

It is a fact that man is an animal, but it is not a fact that he is nothing but an animal. . . . That he alone is capable of making such a judgment is in itself part of the evidence that this decision is correct.

GEORGE GAYLORD SIMPSON, evolutionist

Chapter Two

The Making of Man

Hunting, Competition, and Family

Weston La Barre

The first human revolution should perhaps be called the "Hunting Revolution," for it is in relation specifically to hunting that prehumans first became human. . . .

The relative *size* of the hominid hunter and his prey is important. . . . Evidently our savanna-waif happened to be agile enough to become a hunter, but he was not big enough or otherwise equipped to go it alone, and hence in his new adaptation he remained . . . a *social animal* that developed speech. His accidental size is important here: if the hominoid somehow could have become a lone hunter and had ditched his primate gregariousness, he would surely never have developed speech and would probably be no more loquacious than a nest-pilfering, solitary orangutan.

Hunting has its bearing also on relative size in human sexual dimorphism. Among mammals only the carnivores, including man, are food-sharers, and compact animal protein high in calories is a good basis for group

food-sharing only in *prey of sufficient size*. . . . Fruit-picking needs no special sexual dimorphism; but in our male hunting-hominid, would not relatively larger bones and muscles [and] greater vital capacity . . . be also selective factors in such a context—but not applicable to the female? . . . In any case, food-sharing in hunters *reinforces* primate gregariousness and facilitates greater male interdependency. Not only this: hunting larger and more formidable meat prey itself *requires* and *gives selective advantage* to a closer primate gregariousness. . . .

Given the greater male strength in human dimorphism, the solitary human female is vulnerable to any sexual encounter. Can we not see in this situation the roots of male dominance, sexual possessiveness, "family" protectiveness toward the female too, and a necessity for some sort of rules and relative exclusiveness in sexuality?—for hunting males need social cooperation, which uncoded sexuality would tend to disrupt. The very predicaments of social living require complex communication than that available in "closed" . . .

grunts, if this new hominid band-, family-, and food-ecology is going to persist! . . .

Human "frontal" sexuality has if anything increased the significance of diffuse "play"-sexuality and symbolic body gesture already plentiful in prehuman social primates. If a large brain is needed not only for symbol-using language *but also for cortical control and inhibition* of instinctual impulses—because of that indispensable protohuman food-ecology, the problems of band life, sexuality, etc.—we can see still further selective usefulness in the large brain. Conflicts within the group between adult and immature males are disruptive of the socializing process; but resolution of the problems rests on cortical dominance *and* delayed sexual maturity *and* family- or group-exogamy—which last may have an important bearing on the change from "closed" to "open" communication systems which the linguist should attend to. Specifically, human sexuality, with family-exogamy . . . is part of the total universe within which human speech arises.

One minor "linguistic" problem troubles me. It is a curious fact that although the human ear is most sensitive to sound at a frequency around 3000 cycles per second, that is, minimal amplitudes can be heard at this frequency—whence the "piercing" quality even from far-off of a high-pitched scream from a woman or a child—nevertheless, the energy in the speaking voice, no matter whether it is that of a man, a woman, or a child, is mainly in frequencies below 1000 c.p.s. Ordinary talk simply does not exploit the frequencies we are most sensitive to, as if communication were not *that* important or as if we left that channel open, reserved for emergencies like high-pitched screams. I would hazard a guess that primate tree-calls are high-pitched and quite close to the optimal wave-lengths of the species' hearing. But in humans there is a problem. What protohuman Federal Communications Commission decreed a frequency band separation between "closed" and "open" system communication? Whence the massive flattening of speech-

frequencies in man? Or did speech not arise out of "closed" primate call-systems after all, but rather from the lower frequencies of feckless play-chatter, where speech has remained ever since?

Norman J. Berrill

How did the [australopithecine] man-apes make their living and what kind of social and family organizations did they have? . . .

I am no hunter. Yet I cannot imagine a more ridiculous situation than first of all establishing myself as a dominant male with even a small harem coveted by other men and then going off in a spirit of comradeship on a hunt for large game. The two are about as incompatible as they can possibly be. You cannot concentrate upon the hunt and watch your wives and some sneaking males at the same time. Under such circumstances meat-eaters have to choose between a full stomach and a full house and there is little doubt that once the hunting era of mankind commenced, no matter how apish the hunters were, the system of over-aggressive and dominant males became a liability and the small human family with its monogamous bond took its place. For this was the only kind that could survive both as a breeding unit and as a hunting group either adequate by itself or capable of cooperating with other groups. Adult males undoubtedly must have worked together in the hunt for food and for protection of the group, at least to some extent, as they do in the case of both howling monkeys and wolves, and this by itself would have weeded out the most selfishly aggressive and uncooperative, paving the way or reinforcing the trend toward monogamous mating.

It is an old problem of nature that crops up all the time: how to integrate the egocentric male into society to the benefit of all concerned. In this case the old fashioned male dominated by his own chemistry, the slave of lust and anger, is less successful in propagating a race capable of survival than a male content with one female and able to control his emo-

tions for cooperation in the hunt or in defense. In this sense we are more akin to the wolf than the baboon, for a wolf family is like the human and the male is intelligent, cooperative and solicitous. All of these qualities are selected in the course of time as leading to increased chances of survival and reproduction when pack hunting is the means of obtaining food. The most intelligent and the most cooperative are the most likely to survive and be in a position to continue the breed, and their offspring are more likely to be like themselves than like those that failed to reach maturity. So it was that the brain expanded forwards under pressure, generation by generation, and that it did so rapidly suggests that the pressures were extreme. . . .

During most of the mammalian time, from its beginning some seventy million years ago until late Miocene or early Pliocene, the world climate was warm from pole to pole. . . . Near the end of the period however there is evidence of definite climatic cooling in the northern hemisphere, intimations of the first great glacial advance of the Pleistocene, that chilly period which lingers with us yet.

Long before the ice caps started to form and reach toward the equator climatic zoning became extreme. The tropics narrowed. Temperate regions became extensive and sharply defined. Northern regions became more or less uninhabitable. . . . Except for the narrowed tropical belt and its marginal territories which persisted as an asylum for those that couldn't change to meet the new conditions, most of the earth became an arena for those of fleetier foot or great adaptability. Instead of subsisting on the rich platter of lizards, insects, eggs, tropical fruit, and juicy roots the choice was restricted to flesh or grass. If you couldn't adjust to these then you either retreated towards the equator with the tropical vegetation or you failed to produce or raise your young in sufficient numbers and so took the path to extinction. Our ancestors were among those that rose to the challenge and such were the circumstances that made our foreheads begin to bulge.

Our brains, apart from sheer size, differ from those of apes and other folk in what lies well to the front of the central groove, and in front of the broad belt of cortex associated with the control, sense and memory of muscular actions. Most of this distinctive region that sets us apart appears to be connected with the planning of future performance and with conceptual thought, although I do not mean that this is where the planner or thinker sits; many of us in fact spend hardly any time there at all. Yet certain small areas concerned with muscle control lie farther forward than the rest: those that control the locked movements of the pair of eyes and, on one side particularly, those concerned with the articulation of speech. As human beings we are forever using our eyes as instruments for the measuring of shapes and movements, recording them unconsciously at the time and in memory as infinitesimal actions of our own; and we communicate with one another by means of speech, employing a combination of voice sound and facial gesture to serve as symbols of what is within the mind. Between the two the brain and the mind have grown. . . . The eye brain goes back to the ape, but true speech is new and more than anything else, perhaps, has made us human. How did we acquire it? . . .

The beginnings of true speech cannot be divorced from the situation which evoked it. Both the internal and external requirements were complex, but if I had to select the outstanding feature of each I would say it was a loose tongue within and a lot of grass without. And the grass comes first! . . . Grasslands open to the sun and the wind offered opportunity to those that could take it, and during the Pliocene they grew vastly in extent as the climate became cooler and drier. Yet it is not so simple to eat grass as you might think. . . . Grass is rich in abrasive silicates and new types of grazing mammals evolved with harder and more complex teeth for cropping it. For such as these the grasslands offered abundant food, but with no forest cover to hide in their only escape from the pursuit

of the great cats and dire-wolves was speed. Antelopes and horses and other two- and one-toed grass eaters arose that could run like the wind when danger approached. These became the most abundant kind of game and this abundance was undoubtedly the bait that drew incipient humans into the open. . . .

Who did the hunting? Only those who were fast on their feet, nimble with their hands, quick to see and hear, and above all able to cooperate wholeheartedly with one another in the chase or trapping and capture of an animal. . . . The dull of wit and uncooperative went hungry and left fewer progeny than the others to carry on the race. It was more important to obtain meat on the hoof than to take advantage of male lust or female heat or to indulge in vengeful anger on all other males. Groups that retained the old harem system either quickly died out or kept on as long as they could scrounging for food in the old fashioned way. . . . The future faded for those in whom the sex hormones continued to govern but opened for those whose brains assumed an over-riding control of emotional reactions. . . . No other grouping can be seen to work under the new conditions: only complete cooperation between a man and a woman and their children serves to keep them alive, with all who can cooperating in obtaining meat and with the father cooperating with the mother in raising and training their offspring.

The human family, like that of the wolf, is in origin a hunting family, with monogamous mating, and intelligence and solicitude in training the young to hunt with the parents. Cooperative within the family, these early humans could have cooperated as hunting packs of larger and more effective size, as wolves do too, for cooperation once established tends to spread; but always at the base of it lies the intimate and intelligent interplay within the family, between male and female, mother and infant, father and young. Here is the home of man and the cradle of speech. . . .

The early humans, armed only with wits

and hands and what they could make of them, had to communicate or die. Communications of intent and strategy of forthcoming action made the difference between success and failure, between eating or not eating, between being eaten and not being eaten, between living and not living. Communication of patterns of thought, of symbols for objects and actions, was vital in the training of offspring to act like their parents and to continue the patterns in their turn. Speech in fact grew where it grows today, in the close bondage of infants and children with both male and female parents. The facial expressions and vocal noises unconsciously made with every action and emotion took on definite and meaningful association in the intimacy of family gatherings where faces are close and can be read. Without the family I believe there would have been no speech, and without grass I doubt if the family as we know it would have come into being. Without grass and the game it has supported we would have had little need for elaborate communication and our jaws would not have had to widen and our chins to grow out to make room inside for our tongues to wag in. And as the tongues wagged, so the brain grew.

Desmond Morris

In addition to becoming a biological (as opposed to a cultural) killer, the hunting ape also had to modify the timing arrangements of his eating behaviour. Minute-by-minute snacks were out and big, spaced meals were in. Food storage was practised. A basic tendency to return to a fixed home base had to be built in to the behavioural system. Orientation and homing abilities had to be improved. Defecation had to become a spatially organized pattern of behaviour, a private . . . activity instead of a communal . . . one. . . .

One outcome of using a fixed home base is that it makes parasitization by fleas possible. I also said that carnivores have fleas, but primates do not. If the hunting ape was

unique amongst primates in having a fixed base, then we would also expect him to break the primate rule concerning fleas, and this certainly seems to be the case. We know that today our species is parasitized by these insects and that we have our own special kind of flea—one that belongs to a different species from other fleas, one that has evolved with us. . . .

Because of the extremely long period of dependency of the young and the heavy demands made by them, the females found themselves almost perpetually confined to the home base. In this respect the hunting ape's new way of life threw up a special problem . . . the role of the sexes had to become more distinct. The hunting parties . . . had to become all-male groups. If anything was going to go against the primate grain, it was this. For a virile primate male to go off on a feeding trip and leave his females unprotected from the advances of any other males that might happen to come by, was unheard of. No amount of cultural training could put this right. This was something that demanded a major shift in social behaviour.

The answer was the development of a pair-bond. Male and female hunting apes had to fall in love and remain faithful to one another. . . . It solved three problems in one stroke. It meant that the females remained bonded to their individual males and faithful to them while they were away on the hunt. It meant that serious sexual rivalries between the males were reduced. This aided their developing co-operativeness. If they were to hunt together successfully, the weaker males as well as the stronger ones had to play their part. . . .

What is more, with his newly developed and deadly artificial weapons, the hunting ape male was under strong pressure to reduce any source of disharmony within the tribe. Thirdly, the development of a one-male-one-female breeding unit meant that the offspring also benefited. The heavy task of rearing and training the slowly developing young demanded a cohesive family unit. . . .

In this way, the females were sure of their males' support and were able to devote themselves to their maternal duties. The males were sure of their females' loyalty, were prepared to leave them for hunting, and avoided fighting over them. And the offspring were provided with the maximum of care and attention. This certainly sounds like an ideal solution, but it involved a major change in primate socio-sexual behaviour and . . . the process was never really perfected. It is clear from the behaviour of our species today that the trend was only partially completed and that our earlier primate urges keep on re-appearing in minor forms.

This is the manner, then, in which the hunting ape took on the role of a lethal carnivore and changed his primate ways accordingly. I have suggested that they were basic biological changes rather than mere cultural ones, and that the new species changed genetically in this way. You may consider this an unjustified assumption. You may feel—such is the power of cultural indoctrination—that the modifications could easily have been made by training and the development of new traditions. I doubt this. One only has to look at the behaviour of our species at the present day to see that this is not so. Cultural developments have given us more and more impressive technological advances, but wherever these clash with our basic biological properties they meet strong resistance. The fundamental patterns of behaviour laid down in our early days as hunting apes still shine through all our affairs, no matter how lofty they may be. If the organization of our earthier activities—our feedings, our fear, our aggression, our sex, our parental care—had been developed solely by cultural means, there can be little doubt that we would have got it under better control by now, and twisted it this way and that to suit the increasingly extraordinary demands put upon it by our technological advances. But we have not done so. We have repeatedly bowed our heads before our animal nature and tacitly admitted the existence of the complex beast that stirs within us. If we

are honest, we will confess that it will take millions of years, and the same genetic process of natural selection that put it there, to change it. In the meantime, our unbelievably complicated civilizations will be able to prosper only if we design them in such a way that they do not clash with or tend to suppress our basic animal demands.

Richard D. Alexander

Donald W. Tinkle

It is a significant step forward that the questions receiving attention today are not *whether* man evolved but *how* he evolved. Doubt seems no longer to exist in the minds of reasonable and knowledgeable persons that man is a product of evolution—a result of the same basic process that has produced all life. A major consequence of this realization is that whatever characteristics may be construed to be uniquely or most decidedly human are thereby automatically categorized as producible through natural selection.

If the size of his brain is used as the chief index to man's evolutionary divergence . . . then there seem to be at least three major puzzles concerning man's evolution from a nonhuman primate:

1. How could his brain increase in size so rapidly from australopithecine to modern man (50–150,000 generations)?
2. What caused the increase in brain size to go so far beyond that of all other primates?
3. What caused the brain apparently to stop increasing in size some 50–100,000 years ago? . . .

Let us consider the basic process by which natural selection operates. First, it always involves competition between alternate genetic elements within species. Even in . . . competition [between species], evolution occurs as a result of some variants within one or both species outreproducing the other variants. Although selection actually works through favoring certain individual organisms,

the result is change in gene frequencies in populations.

There seem to be three possible kinds of intraspecific competition or three different levels of intensity at which selection can operate on alternative genetic elements:

1. Differential reproduction without direct interaction, and no confrontation between competitors.
2. Partial or complete exclusion of competitors from the best (or only) sources of food, mates, and shelter through aggressiveness and territoriality.
3. Elimination of competitors or potential competitors by killing them. . . .

The questions we would ask about man's evolution are (1) which kinds of competition were involved, (2) which were most likely predominant, and (3) what were the sizes and compositions of the units among which each kind of competition operated? In other words, which operated only among individuals and which among social groups, such as families, of different sizes and complexities?

Differential reproduction without direct competition occurs in every species of organism, whether or not the other forms of competition also occur. Exclusion of competitors through aggression or some form of territoriality is widespread among animals with complex behavior . . . and may be universal among such organisms during times when food, shelter, or mates are in short supply. Nearly all modern primates seem to be territorial.

Killing of competitors and cannibalism are rarely observed, and it is usually difficult to obtain evidence whether observed cases represent evolved functions or incidental effects resulting from some other kind of selective action. Few animals seem to be cannibalistic—none as much as man's fossil record suggests was the case during his evolution. . . .

The chances seem remote that man evolved without a significant amount of in-

traspecific aggression occurring continuously and, in fact, guiding his evolution to some extent. We would go further and agree with [others] that a more elaborate and extensive array of intraspecific aggressiveness may have been involved in man's evolution than in that of any other animal. This is not to say that any particular kind or instance of human aggression at present may not have grown out of a purely cultural context. We are simply agreeing that, during a long period—perhaps all—of man's evolution, aggressive behavior was directly favored by selection. Under these circumstances there must have been increases in the frequency of many genes that increased the effectiveness of aggression. As with most other human traits, and all human behavior, it is difficult to understand the developmental and hereditary basis of aggressive behavior in any individual or any particular instance; selective action on such a trait must operate in exceedingly indirect fashions. Aggressiveness may easily be modified by culture, and discernible variations in aggressiveness based on genetic differences may be rare or absent among men today. These facts, however, cannot be used to deny the possibility of a genetic background for either the general intensity and quality or the prevalence of aggressiveness in humans. . . .

Let us take a closer look at what early man was presumably like in order to understand better the significance of the above suggestions. Sometime during his early evolution man became more carnivorous than any modern primate. He hunted his food, and this would have placed a selective premium on individuals capable of improving their weapons, their bipedal locomotion, and their ability to hurl weapons at elusive prey.

Up to this point, there may have been relatively mild selection favoring larger brains (by which is implied—properly, we believe—more complex brain function). Cooperation among individuals of a family in hunting could have favored effective communication systems which would have, in turn, allowed for passing on more cultural informa-

tion to offspring. Such families, with the favorable genetic endowment of larger brains and thus better ability to absorb and remember past experiences and to associate cause and effect relationships, must have been better hunters and also better at transmitting to offspring the benefits of experience. There must also have been sexual selection in the same contexts, for it would certainly have been to the advantage of females to choose among potential mates those whose intelligence and hunting prowess would cause the maximum survivorship of their offspring.

One way or another, family groups evidently increased in size, consisting of more than a pair of adults, and perhaps in some cases three generations of individuals, all of which had more in common, both genetically and culturally, than they had with members of other such groups. . . .

As males in family groups aged, they would be unable to maintain dominant positions. However, it may have been of advantage to younger members of the group to tolerate such individuals, thereby benefiting from their experience and wisdom. Such behavior would not only select for long adult life but make for greater cohesiveness between generations and cause groups to increase in size without fragmentation and to persist longer. Cooperation between parents and grandparents might allow surer recognition and encouragement of offspring in culturally transmissible skills such as tool making and hunting. It could free younger adults for hunting and other essential activities, and it would allow a longer period for passing on the accumulated culture to each successive generation. Such processes as these should rapidly incorporate into a stable and long-persisting group not only genes for greater intelligence but also any useful cultural attributes introduced into the group. . . .

The social structure of early man was also probably conducive to the development of elaborate intraspecific aggression. Each family group would have differed from every other one in cultural as well as genetic traits, to a degree depending upon its stability and

cohesiveness. The individuals of such groups were surely able to recognize members of their own group, and, further, to recognize some of their closer relatives (at least their own offspring) within the group. Direct aggression between family groups could have resulted in rapid shifts in gene frequencies in the population as a whole. On the other hand, altruistic behavior toward other individuals within groups would also have been favored by selection, both because of the necessity of belonging to a group and because it would result in the favoring of genetically related individuals. . . .

Elaborate parental behavior, which includes both recognition of relatives and a kind of altruism (toward one's offspring), and elaborate aggressive and territorial behavior go hand-in-hand in a wide array of animals. They are almost universally linked. It seems to us that man's altruistic tendencies, as well as his aggressiveness, could have been favored by ordinary natural selection. . . .

Let us consider in more detail the extent and nature of intergroup aggression in early man. As a result of spatial isolation of family groups and an exclusive kind of social organization such as occurs in many primates (and man) today, each family group would have been to a large extent a gene pool and micro-culture of its own. Different groups might be expected to have varied in average intelligence, in the degree of intragroup cooperation, and in the nature of weapons, hunting ability, and experience.

If shortages of essential commodities such as food and shelter were the rule, then when groups contacted one another, we suppose that one usually attacked the other, killing the males and possibly the young, and appropriating the females. The successful band in these battles could accumulate experiences increasing the probability of success in subsequent encounters. Repetition of intergroup interactions should select for greater intelligence, increasing aggressiveness between groups, and, simultaneously, increasing cooperativeness and altruism within each group.

In short, we visualize a situation in man's early hunting ancestry in which reproductive individuals characteristically lived in groups, and in which some groups, possessing higher frequency of individuals of greater intelligence, were able by intragroup cooperation and communication to exterminate and replace adjacent groups.

To return now to the three questions given at the outset, we believe that man's brain size increased so rapidly and diverged so far from the brains of other primates (1) because man's chief competitors all during his evolution were other men and (2) because the competition was of a most direct and extensively aggressive sort, an increasing amount of it operating between family groups of growing size and complexity and with increasingly effective cultural transmission. We believe that brain size stopped increasing when culture became so elaborate and social groupings so large and complex that recognition of allies largely lost its association with degree of genetic relatedness. The result would have been a re-direction of altruistic behavior previously directed toward genetic relatives until its selective advantages were reduced or nullified. As a result, genetic variations reflected in variations in brain size or complexity would largely lose their selective advantage, and evolutionary increases in brain size would level off. . . .

The story of man's evolution [thus] seems to have been that of individuals becoming able to recognize themselves as members of larger and larger groups of increasing complexity of social organization. The altruistic tendencies of man most likely arose directly out of the interplay between increasingly elaborate intergroup aggressiveness and intragroup cooperativeness originating in parental behavior; the same process was more than likely fundamental in the rapid evolutionary increase in man's brain size. Man's tendency to become involved in wars was almost surely directly favored by selection for a long period of his evolution and, therefore, in some important sense, is not a kind of degenerate or degraded behavior resulting from civilization.

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PAUL B. WEISZ Professor of Biology, Brown University

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ALEXANDER, R. D., AND D. W. TINKLE

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