

able personal experience makes me highly skeptical as to the propriety of our drawing inferences as to the condition of the blood from the effects of intravenous infusions of urine in animals. A very obvious and serious gap in the experiments of Teissier and Frenkel is the absence of observations on the toxic salts ingested with the food and eliminated with the urine, the toxicity of the urine, both in health and disease, being largely dependent on its potassium salts. Future investigations may show that the kidney elaborates an internal secretion, but at present we are justified in taking the position that the observations now relating to this question do not help us in explaining the pathology of uræmia.

Passing now to a consideration of the clinical types of uræmia with a view to the discussion of their pathology, it is desirable first to make reference to the phenomena of double nephrectomy in dogs and their relation to human uræmia of obstructive origin.

The alterations in the composition of the blood that are entailed by double nephrectomy are of the greatest interest in the study of the pathology of uræmia, for they necessarily represent the results of the most extreme degree of renal incompetency *per se* and without complicating factors such as are commonly present in human uræmia. The following description of the symptoms and pathological alterations incidental to experimental uræmia, is based on a series of 10 successful cases in dogs, as well as on cases in the pig and rabbit—and also upon a number of instances in which the ureters were tied upon both sides. It may be stated at the outset that the symptoms were essentially the same in the case of double nephrectomy as in ligation of the ureters. These symptoms consist, in a typical case, of moderate prostration following the operation, of repeated vomiting¹ sometimes associated with diarrhoea, of slow and deep respiration, of slow, full and high tension pulse and, not rarely, of fibrillary twitchings. In only one instance did true convulsive seizures occur. Death is usually preceded by a period of drowsiness or actual coma. In none of my animals was the operation survived more than four and a half days, and most of them lived less than three days. In cases unaccompanied by infection the temperature is generally one or two degrees below normal for one or two days before death.

A considerable number of observations have been made by me to determine whether the blood of nephrectomized dogs is more toxic to rabbits than the blood of normal dogs; or, to put it a little differently,

¹ The vomiting referable to the removal of the kidneys must be distinguishable from that which results from peritonitis accompanying accidental infection in these cases.