opposite half of the midbrain, while in the reciprocal combination, or with one eye totally extirpated, there is a corresponding hypoplasia of 5-10%. In the diencephalic optic centers changes in cell-proliferation are relatively unimportant, and often lacking. In the region of the chiasma (preoptic nucleus), however, there are almost invariably strong hyper- or hypoplastic changes on the same side as the grafted eye. This suggests the possibility that there is normally a homolateral innervation of this region by fibers from the retina, contrary to general belief. In animals with grafted *tigrinum* eyes the gray matter in the dorsal part of the diencephalon opposite the transplant shows a tendency, often quite pronounced, to shift ventrally as if to meet the ascending optic tracts from the large eye. It seems probable that the visual fibers exert an attractive influence on the cells of this optic center.

The eye-muscles, developing from the host, adjust their size in the direction indicated by the size of the grafted eye, although they never attain the size characteristic for the normal muscles of the eye in question. The hypertrophy or atrophy, as the case may be, is accomplished by changes in the number, rather than the size, of the individual fibers. The hyperplasia of fibers in the *punctatum* muscles developing upon a grafted *tigrinum* eye was found to average about 50%.

The cartilaginous eye-capsule, which develops extrinsically, generally assumes the size characteristic for the transplanted eye, rather than for the normal eye of the host. The size of the trabecula, which forms the lateral wall of the brain-case in the orbital region, is also correlated with the size of the adjacent transplanted eye. The *punctatum* trabecula next a *tigrinum* eye shows a very marked enlargement throughout most of its length. When the nasal placode is grafted also, the effect extends to all elements of the capsule of the nose.

4483

Seasonal Variations in the Interstitial Tissue of the Testis of the Horned Toad (Phrynosoma solare).

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A histological study has been made of a series of Phrynosoma testes taken at frequent intervals throughout the year, with special reference to the problem of interstitial cell function. If, as thought by some, their function is the control of sex activity then they should show seasonal changes correlated with the breeding period. Although such work has been extensive on other groups, particularly in the amphibia, practically nothing has been done on the reptiles.

Seasonal changes in the interstitial tissue should be expressed quantitatively. In this it is important to differentiate between the volume of tissue and the number of cells since these do not seem to be directly proportional. In expressing volume changes, the actual volume and not relative volume was calculated since the testis as a whole shows seasonal variations in size. Counts of the number of interstitial cells per unit volume were made and from these the relative number of cells for testes of different seasons was calculated.

The results show definite testicular cycles. The total volume of the testis undergoes a marked seasonal change, reaching a maximum during the breeding season. This is an external expression of the spermatogenetic cycle which gives changes in diameter, total length, and volume of the seminiferous tubules. These changes have been measured and recorded quantitatively.

The interstitial cell cycle is definitely correlated with the spermatogenetic cycle. The size of the interstitial cells and of their nuclei is greatest during the breeding season. Following the period of sex activity a syncytial condition exists in which the cell boundaries are very indistinct or totally lacking. At this time the nuclei are smallest. At no time do these cells revert to a connective-tissue-cell type. The number of interstitial cells decreases as the breeding season advances. The minimum number is reached at a time when the testis is gorged with spermatozoa. There is a marked increase in the number of interstitial cells at the close of the breeding season when all the spermatozoa are extruded. The volume of interstitial tissue is twice as great during the height of sperm production as it is during the period which follows.

The ovary undergoes similar volume changes which culminate in ovulation. These changes are correlated in time with the conditions occurring in the testis and with the time of observed copulation.

The fact that the number of interstitial cells is at a minimum during the breeding season has led some workers to the conclusion that the interstitial cells have no endocrine function. This has been decided without work of a quantitative nature and it has not been realized that the volume of interstitial tissue may be greatest during the breeding season. The present work would indicate that if the interstitial tissue is responsible for sex characters and behavior, it is the volume of tissue and not the number of cells that is important.

4484

Movements in Transplanted Limbs.

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In the course of the experimental work involving the use of the amphibian limb disc, many of the effects of this developing structure upon the nervous system have been discovered. Most of the transplantations have involved placing the limb disc posterior to its normal location. Such transplants show very weak function unless they are innervated by at least one of the nerves which under ordinary conditions would go into the normal limb. Detwiler and Carpenter[1] have studied coordinate movements in both the transplanted and normal limbs and have found that coordination is an expression of an innervation common to both the normal and the transplanted limb through some one of the bronchial plexus nerves. Such coordination is lost as soon as the communicating branches of such nerves are cut.

The work here reported deals with transplantations made in testing the growth of various isolated parts of the amphibian nervous system. The operation, in which the limb and associated tissues were used in order to block the growth of the nervous system, involves the removal of a part of the nervous system and the transplantation into the wound of a rectangular transplant of embryonic tissue which includes the rudiment of the limb and also of the pronephros. The establishment of a block within the nervous system has been reported previously.[2]

The transplants have been located either anterior or posterior to the normal limb level and their reactions noted. Their regional locations are (1) above the notocord in the region formerly occupied by the ninth, tenth and eleventh spinal cord segments; (2) in the region formerly occupied by the tenth cranial, the first and second spinal segments; (3) in the region of the mesencephalon and (4) in the orbit.

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1 Detwiler, S. R., and Carpenter, R. L., *J. Comp. Neur.*, 1929, xlvii, 427.

2 Nicholas, J. S., PROC. SOC. EXP. BIOL. AND MED., 1928, xxv, 662.