CHAPTER V

EFFECTS OF ANTITHYROID DRUGS ON THE DEVELOPMENT
OF THE OSTEOCRANIUM

The secretion of thyroid glands affects the cells in every part of the body and thus it influences the total metabolism. An anhydrenia occurs in the central nervous system, skeletal muscles and the blood due to the absence of thyroid secretion. The high thyroid activity favours the removal of calcium salts from the bones and the low thyroid activity helps the storage of calcium. Osteoporosis occurs due to the exhaustion of lime salts in the skeleton.

The most active antithyroid drug groups comprise thiourea and its congeners but the less active group includes the sulphanamides. These antithyroid substances have the common property of causing a fall of the level of thyroxine in the blood. In the absence of thyroxine majority of vertebrates cannot attain their normal adult forms and there are a number
of evidences that it acts synergistically in the normal growth of skeleton. In young hypophysectomized rat, the arrest of endochondral ossification is prevented by the administration of thyroid hormone. "In the absence of pituitary hormones, thyroxine permits the erosion of cartilage and its replacement by bone to continue but chondrogenesis itself is not maintained." (Asling, Simpson, Li and Evans: Anat. Rec. 119, 1954).

In studying the development of the osteocranium (membrane and cartilage bones) in Nandus marmoratus it was thought worthwhile to see the effects of goitrogeus (thiourea and sulphaguanidine) on them. For this purpose the author used .02% and .1% solutions of thiourea and sulphaguanidine and studied their effects on embryos ranging from 4.8 mm to 25.0 mm in length. Since the effects of the two solutions used were similar, the use of other strengths was thought to be unnecessary. Embryos of different lengths were kept in these solutions from one day to six days. In the case of sulphaguanidine solutions Nandus marmoratus exhibits very little response, whereas thiourea solutions show marked effects. On the sixth day the embryos started dying in solutions of thiourea. Before their death they show a peculiar tendency to bend from the middle region of the body (after pectoral region) and according to the present author this was due to the muscular dystrophy (Ayer, J.B.; Means, J.H. and Lerman, J.J. 1934).
For the purpose of present study 13.0 mm long embryos were taken as both membrane and cartilage bones were well developed in them and they were treated with .1% thiourea solution for three days. The author studied all the bones simultaneously and compared them with those of normal embryos of the same length.

\[1\] Membrane Bones:

(a) Bones related to the lateral line canals:

Dentary, angular, nasal, frontal and preopercular membrane bones get increased both in length and width.

(b) Bones not related to the lateral line canals:

Premaxilla, maxilla, prevomer, parasphenoid, urohyal, articular, ectopterygoid, endopterygoid, parietal, interopercular, opercular and subopercular membrane bones are slightly reduced in length but increased in width.

\[2\] Cartilage Bones:

Premotic, pterotic, epiotic, supraoccipital and exoccipital cartilage bones are decreased in length as well as in width.
The membrane bones generally became slightly thinner whereas cartilage bones became flat. The shape of all the membrane as well as cartilage bones is the same but only the size of the bones differ from the normal ones of the same stage. There are a number of vacuities in the cartilage bones due to the arrest of endochondral ossification by goitrogenic agent (thiourea).

Due to the effect of thiourea the secretion of thyrotropic pituitary hormone is insufficient and the thyroid gland is atrophic and fibrosed which effects the skeletal growth. According to Woolley 1945 (Woolley, P.V. and Cammon, R.W., 1945, J. Pediat, 27: 229) in human beings growth is slowed so much that centres of ossifications are late in appearing and the long bones grow slowly, dentition is delayed and the teeth are faulty in early infancy.