

over the colourless surfaces. The bleaching of the soluble Prussian blue in the gelatine injection mass was attributed to *reduction* of the blue potassium ferri-ferrocyanide to the colourless di-potassium ferro-ferrocyanide; in terms of physical chemistry to the removal of a positive ionic charge of electricity from the tri-valent ferric-ion. Similar results were obtained on injecting the vascular system of the surviving kidney. It then occurred to me that if the kidney could reduce a pigment which was still in its vessels, the organ, if injected under sufficient pressure, might be constrained to excrete an artificial urine through the normal channel of the ureter. I found it possible to effect this. On injecting into the artery of a sheep's kidney the warm soluble Prussian blue and gelatine mixture, I obtained from the cannulated ureter a few drops of an absolutely colourless substance—an artificial urine—which on being treated with hydrogen peroxide at once became blue. The kidney had, then, excreted some gelatine and reduced soluble Prussian blue, proving that these substances had travelled from the blood capillaries to the ureter and in the passage had been reduced by the still living renal epithelium. But after a time it was noticed that the outflow from the ureter had become blue, the kidney cells had become poisoned and so no longer able to carry on their vital reduction. It is not to be supposed that the living tissues can withstand for more than a certain time treatment with substances which cannot be other than ultimately toxic for them. In later experiments ferric chloride was used with both the liver and kidney in order to determine whether a substance devoid of oxygen could be reduced to the lower form—ferrous chloride—on being perfused through surviving organs. From the kidney was obtained an artificial urine which contained ferrous chloride, and some ferrous chloride was present in the liquid which emerged from the renal vein. Similar results were got with the liver; from its bile duct ferrous chloride was drawn off (artificial bile) and in the fluid from the hepatic vein some ferrous chloride was present.

The activities of tissues may be studied in other ways than by injecting chemical substances into their vessels; for instance the organs may be crushed in a juice-press until thoroughly disintegrated, and the resulting juice mixed with some pigment or other substance the reduction of which is expected. By this means the active reducing material is brought into a contact with the reducible material which is very much more intimate than when, for instance, masses of the organ are merely immersed in the reducible solutions. By this technique, press-juice of liver and kidney of cat, sheep,