On the Evolution of Fighting Behavior

The symposium published under the intriguing title, **The Natural History of Aggression** (published for the Institute of Biology by Academic Press, New York, 1964. 167 pp., $5), edited by J. D. Carthy and F. J. Ebling, attempts to trace the evolutionary history of fighting behavior in the animal kingdom. Since behavior leaves no fossils, the results are of necessity somewhat speculative. The most important paper in the volume is K. R. L. Hall's review of aggression in monkey and ape societies; Hall's paper is based on extensive and recent field studies and includes some of the best factual information now available and that which has the most direct relevance to human behavior.

One of the major findings of the primate studies is the great diversity of behavior exhibited by different species, and this raises the question of man's basic nature, not as a super-animal, but simply as another species of primate. Hall concludes that the closest parallels to human behavior are found among baboons. In well-organized societies living under natural ecological conditions, baboons very seldom show any actual fighting between themselves. The baboon troop is so organized by dominance and subordination that young subordinate males are usually found on the periphery of the group and are the first to come into contact with predators. Once an alarm cry is given, all adult males make a collective attack on the predator. Under natural conditions separate baboon societies either avoid each other or, if it is necessary to drink from a common water hole, show mutual tolerance. On the other hand, if a disorganized group of strange male baboons is forced together in captivity, intense and destructive fighting takes place. Hall concludes that the expression of aggression in this and other primate groups cannot be meaningfully considered apart from the detailed ecological context.

The papers by Harrison Matthews and Konrad Lorenz emphasize the more general biological finding that there is a tendency in all social animals to evolve formal modes of intraspecific fighting which ordinarily result in little harm to the combatants. This is particularly striking in the highly social carnivores such as lions and wolves, but many examples are seen in other vertebrates, including fish, reptiles, birds, and mammals. The occurrence of destructive fighting within a species tends to be extremely rare.

The remainder of the symposium proceedings rests on much more controversial grounds. Many of the papers are no more than informed opinions, by experts to be sure, but frequently expressed about matters that lie outside their own areas of competence. For example, Derek Freeman, an anthropologist, takes most of his evidence from history in order to show that man is capable of extraordinary cruelty, and he finds the explanation in psychoanalysis. Stanislav Andreski, a sociologist, ventures into history to find the origins of war, and Anthony Storr, a psychiatrist and presumably competent in dealing with the behavior of individuals, comments instead on possible substitutes for this most complicated form of group fighting.

One of the least satisfactory parts of the discussion relates to the physiological and motivational bases of aggression. Arnold Klopper gives a very brief review of the role of the adrenal glands, the most recent reference being 1959, and barely mentions the extensive research on the effects of the male hormone. He concludes that adrenal functions appear to be a result rather than a cause of emotional and motivational states. Most of the others follow Freud and Lorenz. To quote the latter, "There can be no doubt, in the opinion of any biologically-minded scientist, that intraspecific aggression is, in Man, just as much of a spontaneous instinctive drive as in most higher vertebrates." There is, at least in this biologically minded scientist, a very considerable doubt about both the adequacy and accuracy of this statement. The concept of a "drive" is at best a symbol of an unknown group of internal stimuli and physiological mechanisms affecting behavior. All that we know (and this comprises a considerable body of information in certain species) indicates that the physiological mechanisms associated with fighting are very different from those underlying sexual behavior and eating. There is no known physiological mechanism by which spontaneous internal stimulation for fighting arises. Rather, the physiological mechanisms for fighting are triggered by immediate external stimuli. There is much evidence that fighting can be suppressed by training while the physiological mechanisms are operating, and, on the other hand, that fighting can be induced by training in the absence of these physiological mechanisms.

Other striking omissions from the symposium are adequate references to the enormous literature on the phenomenon of dominance and subordination, and on the very large part that experience and training play in the development of this means of social control of fighting. There is no mention of the important effects of genetics on fighting, apart from vague general references to "instinct." There is no reference to the importance of the primary socialization process in the control of aggression, except for Lorenz's suggestion that aggression is somehow responsible for the formation of social bonds, apparently based on the fact that social fighting often occurs in animals that have close social bonds. A much simpler explanation, of course, is that both of these behaviors are dependent on a common capacity for recognition of individuals, and Lorenz's hypothesis neglects the fact that species with the greatest tendencies toward aggression have the weakest social bonds. Probably all that is implied here is that animals which develop close social bonds must also develop and evolve capacities for the control of aggression.

In general, the biologists who took part in this symposium tend to be too timid or too bold in their attempts

to relate the natural history of aggression to human problems. For example, the ornithologist James Fisher gives an excellent review of instances of conflicts between different species of birds occupying the same habitat and comes to the conclusion that the more similar the two species or subspecies are the more likely they are to fight, just as they would members of their own species, and that the more dissimilar they are the more likely they are to be tolerant. J. A. King [*Proc. Am. Phil. Soc.* **98**, 327 (1954)] has obtained a similar result between like and unlike breeds of dogs. Yet Fisher concludes that this is just like the race problem, where increased dissimilarity is associated with increased aggression. Similar paradoxical conclusions are found in many of the other papers. If biologists wish to be taken seriously in their attempts to relate animal sociology to human sociology, they must become more generally knowledgeable and base their contrasts and comparisons on sound factual and theoretical information.

As scientists begin to make detailed and repeated studies of animal societies under natural conditions, certain general results begin to appear. One is that a well-organized animal society in a natural habitat shows very little harmful and destructive fighting, even under conditions of great stress, as when attacked by a predator or subjected to general starvation. On the contrary, such societies exhibit behavior that would in human terms be called cooperative and even altruistic. Destructive fighting *does* appear when social disorganization is brought about by forcing strange individuals together and confining them in unfamiliar habitats. This suggests that one major general cause of human destructive behavior is social disorganization rather than some hypothetical and supposedly incurable "drive." If this is correct, it is a curable and controllable phenomenon.

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Memoirs 1, 2, and 3, American Entomological Institute

The hymenopterous family Ichneumonidae, which is estimated to contain nearly 10,000 species in North America alone, is one of the largest, and evolutionally one of the most complex, taxa among the insects. Its members are parasitic on other insects and related arthropods, and the group should attract a wide interest because of its great and primarily beneficial economic importance. Until recently, however, there has been an almost total lack of adequate systematic literature on these wasps so that the many exciting problems which they offer to all areas of biological research have been difficult of access for want of a reliable means of identifying the species, or even the genera, in question. Therefore the present contributions—**A Catalogue and Reclassification of the Indo-Australian Ichneumonidae** (1961, 526 pp., $14.50) by Henry Townes, Marjorie Townes, and Virendra K. Gupta; **Ichneumon-Flies of America North of Mexico: 4. Subfamily Gelinae, Tribe Hemigasterini** (1962, 309 pp., $9.50) by Henry Townes and Virendra K. Gupta; and **Ichneumon-Flies of America North of Mexico: 5. Subfamily Diplazontinae** (1964, 308 pp., $9.50) by Clement E. Dasch—are especially welcome because they are systematic and bibliographic works of the highest quality, designed to lessen the most fundamental difficulties encountered in studying the Ichneumonidae. The monographs are published by the American Entomological Institute (5950 Warren Road, Ann Arbor, Michigan).

In Memoir No. 1, *A Catalogue and Reclassification of the Indo-Australian Ichneumonidae*, the area covered is the Oriental and Australian zoogeographic regions that extend from southeast Asia through the East Indies and the Pacific islands (south of Japan) to Australia and New Zealand. For this area the authors have cataloged each described species together with all references that add new information rather than merely quoting previously published sources. Geographic range is given and hosts are listed where known. But the volume is not simply a compilation of names and references. In the great majority of cases Townes has examined the types of the species treated, so that each form is assigned to its genus and each synonymy is established on the basis of his own unique knowledge of the Ichneumonidae. Only by this effort could a rational and useful classification be attained. The characters used in ichneumonid taxonomy have changed so radically during the last few decades that the descriptions of earlier authors are mostly worthless for locating their species in the modern system. A vast amount of new information on adult and larval morphology as well as on the life histories of the Ichneumonidae has here been synthesized to produce a classification in which the tremendous phyletic diversity of this numberless family is more nearly reflected and more astutely analyzed than in any of its predecessors.

Many will criticize Townes, however, because he does not follow certain rules of the International Commission on Zoological Nomenclature. He believes that nomenclature should be based only on taxonomic and bibliographic facts. He does not recognize, therefore, the principle of *nomina conservanda*. I admire Townes's courage in maintaining those names that by clear right of priority ought to be used in a perfectly objective system of nomenclature. Only time can tell whether his system will prevail for the Ichneumonidae, but it should be pointed out that it is Townes who has done, and who is doing, the fundamental work on this family, the work that all future students must make their guide. It may perhaps be questioned whether these students, whatever their attitude in general toward the International Commission, will not follow Townes