

had suggested. These observations were confirmed by experiments upon the dog. The experiments are to be found fully described in my paper above referred to (p. 398). Suffice it to say that the passage through the glomeruli of hæmoglobin (together, probably, with some albumen) could with certainty be demonstrated in animals, in which by lowering the blood-pressure below 40 mm. of mercury complete anuria had been induced, the cessation of the urinary flow being determined not by the empty state of the bladder, but by means of fine catheters placed in the ureters and connected with graduated glass tubes. Here again the appearance of concentrated hæmoglobin outside the glomeruli can only be explained by the hypothesis that the glomerular walls possess selective functions.

But further, the same series of experiments showed in another way that an amount of hæmoglobin could be present in the urine far beyond that explicable by a theory of filtration. In opposition to the view first propounded by Ponfick,¹ Afanassiew,² as the result of an elaborate investigation, has shown that not only a part, but all of the hæmoglobin in hæmoglobinuria passes through the glomeruli, and that the brown granular appearance of the cells of the *tubuli contorti* is due to the presence, not of hæmoglobin, but of the products of degeneration and destruction of the red corpuscles; and that when pyrogallie acid, for example, is injected in quantities not sufficient to produce hæmoglobinuria, while it causes a definite destruction of the corpuscles, the brown granules are to be observed in the cells of the tubules and again in the sediment of the urine. Nevertheless microchemical observation failed to detect hæmoglobin in this sediment. These statements of Afanassiew, so far as they refer to the passage of unaltered hæmoglobin out of the kidney, have recently been confirmed by Hunter.³

On examining and comparing the amount of hæmoglobin in equal quantities of the urine and of blood-serum from dogs in which hæmoglobinuria had been induced, I found that there could be a very great variation in the relative amount contained,

¹ Ponfick, quoted by Heidenhain, *loc. cit.* p. 351.

² Afanassiew, *Virchow's Arch.* vol. xviii. (1884).

³ Hunter, *Lancet*, October 6, 1888.