Alternative defeat strategies in shrews and rats

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Let me supply the Ferguson Roger reference (1). After I wrote the 'dominance hierarchy' paper (2) for the Lancet in 1967, Ferguson Roger wrote to me (I have lost his letter - I think he was working in Scotland) enclosing a copy of his paper, and I quoted a chunk of it in the next thing I wrote (3). My idea was that the depression helps an old bull to fall in rank while still in the group - his idea was that it helps the old bull to keep away from the group and let the young get on with things without interference.

It is interesting that these two 'depressive strategies' have been reported both in tree shrews and rats. The tree shrew is normally territorial rather than group living, but von Holst (4) found that some defeated shrews stayed close to the winner (and showed excess adrenal medullary activity) while others got as far away from the winner as possible (and developed excess adrenocortical activity). The rat is normally group living, but in spite of that Blanchard et al. (5) found that some defeated rats avoided the dominant ones and slept alone in a separate chamber - like the avoidant shrews their expectation of life was much reduced; whereas other defeated rats kept close to the winner and slept in the same chamber - these had normal life expectation. Unfortunately the Blanchards provide no evidence on the relative activity of adrenal cortex and medulla in their two type of rats.

It looks as though the shrews and rats have a strategy set for defeated behaviour; in one alternative strategy they remain in the group in a subordinate role, while in the other strategy they leave the group and presumably join another or set up their own group - it is when they are prevented from doing this by the experimenter that they get into trouble. Then they suffer from 'blocked escape' or 'arrested flight' (6, and see ASCAP, October 1993, pp. 4-7) and this behaviour naturally appears maladaptive and their life expectancy is reduced. I think Michael Chance might agree that the defeated animals which remain with the winners are manifesting what he has called 'reverted escape' in which a defeated animal returns for comfort and/or support to the animal which has defeated them. The arrested flight animals are undergoing what anthropologists call 'circumscription' in which you want to get away but there is nowhere to go. It is interesting that alternative strategies for reverted escape and non-reverted escape occur in both a territorial and group living species: no doubt these are further cases of negative frequency dependent selection. The normally territorial mouse may also adopt the reverted escape strategy (6).

It may well be important to distinguish between the two defeat strategies in experimental work, especially if they have very different endocrine characteristics. So far as I know, the alternative strategies were not recognised in the enormous amount of work in which rats were subjected to 'inescapable shock' (7). So the stress of defeat is not the same as just any old stress, and the ethological approach to the subject receives vindication.

Returning to early speculations about the biological function of depression, Lange (8) suggested that it might be something to do with hibernation, and Pollitt (9) also thought along these lines. Frank (1954) was also an early psychiatric sociobiologist. A reward is offered for the identification of any other early speculations about the biological function of psychopathological states.

References

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