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FOOD, DRINK AND EVOLUTION[1]

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THE three primary animal instincts, to secure sustenance, to gain protection and to enjoy the opportunity of reproducing their kind, are related either individually or collectively to every biological problem, however narrow its scope. Although the impress of each of these necessities is to be found in the behavior and structure of every species, it is by no means evident to the same extent, nor alike at all periods of ontogeny. Reproduction is confined to a limited part of the life span even in the most primitive types of animals, and the period of reproductive activity is still more obviously restricted in the insects, where it becomes an attribute of only the final, unchanging imaginal stage. This stage must thus suddenly disclose all the adaptations of the sexually mature animal.

Protection from destructive agencies is on the other hand a constant necessity, common to all periods of the life span. It is, however, in part passive, as it may depend to a great extent upon bodily characteristics, not necessarily associated with specialized behavior.

The instinct to secure food is equally a constant necessity during post-embryonic growth, for only by its gratification can growth and development take place. Even more than reproductive activity the taking of food by animals is rhythmic, cyclical or interrupted by periods of varying length. Furthermore, food requirements in insects are proportionally much greater during the preparatory stages, when large reserves of fat are produced and stored within the body. Feeding is thus by no means a uniform or continuous process, but its association with the several stages is far more extended than is reproduction. Also, it is a purely active, never a passive, process, and in consequence we find that it has modified struc-

[1] Annual public address of the Entomological Society of America at its meeting in Richmond, Va., December 29, 1938.