

erated, the remainder of the gland structures being perfectly intact. Opie's observations have been confirmed by numerous observers on this continent and abroad, but it must be pointed out that a number of instances have been recorded in which diabetes has occurred without any microscopic changes in the islands having been found. These negative results are subject to two interpretations. One inference is that all cases of diabetes are not actually of pancreatic origin, which is probably true. The other is that, although the islands show no microscopic change, they may be functionally inactive and fail to secrete their specific enzyme, just as we may have a functional inactivity of the oxyntic cells in the gastric mucosa with resultant anaecidity of the gastric juice.

Following closely upon these important researches, Otto Cohnheim, in 1903 and 1904, published results of experiments which seem destined to solve the problem of how the glucose of the circulating blood is ultimately burnt up in the body. This is the mystery which has puzzled physiologists for generations. By means of the Buchner press it is possible to compress the juice out of all the cells of any gland or fibre of any tissue. In this way he secured quantities of juice from the pancreas and muscles of cats and dogs. With each of these juices he first experimented separately. Each juice when added alone to a solution of glucose is inactive. When, however, muscle juice and glucose solution were first mixed together, and then the juice of the pancreas added, there was a rapid and complete conversion of the glucose into carbonic acid and alcohol. Cohnheim at first thought that the chemical change that occurred was analogous to Pawlow's researches concerning the relationship between trypsinogen, the proteid enzyme of the pancreas, and proteid digestion in the intestine. Pawlow found that trypsinogen itself was inactive on proteids, but when it came into contact with the "enterokinase" of the intestinal juice it was converted into trypsin, which then caused rapid digestion of the proteids. Cohnheim believes that the ingested carbohydrates are finally burnt up in the muscles. He holds that both the pancreas and the muscles produce substances that are necessary for normal carbohydrate metabolism. He was led at first to the belief that these substances were of the nature of enzymes or ferments. According to this hypothesis, he held that the muscles produced a proenzyme which requires the action of another ferment, produced by the pancreas and contained in its internal secretion, before it can become active on carbohydrates. Later researches convinced Cohnheim that the activating body produced by the pancreas was really not a ferment. It withstood boiling and was soluble in 96 per cent. alcohol, but not