

Appendix 2

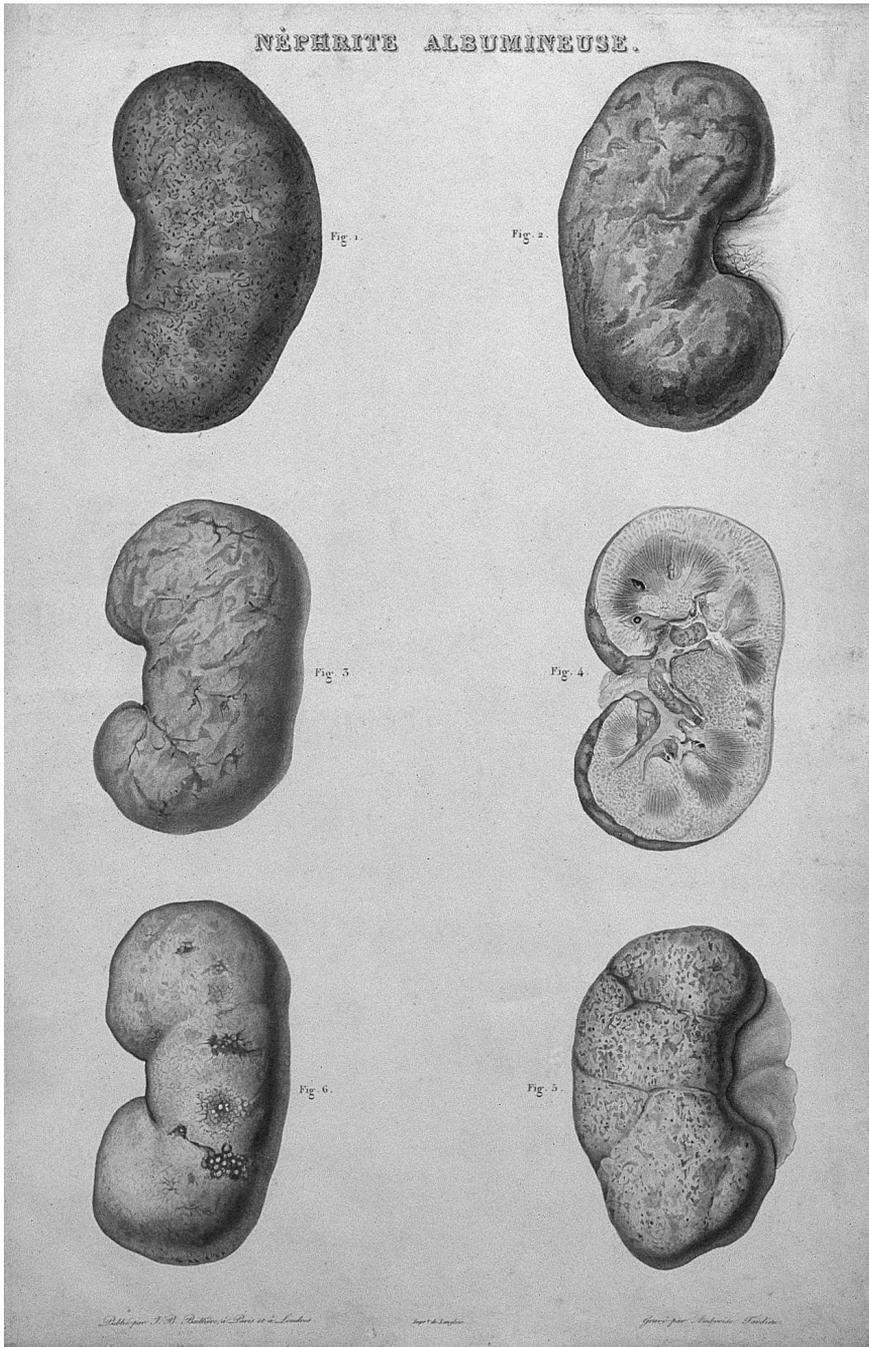
Notes on Classifications and Drawings of Nephritic Kidneys in the Nineteenth Century

It is axiomatic that in the absence of acceptable descriptive terms that could be replicated, drawings of nephritic kidneys were a priceless asset and provided the greatest contribution to our present-day image and understanding of the types of lesions that the nineteenth century renal physicians were depicting. Although injected Malpighian corpuscles or glomeruli could be seen on the surface of the kidney using a hand lens (Rayer described them as “petits points rouges”), prior to microscopic examination workers could only report on the crude morbid anatomical appearance of the kidney. The terms used related to size, weight, shape, colour, hardness, adherence of the capsule and the presence or absence of granulations. It is difficult to assess the value of contemporary classifications of the time unless the findings are accompanied by drawings and all the best studies did so, including those of Rayer, Bright and Martin Solon. If we compare Rayer’s extended six-form classification of nephritic kidney with Bright’s original three forms some interesting facts emerge. Most nephritic patients, other than those who survived scarlatina nephritis and were unavailable for “observations”, died, often at different stages of the disease perhaps days, weeks or months after the onset of the nephritic process. The latter would explain the disparity in the appearances of the kidney. Bright described the three classical forms corresponding to three clinical presentations which we have simply dubbed as the “large red” of acute nephritis, the “large white” of the nephrotic syndrome and the “contracted granular” of chronic end stage nephritis, and remained agnostic about the existence of any other forms. Modern nephrologists are agreed that it would have been difficult at that time to improve on Bright’s classifications. One can identify these three forms within Rayer’s collection of six forms. With the advantage of hindsight it is tempting to postulate that Rayer’s extra three forms were merely examples of the Bright three but at different stages of the disease process, for example sub-acute nephritis. This hypothesis cannot be proved as nowadays nephritic patients do not usually come to post mortem and it is difficult to compare present-day biopsies with the nineteenth-century morbid anatomical appearance of the kidney. This theory may be further considered by examination of Rayer’s and Bright’s classifications and their accompanying plates. Rayer is at great pains to express in words the differences and alterations that he discusses during his post mortem “observations” and from his illustrated plates. The descriptions tend to be over elaborate as he searches for intermediate changes that extend the spectrum of Bright’s three basic kidneys. He places a good deal of emphasis on lobulation, which we now know is a normal variant but which could have been accentuated in a swollen kidney.

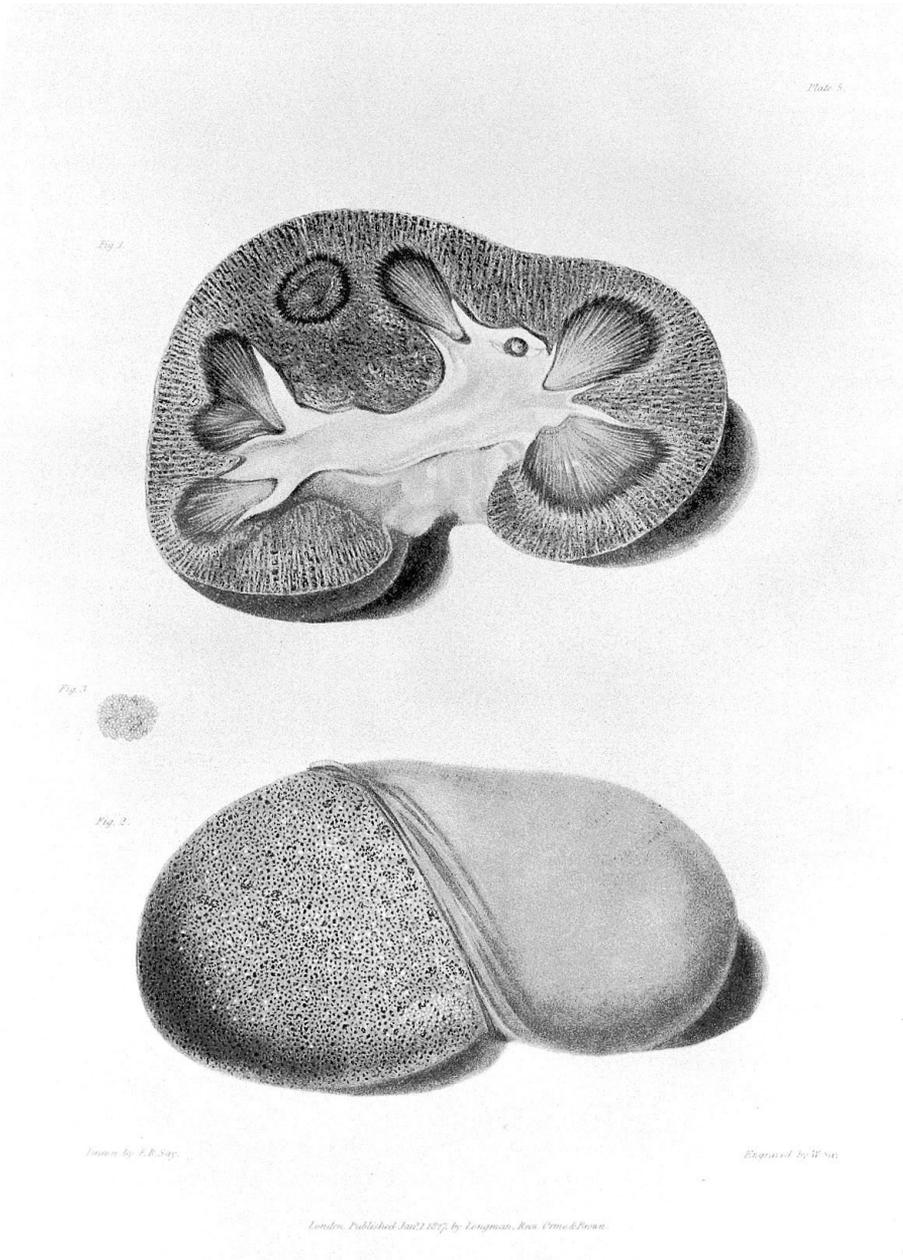
Although it can never be conclusively proven it is likely that as the chronic disease process progressed whether from a large white or red type, the kidney became more

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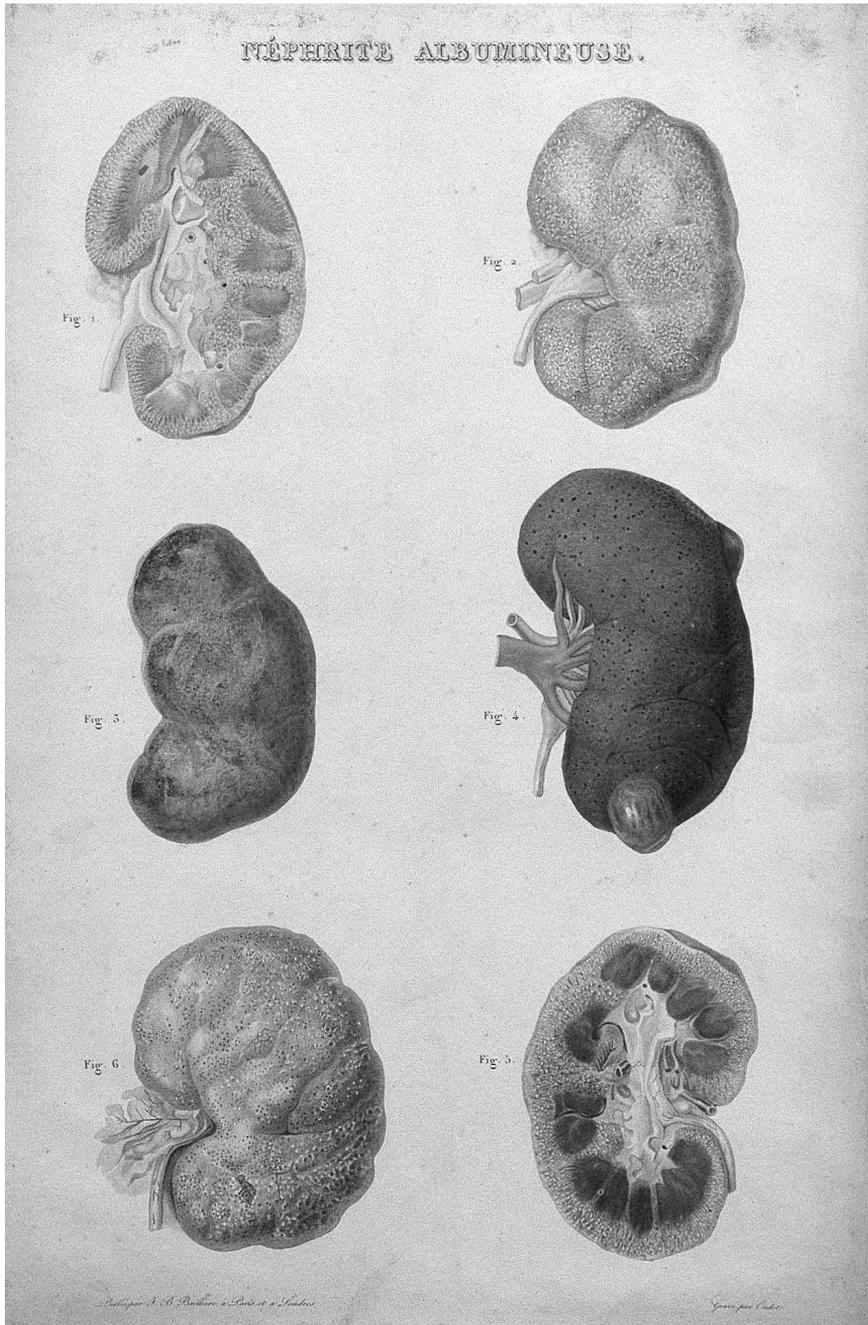
granular and smaller thus explaining the discrepancies between Rayer's six forms and Bright's three. Following the translation of Rayer's classifications and drawings we have attempted to align them with the corresponding plates in Bright's Atlas albeit that they are drawn to a different scale.



Rayer's Plate VI, Fig. 1 (top left) illustrates Form 1—a large blood injected kidney.

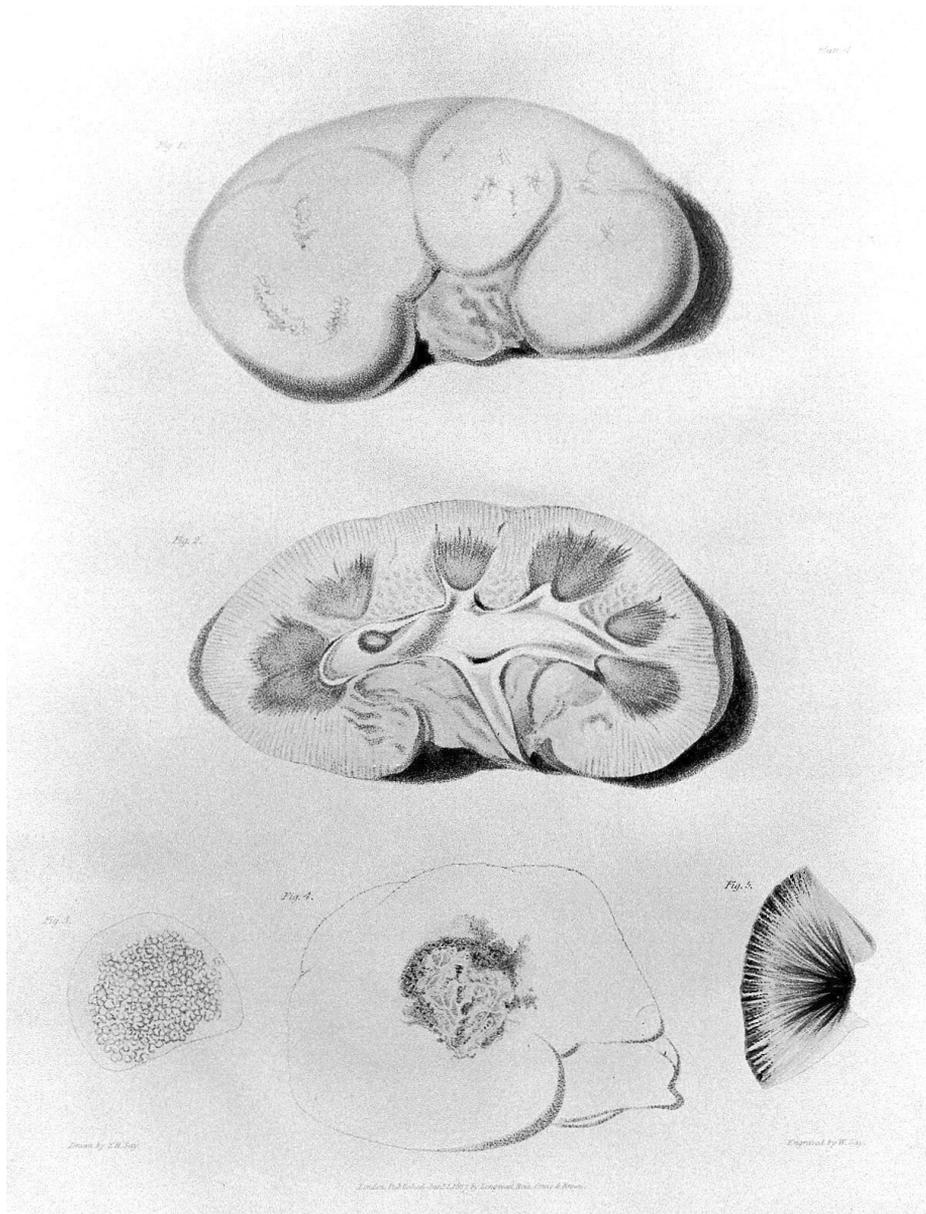


Bright's comparable large red is shown above—Plate V, Figs. 1 and 2.

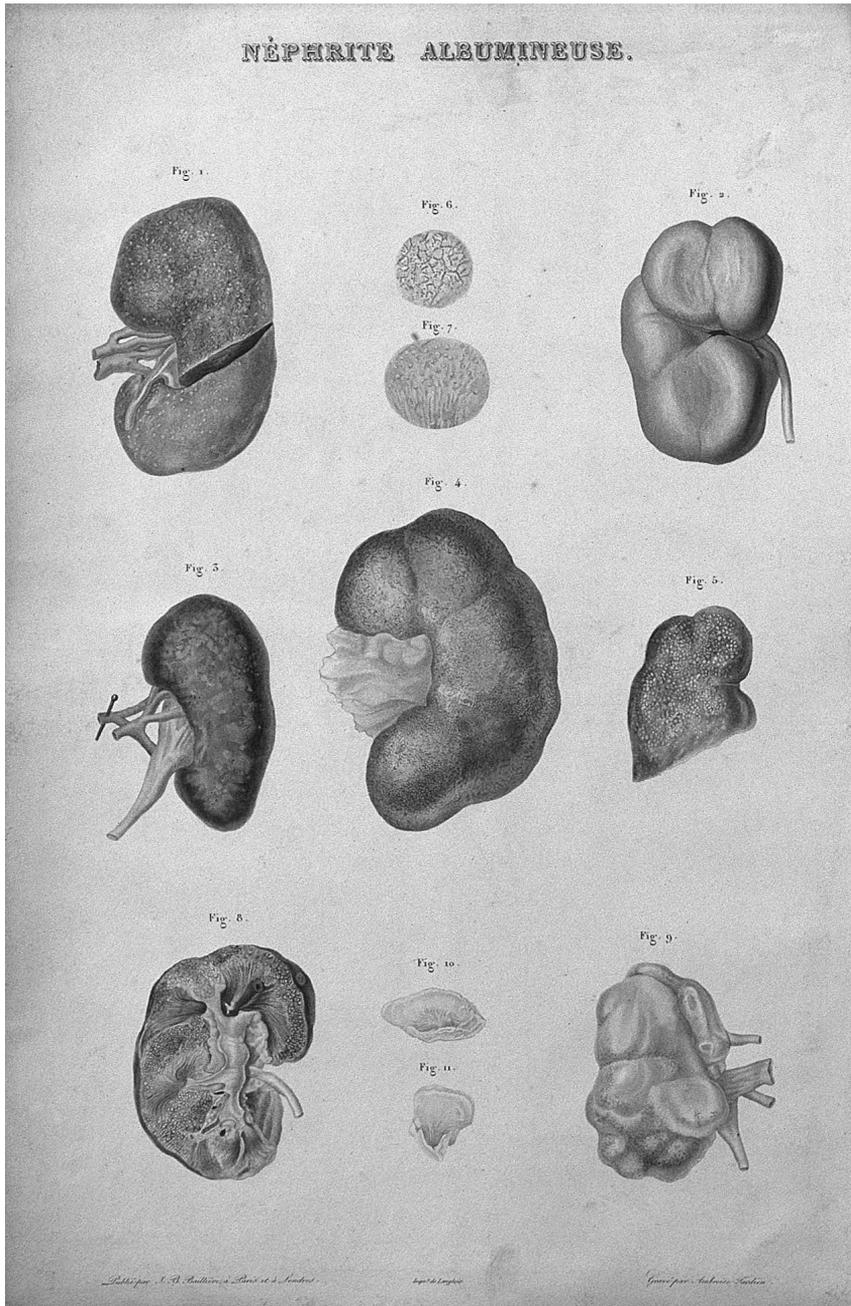


Rayer's Plate VIII, Figs. 1, 2 (at the top) and 5 (bottom right) illustrate Form IV. Again the kidney is increased in size but this time it is a whitish milky-yellow in colour.

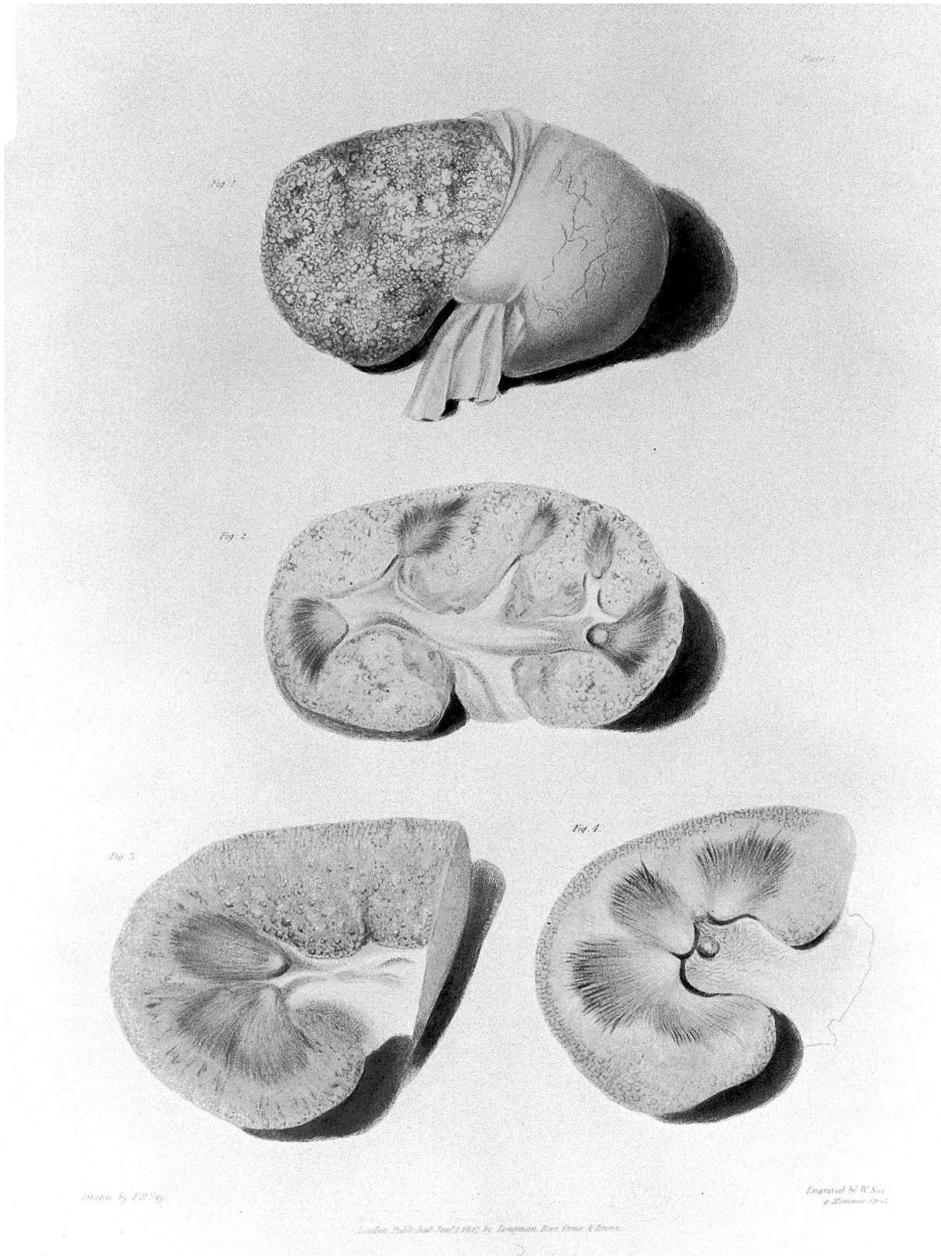
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Bright's corresponding large white is shown here—Plate IV, Figs. 1 and 2 (top and middle).



Rayer's Plate VI, Fig. 5 (see p. 100, bottom right) and Plate VIII, Fig. 6 (see page [102, bottom left) show Form VI, the small, granular, contracted kidney, but this appearance is best exhibited by Plate IX, Fig. 8 (bottom row, left) shown here.



Bright's equivalent small, contracted kidney is shown here—Plate III, Figs. 1 (top) and 3 (bottom left).

Pierre-François Olive Rayer's Classification of the Six Forms of Albuminous Nephritis, translated from his Atlas

Albuminous nephritis is characterized principally by the presence of a notable quantity of albumin in the urine with or without blood-like deposits; by a smaller proportion of salts and urea and more often by a diminution of the specific gravity of the urine; finally by the development of dropsy particularly of the subcutaneous tissue and the serous membranes.

The alteration to the kidneys in albuminous nephritis may be connected to six principal and probably progressive forms:

Form 1: Pl. VI, Fig. 1 and Pl. X, Fig. 3

The size of the kidney is increased, in an adult the weight can double, i.e. from 4 oz to 8–12 oz. The consistency of the kidneys is firm without hardness, i.e. like kidneys distended with fluid. Their surface, a fairly vivid morbid red in colour, appears to be dotted by a number of small red spots darker than the overall colour of the organ. On dissection one realizes that the enlarged volume of the kidney is due to a swelling of the cortical substance; internally the surface shows a large number of small red spots similar to those which one observes externally and which according to my research correspond mainly to the Malpighian corpuscles heavily injected with blood. The tubular substance compressed between the swollen extensions of the cortical tissue extending between the pyramids is of a duller red and its striae are less noticeable than normal. The mucous membrane of the calyxes is injected and displays vascular aborization.

Form 2: Pl. VI, Fig. 2 and 3; Pl. VII, Fig. 5

Increased volume and weight of the kidneys as in the preceding form. The consistency of the kidneys is a little less solid. The lobes are often more pronounced than normal but what especially characterizes the form is the profound mixture of anaemia and hyperaemia; a mottled appearance on the surface of the kidneys produced by the pockets of red spread over a yellow base. On dissection the swollen cortical substance is pale yellow in colour pock-marked with red and is distinct from the tubular substance, which is a fairly vivid brownish-red in colour.

Form 3

The volume and weight is increased as in the preceding forms but one does not find the areas of red or the mottling; the cortical substance on the surface of the kidney and on dissection is of a fairly uniformly pale colour, of a whitish-pink slightly yellow or indeed an even paler colour analogous to that of eel flesh. (Pl. X, Fig. 5.) In some areas of these anaemic kidneys, one sees small blood injected vessels (Pl. VII, Figs. 2 and 5; Pl. IX, Fig. 9; Pl. X, Fig. 10) and more rarely small slate-coloured/brown or large white granulations coming from an old deposit of glutinous lymph (Pl. VI, Fig. 6); one often sees red hardening of the papillary tips of the tubular substance and a slight thickening of the mucous membrane of the calyceal fundi, the vessels of which are sometimes injected.

Form 4: Pl. VIII, Figs. 1, 2, 3, 4, 5, 6, Pl. IX, Figs. 1, 8

This has been described by Dr. Bright as “granulation” of the kidneys. As in the preceding form the kidneys are larger and heavier than normal, their external surface, most frequently of a pale yellow colour, is seeded and sometimes covered with small milky-white pockets, slightly yellow and pin-head sized, often lengthened and with an appearance resembling small milky lumps, which are spread irregularly in a greater or lesser number over the whole surface of the kidneys. Usually these granulations appear in greater number at the poles of the kidneys. All are coated in a thin varnish-like covering; the surface of the kidneys is perfectly smooth. One again finds these small milky deposits (Bright’s granulations) in the thickened cortex. When one splits the kidneys from their convex side towards the fissure, as in the 2nd and 3rd form the surface is generally of an anaemic yellowish colour, which contrasts strongly with the red of the tubular tissue. The swollen cortical substance takes up a larger area than normal, above all in the extensions between the pyramids. The small milky deposits (Bright’s granulations), instead of being fairly rounded and separate from each other as usually seen on the external surface of the kidneys, (Pl. IX, Fig. 1) appear in the form of irregular flocculations which appear to combine with the striae of the tubular substance (Pl. VIII, Fig. 1) In a good dissection this tendency is very obvious, particularly at the periphery of the kidney and at the base of the pyramids where the granular alteration is usually more pronounced.

Sometimes one encounters few, if any, granulations in the thickened cortical substance albeit that on the surface they are quite numerous. On the contrary, in other cases the granular alterations cover the entire depth of the substance, including the elongations that penetrate to the base of the tubular pyramids where the striae appear weighed down or fanned at the outer edges so that they look rather like a wheat sheaf (Pl. IX, Fig. 8).

After a period of maceration in water one can more readily see these distortions on a kidney showing Bright’s granulations. Their dull white colour is more obvious on the surrounding cortical substance (Pl. IX, Fig. 1).

Two kidneys taken from infants who had died of dropsy with albuminous urine showed a greater number of granulations more regularly grouped than those usually seen (Pl. IX, Fig. 1).

Form 5

Rarer than the preceding, but also accompanying dropsy and albuminous urine pre mortem. The kidneys are equally enlarged, weigh more and have lobes more pronounced than normal. I cannot give an exact image of the particular aspect which they present other than by saying that it looks as if a large number of small grains of semolina were deposited beneath their cellular membrane. These small grains, quite distinct from the yellow sand which one sometimes sees in the cortical substance, are also the small granulations of plastic lymph which one encounters by chance in this and some other types of nephritis.

Form 6

This appears to correspond to the third form described by Dr. Bright. The kidneys are rarely enlarged and indeed sometimes smaller than normal (Pl. VI, Fig. 5; Pl. VIII, Fig. 6;

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Pl. X, Fig. 10); are hard and show irregularities or nodules on their surface. One encounters few if any milky deposits (Bright's granulations) but on dissection one usually discovers a certain number in the thickened cortical substance. I have also seen a kidney in this hardened condition and curiously deformed (Pl. VII, Fig. 6) showing a large number of Bright's granulations on the surface.