hydrate, the quotient stands near 1, but when it is protein or fat, it falls to about 0·7. In starvation, however, quotients below 0·7 have been observed, which can be explained only by assuming that oxygen has been retained in the body beyond that which is necessary for immediate purposes of oxidation. Since it is known that this retained oxygen cannot exist in the body in a free state, we must conclude that it has been incorporated with certain substances, so as to raise their oxygen content. Such would be the case if proteins or fats, which contain only from 12 to 20 per cent. of oxygen, are converted to carbohydrates, which contain about 53 per cent. It does not necessarily indicate, however, that such a process occurs, for a similar retention would occur when oxy-acids, such as β-oxybutyric, are formed.

The undoubted conversion of at least protein and the glycerine portion of fat into carbohydrate in the diabetic and starved animal, and the possibility that fat may also be converted, raises the question as to whether, in the normal animal, proteins and fats may not become converted into carbohydrate before they can be utilized. Some have accepted this view, and have asserted that the process occurs in the liver. There are not wanting some observations that would seem to warrant such a conclusion. Thus, when an animal is first of all treated with strychnine, so as to render the liver free of glycogen, and this organ is then removed and perfused with defibrinated blood mixed with Locke's solution, it has been found that sugar accumulates in the blood up to a certain percentage, beyond which it ceases to be produced (7). But this can be shown not to be because of exhaustion of the glyconeogenic power of the liver, but because the sugar, which the perfusion fluid has gained, inhibits this process. The sugar formation, therefore, reappears when fresh blood-mixture is perfused. We must be cautious, however, in accepting results that are obtained on a perfused, and therefore half-dead, liver.

Assuming that the transference of oxygen necessary to convert proteins and fats to carbohydrate occurs in the liver, it is of interest to see what influence the removal of this viscus from the circulation will have on the respiratory quotient. It has been found, after clamping the aorta and vena cava so as to exclude the liver and the abdominal viscera from the circulation, that the respiratory quotient rises nearly to 1, and this has been interpreted as indicating that carbohydrates alone are being