

Davies, D. E., The Physiological Analysis of Aggressive Behavior from Social Behavior and Organization among Vertebrates W. E. (Ed.) Univ. of Chicago Press, 1964.

L21

53. "... aggressive behavior will be operationally defined as action in relation to a more animal. Not fleeing, bluff or attack each other." → one flees, more often than combat. Learning plays a predominant role.
54. distinction between predatory attacks (interspecific) and aggression (intra-specific).
- 54/5 "Aggressive behavior is also clearly distinct from sexual behavior."
56. "Some species divide an area into territories and others arrange themselves into a social rank. These patterns may be at the poles of one continuous phenomenon, but for the present we can consider them distinct."
57. "An unsolved problem or set of problems is the extent to which aggressive behavior is learned. Presumably, many many details are learned or, at least, perfected through experience. Other aspects, especially the disposition to aggressiveness, are apparently innate. Experimental evidence is meager, but some items are relevant."
58. "Recent work suggests that the object of aggression is learned but the actual motions are innate."

# Davis

59. "The "agent" <sup>[hormone]</sup> can not deliver its message unless suitable conditions are present. ... For example, some birds will not demonstrate aggressiveness unless a particular type of perch is available."  
 ↓ Potential given but activated by circumstances!:

59 "This almost universal reaction of animals to androgens, was fortunately permitted the assumption that aggressive behavior always depends upon androgens. The exception will be mentioned below."

60 "The current status of work on androgens indicates that aggressive behavior is greatly accentuated in many species when the hormone is injected or is naturally present."

60 "Females fight much less vigorously than do males but nevertheless show aggressive behavior that can often be accentuated in many species by injection of testosterone!"

60. Hypothalamus

Hormones of pituitary

affect aggressive behavior directly.

Pituitary (LH) ↓

promotes produce testosterone

↑ increased aggression (Recent!)

pituitary

gonads

↑ promotes aggression

both parts of the adrenal

adrenal cortex

↓ produces corticoids  
 ↓ organs involved in aggressive behavior

through sympathetic nerves to adrenal medulla

↓ release of adrenaline

↑ active in physiological process active during aggressive behavior.

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61. "At the moment we cannot say whether C.H., Testosterone or some other hormone was the first to be associated with aggressive behavior.
62. "Song usually has at least two functions: defense of territory or advertisement to the female. Per birds in some species the latter is the major function, or possibly, defense is an acquired function."
64. "From the ~~ecological~~ ecological viewpoint, the separation of aggressive behavior or sexual behavior, may be advantageous to some species as may have occurred in the evolution of some song birds.
63. "The hormones mentioned thus far are produced in the gonads or pituitaries and are concerned with reproductive activities. Several additional hormones (progesterone, relaxin etc.) are associated directly with reproduction, but investigations have thus far not demonstrated that they have any influence on aggressive behavior. ... Other organs, such as the adrenal, thyroid or pancreas produce various hormones. But only certain hormones of the adrenal are important for the study of aggressive acts."
65. "Adrenalin permits an animal to carry out aggression rather than causes it to be aggressive. For example, persons receiving adrenalin demonstrate the physiological reactions but do not feel mad or become aggressive."

## Davis.

68. "As numbers increase, reproduction declines and mortality increases, thereby retarding the increase in population."
69. "... corticoids are increased under conditions where aggression occurs. Aggressive behavior is thus recognized as one of many environmental variables stimulating the hypothalamo-pituitary-adrenal axis."
69. "Stimulation by electrodes of certain areas in the brain results in an increase in corticoids, whereas in other areas stimulation has no effect. In particular, the amygdala is necessary for a response."
70. "Innumerable studies show that certain behavioral situations result in an increase of adrenalin.  
Fear produces adrenalin  
people with high tolerance for stress had low levels of catecholamines." (Levy, 1961 A new stress tolerance test.. Acta Endocr. 37(1): 38-44.
70. "... aggressive behavior produces, through the corticoids, many physiological changes in reproduction and mortality rates. We also saw that stressful situations resulted in an increase of catecholamines."
72. "Do animals other than man have emotions? ... Perhaps this problem will never be solved ..."
71. Persons (or animals) do receive injections of adrenalin, show a physiologic reaction (increased pulse etc), but did not feel any.

## Davies

72 Summary: "Animals start life with an innate disposition to attack other members of the same species under certain circumstances. For this attack, the animal mobilizes, through the adrenal medulla and cortex, the bodily reserves and defenses. During the attack a number of stimuli (pain, sounds) become associated with the physiologic state, so that, these circumstances promptly begin to signify aggression. In this manner an attack becomes connected with certain physiologic responses, and in turn, become recognized by humans, as emotion. Eventually, merely the thought of the situation may stimulate the physiologic consequences."

// [Given a disposition which is activated by circumstance, not a drive which operates continuously.]  
 see p. 56 "On the aspect, the disposition to aggressiveness, are apparently innate."

59. "Contractor roosters cease fighting."

59. In many cases female or sexually immature individuals respond to androgens as characteristically as do males (such as testosterone)

60. 'Presumably, the endocrine glands in females produce enough androgens to stimulate aggressive action.'  
 [are women less aggressively hostile to men.]

63 "Another example of unexplained behavior is the aggressive behavior of the female mammals immediately after copulation."

