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1 Mongrel Models and Seductive Scenarios of Human Evolution 1

Theories of human evolution have been biased by folk beliefs about the meaning of individual, sexual, and group differences in appearance and customs, and by world events, like warfare, and personal experiences of theorists. As apes became subjects of detailed study their behavior served variously to reinforce or refute notions of close similarity between them and us.

Part I: Terminology, Morphology, Genes, and Lots of Fossils

2 Apes in Space 15

Although the old argument about which nonhuman primates are closer to humans has settled on the apes, many puzzles remain regarding the extent to which we can draw on them as models for specific aspects of our variable genomes, morphology, and behavior. This chapter contains the vocabulary and features that are essential to explore our phylogenetic position vis-à-vis living apes.

3 Apes in Time 60

Rare major and many minor fossil discoveries underpin phylogenetic models of primate evolution over a ≥ 65 -Ma span of geologic time. A variety of refined geochemical and excavation methods allow ever more precise placement of specimens in time; however, small samples of fragmentary specimens and very patchy spatiotemporal representation usually limit their informational value.

4 Taproot and Branches of Our Family Tree 126

*The past century of field research has produced a trove of fossil specimens indicating that our Linnaean family, the Hominidae, contained a notable number and variety of species that is difficult to organize into phylogenetic lineages, only one of which terminated in modern *Homo sapiens*.*

Part II: Positional and Subsistence Behaviors**5 Apes in Motion 189**

Apes display highly diverse repertoires of locomotive behaviors that inspire models on the evolution of human anatomy. Chimpanzees, bonobos, and most gorillas engage in vertical climbing to move from ground to canopy, and orangutans and gibbons frequently climb up and down trunks and vines. Gorillas, chimpanzees, and bonobos knuckle-walk on the ground and on large horizontal branches. Gibbons, orangutans, and less frequently, chimpanzees and bonobos arm-swing (brachiate) beneath branches.

6 Several Ways to Achieve Erection 225

Modelers of the evolution of human obligate erect bipedal posture employed living apes to exemplify precedent behavior and anatomy upon which various selective forces acted to produce the human form, viz., brachiators and knuckle-walkers, closely resembling chimpanzees. Instead, a small-bodied vertical climbing, bipedal branch-running ape is a more likely model because similar lower limb mechanics are involved in vertical climbing and human bipedal walking.

7 Hungry and Sleepy Apes 261

The daily food quest and need for secure lodge trees affect the ranging patterns of all ape species. They prefer fruits; however, during fruit shortages they are remarkably versatile in accommodating to a wide variety of vegetal and animal foods. Great apes build arboreal nests at night. Gorillas, chimpanzees, and bonobos sometimes also rest in ground nests during the day. Like Old World monkeys, gibbons roost in trees on ischial callosities (sitting pads).

8 Hunting Apes and Mutualism 304

All apes ingest invertebrates inadvertently or via active searches. Chimpanzees and, to a lesser extent, bonobos are notable for capturing small and medium-sized mammals. Chimpanzees also engage in infanticidal cannibalism. The extent to which chimpanzee hunting is cooperative is arguable, as is the relation between food sharing and mating behavior in chimpanzees and bonobos.

Part III: Hands, Tools, Brains, and Cognition**9 Handy Apes 331**

Unlike human hands, which are free of obligate locomotive functions, ape hands are evolutionary compromises serving various locomotive activities, grasping, and fine manipulation, including tool making and use. Their hands are highly sensitive, which allows them to feel fruits for ripeness and to engage in social grooming. Fossil hominid hands before 1.5 Ma retain features that would facilitate arboreal climbing.

10 Mental Apes 355

Scientists employ a diverse array of approaches and devices to explore the structure and functions of outsized human brains in comparison with those of apes. There is general consensus that apes possess self-awareness and think about situations and actions, albeit not comparable to or necessarily on the same basis as those underpinning human cognitive abilities.

Part IV: Sociality and Communication**11 Social, Antisocial, and Sexual Apes 397**

Apes are a rich resource for theorists who model emergent hominid and early human social structures. Gibbons are attractive to those who believe that human monogamy is deeply rooted in the past. Orangutans are usually ignored because adults do not form stable groups. Gorillas and especially chimpanzees are favorites of persons who emphasize male dominance and aggression, while bonobos are preferred by modelers who view our apish ancestors living in quasi-egalitarian societies with notable female agency.

12 Communicative Apes 507

Laboratory studies revealed that great apes can learn to communicate with humans and one another via sign language and non-iconic symbols. Their natural vocalizations offer fewer clues to a system of communication that might have been used by early hominids. There is notable disagreement about when fully human language emerged and the sequence of events that culminated in it.

Part V: What Makes Us Human?**13 Language, Culture, Ideology, Spirituality, and Morality 569**

Humans live in a symbolic niche: virtually everything we say, do, create, and make is consciously or unconsciously dependent upon symbols. Although many other animals probably think about proximate situations, humans have beliefs about phenomena and relationships. Humans have social and moral codes, while apes are probably amoral. Their survival and perhaps that of our species ultimately depends upon us.

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