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THE PREDATOR AND ITS PREY

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ASKED whether, if he were an animal, he would prefer to be a predator or belong to a species preyed on by others, the average person would elect to be a predator and would pick a hard and hungry life. The picture most of us have of the predator enjoying a comfortable life feeding at choice on the animals on which it preys is one which we are learning is far from the rule. It may apply to some few predators, but not to all. There is still as much opportunity for fresh research into this relationship between various animals, as in any other major aspect of zoology; and the promise of results which can profoundly change our understanding of some of the very old but persistent erroneous ideas of life under natural conditions.

For instance, there is the commonly held belief in a "balance of nature."

that the number of the individual animals in a species is controlled ordinarily to a certain level around which the numbers fluctuate only slightly. We are accustomed to think that animals continue to reproduce abundantly and that predators eat the surplus, or if there are no predators, that the number will increase until food-shortage develops and starvation kills out the surplus to restore the "balance."

We need to distinguish between major predators which feed on large prey, and minor predators which feed, for example, on insects, worms and other tiny

but abundant animals. Any predator-prey principle should apply equally to predators of both groups. If food-shortage is important in keeping a balance in nature, then we would reasonably expect to find that where major predators are absent the health of the individuals of a minor-predator species will be poorer than if the numbers were held down by major predators to a level where the food-supply was fully adequate. There are many places where major predators are lacking, or insignificant in numbers. Islands provide us with excellent examples of this, and when we examine such islands we fail to find any picture of overall ill-health, stunting in size, or other indications of consequences from food shortage in the species of larger size.

We are led, then, to a peculiar conclusion. On an island, like many around our coast, where the larger species such as birds or tuatara represent the end-animals of a food-chain and are not themselves subject to control by a major predator, we fail to find evidence of ill-health from malnutrition. We must conclude that the control over number is established before malnutrition takes place. In other words, in the absence of a major predator, the "balance of nature" is brought about before a significant strain is placed on the food-supply. If this were not the case, then there would be violent cyclical fluctuations in numbers, far more so than is found in such circumstances.

The excellent work being done by K. R. Allen and his associates in New Zealand on the food of trout can be taken as an example of a study of a minor predator-prey relationship and correlates well with much work in the United States, especially that of the pioneer and later studies on the quail, which demonstrate among other matters a case of a major predator-prey relationship. The two examples together give a little-known picture of this relationship.

Mr. Allen has given ample evidence that the abundant small aquatic animal life of a trout-stream is available as food for a trout only under very definite conditions. The trout is carnivorous. It feeds to a small extent on insects which fall by chance into the water; but the bulk of the food is insects and other small animals living in the water. The trout can eat only the prey which it can see and capture. However, many of these small animals are, from the trout's viewpoint, secretive in habit, living under stones or otherwise concealed. Of these, the trout can eat only the relatively few individuals which for one reason or another leave their cover and can be seen and caught. In fact, just as McAtee found when he studied the insects eaten by birds in North America, the different kinds of insects are not eaten according to their relative abundance, but according to their availability. The most numerous do not necessarily form the greatest part of the food of a bird, or of a trout.

The same thing was beautifully demonstrated with bob-white quail by Errington and his associates at Iowa where, through much careful field study, it was found that the number of quail in a given area was stable and related to the amount of suitable cover, in this case shrubs, thickets, brush and the

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