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# The Development of Musk Glands in the Loggerhead Turtle

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# THE DEVELOPMENT OF MUSK GLANDS IN THE LOGGERHEAD TURTLE.

*(ABSTRACT.)*

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Musk glands were first described in turtles by Dr. William Peters in 1848, and independently, in the same year, by Rathke. The glands do not appear to be present in all turtles, but when present consist of one or two pairs according to the species of turtle. One pair is located at the anterolateral angles of the carapace, just beneath the peritoneum. The second pair, when present, is found at the posterolateral angles, one on each side. According to Peters, the secretion is a brownish, watery fluid, tasteless, but having a very penetrating odor. The glands are compared to the "Kieferdrüsen" of Crocodiles (Mueller's Archives, 1848, 492-6).

In a loggerhead turtle embryo at the time of hatching there are two pairs of musk glands. The anterior pair are double, having a cranial and a caudal portion, opening to the exterior by separate ducts. The duct of the larger cranial portion opens just beneath the lateral border of the carapace between the third and fourth marginal plates. The duct of the smaller caudal portion opens between the fourth and fifth plates. The posterior glands are single and lie beneath the eighth marginal plate of each side.

Histologically, the wall of the gland is made up of three layers, more or less distinctly defined. The outer layer consists mostly of striated muscle fibers, the middle layer of connective tissue, and the inner layer of more or less flattened epithelial cells. The gland at this stage of development is of the simple branching alveolar type.

The epithelium is derived from the ectoderm and the muscular layer from the deep muscles of the ventral thoracic region. Development is initiated by the elongation and proliferation of the ectodermal cells of the ventrolateral border of the carapace just caudad of the anterior limb (figure 48, a, b). The mesenchyme in the immediate region of the proliferating ectodermal

cells shows a condensation due to rapid multiplication of cells and to the intrusion of wandering leucocytes. There is thus

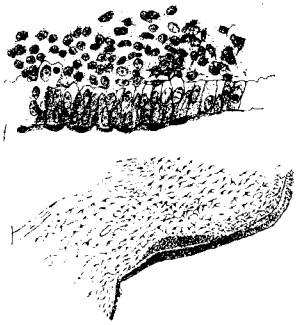

Figure 48.—Loggerhead turtle embryo of about 20 days incubation. a. Section showing region of elongating ectodermal cells and condensation of mesenchyme. b. A portion of same region enlarged.

formed in an embryo of about twenty-four days incubation (figure 49) a small elevation on the inner surface of the ectoderm

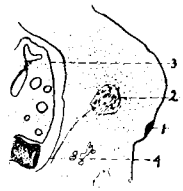


Figure 49.—Loggerhead turtle embryo of about 24 days' incubation. 1. Beginning of musk gland. 2. Muscle. 3. Lung. 4. Liver.

which grows upward, rodlike, through the mesenchyme of the carapace (figure 50). After passing through this denser tissue

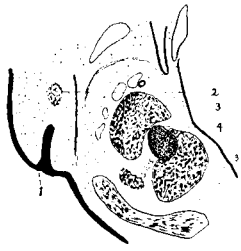


Figure 50.—Loggerhead turtle embryo of about 25 days' incubation. 1. Developing gland. 2. Muscle. 3. Muscles of anterior limb girdle. 4. Cartilage of anterior limb girdle.

of the carapace this rod of cells penetrates the peripheral portion of the deeper breast muscles of this region and divides into sev-

eral branches. The rod of cells with its branches then becomes hollowed out and forms the duct and secreting alveoli of the gland (figure 51). The muscle mass and connective tissue im-

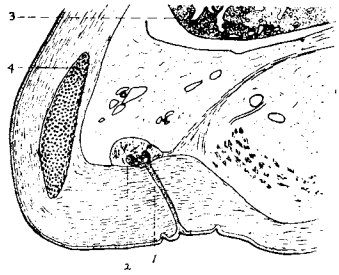


Figure 51.—Loggerhead turtle embryo of about 31 days' incubation. 1. Musk gland. 2. Muscular and connective tissue wall. 3. Liver. 4. Costal cartilage of carapace.

mediately surrounding the epithelial gland condense to form the walls of the gland.

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