

*The Thyroid and Parathyroid Glands throughout Vertebrates.*

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(Abstract.)

1. The organs recognised as arising in the regions of the gill-clefts in Elasmobranchs are thyroid, thymus, and post-branchial body. The parathyroid and carotid glandules have not yet been discovered in these animals.

2. Within the thyroid gland of Elasmobranchs are small, solid masses of cells, partly epithelial, partly adenoid. These have not, so far as I am aware, been previously described. One is tempted to suppose that these are homologous either with parathyroid or thymus. In the latter case it would correspond with thymus IV of Mammals. (It has not been suggested that the thymus derivative of the fourth cleft furnishes isolated nodules in the thyroid of Elasmobranchs.)

3. In Teleosts the only organs of the series are the thyroid and the thymus. The parathyroid has never been described in this group, and it is doubtful whether there is any trace of post-branchial body. The thyroid in *Amiurus* consists of a few scattered vesicles embedded in the connective tissue matrix. The cells lining the vesicles are very low columnar, and in some cases almost flat.

4. In Urodela the branchial cleft organs are thyroid, thymus, parathyroid, and post-branchial body. The thyroid is fairly superficial, and there is no intimate relation with the parathyroid.

5. In Anura the branchial organs are, in addition to thyroid and parathyroid, thymus, post-branchial body, ventral "Kiemenreste" and carotid gland. The thyroid is very small and deeply placed. The parathyroid has not yet entered into intimate relations with the thyroid. The ventral "Kiemenrest" is a large striking-looking organ which must have been frequently mistaken for the thyroid, and appears to be a hæmolymph organ. The arrangement of the cells in the parathyroid is somewhat characteristic, and is described in the text.

6. In Reptiles, thyroids and parathyroids are still anatomically separate organs, but the parathyroid in some instances possesses distinct lumina, and in this the fundamental distinction between thyroid and parathyroid is at once broken down. Moreover, in this group there are clear indications that the post-branchial body secretes colloid.

7. In Birds, we frequently find large areas of the thyroid either devoid of colloid vesicles, or having these in a compressed, crowded condition. But the parathyroids are still separate and distinct organs. The post-branchial body presents certain peculiar features, described in the text, among these being an accumulation of concentric corpuscles, such as is found in the epithelial part of the thymus.

8. In Mammals, there is much more intimate relationship between the parts of the thyroid apparatus than in lower animals. The cells lining the vesicles are practically of the same character as those accumulated in varying amount between the vesicles, and do not differ in any essential respect from those forming the parathyroid glandules.

Many of the masses of intervesicular cells are indistinguishable from parathyroids. The internal parathyroid is frequently in direct tissue continuity with the thyroid, and every kind of transition form exists. Parathyroid has only, indeed, to have colloid spaces in its interior to constitute itself thyroid, and this occurs in the human subject under certain pathological conditions.

Parathyroids left behind after removal of the thyroid develop colloid vesicles and become practically converted into thyroid. Moreover, the changes in the thyroid, after removal of the parathyroids, may be interpreted as the reverse change of thyroid into parathyroid tissue. The experimental evidence as to a separate function for parathyroids is inconclusive.

9. Thyroid and parathyroids are to be looked upon as structures of somewhat different embryological origin, which are anatomically separate and distinct in the lower Vertebrata, but which come into very intimate anatomical and physiological relationships with each other in the Mammalia. In this latter group they are, in fact, to be looked upon as constituting one apparatus.

10. Parathyroidectomy, like thyroidectomy, causes compensatory changes in the pituitary body. These consist in a notable increase of the colloid vesicles in the *pars intermedia*.

This observation confirms the general view that thyroid and parathyroid are very intimately related to each other. The colloid vesicles of the *pars intermedia* of the pituitary resemble in all respects those of the thyroid and of the parathyroid (where such occur), and it is probable that the intermediate portion of the pituitary is to be looked upon as an integral part of the thyroid—parathyroid apparatus.

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