

observed in the lumina of the saccus and ducts of the gland at this time, indicating the onset of secretory activity of these labial glands.

An increased secretory activity of the cells of the glandular portion occurs with development. The cells appear more vacuolate at their outer, attached borders while at their inner, free borders the presence of secretory material is evident (fig. 20). The cells of the saccus portion, now squamous in shape, have a uniformly granular cytoplasm. This condition is observed first in the labial glands of some of the largest larvae of the third nomadic day, in the intermediate and smallest larvae of the fifth nomadic day, and occasionally as late as in the smallest larva of the tenth nomadic day.

The height of secretory activity of the labial gland is marked by an increase in the amount of fine, basophilic-staining, secretory material in the lumina of the glandular, saccus and duct portions (figs. 7 and 21). This condition, observed first in some of the largest larvae of the fifth nomadic day, next in the size-graded larvae of the seventh nomadic day and last in some of the smallest larvae of the eighth and tenth nomadic days, is found in all older and more advanced individuals of the respective groups. It persists until the function of this gland changes from the production of the labial secretion to the production of the precursor of the spinning material. This change in function of the labial gland from its primary to its secondary role is noted first in some of the largest larvae of the eighth nomadic day, and next in the largest, the intermediate and some of the smallest larvae of the tenth and eleventh nomadic days. At this time the cells of the glandular portion become enlarged, irregular in shape and stain intensely basophilic (fig. 14). At the correspondingly different times noted above, the lumen of this region becomes almost completely obliterated.

Somewhat later than the last noted time, a fibrous-appearing acidophilic substance begins to accumulate in the lumen of the glandular portion. This is observed in some of the largest larvae of the tenth nomadic day, and in the intermediate and smallest larvae of the eleventh and last nomadic days. This substance, believed to be the precursor of the spinning silk, accumulates first at the terminal ends of the glandular portion and then more anteriorly. The cells surrounding this fibrous material are now low, cuboidal-shaped, deeply staining basophilic cells which have a dense granular cytoplasm (fig. 15). At this stage of labial gland development, the cells of the saccus portion show signs of a cellular breakdown and irregular, coarse, basophilic-staining masses become evident in the lumina of the saccus and ducts (fig. 22 and 23).

To summarize the developmental history and functional activity of the labial glands, corresponding changes in the formation of products of the labial gland occurs in the three arbitrary polymorphic groups at respectively different times in the nomadic phase. At the last statary and early nomadic days only the largest larvae have glands producing salivary secretion. As the nomadic phase proceeds, the size-graded and the smallest larvae acquire functional glands, until at the seventh or eighth nomadic day almost all individuals of the three arbitrary size groups have functional