

UNIVERSITY OF ADELAIDE

A STUDY OF THE OPTIC TRACTS  
AND THE PRIMARY OPTIC CENTRES IN THE SHEEP  
WITH REFERENCE TO OTHER MAMMALS.

Presented for the Degree of M.D.

by

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That the brain is the organ of thought is a belief virtually as old as man. Investigation of other parts of the body has generally yielded a reasonable picture of how these parts fulfil their functions. The central nervous system presents a peculiar problem in that, although more detailed studies have been made of it than of any other part of the body, and much is known of its minute structure, very little of primary importance is understood about its mode of functioning, especially where large numbers of neurones are concerned. One reason for this possibly is that the central nervous system is of quite a different order of complexity from the rest of the body, both as regards structure and function. It is also probable that our present methods of investigation are inadequate for the solution of its most fundamental problems.

There can be no doubt however that our detailed anatomical and histological knowledge, both of the human brain and of other brains, still needs to be much more complete. Without a proper anatomical basis physiology must remain limited in its advances, and without a full physiological and anatomical understanding psychology can never become a true science. Progress is being made in the elucidation of the part played by the central nervous system in movement and sensation, and in its present phase anatomy is concerned almost solely with these aspects.

The visual system has been studied by modern methods for many years, and although much is known about it, many points have not passed beyond the stage of guess-work. Until the necessary techniques for the more detailed investigation of both structure and function in a single animal have been developed, advance in knowledge can be expected principally from the application of known techniques

to different animals so as to form a basis for the use of the methods of comparative anatomy.

The optic system in ungulates has so far received comparatively little attention. The present study is an attempt to extend knowledge in this particular field and will be concerned chiefly with the course and destination of the optic tracts in the sheep and the internal structure of the lateral geniculate body, so far as these are revealed by simple neuro-histological stains ( i.e. toluidin blue and the Weigert method ) and by the experimental methods used for the Marchi technique and for transneuronal degeneration in the lateral geniculate body. The findings will be compared with those which have been reported in other mammals.

The general plan followed in this description is that first of all is given a brief account of the retina in the sheep, next a description of fibre tracts, with a discussion of findings in other mammals, and finally an account of the lateral geniculate body, followed again by a discussion of findings in other mammals. The results of personal investigations are included in all three sections.