

Introduction

This issue of *Kidney International* is a Festschrift in honor of Dr. Jean Redman Oliver, a most remarkable man who has made many unique contributions to nephrology. Now in his 85th year, Dr. Oliver has enjoyed an exceptionally long and productive career, and his continuing productivity is demonstrated by the publication of his most recent work in this Festschrift.

This particular work of Dr. Oliver has had a lengthy incubation period, dating back to his student days at Stanford Medical School. There in 1915 he published his first approach to the mysteries of renal activity in a confirmation of Suzuki's demonstration two years earlier by means of vital staining of the differential action of certain metallic salts (chromium, uranium and mercury) on the proximal convolution of the renal tubules (at that time, Dr. Oliver points out, there were no "nephrons!"). There was this difference in Oliver's confirmation; the method of microdissection was applied to the pathological state and one could see for the first time that "ascending limbs" and "distal tubules" were free of necrotic damage.

Of perhaps wider significance was the visible demonstration that vital dyes (carmines, trypan blue) were normally reabsorbed and stored in a gradually decreasing gradient in the proximal convolution; it was to be some 30 years before he was to participate in the demonstration that a similar localization and gradient of function was the physiologically normal aspect of the reabsorption of glucose, sodium and water.

In a lecture at Columbia University College of Physicians and Surgeons in the mid-1930's, Dr. Oliver described the diverse anatomical configurations of the nephrons in patients with chronic renal disease as they could be seen by microdissection, findings which were later published in his landmark book *Architecture of the Kidney in Chronic Bright's Disease*. Following his talk Dr. A. M. Pappenheimer, Sr., then Professor of Pathology, rose to express his appreciation of such morphological studies and to urge as an ultimate goal for Dr. Oliver the application to experi-

mentally diseased mammalian kidneys of both microdissection and micropuncture techniques of the type then being performed by Dr. A. N. Richards and colleagues at the University of Pennsylvania on the amphibian kidney. Several years were to pass before collaboration with Dr. Richards' group was to occur. The conjunction of these two groups of investigators with their unusually definitive techniques resulted in the two classical publications: *Methods for the Collection of Fluid from Single Glomeruli and Tubules of the Mammalian Kidney* by Arthur M. Walker and Jean Oliver, accompanied by *The Collection and Analysis of Fluid from Single Nephrons of the Mammalian Kidney* by Walker and Bott, Oliver and MacDowell. To this day these studies represent the standard by which all other mammalian micropuncture work is judged, and the passage of time has only enhanced the general appreciation of the importance of the 1941 work.

Kant, a most modest man, is said to have always referred to his work in philosophy as a "Copernican Revolution"; perhaps some such term might be applied to the results of these early workers, for in the lesser microcosm of nephrology they ended a long era of indeterminate and, what seemed to promise to be, an interminable controversy which Bowman, Heidenhain, Ludwig and even the critical acumen of Cushny with his "Modern Theory" had been unable to resolve.

It was with great interest that Dr. Oliver observed the revival of kidney micropuncture in the early 1950's. He took special note of the fact that Wirz and others were reporting analyses of distal tubular fluid, since Arthur Walker had very rarely been able to identify distal convolutions on the surface of living kidneys. I suspect that it was not until after Dr. Oliver's long-time associate Mrs. Muriel MacDowell had actually dissected the distal convolutions in the continuity of the entire nephrons from kidneys which my colleague Miss Margaret Mylle had punctured *in vivo* that he accepted the fact that the new wave of micropuncturers were really able to identify and collect fluid from the end as well as the beginning of the nephron.

This initial contact provided the workers in the

Chapel Hill micropuncture laboratory a unique opportunity for collaborative studies of diseased kidneys and their constituent nephrons when our interest turned in this direction. Dr. Oliver's enthusiasm is evidenced in a letter he wrote me on January 30, 1961: "Your letter arrived just as I am struggling over a chapter for D. A. K. Black's new book on Renal Disease. In it I have repeated the old story that I think is obvious to everyone now; the complexity of structure and function even in the normal kidney, the futility of believing that indirect methods can ever solve the problem in the heterogeneity of the renal lesion," and concluding with the necessity of the application of the direct methods of micropuncture and microdissection to the abnormal nephrons.

The study in this Festschrift by Kramp, Oliver et al of rats with chronic kidney damage is then of special interest since the same individual chronically damaged nephrons were studied with both micropuncture and microdissection techniques. Viewed in the perspective of the accumulated information provided by Dr. Oliver's microdissection studies of nephrons from diseased kidneys and the micropuncture studies of normal nephron function performed in many laboratories, there are few surprises in this most recent work. The study documents what Dr. Oliver has posited since his study of chronic renal disease in vitally stained dog kidneys many years ago: that diversity of morphological form is associated with diversity of function, thus confirming his belief in the inseparability of structure and function in still another situation.

This Festschrift appropriately begins with an article entitled "Jean Redman Oliver: In Context" by Dr. Stanley E. Bradley, a nephrologist who has had a long personal acquaintance with Dr. Oliver and with whom he has collaborated. Bradley and his colleagues have also contributed an article concerning an area of

interest which they share with Dr. Oliver, the "Effect of uninephrectomy on glomerulotubular functional-structural balance in the dog." Dr. Malcolm Holliday and associates follow a similar theme in their article "Early responses of glomerular filtration rate to unilateral nephrectomy." Some years ago Dr. Holliday collaborated with Dr. Oliver and Dr. Louis G. Welt in their studies on the effects of electrolyte imbalance on form and function of nephrons. Professor G. Richet and colleagues pursue the theme of structural-functional correlations in their paper "Scanning of the apical pole of distal tubular cells under differing acid-base conditions." Professor F. Reubi discusses "The pathogenesis of anuria following shock," a subject in which Dr. Oliver has had a long interest and to which he has contributed so importantly. Drs. Norman Kretchmer and Jay Bernstein review the morphogenesis of the protein droplet in renal disease. Dr. Kretchmer in his premedical days was an associate of Dr. Oliver, and an article on the protein droplet seems particularly appropriate in view of Dr. Oliver's early interest in protein droplets in renal tubular cells. Dr. George Fetterman and colleagues provide an elegant demonstration of the continuing usefulness of the microdissection technique in their article, "Cystic changes in fetal kidneys following ureteral ligation: Studies by microdissection."

Selection of papers for this Festschrift has been rather arbitrary, since space and other limitations prohibit publication of contributions by all of the many investigators who have had a meaningful personal contact with Dr. Oliver or who have worked in the areas to which he has contributed so importantly. This issue of *Kidney International*, however, symbolizes the affection and respect that all nephrologists have for Jean Redman Oliver.

CARL W. GOTTSCHALK
Chapel Hill