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AN  
ELECTRON MICROSCOPICAL STUDY  
of the  
COMPARATIVE MORPHOLOGY  
and  
PATHOLOGY  
of the  
VERTEBRATE RENAL GLOMERULUS.

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CONTENTS.

PART I

The Comparative Morphology of the Vertebrate  
Renal Glomerulus.

CHAPTER I.

The Mammalian Renal Glomerulus.....1

CHAPTER II.

The Glomeruli of Lower Vertebrates..39

CHAPTER III.

Comparative Physiology.....46

CHAPTER IV.

Technique.....58

CHAPTER V.

Results.....72

CHAPTER VI.

Discussion.....150

PART II.

Pathology of the Renal Glomerulus.

CHAPTER VII.

Electron Microscopical Study of  
Glomerular Changes in Experimental  
Hydronephrosis.....189

CHAPTER VIII.

A Comparison of Light and Electron  
Microscopy of Glomerular Lesions  
in a Diseased Kidney.....205

BIBLIOGRAPHY.

AUTHOR INDEX.

SUBJECT INDEX.

## PREFACE.

Conventional light microscopists have not placed much stress on the comparative morphology of the vertebrate renal glomerulus, generally reporting that nephrons are glomerular or aglomerular, except in the avian and reptilian nephrons. With the application of electron microscopy to biological work, especially sectioned material, much greater detail of structure is being described in the renal glomerulus. The work has been done mainly on mammals with only two papers, one being an abstract, on the amphibian renal glomerulus. Even with the increased magnification and resolution achieved by this new technique, these new findings do not solve all the problems of the conventional microscopist concerning the glomerulus. Furthermore they bring to light other problems especially with regard to known and generally accepted physiological data. This indeed is one of the stimulating facets of research. It was therefore decided to undertake an electron microscopical study of the comparative morphology of the vertebrate renal glomerulus, in an attempt to shed further light on this important structure.

It is proposed to describe each component of the glomerulus separately, both in the historical background and in the results, as this will make reading and understanding easier. In the results, the description of

each component of the glomerulus of all the animals studied will be followed by a series of electron micrographs illustrating this component. It is hoped that this will make comparison more readily appreciable.

The natural sequence of such a study on normal glomeruli, is the study of this organ when it is involved in a disease process. Therefore, the second part of this thesis reports the glomerular changes in experimentally induced hydronephrosis, and a correlation of light and electron microscopical findings in a diseased kidney surgically removed from a human subject.

The work presented in this thesis was performed during the author's tenure of a lectureship in Professor J. S. Robertson's department of pathology at the University of Adelaide. The author is extremely grateful to his chief for suggesting the greater part of the subject matter, for his continued interest, advice, criticism, encouragement, and also for his permission to draw freely on the work published with him as co-author. Dr. H. Hoffman, of the Animal Genetic Section of C. S. I. R. O. was very helpful in the general field of electron microscopy. Dr. S. G. Tomlin, Reader in Physics, Dept. of Biophysics, University of Adelaide, granted access to the electron microscope, and also the full co-operation of his technical assistant, Mr. J. Orsula. Other members of the staff of the Dept. of Pathology - Drs. R. T. W. Reid, P. R. Hodge, J. R. Lawrence and S. Posen - were helpful during the

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The preparation and fixation of the tissue, the sectioning, the electron microscopy and the greater part of the printing were done almost entirely by the author.