

Subhuman and Human Fighting

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I

Can the study of animal fighting contribute anything to the understanding of human warfare? Clearly some students have believed that it can. But largely they have concerned themselves with the causes of aggressive behavior in the individual animal and with the possibility that similar causes may operate in man. Thus both Quincy Wright (1942) and John Cohen (1946) in their rather differently organized studies of human warfare consider animal fighting on the assumption that the sorts of drives or frustrations that cause animals to become aggressive may also lead to aggressive behavior in human beings. Among students of animal behavior, Hebb and Thompson (1954) suggest that the primate capacity for boredom is related to the problem of human warfare, while J.P. Scott (1958) finds in the capacity of mice and other animals to learn aggressiveness, or not to learn it, some hope for the ultimate control of human aggressiveness. I think most anthropologists would probably agree that the study of animal fighting is relevant to the study of the biological or psychological basis of human aggressiveness.

On the other hand, there seems to have been little written in recent years relating animal fighting to human warfare as such. War is generally defined as conflict between organized groups of men. It is asserted that intraspecific fighting among animals (except for some species of ants) is not organized and is rarely lethal, and therefore animal warfare (excepting the ants) does not exist (Cohen, 1946, p. 111; and Swanton, 1943, pp. 3-4, take this position; Wright deliberately extends his definition of warfare in order to include animal fighting but apparently does so mainly to examine the drives leading to aggressive behavior.) Or it is asserted that since not all human groups know warfare,

then warfare is not an inheritance from man's subhuman past, but is rather an invention — a part of the culture of most but not all of mankind (Swanton, *op. cit.*; Mead, 1940). From this argument one can take the position that, war being culturally determined and animals being without culture, comparison is futile. I suspect that this comes close to being the position of many of my fellow cultural anthropologists and they would therefore be reluctant to regard any particular kind of animal fighting as comparable or analogous to any particular form of human fighting. However, recent developments in the field of animal studies that has come to be called ethology suggest to me that the question of comparisons ought to be reconsidered.

Ethology is the comparative study of animal behavioral systems. The ethologists attempt to study animal behavior under natural conditions rather than in the laboratory and they have, as Tinbergen (1955, p. 85) has pointed out, concerned themselves much more than have the experimental psychologists with the questions: "How does the behavior contribute toward survival? How has the behavioral equipment of each species developed in evolution?"¹ Without meaning to detract at all from the value of laboratory experiments on animal behavior and the importance of these for the understanding of the biological and psychological bases of human behavior, I would like to confine this paper to some of the implications of the ethological approach. In particular I would like to discuss some of the forms of animal fighting as described by the ethologists, especially Tinbergen (1953, pp. 57-71), and to suggest how they might be related to forms of human fighting.

II. *Types of Animal Fighting*

Among subhuman animals, fighting may occur (1) between members of different species or (2) between members of the same species. Interspecific fighting may occur in (1a) predation and defense against predators or (1b) competition for the same ecological niche. Intraspecific fighting may occur (2a) between

¹ See also Lorenz's question, "You must ask yourselves what the survival value of fighting is?" (LORENZ, 1957, p. 182).

members of separate social units ("reproductive" or "territorial" fighting) or (2b) between members of the same social unit ("peck-order fighting"). This may not be an exhaustive typology but it seems sufficient as a basis for this discussion. Let us now look at these forms of animals fighting in the order just given.

1a. Predation and defense against predators of course does not always take the form of fighting. Usually the prey seeks to escape by flight, by withdrawal into an inaccessible position, or by making itself inconspicuous. Some animals may be taken in flight by predators without putting up any resistance, but others will fight when cornered with whatever means they have. The sharp teeth of rodents and the sharp hooves of deer have developed primarily for other purposes but can also serve as weapons of defense. Some animals, like the porcupine and the armadillo) have developed special means of protection and so usually need not engage in actual combat to defend themselves. A few, like the skunk, have developed special weapons of defense and thereby, through becoming offensive in a non-military sense, have become undesirable as prey. And a few species, like some of the larger herbivores, have developed cooperative methods of defensive fighting.

Generally, within any relatively closed and stable ecological system, the capabilities and the numbers of predators and prey are probably closely interrelated. If, in the course of evolution, the prey becomes increasingly fleet or evasive, then the predator must either improve its methods or change its prey. But if the predator should become more efficient and take a greater number of the prey, then the predator too would have to change, by either becoming fewer in number itself or by broadening its hunting habits to include other kinds of prey. The evolution of the weapons of predators and of the defenses of prey are conditioned by the requirement of ecological balance.

1b. Fighting among competitors for the same ecological niche is probably rare. Herbivores of different species may graze peacefully together. Carpenter (1942, p. 191) reports seeing howler monkeys feeding peacefully in the same trees with capuchin monkeys, gibbons with siamangs and with macaques, and

macaques with langurs. Competition between such species is generally a matter of out-eating and out-breeding. There may of course also be advantages in such associations. However, inter-specific fighting does occur among some species of birds that require similar nesting sites when these sites are limited in number, as for example, holes in trees or back-yard bird-houses. Such fighting is probably rarely if ever lethal, but its ultimate effect may make for differential survival. It is partly because of its success in competing for nesting sites that we can almost say that the sun never sets on the English sparrow.

Carnivores or different species may also fight. Adolph Murie in his study *The Wolves of Mount McKinley* reports (1944, pp. 204-207, 219-221) that while usually wolves and grizzlies occupy the same range without taking much notice of each other, grizzlies will dispossess wolves of their kills if they have the opportunity. The wolves may try to defend their food but can only harry the bear, which lunges back but not fast enough to do any harm — at any rate in the incidents observed neither bears nor wolves were hurt. Wolves and foxes may also visit each other's caches. The foxes apparently object only vocally when the wolves visit them and rob the wolves' caches only by stealth. The wolves also use old fox dens by enlarging them. Since the wolf is a better hunter and the fox a better digger, the relationship between the two, Murie suggests, may be one of mutual gain.

2a. "Reproductive fighting" is the term Tinbergen (1953, p. 57) uses for the sort of fighting that occurs between members of the same species particularly in the breeding season. It is, he says, the most common form of fighting among animals. It occurs among very many species and in many different ways. Different animals fight in different ways, mammals with teeth and with antlers, birds with beaks and wings, fish with jets of water. But even though such fighting is frequent, it is rarely lethal. Usually it is more threat or bluff than actual attack. Moreover, all bluffing is not merely visual; it may consist of sounds, as of songbirds, or even scents, as with dogs and bears. Furthermore, this kind of intraspecific fighting is generally limited to one sex. In most species males fight males. In some

species females fight females. And in a few species both sexes fight but males attacking males and females females. "All this shows," Tinbergen concludes (p. 60), "that fighting is aimed at reproductive rivals."

Reproductive fighting is also limited as to place. Each animal usually fights within a limited territory. Many nest-buildings birds and nest-building fishes defend a territory around the nest. Or perhaps it would be more accurate to say that the male bird or fish establishes and defends the territory in which the nest is built. In one fish, the bitterling, it is clearly the nest and not the territory as such that is defended; the nest is in fact a fresh-water mollusk and when it moves the bitterling moves with it. Similarly, among deer the moving females may be the center of territory defended by the male. Defense of territory, whether fixed or mobile, against members of the same species and of the same sex is thus the most usual form of reproductive fighting.

Several students of animal behavior have stressed the functions or adaptive value of this widespread principle of territoriality Tinbergen, among others, sees (1953, pp. 61-62; 1957) defense of territory functioning principally as a "dispersion mechanism". It results in the spacing-out of members of a population, ensuring that food, nest sites, and mates, and cover from predators are used more efficiently than they would be if there were greater sharing. "Spacing out makes the individuals utilize the available opportunities." (Tinbergen, 1953, p. 62).

But while spacing out can have survival value for a population, the fighting that results in this spacing out would be non-adaptive or dysfunctional if it led to a high rate of mortality or if it occupied the combatants for such long periods of time that they failed to reproduce or fell prey to predators. Thus to be adaptive, reproductive fighting must be limited in duration and amount of damage done. And so it is. Usually the male of a nest-building species of fish or bird establishes his territory, responds, aggressively to the presence of another male of the same species, fights courageously when near the center of his own territory, pursues with caution at the edge of his territory,

and becomes a coward after entering the territory of his rival. The fighting itself, as I have already indicated, consists more of threat of bluff than of actual physical attack, and is rarely lethal.

Through experiment it has been shown that males of both fish and birds react aggressively not to any intruder, not to any member of their own species, but simply to males of their own species. Moreover, the experiments have shown that the fish or bird reacts innately (without having been taught to react) to very particular features seen in the rival. A male stickleback defending its territory will attack a crude model of another male if the model has a red underside, but reacts less to a more realistic model without the red underside. Similar experiments have been made with birds. (Tinbergen, 1953, pp. 66 ff.) Such narrowly restricted stimuli serve to restrict intraspecific fighting, and this restriction in turn has a survival value for the species. Tinbergen has called these stimuli or signals "releasing mechanisms".

The ethologists have concerned themselves mainly with reproductive fighting in fishes and in birds. What of mammals? Is intraspecific fighting among mammals aimed at reproductive rivals and associated with the principle of territoriality? Evidently not among all species, but certainly in some. The female of the European rabbit defends a territory around her burrow against other females during the breeding season, as do the females of several of the smaller rodents (Bourlière, 1954, pp. 97-98). Male deer, as I have already mentioned, defend moving territories around harems of females. Bull sea lions defend harems on breeding rocks during the period of reproduction (*op. cit.*, pp. 240-241). According to a study made by G. W. Bradt, a beaver colony, which may consist of up to a dozen individuals sharing a nest and body of water and maintaining a dam, actually consists of a monogamous pair of adults and their juvenile offspring of the last one or two litters. The adults are intolerant of others of reproductive age and drive out the young when they approach maturity. (Bradt, 1938, cited in Bourlière, 1954, pp. 236-237).

Among some other mammals, however, the local group that defends its territory consists of more than one mated pair and

their young. In anthropological circles, undoubtedly the best-known examples of this situation are provided by some of the primates. C. R. Carpenter, in his famous study of howler monkeys in Panama, discovered that the howler social unit consists of, on the average, three adult males, eight adult females, and seven or so young. This social unit has a clearly defined territory which it defends against outsiders, principally by making a great noise, the usual sub-human primate substitute for actual fighting between groups. Carpenter writes (1942, pp. 203-4):

"In howlers and gibbons, marked evolutionary specialization has occurred in organs for sound production. In these arboreal types, through the medium of calls, intergroup social behavior may be coordinated over distances of more than a mile through dense tropical forests. The most conspicuous vocalizations of howlers and gibbons relate to the inter-group exchanges and particularly to the possession and maintenance of territorial ranges. Coincident with the approach to, or entry of, the territory of one howler group by another, the barking roars of this species are normally exchanged between the two groups. A truly vocal battle between the males of the groups, supported by whines of females and young, ensues and continues usually without actual fighting, until one group retreats. Most often the retreat is made by the encroaching group, *i.e.*, the home team usually wins. The territory is defended and inter-group dominance is asserted through the medium of strong and persistent sound production."

After discussing similar habits among the gibbons, Carpenter goes on to say; "These relatively loud inter-group calls of monkeys and apes in natural groups serve as a sound buffer which substitutes for, or actually prevents, fighting which would often result in the wounding and killing of group members."

Clearly this is very like what Tinbergen has called "reproductive fighting" in fishes and in birds. It is mostly bluff. It serves to maintain boundaries without being lethal and thus detrimental to the population as a whole, and very likely the consequent spacing out has a survival value for the population

as a whole. But is howler howling directed toward reproductive rivals? The presence of more than one adult of each sex within the social unit might suggest that it is not — that howler defense of territory has nothing to do with reproduction. But if we look more closely at Carpenter's description of the howler social unit, we see that it is a kind of breeding unit, a kind of family. Sexual activity occurs throughout the year. Each female, during her estrous period, mates with each of the males in turn. Carpenter calls this "a type of *rotating mateship*" (p. 196). He suggests that the fairly constant ratio of males to females is, among other things, an expression of "a balance between the summed female sex needs or capacities in a group and the sexual capacities of the effective males available to satisfy the needs." If these two factors are not balanced, he suggests, a balance will be effected by ejecting surplus males from the group or absorbing surplus males from other group (pp. 182-183). It seems then that the maintenance of boundaries between howler social units can be seen as a form of reproductive fighting.

The social unit among other sub-human primates differs of course from species to species. The gibbon unit is clearly a monogamous family, the chimpanzee and the gorilla units seem to be polygynous families. The baboon unit is said to be a troop consisting of a number of harems each under an overlord; the social ties between these subdivision, however, are not clear.²

Let us consider briefly one more mammal that lives in social units with territory — the wolf. Wolves have an annual mating season, are monogamous, and yet form social units of more than one mated pair. Murie summarizes (1944, pp. xv-xvi) his observation as follows:

² Since this paper was written S. L. Washburn and Irven DeVore have reported some of the results of their field observations of baboon troops in "The Social Life of Baboons," *Scientific American*, June 1961, pp. 62-71. These observations contrast strongly with the earlier view, based on observation in captivity, on the baboon troop as brutally dominated by harem-holding "overlords." It appears that sexual relations are actually closer to the rotating mateship of the howlers and that, as with Lorenz's jackdaws, the highest ranking individuals defend the lowest against those in the middle.

"A wolf family at a den on East Fork River was closely observed during two denning seasons. In 1940 there were five adult wolves at the den — the parents, two males, and a female. After these animals left the den, two other males joined them. In 1941 the den was occupied by the same pair; the second female mated with one of the extra males and had her own den. She later brought her pups to the original den and the two families lived together. The wolves generally rested at the den during the day and hunted at night, but some hunting was also done during the day. Food was brought to the den by the parents and the other adults. The wolves were unusually friendly among themselves, and the pups played with all the adults.

The 1940 group of seven adults and five pups traveled together during the fall and winter. They were last seen together on March 17, 1941. None of the 1940 young was observed at the 1941 den. They traveled readily over a home range known to be at least 50 miles in diameter.

Two other wolf families were observed. In one of these there were three adults with the pups."

Murie suggests (p. 25) that the presence of extra adults in the wolf "family" is an outcome of the close association of wolves in hunting and the advantage for the parents in having help in feeding the pups. While the pups were young the extra adults helped by hunting with the father while the mother stayed at the den with the pups, by bringing food back to the den for the mother and the pups, and by pup-sitting — on three occasions Murie observed the extra female stay with the pups while their mother went happily off on a night's hunting expedition with the males (pp. 29-30). However, in spite of such cooperation and friendly relations (among individuals not united by mateship) within the group, hostility may be usual between strangers. Murie observed one incident when the group drove off a strange wolf, attacking and wounding it (pp. 43-44). Also, I. McT. Cowan, writing on wolves in the Canadian Rockies, reports (1947, p. 154) that "fierce fights sometimes take place during the mating season", which is probably late March or early April. One such fight resulted

in the death of one male. It is not clear whether such fights are between members of the same group, but if so it might explain the springtime loss of some of the members of the pack observed by Murie and the shift in dens the second year. Reliable data on wolf social organization are scarce. I give these here because I believe that they are of very great significance to problems that we are concerned with. More of this later.

Let me now give one last example of an animal society. The jackdaws described by Konrad Lorenz (1952, pp. 128-180) seem to have formed a social unit that defended itself collectively against predators but not against other jackdaws. Strangers apparently enter the group without group opposition but must establish a position in the internal hierarchy, which may involve individual fighting.

2b. This brings me to the fourth type of animal fighting, fighting within the social unit. This is what has been generally called "peck-order" fighting, because it generally results in the formation of a "peck order", a hierarchy within the group. Different species of course differ in the amount of actual fighting required to maintain such a hierarchy and in the rigidity of the hierarchy and social distance between its members. As Carpenter has pointed out, the New World monkeys are much less hierarchical than the Old World monkeys. A hierarchy may be a simple series, a triangular arrangement (where A pecks B, B pecks C, but C pecks A), or, as among Lorenz's jackdaws, it may be a more complex arrangement where high-ranking individuals peck only those immediately below them but defend the lower ranks against those of intermediate position. Among jackdaws there is the added complication that a female assumes the rank of her mate, so that a low-ranking lady jackdaw, upon becoming the fiancée of a male of high rank, was able to bully her former betters with impunity.

Peck-order fighting may also be related to defense of territory. Carpenter (1942, pp. 193-4) found by experiment with rhesus monkeys that if the dominant male were removed from a group, its territorial range become reduced. He concluded that the freedom of the group to move throughout its

territory depended on the dominance of its number one male relative to the most dominant males in neighboring groups.

Fighting to establish a peck-order, like reproductive fighting, must not be too destructive. Too many mortalities or even too much time taken up with threatening behavior would be disadvantageous. But enough hostility to establish a hierarchy may be advantageous in that it creates a social unit. The advantages of social organization need not be defended here. But we ought to remember that, as Tinbergen has pointed out (1953, p. 71), peck-order relationships are by no means the only basis for social organization. Mutual feeding, mutual grooming, cooperation in the food quest — these are some others.

In concluding this portion of this paper, which has been a sketchy presentation of forms of animal fighting, I would like to suggest that what is most needed for any more systematic study is a better typology of animal societies. This in turn may have to wait for better field studies, especially of mammals.³

III. *Human Fighting*

Let me now turn to fighting among human beings and suggest a few comparisons with fighting among subhuman animals. First, we must note that fighting between men must be defined biologically as intraspecific fighting since all men are biologically of the same species. However, we ought to begin by considering conflict between men and other species. Here we can see in man's activities counterparts of the forms of interspecific fighting that I discussed for other animals — predation and defense against predators and fighting to eliminate competitors for the same ecological niche.

1a. Man is, of course, a predator and has been one since before evolving into his present form. Moreover, man is a

³ I have ignored the social insects here because of limitations of time and space, not because I regard their behavior as less relevant. For suggestions as to the relevance of the study of insect societies see EMERSON, 1958.

social predator. And therefore, as Carveth Read pointed out many years ago and A. Kortlandt has recently pointed out, the prototype of human society may have had more in common in some respects with the wolf pack than with the frugiverous monkey troop or ape family.⁴

Like other animals man may, and certainly did in the past, use the same weapons for both inter — and intraspecific fighting. In speaking of other animal predators, I suggested that the evolution of more efficient means of predation may be limited by ecological factors. In an environment that will support only a certain number of game animals the predator who becomes a more efficient hunter may pay for his greater efficiency by a reduction in his own numbers. This kind of ecological limitation may have operated on human populations wholly or largely dependent on hunting. Is it too farfetched to suggest that the prolonged childhood and consequent slower rate of reproduction of man arose as an adaptation to his increased efficiency as a hunter? At any rate, there may be limitations on the evolution of weapons among hunting peoples. For food-producing peoples, however, and that means for a large portion of mankind since the Neolithic, this has no longer been true. A horticultural people can develop more efficient means of hunting and go ahead and exterminate the game in its environment without endangering its own food supply, as many peoples doubtless have. For food-producing peoples, the withdrawal of evolutionary pressure against the development of too great an efficiency in weapons of the chase may have had important implications for the evolution of weapons of war. On

⁴ Read, 1920; KORTLANDT, n.d. Also WASHBURN and AVIS, 1958, discuss the psychological, social, and territorial effects of a hunting way of life upon man's ancestors. It seems to me that in our search for the conditions that made the appearance of culture possible, if we confine ourselves too closely to primates we may miss certain necessary conditions that develop more readily in a hunting way of life. For example, SAHLINS (1959) lists five advances over prehuman primate society made by man's ancestors in the early evolution of human society. One of these, sharing and cooperation in the food quest, is unquestionably found among pack-hunting carnivores; another, the division of labor by sex and the establishment of the family on that basis, may exist in rudimentary form among some carnivores that hunt in pairs, such as lions, or may possibly be seen in the pup-sitting of Murie's wolves.

the other hand, for food-producing peoples, the decreased need for game means less evolutionary pressure for better weapons.

1b. Besides attacking other animals as a predator, man also attacks competitors. On the whole he is less tolerant of competitors than are other animals. Perhaps this is because he more clearly recognizes them as such. But we might also recall that carnivores seem generally less tolerant of competitors than herbivores. I think there is an interesting question here: why is a pack of wolves more jealous of its kill than a troop of monkeys is of the fruit tree it happens to be feeding in? Is it merely the size and distribution of the edible objects? Or does the energy exerted to catch the game make the difference? I suspect the answer to this question might tell us something of the growth of human concepts of property.

But of course the human fighting that concerns us most is intraspecific. Looking now at the conflict of man against man, we can see some forms of human behavior that are comparable to intraspecific fighting among animals and others that are not. Let us first consider fighting within the social unit.

2b. "Peck-order fighting" has its analog in the fighting for status within the group that occurs in some Eskimo groups, perhaps in some other primitive communities, and certainly in some segments of Western society. But this is probably rare. Hierarchies established by peck-order fighting among other animals serve to form social groupings that may be of mutual advantage and such hierarchies also serve, by giving each individual a recognized place, to reduce the amount of actual fighting — once the relative positions are established, gestures of threat and of submission may be substitutes for further fighting. Among human animals social units are maintained culturally through the assignment of different roles according to age, sex, and kinship. In those sorts of social relations where individuals can compete for status they usually do so in activities of value to the group, or in the manipulation of symbols, or in both — since these two are likely related. But it might be fruitful to compare this use of symbols in man with animal gestures of dominance and submission. In those cases where actual fighting does occur to establish or maintain a hierarchy

of individuals among human beings, it might also be fruitful to ask whether having a physically strong individual in highest rank does not give some advantage to the group.

2a. "Reproductive fighting" among other animals seems in several respects comparable to human warfare. It generally occurs in relation to territory. It generally occurs between members of the same sex. It seems especially comparable to warfare in those primitive societies where numerous small groups live in a state of actual or potential hostility. Under such conditions warfare is often conducted according to rules recognized by all sides. Its objectives appear to be symbols of glory rather than loot or territory. Speier (1952, p. 227) says of this kind of fighting (which he calls "agonistic"), "Measured in terms of destruction such a fight is highly inefficient and ludicrously ceremonious."

The function of such warfare is often assumed to be simply the expression of social values and consequent strengthening of social solidarity. But is it not possible that this type of warfare has the same spacing-out function that reproductive fighting has among other animals? Can the hostile human groups be seen as simply units within a larger population for which the spacing-out effect of hostility has adaptive value? Looking at the controls that natural selection has placed upon time, duration, and mortality in reproductive fighting among other animals, we need not be surprised by the ceremonial conduct and low mortality of this type of human warfare. The alternatives to mass slaughter, such as the taking of a single head or the "counting of coup", seem comparable to threat behavior in other animals. The values attached to such symbols of courage then may be compared with Tinbergen's innate releasing mechanisms — such as the red belly of the male stickleback — in that they both serve to limit the actual fighting.

It seems to me that this sort of interpretation is possible for some kinds of warfare among human groups who are at the same level of technological development and who, because they alternate hostility with intermarriage, form in fact a single interbreeding population. But when one group of human beings has a radically superior weapon or type of military organization,

then warfare seems to become something much more like inter-specific fighting among other animals. Certainly in some parts of the world Europeans have eliminated native peoples in the same manner in which they have eliminated non-human predators or competitors. Is this degree of cultural differentiation comparable to speciation in biology? As I have already suggested, there may be evolutionary pressures operating against the development of greater efficiency of weapons in other animals but not in food-producing societies of men. Freed of such limitations, some groups of men have become able to prey upon others, sometimes necessarily maintaining the fiction that they are separate species. But this sort of inter-group relationship seems happily to be less frequent today than at any time within the last few centuries. Now, as more and more nations become industrialized and even come to possess some of the various "ultimate" weapons, we may again have in inter-group relations something comparable to intraspecific fighting where, for the survival of the total population, threat and bluff will have to be substituted for actual fighting.

IV. Conclusion

A paper such as this cannot have any very clear and precise conclusions. I think it is enough to say that the comparison of *behavioral systems*, subhuman and human, can lead to the formulation of new questions about such a perennial activity as human fighting. My purpose in this paper has been to raise some of these questions.

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BIBLIOGRAPHY

- BOURLIÈRE, François, *The Natural History of Mammals*. New York, Knopf (1954).
- BRADT, G.W., "A Study of Beaver Colonies in Michigan," *Journal of Mammalogy* 19 (1938): 139-62.
- CARPENTER, C.R., "Societies of Monkeys and Apes." In "Levels of Integration

- in *Biological and Social Systems*," Edited by Robert Redfield, *Biological Symposia*, Vol. 8 (1942), pp. 107-204.
- COHEN, John, *Human Nature, War, and Society*. London, Watts and Co. The Thinker's Library, No. 112 (1946).
- COWAN, Ian McTaggart, "The Timber Wolf in the Rocky Mountain National Parks of Canada". *Canadian Journal of Research*, D. 25: 139-174. National Research Council of Canada (1947).
- EMERSON, Alfred E., "The Evolution of Behavior among Social Insects," In *Behavior and Evolution*, Edited by Anne Roe and G.G. Simpson. New Haven, Yale University Press (1958). pp. 311-335.
- HEBB, D.O., and THOMPSON, W.R., "The Social Significance of Animal Studies," In *Handbook of Social Psychology*, Edited by Gardner Lindzey, Vol. 1, pp. 532-561. Cambridge, Addison-Wesley (1954).
- KORTLANDT, A., *English Summary of "Tussen Mens en Dier" ("Between Animals and Man")* ... (Inaugural lecture given when taking up the post of lecturer in animal psychology at the University of Amsterdam). Four mimeographed pages available at the Darwin Centennial Celebration, Chicago. (1958).
- LORENZ, Konrad, *The Role of Aggression in Group Formation*. Group Processes, Fourth Conference, pp. 181-252. New York, Josiah Macy Foundation (1957).
- MEAD, Margaret, "Warfare is only an Invention — Not a Biological Necessity," *Asia*, August 1940, pp. 402-405.
- MURIE, Adolph, *The Wolves of Mount McKinley*. United States Government Printing Office, Washington (1944).
- READ, Carveth, *The Origin of Man and his Superstitions*. Cambridge, University Press (1920).
- SAHLINS, Marshall D., "The Social Life of Monkeys, Apes and Primitive Men," *Human Biology* 31 (1959) 54-73.
- SCOTT, John Paul, *Aggression*. Chicago, University Press (1958).
- SPEIER, Hans, *Social Order and the Risks of War; Papers in Political Sociology*. New York, G.W. Stewart (1952).
- SWANTON, John R., "Are Wars Inevitable?" *Smithsonian Institution, War Background Series*, No. 12 (1943).
- TINBERGEN, N., *Social Behavior in Animals, with Special Reference to Vertebrates*. London, Methuen (1953).
- *Psychology and Ethology as Supplementary Parts of the Science of Behavior*. Group Processes, First Conference, pp. 75-167. New York, Josiah Macy Foundation (1955).
- WASHBURN, S.L., and AVIS, Virginia, "Evolution of Human Behavior," In *Behavior and Evolution*, Edited by Anne Roe and G.G. Simpson, pp. 421-436. New Haven, Yale University Press (1958).
- WRIGHT, Quincy, *A Study of War*. Chicago, University Press (1942).