition.

Reproductive strategies and paternity in wild Japanese macaques on Yakushima Island, Japan. J. SOLTIS¹, R. THOMSEN², and O. TAKENAKA³.

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Paternity discrimination by analyzing subject DNA is critical to the study of animal reproductive strategies.

Among primates, however, most paternity studies to date have occurred in captive or provisioned groups. Here we report the first paternity study of Japanese macaques (*Macaca fuscata yakui*) living in natural habitats. Behavioral observations were conducted for one mating season, and subject DNA was recovered from samples collected non-invasively in the field (feces, urine, ejaculate). To amplify micro-satellite loci, we used nine primers known to be polymorphic in the study population.

Paternity was determined for nine of ten offspring born the following birth season. Three of the nine offspring (33%) were sired by non-troop males. The remaining six offspring (67%) were most likely sired by troop males, and high ranking males were more likely to sire these offspring than low ranking males ($r_s=0.587$, $n=15$ males, $p<0.05$). Observed mating success was also positively correlated with male dominance rank ($r_s=0.700$, $n=15$ males, $p<0.001$). Low ranking males were the most likely to engage in sneak copulations (i.e. to mate outside the presence of other males; $r_s=-0.783$, $n=15$ males, $p<0.001$). The mean number of females exhibiting mating behavior per day was 2.44 (range: 1-5). These females attempted to mate with multiple males of variable dominance ranks, including both high and low ranking males. Although females and mid to low ranking males sometimes mated, and a few mid-ranking males sired offspring, high ranking males were able to monopolize most female matings as well as paternity.

Temporal patterning of enamel hypoplasias: a study from the Larson site (39WW2), Walworth county, South Dakota. C.S. SPARKS, Department of Anthropology, University of Tennessee, Knoxville, Tennessee 37996

Enamel hypoplasias have been identified as an excellent record of nutritional and metabolic stress in human populations. The Post-Contact Arikara population from the Upper Missouri River valley is a group not yet studied for these defects. The possible etiological and temporal significance of defects in the Arikara sample are key in reconstructing the earth-lodge village lifeway exhibited at the Larson Site.

The Arikara skeletal series from the Larson site (39WW2) was examined on an intrasite basis in order to detect any temporal trends in the prevalence and age of formation of enamel hypoplasias. A total of 220 adult individuals was examined for presence and age of formation of hypoplastic episodes. The mean ages were calculated for the four temporal features identified by field notes and separated temporally by differential presence of European trade goods associated with the burials. Statistical comparisons of the four features were conducted by means of the Dunnett T-3 ANOVA test. This test yielded significant difference in mean age of defect formation between cemetery and village areas. The difference in mean ages reflects a trend, which shows an increase in age of formation, and an increase in prevalence from the earlier features to an apex at the terminal occupation.