

ing populations residing in New Britain, and 30 samples from an amalgam of Austronesian speaking populations residing in New Ireland. Using PCR and gel electrophoresis methodology, we typed four markers: YAP, M9, M15, and 50f2/c.

Our data show statistically significant variation among the four sampled populations at the 50f2/c locus. While the Kuot and both Austronesian sample sets were negative for the deletion, the Atta sample included 10 out of 30 50f2/c deleted individuals. This 33% occurrence of the mutation is the highest frequency documented outside of Europe to date. Many population genetic studies have examined the relationship between linguistic affiliation and the pattern and distribution of genetic variation. Our pilot data on the NRY in combination with preliminary chromosome 22 typing suggest this relationship is relevant in New Britain and New Ireland.

Weight growth velocity from birth to 2 years of age in relation to lead burden.

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To determine the impact of lead pollution on human health and variation we examined growth from birth to 24 months of age in relation to child's blood lead. The sample consists of children enrolled in the 1st phase of the APILS (Albany/Pregnancy Infancy Lead Study). Mothers in APILS were drawn primarily from urban disadvantaged neighborhoods in Albany, NY. Children were measured for size and lead level at birth, 6, 9, 12, 18, and 24 months of age. The Jeness-Bailey model was fit to all children with 6 or more weight measurements out of 7 possible from birth to 24 months (n=53). All fits were good ($r > 0.97$). Controlling for birth weight, gestation length, sex, maternal smoking, race/ethnicity, parity, and the average calories consumed from 312 months, we found that an increase in lead levels from the first to the second half of infancy is significantly associated with lower weight velocity from age 6 to 12 months ($r = -0.36$, $p=0.03$), and from 9 to 12 months ($r = -0.39$, $p=0.02$). There was no effect of lead level change during infancy on weight velocity prior to 6 months of age ($r = 0.13$, $p=0.93$), suggesting that change in weight velocity follows the change in lead rather than the countercausal explanation that slow velocity is characteristic of children who later develop higher lead

levels. We conclude that blood lead can impair weight growth in later infancy. Supported by NIEHS - ES05280.

Understanding and correcting molar robustness index error.

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The primary limitation of the Robustness Index (MDxBL diameters) is that it provides the area of a rectangle and, thus, overestimates molar occlusal area. Some have argued that the error should be about the same on all molars. Still others have decided that the error is simply too much and that the method should be disregarded. Given the intuitive and convenient way in which the Robustness Index (RI) expresses occlusal area, it merits the effort required to understand and improve its error before it is abandoned altogether.

The current study seeks to see if the RI error differs significantly between molars of different shape. A total of 144 maxillary and mandibular molars were sorted into six shapes defined by the relative size of their hypocone/hypoconulid (i.e., no, small, and large hypocone; no, small, and large hypoconulid). The "actual" occlusal area was determined for each molar by tracing the occlusal outline on a detailed digital image using ScionImage software (a derivative of NIHImage). Care was taken to insure that all images were in the same plane and to a corresponding scale. The RI error was then calculated for each of the six molar shapes. Analysis of Variance tests between the errors of each shape suggest rejecting the hypothesis that RI errors are the same for all molars. Of the maxillary molars, those with large hypocones were statistically distinct from those with small or no hypocones. Among the mandibular molars, those with no hypoconulids were statistically distinct from those with small or large hypoconulids. Regression-based formulae were then derived from the "actual" and RI areas. These formulae may hold promise for the future use of this method.

Locomotor modes of primates at moderate speeds. I. The implications of the amble and the canter for primate locomotor evolution.

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It is widely recognized that primates walk and gallop, but rarely use trotting gaits with a whole-body aerial phase. Previous researchers have suggested that at intermediate speeds, primates "amble". During an amble, forelimb and hindlimb contacts alternate, as in the walk but the forelimbs and hindlimbs experience an aerial phase, though not simultaneously. This lack of a whole-body aerial phase ensures that the body is always supported by at least one limb during the gait cycle. We examined how common this mode of locomotion is among primates using videotapes of 14 prosimian, platyrrhine, and catarrhine species. We found over 200 steps that could be categorized as an amble. In addition, we found that most primate gallops do not involve a whole body aerial phase, and thus could be classified as a canter. Both the amble and canter allow primates to maintain a secure hold on a substrate during locomotion and potentially lower peak vertical forces compared to gaits with whole body aerial phases. This conclusion supports Schmitt's (1995) contention that primates avoid trotting because of the high stresses that have been observed for this gait in other mammals. Maintaining a secure support and lowering substrate reaction forces may be important for locomotion on arboreal supports, particularly on thin and flexible supports. The regular use of the amble and canter by primates may have evolved in early primates to meet mechanical requirements necessary for moving at intermediate speeds on thin supports.

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Evolution of the prefrontal cortex: A stereological analysis of primate brain MRI scans.

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While it is well established that the human brain is ~3 times larger than expected for a primate of our body size, there is dispute over the extent to which the prefrontal cortex (which mediates a number of behaviors thought to be important to human evolution) has increased disproportionately. Semendeferi et al. (2002, 1997) have argued that the frontal lobe (of which the prefrontal cortex is a major subcomponent) is *not* relatively larger in modern humans, in contrast to earlier studies dating back to Brodmann (1912).

However, Semendeferi et al. use estimates of cortical volume, whereas the

earlier studies suggesting a disproportionate increase have used measures relating to cortical surface area. The volume/surface area distinction may be crucial because it appears that cortical surface area may be more behaviorally relevant than cortical volume. We measured both cortical surface area and volume using stereological techniques on a sample of primate MRI scans (obtained from the Yerkes Regional Primate Research Center; Rilling and Insel 1999) and a sample of modern humans. Both the entire cortex and prefrontal only (operationally defined as all cortex anterior to the corpus callosum) were analyzed. To avoid missing cortical surface hidden deep within sulci, surface area were estimated using the grey-white interface. A full statistical analysis of the relative differences in proportion of prefrontal cortex across primates is presented, for both volume and surface area. Preliminary indications from a subsample of chimp and human scans suggest relative increases in the anterior portions of the prefrontal in humans.

Insulin, gestational diabetes and maternal thrift.

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Hyperinsulinemia has been proposed as an adaptation that increases the efficiency of energy storage in an environment where there is feast or famine. 'Thrifty' individuals may be predisposed to gain weight, become overweight or obese and develop type 2 diabetes or other diseases related to hyperinsulinemia and insulin resistance. However, research often does not support this hypothesis. We examined the relationship of fasting insulin at entry to care (15.2 ± 5.3 wks gestation) in more than 800 women from Camden without pre-gestational diabetes. After control for potential confounding variables (age, parity, ethnicity, BMI, smoking, week gestation at entry to care) gravidas in the highest quintile of fasting insulin had significantly increased sum of skinfolds and a more central fat distribution (trunk/extremity ratio) than the others. They had a significantly higher rate of gestational weight gain and an increased risk of excessive weight gain for BMI (Adjusted Odds Ratio (AOR) = 1.56, 95% Confidence Interval (CI) 1.05-2.33), nearly a threefold increase in the risk of gestational diabetes mellitus (AOR=2.67, 95% CI 1.19-5.99) as well as significantly increased risks of new overweight (BMI>26) and new obesity (BMI>29) in the postpartum (4-6 weeks). Thus, preg-

nant women with high levels of insulin do evidence 'thrift', enhancing their own nutritional status while simultaneously nourishing a fetus. Unlike the situation in mature individuals where hyperinsulinemia limits weight gain, high levels of insulin early in pregnancy increase maternal energy stores at the expense of subsequent overweight, obesity and diabetes.

Terrestrial walking versus climbing in bonobos (*Pan paniscus*): Position of the center of mass and consequences for the locomotor behavior.

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Two major groups of theories exist on the precursor of habitual bipedalism in hominids, both primarily based on paleontological findings. On the one hand, the "terrestrial theories" postulate that bipedalism evolved from terrestrial quadrupedalism. On the other hand, the "arboreal theories" state that bipedalism originated from climbing, the latter being an exaptation for (eventually habitual) bipedalism.

In order to help evaluate current theories, we have recently started a project on the kinesiology of arboreal locomotion versus terrestrial locomotion in bonobos (*Pan paniscus*). Like all apes, bonobos are habitually arboreal, but they are also adept terrestrial walkers, both quadrupedally and bipedally. Together with chimpanzees (*Pan troglodytes*), they are the closest known relatives to hominids, but bonobos likely resemble the common ancestor better from a morphometrical point of view.

For walking and climbing, two separate set-ups were used, both allowing for synchronous recording of kinematics (50 Hz video) and of substrate reaction forces. These were measured by force platforms for terrestrial walking, and by a 4-m long, straight pole (12 cm diameter), partially instrumented with two 3D force transducers for incline walking and climbing.

During terrestrial quadrupedalism, weight is generally well distributed between the front and hind limbs, although this is variable and typically oblique to the walking direction. When the slope increases, the load shifts towards the feet. At a slope of 30°, locomotor behavior resembles terrestrial walking, although less oblique, including knuckle-walking and bipedalism. At 60°, bipedalism occasionally occurs, but locomotion is typically quadrupedal with grasping hands.

Bioarchaeology and sociobiology in the pre-Columbian Grasshopper Pueblo, Arizona.

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The skeletons of 246 children excavated at the Grasshopper Pueblo, a Mogollon pueblo community in the mountains of east-central Arizona, were studied to calculate the causes and the frequencies of deficiency and infectious diseases in the populations of three different large room blocks. These blocks were used for approximately 60-90 years during the 14th century. As a rule, the skeletons are very well preserved. They were investigated by macroscopy and low power microscopy. Pathological changes of the skulls and long bones were documented by measurements, photographs and drawings. To diagnose and to score the lesions, a new morphologic pattern was used. For this contribution, only the vestiges of diseases in the skull were examined.

The results are striking and characterize in limits different living conditions in the three room blocks of this pre-Columbian community that elucidate some aspects of pre-Columbian social life. There is evidence of different health pattern dealing with the frequency of deficiency diseases such as scurvy and anemia but also of infectious diseases such as inflammatory processes in the middle ear region and the paranasal sinuses. The expression and the frequency of the vestiges of meningeal reactions (e.g., inflammatory-hemorrhagic meningitis, epidural hematoma, irritation of the venous sinuses of the brain) show an interesting distribution within these three groups. On the other hand, there is, of course, also conformity in many aspects. Thus, the disease profiles are, for instance, very similar and group the Grasshopper population to the well-known pattern of other the pre-Columbian populations from the Southwest.

mtDNA variation in Central Siberians identifies West Eurasian and East Asian components of their gene pool.

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