

tive output in a group of male rhesus macaques, *Macaca mulatta*, from Cayo Santiago over six consecutive birth seasons in order to assess the magnitude of reproductive skew and to investigate its potential causes and consequences.

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## Olfactory Sensitivity for Androstenone in Three Species of Non-Human Primates

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Social communication by means of odour signals is widespread among mammals. In pigs, for example, the C19-steroid 5- $\alpha$ -androst-16-en-3-one is secreted by the boar and induces the mating stance in the sow. In humans, the same substance has been shown to be a major compound of body odour and is presumed to affect human behaviour. Using a conditioning paradigm, we determined olfactory detection thresholds for androstenone in four pig-tailed macaques (*Macaca nemestrina*), four squirrel monkeys (*Saimiri sciureus*) and three spider monkeys (*Ateles geoffroyi*). We found that all three species of non-human primates were able to detect androstenone at concentrations lower than those reported in pigs and humans. Additional tests, using a habituation-dishabituation paradigm, showed that none of the ten animals tested per species was anosmic to this odorant. These results suggest that androstenone may be involved in olfactory communication in the non-human primate species tested and that the specific anosmia for this odorant found in ~30% of human subjects may be due to the reduced number of functional olfactory receptor genes in humans compared to non-human primates.

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## Linear Dominance Hierarchy due to Contest Competition among Female Chimpanzees (*Pan troglodytes verus*)

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The study of social relationships among female chimpanzees (*Pan troglodytes*) has been regularly neglected, since chimpanzees are usually referred to as male-bonded. This is largely due to the fact that dominance relationships have commonly been found to be ambiguous among female chimpanzees and linear hierarchies have not yet been detected. Following the idea of the socio-ecological model, a linear hierarchy among female chimpanzees is expected when they face contest competition over food. Indeed, at one study site more dominant females had a higher reproductive success. This is expected if high-ranking females can obtain access to the best foods, enabling them to invest more energy in reproduction. We investigated food competition and relationships among 11 adult female chimpanzees in the Taï National Park, Côte d'Ivoire (West Africa). Females faced contest competition over food. The contest competition increased when either the food was monopolisable or the number of competitors increased. We detected a formal linear hierarchy among the

females based on greeting vocalisations, emitted by the subordinate towards the dominant female. Winning contests over food, but not the age of the chimpanzees, was related to dominance rank. Comparison among five different study sites revealed differences in the dominance relationships of female chimpanzees. It seems possible that these differences are affected by type of food competition and predation risk as well as observation time. However the comparison also supported the idea that Tai chimpanzees are bisexually-bonded.

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### **A mtDNA Phylogeny of *Papio***

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The phylogenetic relationships among members of the Old World monkey genus *Papio* are not clear and the taxonomic status of the various morphotypes is controversial. Five to nine morphologically distinct populations are recognized. Hybrid zones are confirmed for two population contact zones, but they are expected for almost all contact zones. We therefore inferred the phylogenetic relationships within the genus *Papio* from nucleotide sequences of the mitochondrial cytochrome *b*-gene (645 bp) and the hypervariable region I of the mitochondrial control region (340 bp) with special interest in the hamadryas-anubis relationships. We included samples from 11 regions in Africa and Arabia. DNA was extracted mainly from faecal samples and in a few cases from tissue of museum specimens. Maximum likelihood and maximum parsimony reconstructions revealed that phylogenetic relationships among *Papio* morphotypes are primarily explained by geography and only secondarily by morphological similarity. Eastern olive baboons (Ethiopia and Tanzania) form a clade with hamadryas baboons, while their western ‘conspecifics’ (olive baboons from Nigeria, Ivory Coast) form a clade with Guinea baboons. This points to secondary reproductive contact of olive baboons with their western and eastern sister taxa. Implications of the results on the taxonomic status of *Papio* morphotypes and on species concepts will be discussed.