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e alimentary canal into nd in the second place, ough the walls of the The digestive changes breaking down of the

of the raw food masimple chemical sube taken up by the cells into complex protoplas. hich can not escape nembrane until they are

n into simpler forms.

Salivary Glands

of the salivary duct of probiscis has already bee e true salivary glands, r insects, are arranged situated within the less within the thorax. I te into one median tob he base of the labium

ens upon the upper surface of ligu'a. T'e arge and conscpicuous glands lying within the anterior and upper parts of the head and opening into the pharynx will e described later in connection with this ngan. They are special pharyngeal lands in no way homologous with the alivary glands of other insects, and are y many supposed to secrete the broad od instead of a digestive liquid like

The salivary glands of the head (Sysucts of the cells consist am No. 2 of Cheshire, postcerebral glands bon, hydrogen and nit. (Bordas) lie against the posterior walls converted by the oxylogen and state of the cranium. In the worker each conthe respiratory system sts of a loosely arranged mass of pearl, water, and compounds haped follicles or acini whose individual being a gas, mixes with sucts unite irregularly with one another tracheal tubes and so and eventually form a common duct on rior during exhalation, sch side. Their two ducts unite with the ater is also given of edian duct from the thoracic glands just heal system in the form store the bases of the mesocephalic pilchales from the spiracles, is are covered by their different appearance from those of hell, it is probable that e female, each consisting of a compact eat." The compou ds a ass of very small follicles connected by oly also some water, are inute ducts and flattened against the bly also some water, and mattened against the the blood by the exert sterior walls of the head. A 'arge lobe and Malpighian tubules in this gland in the drone extends for any canal, whence the tenth compound eye and the dypeus, with the fæces from the compound eye and the dypeus, as occupying the position of a large and the dypeus, and the position of a large andibular gland in the worker, and in brought about by sub sequeen. There is also a promirent trigular mass of glandular cells in the enzymes which are congular mass of glandular cells in the arious liquids mixed with the alimentary canal. The street been described by Bordas (1895) as ted by the salivary gland eparate gland opening by two ducts inlar walls of the stomada the esophagus just behind the rynx. The writer, however, has been erly unable to discover any such ducts, ugh two suspensorial ligaments of the erior end of the esophagus are attached the wall of the head at the posterior nding with the salivar s of these glands, and might easily be taken for ducts. These "postocellar ds" of Bordas, moreover, appear to simply detached lobes of the postbral glands. They are prominent also

in the queen and are represented by a few follicles in the worker.

Bordas describes the follicles of the postcerebral glands in the worker as hollow sacs, each having a large lumen lined with a chitinous intima. Their secretion, he says, is a thin viscid liquid, pale yellow in color and having a slightly alkaline reaction. According to Schiemenz (1883) each gland is developed as an outgrowth from the common duct of the thoracic glands.

The salivary glands of the thorax in the bee (System No. 3 of Cheshire, thoracic salivary glands of Bordas) are the ones that correspond with the ordinary salivary glands of other insects. They are described by Schiemenz (1883) as being formed inside of the outer covering (tunica propria) of the first part of the larval silk glands. But it is of common occurrence in insects that the salivary glands are temporarily specialized as silkproducing organs in the larva. In the adult worker these glands lie in the ventral part of the anterior half of the thorax. The two are widely separated anteriorly, but their posterior ends are contiguous. Each consists of a mass of small, manybranched, glandular tubes opening into several collecting ducts which empty in o a sac near the anterior end of the From each of these reservoirs, then, a duct runs forward and fuses with the one from the opposite side just within the foramen magnum of the head. The common duct thus formed turns downward within the head, receiving the two ducts of the postcerebral salivary glands and then enters the base of the mentum, to open as already described on the upper side of the ligula at the root of the glossa and between the bases of the two paraglossæ. The secretion of the thoracic glands is said also to be weakly alkaline. Therefore the entire salivary fluid poured out upon the labium is alkaline, and it must be designed to act especially upon the food taken through the proboscis.