mere chemical transformation. As carbohydrate may happen to be here applied to fat-production, so have we a provision in the direction wanted for preventing its reaching the general circulation as sugar. There are grounds also for believing that a further formation of fat is effected by the protoplasmic agency of the cells of the liver.

That carbohydrate can be turned to account in contributing to proteid-production is demonstrated by the growth of the yeast-cell in a medium containing no other source than sugar for the carbon constituent of its protoplasm. Further, carbohydrate is susceptible of being cleaved off from the proteid molecule. The proteids entering into our constitution do not enter the system in a ready-formed state. The proteid matter of food is as a first step towards its application to the purposes of life broken up by the ferment-agency of digestion. The absorbed products of digestion then fall into relation with the living protoplasm of the cell of the villi. Peptone, which is recognizable previous to the occurrence of absorption, now becomes lost sight of, and in view of all the circumstances existing it may be taken as reasonably permissible to conclude that through the instrumentality of protoplasmic action an extensive building up of proteid goes on in the villi.

By synthesis into proteid carbohydrate matter is placed in a position to be susceptible of transport through the system without running off with the urine. At the same time it is evident that its liberation from the locked-up state into a free form can be most easily effected in the presence of suitable conditions. The lactose of milk cannot, reconcilably with our collateral knowledge, be conveyed as such to the mammary gland, but must constitute a cleavage-product resulting from the effect of—may it not be said—ferment-agency existing within. In the grave form of human diabetes, as well as in the experimentally induced phloridzin and pancreatic diabetes, sugar is drawn from a source other than the food, and the large quantity that can be eliminated testifies to the abundant store of locked-up carbohydrate that must exist ready to be set free when the requisite agent for effecting the purpose is present, just as the sugar in amygdalin is set free in the presence of emulsion.

What has been said of the villi gives them the assimilation of food; a process that may be naturally looked for to immediately follow absorption. At a period of fasting, the amount of sugar in the portal blood practically stands in accord with that in the blood of the general circulation. After the copious ingestion of carbohydrate food, the amount of sugar in the portal blood rises, and I have known it reach as high as between 4 and 5 per 1,000. The circumstances are such as to lead to sugar being absorbed in too large a quantity to be fully assimilated or disposed of in the villi, and the portion that has failed to be assimilated reaches the portal blood and gives to it a fluctuating condition dependent upon the food. If there were no further provision existing for the purpose of assimilating this sugar and checking its passage into the general circulation, we should be thrown into a more or less pronounced glycosuric state after every meal, in precisely the same way as, in fact, occurs with the subject of alimentary diabetes. The liver, however, intervenes between the portal vein and the general circulation,