connections the ferment continued to be sent into the blood, and so diabetes was prevented. One or two objections which have been raised to this line of experiment may be usefully considered before detailing the experiments which are the subject of the present paper. One is that the glycolytic changes described by M. Lépine are *post mortem*, and probably do not occur during life at all. The evidence about to be given will, I trust, show that there is as much reason to believe in this glycolytic ferment of the pancreas as in the peptonising or amylolytic ferments of the pancreatic juice, save that it has not been obtained from a fistula in the pancreatic duct.

Secondly, it is urged that the pancreatic origin of diabetes does not explain all the cases of diabetes. He would be a very unscientific observer who should affirm the contrary, like a eulogiser of a patent medicine. It is said that when in a case of diabetes you have cut off all carbo-hydrates from your patient's diet, still there goes on this excessive glycosuria, which is accompanied by an excessive excretion of urea. Therefore they say, if the glycosuria simply depends on a failure of the system to destroy sugar, the amount got rid of should be proportional to the amount received as food, and no account is taken of the output of urea. This objection suggests some interesting features of diabetes. First of all, there are probably many cases of diabetes wherein the pancreas is not diseased at all. These are chiefly cases of glycosuria occurring in elderly patients who may be gouty, and not infrequently distinctly corpulent. In these very probably the source of much of the sugar is to be found in the muscles, and so not so much exposed to the action of the pancreatic ferment. In other cases of diabetes, generally among the young, there have been found certain symptoms, more or less marked, of affection of the pancreatic gland. Emaciation with great voracity, fatty stools, the passage of undigested meat, and probably pallor of the stools, are all symptoms of disease of the pancreas, and have all been noted in a relatively large number of cases of diabetes. Now it may fairly be suggested that in a typical case of diabetes with these symptoms, the action of the pancreatic juice being diminished or abolished, "the sugar may arise from proteids which have been split up into a nitrogenous (urea) and a non-nitrogenous moiety" the sugar. But if this were all there need surely be little or no glycosuria; the extra supply of sugar would be stored up as usual in the liver. But, granting the existence of a glycolytic ferment also in the pancreas, this naturally is interfered with also by the disease of the gland, and permits the sugar to circulate in the blood, and, of course, to be excreted by the kidneys.

EXPERIMENTS.

Only a brief account will be necessary on the present occasion. The material was always a freshly killed sheep's pancreas. First of all some experiments were made to see if there was any glycogen in the pancreas; not a trace could be found. Next experiments were made, and are going on, to obtain a glycolytic ferment from the pancreas. The same results were gained invariably. For instance on November 26th two test tubes with a solution of glucose (3gr. to 3ss) in each, and in one an addition of 3j of an aqueous solution of pancreas were kept in an incubator at a temperature of 100° F. for ten hours. On being examined with Pavy's modified Fehling's solution, the one with the pancreatic solution showed much less sugar than the other.

On November 28th, a test tube with the same amount of glucose solution and 3 drops of a glycerine extract gave much less evidence of sugar than a similar tube exposed to the same temperature of 100° F. for twelve hours. These tests were also vividly confirmed by Moore's test, and later on by Oliver's. In an experiment for twenty-four hours, the difference between one solution and the other (which had been exactly the same) was equal to 50 per cent. Also by Zeiss's saccharimeter a difference of one degree and a half was found under similar circumstances. The solution was also tested to see whether any carbonic acid gas was given off during the process; no trace of the acid could be found. Also, to show that the glycolysis was due to a ferment, the solution of pancreas was thoroughly boiled before it was added to the glucose solution, and this completely checked all glycolytic action.

The glycerine extract of pancreas seemed more active in producing glycolysis than an aqueous extract, and is, of course, much more easily kept. Glycerine itself, in exactly the same doses as were given of the glycerine extract of pancreas, had no effect whatever.

Finally, then, there seems to be no doubt that a substance can be extracted from fresh sheep's pancreas, which is of the nature of a ferment, and which has a powerfully glycolytic action on solutions of glucose. An objection (which I hope very shortly to undermine) may indeed be raised that the glucose used in these experiments was not absolutely pure. Still this does not outweigh in my opinion the facts that again and again the extract of pancreas (whether glycerine or aqueous) has destroyed a quantity of sugar in one tube, when an exactly similar tube, exposed to the same conditions of temperature and measurements (only without the pancreatic extract), has kept of exactly the same strength as it was at the beginning of the experiment.

If, then, these various symptoms of disease of the pancreas in diabetics be correlated with a glycolytic ferment in the pancreas, the important bearing on treatment is, as I wrote in the *Practitioner* (August, 1891), to give these patients, as has been done with some success, liquor pancreaticus and the sweetbreads of calves and other animals.

My thanks are due to the practical encouragement afforded me by the Scientific Grants Committee of the British Medical Association.

CASE OF MYXCEDEMA TREATED BY THYROID FEEDING.

By CONSTANTINE HOLMAN, M.D.,
Vice-President of the British Medical Association.

Mrs. B., aged 44, came under my care on October 3rd, 1892. She had been suffering from symptoms of myxœdema, as recognised by Dr. Ord seven years since.

CONDITION AT COMMENCEMENT OF TREATMENT.

Face, hands, feet, and body swollen; features expressionless. Forehead deeply lined; hair frizzy. Skin generally cold, dry, and unsperspiring, and feeling hard and even horny in some parts, such as the palms of the hands, soles of the feet, and forehead. On account of the swelling she was unable to button her boots or to wear any but very large gloves, or to wear her usual dress. The mucous membrane of the mouth was red and swollen, overlapped the plate of the false teeth, and bled on the slightest pressure. Hæmorrhage difficult to restrain followed extraction of a tooth. Pain over region of right kidney. Urine—specific gravity 1024—contained blood and pus corpuscles in considerable quantities; one-sixth albumen. Free menstrual loss every second month.* Articulation slow, imperfect; thinks very slowly; writes with difficulty; spelling defective; memory very bad. Breathless on slight exertion. Restless; unable to apply herself to read or to work. Pulse 64, temperature 96.6°. In consultation with Dr. Ord, it was decided to treat the patient with sheep's thyroids, one whole gland—both lobes—to be taken every other day.

PROGRESS OF CASE.

Treatment was commenced on October 12th. The remedy took immediate effect—the pulse rose from 64 to 96 on October 14th, on the 18th to 106, and on the 21st to 130. The temperature, from 96.6°, rose to 97° on the 14th, and to 97.4° on the 18th, and 98.8° on the 21st.

Complaint was made of tumultuous action of the heart at night; she slept badly, and was reported to be talkative in her sleep. More urine passed; it contained much less blood, less pus, less albumen, but a large amount of mucus.

On October 21st all symptoms better, skin perspiring, face less swollen; more expression in features; hands and feet less swollen, less chilly; more power of application in reading and writing; urine contains no blood, very few pus corpuscles, less albumen; large quantity of mucus; pulse 130, temperature 99°. As the patient complained much of the action of the heart at night, the thyroid was omitted for a few days, and then a much smaller amount was given—half a lobe every other day. The pulse rate soon diminished in

* Foster's Physiology, p. 734, 1888.

frequency, and the sleep became tranquil and refreshing. The breathlessness subsided; the hands and feet desquamated freely between four and five weeks after commencement of treatment. She was for a time troubled now and then with a little sensation of faintness, for which small doses of stimulants were prescribed.

This case has gone on uninterruptedly well, and she now takes half a lobe every twelve or fourteen days. She is smaller in girth by 5 inches; she enjoys life, takes her position in her social circle, and says she feels better than she has done for years.

Her friends, who have not seen her for some months, state they would not have recognised her, and practically there is nothing to be seen in meeting her to indicate that she has ever had myxœdema.

There is still a little albumen in the urine, for which she is taking steel. The periods have ceased entirely. The points of interest in this case, I think, are the long duration and advanced condition of the disease; the grave mischief in the right kidney; the rapidity with which the remedy took effect; the lesson to be learned not to give too large doses and upset the digestion—resulting in nausea and vomiting—and the satisfactory results obtained by the administration of small doses. And especially I would direct attention to the large quantity of mucus passed in the urine from almost the first dose of the thyroid.

The gland administered was from sheep slaughtered two or three hours before, and prepared by fine mincing with sharp scissors in the glass from which the patient drank it after the addition of a little brandy and water.

For much valuable information on this mode of treatment, most courteously given, I would express my warm acknowledgments to Dr. Hector Mackenzie.

SARCOMA CAUSED BY PSOROSPERMS.

By J. JACKSON CLARKE, M.B., F.R.C.S.,
Curator of the Museum and Pathologist at St. Mary's Hospital, and
Assistant-Surgeon at the North-West London Hospital.

ON December 20th, 1892, I had the honour of communicating to the Pathological Society some observations which had led me to the settled conclusion that squamous epitheliomata not only contained parasitic sporozoa, but were caused by them. By subsequent study my conviction has been confirmed, and extended to cancers of the most varied kinds, and to some adenomata and cysts of the breast. To discuss this question adequately, giving references to the work published upon it, would be impossible in a single article, and as I hope very shortly to go fully into the evidence for and against the psorospermial origin of cancer and other pathological formations, I will here only relate briefly the result of a renewed examination of one group of malignant growths, namely, the sarcomata.

The first case of sarcoma I examined after learning to recognise psorosperms in various human growths, was a myeloid sarcoma, of which a beautifully prepared section was kindly given to me by my friend, Mr. John Griffiths, to whom the pathological examination of the growth had been entrusted by Dr. Glinn, who removed it. The section is stained with log-wood and eosin.

Every part of the large specimen, which is a complete vertical section of the growth, abounds in sporozoa in various stages of development. The parasites are almost identical morphologically with those described¹ in cancer. I have represented them in the three woodcuts.

Fig. 1 shows a giant cell which contains to the right an encapsuled and to the left two amœboid psorosperms. Adherent to the left end of the giant cell is part of an encapsuled psorosperm in the plasmodium stage.

Fig. 2 represents a giant cell with two encapsuled plasmodia adherent to its right hand border, whilst the body of the cell contains several vacuoles, probably due to parasites having fallen out in the course of mounting the section.

Fig. 3 represents part of the most interesting region of the neoplasm—its advancing border. Along the entire peripheral zone the section could be examined from end to end without

anything but amœboid psorosperms and remains of infiltrated connective tissue coming into view. In the centre of the field (Fig. 3) is a psorosperm in the plasmodium stage, in which spore-formation is commencing. Below is part of a giant cell containing one encapsuled and two amœboid psoro-

Fig. 1.

sperms. In the field are also numerous free amœboid parasites, and to the left is part of a large plasmodium, within which are nuclei and fibres undergoing digestion. All the drawings were made under Leitz $\frac{1}{8}$ in. oil im. and Zeiss's oc. 2.

Fig. 2.

In this sarcoma, as in all the cancers (about 20) I have examined recently, there is in the advancing zone an army of amœboid psorosperms invading and digesting the tissues beyond, and thus determining renewed growth in the tissue with which the parasites have established a symbiosis.

Fig. 3.

Other sarcomata I have now under observation show the same features as this myeloid of the jaw. In the latter the epithelium covering the growth is being invaded and destroyed by the parasites and shows no sign of proliferation.

¹ BRITISH MEDICAL JOURNAL, December 24th, 1892, p. 1387.