

THE NUTRITION OF THE BEE.

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In thinking over the question of the food supply and nutrition of insects from the point of view of the physiologist, it seems to me that some points were of sufficient importance to bring under your notice at your annual conference. While we are not yet sufficiently informed on all the points connected with the growth and life history of insects to enable us to make any statement of any value with regard to some of the details of the process, yet there are one or two broad facts which stand out so strongly that they must be kept in view by everyone who is aiming to make an economic success of his work with insects. While great differences are found to exist among different classes of insects, it appears to be the general rule that in those that exhibit the phenomena of complete metamorphosis there is special provision made during the early history of the individual for building up the active working tissues of the adult. In all animals the food which is consumed is devoted to two separate purposes—part of it goes to build up the active working tissues the other part is utilized by these working tissues in the course of their activity. Hence the distinction between the flesh-formers and the heat-producers. The former are the foods utilized to make good the wear and tear of the active living portions of the animal. The latter, although they may be incorporated with the living tissues for a longer or shorter period, seem on the whole, to bear the same relation to the living tissue as the fuel does to the steam engine. Flesh producers always contain appreciable quantities of protein or other nitrogen-substance. The heat producers consist chiefly of carbon

and are typically represented by sugar and fat. It is at some stage in the development of the bee from the egg to the imago (adult insect) that provision is made for the formation of the muscles and other active working parts. As the process of development is followed, it is found that this provision must be made either in the egg itself or during the life of the larvae. There is no great amount of proteid material provided by the food of the imago. This consists, as is well-known, almost entirely of sugar in one form or another; while, should the bees begin to eat pollen or other substance of a similar nature, they are liable to very quickly fall out of health. Experiments have shown that they are able to thrive and remain active in the adult stage on food consisting solely of pure sugar and water. On the other hand, the food of the larvae is composed largely of pollen, and pollen differs from honey chemically in containing a comparatively large amount of nitrogen in the form of proteid and other allied substances. When we consider that during their active adult life the muscles and other organs of the bee are kept extremely active and when we remember that during this period of activity no provision is made by means of the food for making good the wear and tear of these active tissues, we understand at once why it is that the life of the insect is so short. In all the higher animals provision is made in the food for the supply of material to renew the worn-out parts and special provision is seen in some of the organs of the body for the removal of this worn-out tissue. But with the bee the opposite is the case—no provision is made in the food for the repair of the active working parts—and it is doubtful if there is any provision amongst the organs of the body for the special removal of the waste pro-