

rabbit, horse and frog was able to reduce methylene blue to methylene white, sodium indigo-disulphonate to the colourless chromogen and sodium nitrate to sodium nitrite. It was found also that e.g., liver juice could reduce the pigment methæmoglobin first to the stage of oxyhæmoglobin and later to that of fully reduced hæmoglobin. A boiled control of these juices had no reducing power whatever.

Two French workers, Abelous and Gerard, as long ago as 1899 had suggested that these reducing powers of tissues might be due to the presence of a ferment to which they gave the rather barbarous name "reductase." Later reasons will be given for suggesting a more specific term for this tissue-ferment.

My work carried out in 1909-10 was undertaken with a view to determine what was the evidence for the existence of a reducing enzyme in tissue press-juice. The results then obtained, taken in conjunction with others arrived at more recently, have gone far to convince me that there is a tissue-ferment with reducing powers. We have no evidence that this ferment differs qualitatively whether it is derived from liver, kidney or other tissue.

Some of the evidence for this conclusion may be summarized as follows:

In the first place in a control experiment where the juice is boiled, none of the reducible substances mentioned above is reduced thereby. The temperature of boiling water, as is well known, destroys the activity of all enzymes.

In the next place, the general behaviour of the juice according as the temperature is raised or lowered is in agreement with the behaviour of acknowledged enzymes. Thus at minus 10°C., there is no reduction of soluble Prussian blue by fresh liver juice, and it is extremely slow at zero; inhibition may be induced indefinitely by keeping the mixture of pigment and juice surrounded by a freezing mixture; on the mixture being removed to air temperature, reduction goes on as rapidly as is usual for that temperature; the ferment, therefore, has been inhibited but not destroyed. As the temperature rises, the velocity of reduction increases correspondingly; the optimum temperature is somewhere between 40 and 45°C. Like recognized enzymes, reductase has a destruction-temperature which is in the neighbourhood of 70°C.

While fresh juice reduces soluble Prussian blue within a minute or so at room temperature (17°C.), its activity rapidly falls off, so that after twenty-four hours it takes some minutes longer to bleach the pigment; yet juice which takes some minutes at room tempera-