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Letter From the Desk Of David Challinor
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Cannibalism and incest are two activities which, although relatively rare, exist in almost every group of vertebrates and invertebrates. These practices trigger revulsion in most humans and the proscription against them is reinforced by strong cultural taboos. This letter will consider some of the biological advantages and disadvantages of cannibalism and incest and will speculate how such behavior might have evolved in the first place.

From an evolutionary perspective, these twin proscriptions are logical because close inbreeding from incest often leads to genetic bottlenecks, which in turn produce physical and behavioral handicaps among the too-closely related offspring. Two examples of unwanted results from excessive inbreeding in mammals are the high percentage of abnormal reproductive cells in cheetah, and polydactylism (more than five digits) and hemophilia in inbred humans.

Why cannibalism developed in certain species is unclear.[1] Starvation might be one incentive, and stress may also be a contributing factor, especially among confined breeding mammals such as rats, mice, mink and fox. In the wild, however, it exists in some remarkable forms. For example, among Tiger salamanders there are two types of newly hatched young: one has mouth parts suitable for feeding on small invertebrates, and the other has a modified mouth with enlarged teeth to prey on its conspecifics (animals of the same species). The proportion of the latter in a newly hatched salamander population is directly related to the density of related hatchlings in the pond. Cannibalism in this case might have developed as a means of population control, but it is hard to see how individual selection could produce this behavior.

Scientists study cannibalism by looking for behavior that would benefit the practitioners; in this case, the eater and the eaten. From the latter's perspective, the benefit would be, to say the least, hard to imagine. The victim could be behaving altruistically by offering itself as food to a sibling, although this seems ridiculously farfetched. The cannibal, in turn, might recognize its own kin and avoid eating them. Preying on unrelated conspecifics seems more likely. If the latter is the case, then the cannibal would theoretically have to determine the relatedness of its prey before eating it and, unless the

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[1]Pfennig, D.W. (1977). Kinship and Cannibalism. Bio. Sci. 47(10):667-677.

identification was instantaneous, the prey might escape. Such an added cost of recognition, however, seems superficial. Scientists can only speculate on how these behaviors interrelate in a population, but it seems that the cannibal's principal benefits are acquiring an easy meal and eliminating a competing conspecific.

Insects, birds and mammals that practice cannibalism have evolved ways of identifying kin so as to avoid eating them when possible. Certain insects and frogs produce infertile eggs to feed their newly emerged young; a case of merely providing accessible protein (as in egg yolk) or, to stretch a point, a nutritional substitute for a live sibling. A problem remains, however, among those few species that seem to prefer eating their own kin. Explanations for this behavior are hard to find because how could individuals be selected for this trait? The victim can scarcely offer itself altruistically as food to its cannibal kin.

Although the costs of inbreeding resulting from incest have been long known, the costs of cannibalism are generally not as obvious. Eating a conspecific puts the consumer at risk of infection by pathogens and parasites already well-adapted to the species. In humans one of the best known examples of such disease transmission is kuru, the mysterious ailment that caused nerve degeneration among some tribal groups in New Guinea. The affliction was often fatal and although the precise path of transmission is not certain, the disease seemed confined to those groups that practiced cannibalism. The risk of infection from ingestion of conspecifics would seem to be a strong selection force against cannibalism and may help explain its rarity among most animal species. Even under food stress, when some animals kill conspecifics to reduce food competition among nestlings (e.g., bee-eaters, boobies, *et al*) or littermates (spotted hyenas), the victims are not generally eaten.

Similarly, humans kill conspecifics. They war endlessly to reduce competition for everything from land to language to religion. The victor generally enjoys a brief surfeit of goods, dominance or whatever else triggered the conflict, but in most cases the victim, unless exterminated, recovers, thereby renewing the incentive to compete lethally again. Fortunately, cannibalism among humans is now so rare as to be virtually non-existent. Reports exist of ancient ritual consumption of certain organs of a particularly valiant foe which were thought to imbue the victor with the victim's bravery, strength, or fighting ability. Hard evidence of this practice is elusive, however. The Aztecs, for example, excised the hearts of sacrificed humans, which they ritually offered to their sun god, but there is no confirmation that the hearts were eaten.

An account of a recent cannibalistic incident appears in Piers R. Read's book, Alive: The Story of the Andes Survivors, Avon (1979). The survivors of a plane crash high in the Andes stayed alive by consuming the muscle tissue of their dead colleagues. They were all members of a rugby team and their faith in each other and in their eventual rescue enabled them to break the taboo.

Incest had a religious justification during the Ptolemaic Dynasty in Egypt (323-30 B.C.). Ptolemy I, the founder and general of Alexander the Great, unified Egypt. After his death the Egyptians declared him a god. His successor, Ptolemy II, also a god, married his sister, Arsimoe II. According to legend, a god could only marry a goddess, which thereby limited the ruler to marrying a sister; five of his successors married their sisters. The royal line ended with Ptolemy XIII, who ruled jointly with his sister Cleopatra VII until they were defeated and dethroned by Julius Caesar.

Incest and cannibalism are thus rare behaviors among most animal species because the disadvantages from an evolutionary perspective seem to be considerably greater than the advantages. Among humans the proscription against these two practices is culturally enforced by taboos, but it also has a sound evolutionary basis. The taboos are effective, and reports of such behavior generally cause revulsion among most people. However, there is virtually no practice so bizarre that some people have not tried it during human history.

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