learned by the patient who avoids it altogether, and it requires skilled psychological techniques to help the patient to undergo the required learning. In both alcoholism and obesity it has been found that self-help groups of sufferers are often able to achieve more than the physician can with the individual patient, and a recent controlled trial from the Institute of Psychiatry in London showed that socially cohesive groups of agoraphobics benefited more from a communal flooding experience than did non-cohesive groups. Other methods of behaviour therapy such as desensitization have been disappointing, but clearly the whole field of behaviour therapy requires more investigation, particularly combined with physical treatments.

4 Kerr, T. A., and Gurney, C., Medicine, 1974, 30, 1777.
5 Agras, S., Sylvester, D., and Olieveau, D., Comprehensive Psychiatry, 1969, 10, 151.

Closer scrutiny is needed of the relationship between spoilage organisms and their toxic byproducts. Enumeration of the various organisms in raw fish and open-pack cooked fish suspected to cause this scombroid type of food poisoning would be useful, together with careful examination of stool samples. The outbreak of scombroid fish poisoning in the U.S.A. is said to be the first reported from commercially canned fish. It would be interesting to know whether similar incidents can be recalled in Britain.

1 Halstead, B. W., Cepia, 1953, 1, 31.

An Artificial Pancreas?

Insulin was first used in the treatment of diabetes in 1922. Many routes for its routine administration have been attempted but only subcutaneous injection has stood the test of time. It is remarkably free from serious side effects: sepsis and allergy are rare, and minor local reactions or fat atrophy are common but not dangerous. Only hypoglycaemia remains both disagreeable and at times hazardous, and anything which could eliminate it would be welcome. A system of insulin delivery on demand is needed; pancreatic transplantation, islet transplantation, or a mechanical artificial pancreas are the methods for achieving it.

Pancreatic transplantation has been performed successfully, but the mortality is high and even in the U.S.A., where most experience has been obtained. There were in 1973 only two long-term survivors from 32 operations. This price is clearly too high for the theoretical advantage of halting the progress of diabetic complications in some patients, and certainly too high as an exchange for insulin injections. Admittedly many of the pancreatic transplants were performed in conjunction with renal transplants in patients with advanced renal failure: even then the mortality remains much greater than for renal transplant alone.

Islet transplantation looks more promising and has been successful in diabetic rats. The techniques are still experimental, and problems of rejection have yet to be overcome. Relatively large amounts of embryonic islet tissue are needed, and the methods of organ culture, with alteration of immunogenicity, are still being developed. The development of an artificial pancreas sounds an exciting alternative.

An artificial pancreas system consists of a glucose sensor, which rapidly determines the concentration of blood or tissue glucose and which controls an insulin infusion apparatus. Techniques for continuous monitoring of glucose concentrations have been developed over many years. The most refined glucose sensor is a glucose-oxygen fuel cell, only 12 × 12 × 2 mm in size. It has been implanted subcutaneously in animals and has responded to blood glucose changes for up to 117 days. Most systems depend on continuous flow of blood through a glucose analyser, which at its best requires a blood flow of 0.05 ml per minute with a delay of 3½ minutes before the blood glucose reading is recorded. Using this system, workers in Toronto have linked the blood glucose

Scombroid

Intoxication after eating fish was named ichthyosarcotoxism by Halstead and reported by him to comprise six distinct clinical entities associated with different groups of fish. One of these groups is the suborder Scombrolaud, which includes tunny and mackerel, though other less familiar genera seem to be responsible more often for poisoning. Numerous outbreaks have been reported from Japan, where raw fish is often eaten.

Recent interest has been aroused by a large outbreak last year in the U.S.A., affecting 232 persons from four states who had eaten commercially canned tuna fish from two lots produced by one canner. The incubation period ranged from 15 minutes to three hours with a mean of 45 minutes, and the symptoms, which lasted up to eight hours, included nausea, vomiting, abdominal cramps, diarrhoea, flushing, headache, urticaria, and a burning sensation in the mouth. Hospital treatment was not required, and there were no deaths. Assays on nine samples of the suspected fish showed histamine levels ranging from 68 to 280 mg/100 g of fish muscle, as compared with a normal of 3 mg/100 g.

It seems that the toxic entity in this disease is composed of histamine (resulting from the enzymatic decarboxylation of histidine by certain organisms), saurine (named after "saury," a dried fish delicacy associated with scombroid poisoning but not yet defined chemically), and possibly other compounds. Of organisms capable of forming histamine from histidine, Kimata reports that Proteus morganii has been most commonly cultured from incriminated raw fish.

Iniesta states that fish, fish products, and some types of cheese may develop large amounts of histamine, but that histaminolytic bacteria probably break it down. Shewan mentioned a taboo on the consumption of mackerel in certain localities in Scotland; this was thought to be due to the presence of histamine, which may be produced in quantity when these fish are stored at temperatures above 8°C.