

secretion could be best poured into and mixed with the stream of nectar that might be drawn through the tongue in any of the three ways already mentioned. The function of these glands has, I think, been misunderstood in part, by even such authorities as Leuckart and Schiementz. They think that the upper head glands secrete the larval food. I feel sure that this is wrong. I believe they secrete the saliva of bees, a substance analogous to own saliva in that it is mixed with the pollen or bee bread renderp it soft and plastic. More than this, I think the secretion from the glands doubtless furnish the ferment which adds to digest the pollen or albuminous food of the bees. The fact that the nurse or young bees furnish chyle or digested food to nourish the thousands of larvae of each hive, and also to feed the queen and the drones explains why these glands are so large in the nurse bees. My reasons for this view are that the mouths of the ducts on the floor of the bee's mouth are just where they should be, the large size of the glands, in the nurse bees is also in harmony with this view, and except for this secretion we cannot explain the deglutition of the pollen. The function of the secretion from the other four glands is without doubt to digest nectar of flowers. As is well known this nectar is neutral and contains cane sugar. Honey is acid and contains reducible sugar. This honey is digested nectar, and the secretion from the large rocemose glands of the bee is the agent which effects this transformation. The common duct from these glands empties just where the stream of honey from the tongue enters the mouth. This honey must be digested while in transit from flower to hive. The fact that a colony of bees may gather twenty pounds of honey in a day, explains the necessity of the great size and number of these glands. The fact that all honey is not equally reduced, and that some honey has even a right handed rotation, is also explained. When honey is collected very rapidly as is often true in the linden season it is not fully digested. This makes the analysis of honey a difficult matter. I much question whether any chemist can certainly determine whether or not honey is pure. I positively know that some of our best chemists have pronounced honey of undoubted purity to be adulterated. To one acquainted with the physiology and habits of bees, this is not surprising.

The honey stomach is a strongly muscular organ, richly lined with epithelial cells, and in no wise peculiar, except for the interesting and complex stomach mouth at its lower end. This is a slightly oblong, nearly special organ, with a central passage. The four segments which

comprise the anterior end are jaw like, slightly moveable, and have a peculiarly snapping motion, as is easily seen by viewing a fresh specimen under a low power objective, short bristle-like hairs, form a thick lining to the central cavity. These hairs point downward. The function of this unique organ is as interesting as is its structure. The fine pollen grains of flowers, as you all know, are light and airy, and so float in every breeze. As they fall from the overhanging anthus, they often lodge in the same nectar that attracts the bees. Thus as the bee sucks the nectar from the flowers, it secures at the same time more or less of this rich nitrogenous pollen. The pollen and nectar pass together into the honey stomach. When the bee reaches its brood-nest, it desires to pass the honey, for by this time the nectar has been digested, into the cells, where it is stored for the future needs of the bees. But while we find a small amount of pollen in the honey, we find much less than is found in the nectar. But how can the bees separate this pollen from the nectar. It is done by this stomach mouth, the jaws of which are constantly opening and shutting as the bee is gathering from flower to flower, and is bearing its full load to the hive. Thus the mixed nectar and pollen are drawn into the central cavity of the stomach mouth, when the jaws close pressing the nectar back into the honey stomach, while the pollen is retained by the bristles, and passed into the true stomach. This constant motion also mixes thoroughly the nectar and saliva thus promoting the digestion of the nectar or the formation of honey. We see then, that the stomach mouth is a sort of screen, whose purpose is to separate the nitrogenous from the carbonaceous food. The former is in small quantities, just the sufficient for the daily needs, while the honey comes in large quantities, and is stored up for times of scarcity. Where the stomach mouth enters the true stomach, the central opening is continued in a free membranous tube which hangs in the true stomach. This, of course, serves as a valve and prevents the digested material, as it is pressed by the muscular action of the stomach, from returning, through the stomach mouth into the honey stomach. It is now a well-known fact that the nurse bees digest the food for the larvae, the queen, and the drones. It is probably true that all the albuminous food of both queen and drone is prepared by the nurse bees. The upper head glands are not found in the drones, and are very rudimentary in the queen. Thus these bees are not able to take and digest pollen. They can take the honey, and so have the rocemose glands, which in case the nectar was not fully digested by the worker bees, enables th