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Fighting between members of the same species is almost universal among vertebrates, from fish to man. Casual observation suggests the reason: Animals of the same kind, occupying the same niche in nature, must compete for the same food, the same nesting sites and the same building materials. Fighting among animals of the same species therefore serves the important function of "spacing out" the individuals or groups in the area they occupy. It thereby secures for each the minimum territory required to support its existence, prevents overcrowding and promotes the distribution of the species. Fighting also arises from competition for mates, and thus serves to select the stronger and fitter individuals for propagation of the species. It is no wonder, then, that herbivores seem to fight each other as readily as do carnivores, and that nearly all groups of vertebrates, except perhaps some amphibians, display aggressive behavior.

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A growing body of evidence from observations in the field and experiments in the laboratory, however, points to the conclusion that this vital mode of behavior is not learned by the individual but is innate in the species, like the organs specially evolved for such combat in many animals.

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A complete investigation of fighting behavior must take account, however, of another general observation: Fights between individuals of the same species almost never end in death and rarely result in serious injury to either combatant. Such fights, in fact, are often highly ritualized and more nearly resemble a tournament than a mortal struggle. If this were not the case - if the loser were killed or seriously injured - fighting would have grave disadvantages for the species. The animal that loses a fight is not necessarily less healthy or less viable; it may simply be an immature animal that cannot withstand the attack of a mature one.



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All-out fights between animals of the same species do occur, but usually in species having no weapons that can inflict mortal injury. Biting animals that can kill or seriously injure one another are usually also capable of quick flight. They may engage in damaging fights, but these end when the loser makes a fast getaway. They may also "surrender," by assuming a submissive posture that the winner respects. Konrad Z. Lorenz of the Max Planck Institute for the Physiology of Behavior in Germany has described such behavior in wolves and dogs. The fight begins with an exchange of bites; as soon as one contestant begins to lose, however, it exposes its vulnerable throat to its opponent by turning its head away. This act of submission immediately inhibits further attack by its rival. A young dog often submits by throwing itself on its back, exposing its belly: a pet dog may assume this posture if its

master so much as raises his voice. Analogous behavior is common in birds: a young rail attacked by an adult turns the back of its head - the most sensitive part of its body - toward the aggressor, which immediately stops pecking.

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Most animals depend neither on flight nor on surrender to avoid damaging fights. Instead they engage in a ceremonial struggle, in the course of which the contestants measure their strength in bodily contact without harming each other seriously.



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The ritualization of fighting behavior assumes critical importance in contests between animals that are endowed with deadly weapons. Rattlesnakes, for example, can kill each other with a single bite. When male rattlesnakes fight, however, they never bite. Charles E. Shaw of the San Diego Zoo has described the mode of combat in one species (Crotalus ruber) in detail.— The two snakes glide along, side by side, each with the forward third of its length raised in the air. In this posture they push head against head, each trying to force the other sideways and to the ground, in accordance with strict rules reminiscent of those that govern "Indian wrestling." The successful snake pins the loser for a moment with the weight of his body and then lets the loser escape. Many other poisonous snakes fight in a similar fashion.

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Among mammals, the fallow deer (Dama dama) engages in a particularly impressive ceremonial fight. The rival stags march along side by side, heads raised, watching each other out of the corners of their eyes. Suddenly they halt, turn face to face, lower their heads and charge. Their antlers clash and they wrestle for a while. If this does not lead to a decision, they resume their march. Fighting and marching thus alternate until one wins. What is notable about this struggle is that the stags attack only when they are facing each other. A motion picture made by Horst Siewert of the Research Station for German Wildlife records an occasion on which one deer turned by chance and momentarily exposed his posterior to his opponent. The latter did not take advantage of this opportunity but waited for the other to turn around before he attacked. Because of such careful observance of the rules, accidents are comparatively rare.

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Mountain sheep, wild goats and antelopes fight similar duels with their horns and foreheads, the various species using their horns in highly specific ways. From observation of clashes between rapier-horned oryx antelope (Oryx gazella beisa) and other African antelope, Fritz Walther of the Opel Open-Air Zoo for Animal Research concludes that the function of the horns is to lock the heads of the animals together as they engage in a pushing match.



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Until field observations of this kind had accumulated in support of the innateness of fighting behavior, laboratory experiments had made a strong case for the notion that such behavior is learned. Experiments by J.E. Scott of the Roscoe B. Jackson Memorial Laboratory in Bar Harbor, Me., had indicated, for example, that a rat or a mouse reacts aggressively toward another rat or mouse primarily because of pain inflicted by a nestmate early in life. Scott suggests that aggressiveness should therefore be controllable by a change in environment; in other words, rats that have had no early experience of pain inflicted by another rat should be completely unaggressive.

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In sum, the experiments demonstrate that aggressiveness is aroused in adult male rats whenever a stranger enters the territory, even when the defender has had no painful experience with members of its species. Similar experiments on polecats (Putorius putorius) have shown the same results.

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To test this conclusion I raised male Norway rats in isolation from their 17th day of life, an age at which they do not show any aggressive behavior. When each was between five and six months old, I put another male rat in the cage with him. At first the hitherto isolated rat approached the stranger, sniffed at him and sometimes made social overtures. But this never lasted long. The completely inexperienced rat soon performed the species-specific combat display - arching his back, gnashing his teeth, presenting his flank and uttering ultrasonic cries. Then the two rats pushed, kicked and wrestled, standing on their hind legs or falling together to the ground. Sometimes the fights ended at this point, the rat that landed on his back giving up and moving away. But usually the rats went on to exchange damaging bites. The patterns of display tussling and biting were essentially the same in the case of the inexperienced rats as in the case of those

who had been brought up with other rats and were faced by an outsider.



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The view that aggressiveness is a basic biological phenomenon is supported by physiological studies of the underlying neural and hormonal processes. Some investigators have actually elicited fighting behavior in birds and mammals by stimulating specific areas of the brain with electrical currents. The mind of a newborn animal is not a blank slate to be written on by experience. Aggressive behavior is an adaptive mechanism by which species members are spaced out and the fittest selected for propagation. Learning is no prerequisite for such behavior, although it probably has an influence on the intensity and detailed expression of aggressiveness.

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In this connection, it should be emphasized that aggressiveness is not the only motive governing the interaction of members of the same species. In gregarious animals there are equally innate patterns of behavior leading to mutual help and support, and one may assert that altruism is no less deeply rooted than aggressiveness. Man can be as basically good as he can be bad, but he is good primarily toward his family and friends. He has had to learn in the course of history that his family has grown, coming to encompass first his clan, then his tribe and his nation. Perhaps man will eventually be wise enough to learn that his family now includes all mankind.

