THE THYMUS GLAND

Structure.—Microscopically the parathyroids consist of intercommunicating columns of cells supported by connective tissue containing a rich supply of blood capillaries. Most of the cells are clear, but some, larger in size, contain oxyphil granules. Vesicles containing colloid have been described as occurring in the parathyroid, but the observation has not been confirmed.

No doubt the parathyroid glands produce an internal secretion essential to the well-being of the human economy; but it is still a matter of dispute what symptoms of disease are produced by their removal and suppression of their secretion. Pepe believes that they show signs of exceptional activity during pregnancy, and that parathyroid insufficiency is a main factor in the production of tetany in infants and adults, of eclampsia, and of certain sorts of fits. It is probable that the tetany following parathyroidectomy is due to the accumulation of ammonium carbonate and Kendall has suggested that the function of the parathyroid is to convert ammonium carbonate into urea.

THE THYMUS GLAND (Fig. 1178).

The thymus is a temporary organ, attaining its largest size at the time of puberty (Hammar), when it ceases to grow, gradually dwindles, and almost disappears. If examined when its growth is most active, it will be found to consist of two lateral lobes placed close contact along the middle line, situated partly in the thorax, partly in the neck, and extending from the fourth costal cartilage upward, as high as the lower border of the thyroid gland. It is covered by the sternum, and by the origins of the Sternohyoides and Sternothyroidei.

Below, it rests upon the pericardium, being separated from the aortic arch and great vessels by a layer of fascia. In the neck it lies on the front and sides of the trachea, behind the Sternohyoides and Sternothyroidei. The two lobes generally differ in size; they are occasionally united, so as to form a single mass; and sometimes separated by an intermediate lobe. The thymus is of a pinkish-gray color, soft, and lobulated on its surfaces. It is about 5 cm. in length, 4 cm. in breadth below, and about 6 mm. in thickness. At birth it weighs about 15 grams, at puberty it weighs about 35 grams; after this it gradually decreases to 25 grams at twenty-five years, less than 15 grams at sixty, and about 6 grams at seventy years.

Development.—The thymus appears in the form of two flask-shaped entodermal diverticula, which arise, one on either side, from the third branchial pouch (Fig. 1175), and extend lateralward and backward into the surrounding mesoderm in front of the ventral aorta. Here they meet and become joined to one another by connective tissue, but there is never any fusion of the thymus tissue proper. The pharyngeal opening of each diverticulum is soon obliterated, but the neck of the flask persists for some time as a cellular cord. By further proliferation of the cells lining the flask, buds of cells are formed, which become surrounded and isolated by the invading mesoderm. In the latter, numerous lymphoid cells make their
appearance, and are aggregated to form lymphoid follicles. These lymphoid cells are probably derivatives of the entodermal cells which lined the original diverticula and their subdivisions. Additional portions of thymus tissue are sometimes developed from the fourth branchial pouches. Thymus continues to grow until the time of puberty and then begins to atrophy.

![Diagram of the thymus](image)

**Fig. 1179.** Minute structure of thymus. Follicle of injected thymus from calf, four days old, slightly diagrammatic, magnified about 80 diameters. The large vessels are disposed in two rings, one of which surrounds the follicle, the other lies just within the margin of the medulla. (Watney.) A and B. From thymus of calf, examined without addition of any reagent. Magnified about 600 diameters. A. Large colorless cell, containing small oval masses of hemoglobin. Similar cells are found in the lymph glands, spleen, and medulla of bone. B. Colored blood corpuscles.

**Structure.**—Each lateral lobe is composed of numerous lobules held together by delicate areolar tissue; the entire gland being enclosed in an investing capsule of a similar but denser structure. The primary lobules vary in size from that of a pin's head to that of a small pea, and are made up of a number of small nodules or follicles, which are irregular in shape and are more or less fused together, especially toward the interior of the gland. Each follicle is from 1 to 2 mm. in diameter and consists of a medullary and a cortical portion, and these differ in many essential particulars from each other. The **cortical portion** is mainly composed of lymphoid cells, supported by a network of finely branched cells, which is continuous with a similar network in the medullary portion. This network forms an adventitia to the bloodvessels. In the medullary portion the reticulum is coarser than in the cortex, the lymphoid cells are relatively fewer in number, and there are found peculiar nest-like bodies, the concentric corpuscles of Hassall. These concentric corpuscles are composed of a central mass, consisting of one or more granular cells, and of a capsule which is formed of epitheloid cells (Fig. 1179). They are the remains of the epithelial tubes which grow out from the third branchial pouches of the embryo to form the thymus.

Each follicle is surrounded by a vascular plexus, from which vessels pass into the interior, and radiate from the periphery toward the center, forming a second zone just within the margin of the medullary portion. In the center of the medullary portion there are very few vessels, and they are of minute size.

Watney has made the important observation that hemoglobin is found in the thymus, either in cyste or in cells situated near to, or forming part of, the concentric corpuscles. This hemoglobin occurs as granules or as circular masses exactly resembling colored blood corpuscles. He
has also discovered, in the lymph issuing from the thymus, similar cells to those found in the gland, and, like them, containing hemoglobin in the form of either granules or masses. From these facts he arrives at the conclusion that the gland is one source of the colored blood corpuscles. More recently Schaffer has observed actual nucleated red-blood corpuscles in the thymus. The function of the thymus is obscure. It seems to furnish during the period of growth an internal secretion concerned with some phases of body metabolism, especially that of the sexual glands.

**Vessels and Nerves.** The arteries supplying the thymus are derived from the internal mammary, and from the superior and inferior thyroids. The veins end in the left innominate vein, and in the thyroid veins. The lymphatics are described on page 698. The nerves are exceedingly minute; they are derived from the vagi and sympathetic. Branches from the descending hypoglossal and phrenic reach the investing capsule, but do not penetrate into the substance of the gland.

**THE HYPOPHYSIS CEREBRI.**

The hypophysis (pituitary body) (Fig. 1180) is a small reddish-gray body, about 1 cm. in diameter, attached to the end of the infundibulum of the brain and resting in the hypophyseal fossa.

![Diagram of the hypophysis cerebri](image1)

**Fig. 1180.**—The hypophysis cerebri in position. Shown in sagittal section.

![Diagram of the hypophysis cerebri section](image2)

**Fig. 1181.**—Median sagittal section through the hypophysis of an adult monkey. Semidiagrammatic. (Herring.)

The hypophysis consists of an anterior and a posterior lobe, which differ from one another in their mode of development and in their structure (Fig. 1181). The anterior lobe is the larger and is somewhat kidney-shaped, the concavity being directed backward and embracing the posterior lobe. It consists of a pars anterior