

eaten. Honey which is made from the regurgitated nectar does indeed contain some pollen, but most of the pollen eaten by the bee is undoubtedly retained in the stomach as food. The apparatus by means of which the pollen is supposed to be separated from the nectar belongs to the following division of the alimentary canal, but it is not known that the worker takes nectar, and pollen for food, into its honey stomach at the same time.

The proventriculus forms the neck-like stalk between the honey stomach and the true stomach or ventriculus, but a very important part of it projects up into the honey stomach. If the honey stomach be slit open, a short, thick, cylindrical object will be seen invaginated into its posterior end and having an X-shaped opening at its summit. This opening is the mouth of the proventriculus, and its four triangular lips, which are thick and strong, mark four longitudinal ridges of the proventricular tube. This structure is commonly known as the "stomach-mouth" and is supposed to be an apparatus designed especially to enable the worker to pick out pollen grains from the honey-stomach and shallow them on down into the true stomach or ventriculus, while the nectar is left to be stored in the hive. Cheshire says: "While the little gatherer is flying from flower to flower her stomach-mouth is busy separating pollen from nectar." This notion is so prevalent among bee writers in general that it passes for a known truth. Yet it has really never been shown that the worker eats pollen while she is gathering nectar. Probably no more pollen is ever mixed with the nectar in the honey stomach than is found in the honey itself. Furthermore, under normal conditions pollen never accumulates in the honey stomach, even when the bee is not collecting nectar,—or at least the writer has not observed it—while, finally, both the proventriculus and its mouth are just as well developed in the queens and drones as in

the workers, though neither of the former are known to eat pollen, and they certainly do not gather nectar.

If the honey stomach be cut open in a freshly killed bee, the proventricular mouth may be seen still in action. The four lips tightly roll together and sink into the end of the proventricular lumen. This, of course, suggests their picking pollen out of the nectar, but it is probably simply the ordinary process by means of which the proventriculus passes any of the food in the honey stomach on to the ventriculus. Nearly all insects have some such proventricular apparatus, which simply takes the stored food from the crop as it is needed by the stomach. In some insects it forms apparently a straining apparatus, which prevents coarse, indigestible fragments from entering the stomach, while in some the proventriculus may be a triturating organ comparable with a bird's gizzard. Bees, however, do not crush the pollen either in their mandibles or in the proventriculus, for it occurs in perfect condition in the ventriculus.

Hence, before the current notion that the "stomach-mouth" is for the special purpose of taking pollen out of the nectar in the honey stomach can be accepted it must be first demonstrated that the workers eat pollen while the honey stomach contains nectar to be stored in the cells, i.e., any more than is disgorged along with the nectar; and, secondly, a reason must be shown why the queens and drones should have a "stomach-mouth" as well developed as that of the worker. In the meantime it appears most logical to regard the proventricular mouth as simply the ordinary apparatus, possessed by insects in general, by means of which all of the food is passed from the crop to the stomach.—By R. E. Snodgrass (Bul. U. S. Dept. of Agriculture, Tech. Series), issued by the U. S. Department of Agriculture..

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