introduced into the circuit of a galvanometer through which a weak current is passing, and the resistance, being so arranged by means of a rheostat as to enable them to bring the needle to zero on the scale, psychical conditions will lead to a deflection of the needle of the galvanometer. The inference is that the psychical change produces some physical change by which the current passes less readily or more readily through the body. The results previously obtained by Féré and Tarchanoff have been corroborated and further elaborated by Veraguth, who found that if an individual introduced into the circuit be read to, deviation of the mirror is noted when passages associated with emotional tone are reached. Or if a series of unrelated words is pronounced by him, the words connected with some emotional complex produce an effect on the galvanometer, while indifferent words have no effect. He is unable to explain the changes in resistance. Jung and Petersen, who have repeated and elaborated the above experiments and applied the method of investigation to cases of dementia praecox, conclude that the change in resistance is due to the relative condition of secretory activity in the sweat glands.

A perception or an idea arises; it may suddenly, and before it can be controlled by the higher centres, lead to a diffuse emotional discharge—that is, a stimulus irradiates downwards into lower centres before it can be controlled. But when a person is of a stable temperament and has habitually practised control, the tendency of the perception or idea is to irradiate into the higher association centres, resulting in deliberation, judgement, and inhibition of the emotions. Perhaps the tendency at the present time is to suppress the affective side of our nature too much. "It should be the aim of mental culture to retain the emotions within the sphere of intellectual life, and so to get the benefit in the supply of the interest and energy required for effective volition" (Maudsley).

I fear in these two lectures I have left unsaid many things which I ought to have said, and said some things which I ought not to have said, but if I have stimulated your interest in a subject which is of profound importance in the study of nervous diseases, I am satisfied. You will find in practice, as Maudsley says, a "disordered emotion may act upon the animal life, the organic life, and the intellectual life." "It may grave itself in the lineaments of the countenance, or declare itself in the habit of the body; it may initiate or aggravate organic disease, producing, according to its duration, a transient or lasting derangement, and it may temporarily obscure or permanently vitiate the intelligence."

I hope at some future time to give at Charing Cross Hospital four lectures on the application of the physiology of the emotions to morbid states.

BIBLIOGRAPHY.

- Sherrington: *The Integrative Action of the Nervous System*.
 Maudsley: *The Physiology of Mind*; *The Pathology of Mind*.
 Ribot: *Les Sentiments*.
 James: *Principles of Psychology*.
 Bain: *Mental and Moral Science*.
 Bell: *Sir Charles: The Anatomy of Expression*.
 Sergt: *Les Emotions*.
 Von Monakow: *Gehirn Pathologie*.
 Darwin: *The Expression of the Emotions*.
Dictionnaire de Physiologie. Articles: Le Cerveau, Soury; Le Douleur, Richet.
 Pagano: *Archives Italiennes de Biologie*, 1906.
 Schäfer: *Textbook of Physiology*. Articles: Respiration, Starling; Circulation, L. Hill.
 Kappers, Ariens: *Weitere Mitteilungen bezüglich der phylogenetischen Verlagerung der motorischen Hirnnervenkerne. Der Bau des Autonomen Systemes*. *Folia Neuro-Biologica*, Bd. 1, Nr. 2, January, 1908.
 Jung and Petersen, *Brain*, vol. ii, 1907.

On March 19th the Maryland State Senate passed a Bill prohibiting Christian Scientists or faith-healers from practising in Maryland without the diploma of regular physicians. The Bill has already passed the House.

The American Therapeutic Society will hold its ninth annual meeting at Philadelphia on May 7th, 8th, and 9th. Among the features of the meeting is a "symposium" on diseases of the vascular system. Among the subjects to be discussed are: The pharmacology of heart stimulants, by Dr. Horatio C. Wood, jun. (Philadelphia); venesection in diseases of the heart, by Dr. Judson Daland (Philadelphia); and some conditions requiring caution in the use of digitalis, by Dr. Alexander D. Blackader (Montreal). Another feature will be a "symposium" on the treatment of tuberculosis.

THE CLINICAL VALUE OF THE PANCREATIC REACTION IN THE URINE, BASED ON OVER 250 ANALYSES.

By CHALMERS WATSON, M.D., F.R.C.P.E.,
 ASSISTANT PHYSICIAN, ROYAL INFIRMARY, EDINBURGH.

IN recent years the clinical researches of Mayo Robson and other observers have directed attention to the comparative frequency of serious organic disease of the pancreas and to the various clinical tests which assist in its recognition. More particularly, attention has been directed to the value of the pancreatic reaction in the urine, a test devised by Cammidge, which has proved in Mayo Robson's experience of great value in diagnosis. This test, first described by Cammidge in 1904, has been elaborated and improved, and in 1908 is again advanced by its originator as a valuable diagnostic method, after an experience of 800 analyses.

My interest in this subject was aroused in the course of the autumn of last year through the admission to Sir Thomas Fraser's wards, then under my care, of a case of chronic pancreatitis, in which this diagnosis had previously been established by operation. The object of the present paper is to present a brief summary of results I have obtained in a series of over 250 analyses from 120 consecutive cases. The test employed was the "improved method" as described in Mayo Robson's and Cammidge's recently published work on *Diseases of the Pancreas*. I have empirically divided the positive results obtained into three groups:

(a) *Pronounced*.—Those in which the end reaction showed a pronounced deposit of the crystals of characteristic appearance and solubility, the deposit ranging from about $\frac{1}{4}$ in. to $\frac{1}{2}$ in. in an ordinary test tube.

(b) *Marked*.—Those in which the deposit was much less in amount, but still considerable.

(c) *Slight*.—Those in which there was either a slight deposit on naked-eye examination or in which there was no naked-eye deposit, the presence of crystals only being determined on microscopic examination.

NOTE.—At the outset of my observations I experienced some difficulty with the test and failed to get any reaction. This failure may have been due to faulty chemicals employed. At a later date Dr. Cammidge kindly demonstrated to me the end reaction, and subsequently I have experienced no special difficulty with the test. The present series of analyses was carried out by a trained assistant in the laboratory of the Royal College of Physicians, the end reaction being determined by myself, a microscopic examination being made in every instance.

PRONOUNCED REACTION.

Clinical Diagnosis.	Remarks.
1. Chronic pancreatitis.	Pronounced reaction during acute attacks, on two occasions negative in interval.
2. Acute pancreatitis ..	Operation: Incision and drainage; cholecystenterostomy (Mr. Caird). Reaction gradually became less marked and was negative when patient was discharged cured.
3. Acute suppurative appendicitis and peritonitis	Died. Pancreas showed the naked eye and microscopic appearances of acute pancreatitis.
4. Malaria (aestivo-autumnal)	Jaundice with pronounced epigastric tenderness. Reaction became negative coincidentally with recovery from jaundice and epigastric tenderness.
5. Pneumonia	Died. Pronounced reaction three days before death; reaction negative on day of death. Pronounced arterial sclerosis. No post-mortem examination.
6. Chronic bronchitis, arterio-sclerosis, and myocarditis	Pronounced reaction on three occasions. Man, aged 48. Incapacitated from work.
7. Alimentary glycosuria and constipation	Marked diminution in the degree of reaction coincidentally with use of restricted diet and aperients.
8. Duodenal ulcer, chronic pancreatitis	Pronounced reaction associated with glycosuria. Extensive malignant disease was revealed at the operation.
9. Gall stones in common bile duct	Reaction negative on two occasions in December, 1907; slight positive reaction on day before operation (January 10th), reaction became very marked and patient died on fourteenth day. Pancreas showed the naked eye and microscopic appearances of recent inflammation.
10. Exploratory laparotomy	Palpable tumour in region of pancreas. Pronounced pancreatic reaction with trace of glycosuria; at the operation Professor Chiene found marked chronic pancreatitis.
11. Pregnancy, seventh month	Pronounced reaction associated with glycosuria (patient not seen by the author).

PRONOUNCED REACTION—(continued).

Clinical Diagnosis.	Remarks.
12. Mitral stenosis (pronounced)	Reaction negative on admission. A pronounced pancreatic reaction developed coincidentally with the occurrence of jaundice, epigastric tenderness, and general increase in severity of the symptoms. Died. At the <i>post-mortem</i> examination there was intense catarrh of duodenum, with muco-purulent blocking of the ampulla of Vater and recent inflammatory changes in the pancreas.

MODERATE REACTION.

Clinical Diagnosis.	Remarks.
13. Chronic pancreatitis...	Probably a primary infective inflammation unassociated with gall stones. Symptoms of ten years' duration.
14. Uraemia ...	Died. At the <i>post-mortem</i> examination the terminal portion of the common bile duct was markedly bile stained throughout its course.
15. Colitis ...	Associated with pale stools of some years' duration.
16. Uraemia ...	Recovery. Reaction negative on discharge from hospital.
17. Gall stones in common bile duct	Reaction negative in December, positive in January, before operation; increased in degree after operation, and finally disappeared on recovery.
18. Acute gout ...	The administration of 1 grain of calomel at night for some days was followed by a copious discharge of apparently unaltered bile.
19. Tuberculous intestine. Pthiasis	Died.
20. Chronic pancreatitis secondary to duodenal ulcer	Reaction negative in December, positive in January, and associated with glycosuria, followed by melaena and exacerbation of symptoms.
21. Constipation ...	Symptoms of six years' duration, ill-defined tumour in region of hepatic flexure. Reaction became negative after eight days' close attention to the bowels (eight enemata of warm oil, followed by soap and water, with, internally, castor oil, etc.). Patient not personally seen.
22. Chronic nephritis, alcoholism	Pronounced arterial disease. History of two previous cerebral haemorrhages.
23. Cerebral haemorrhage. Aphasia	Died in February, 1908. In December, 1907, it was observed that there was a notable, though temporary, improvement in patient's condition coincidently with the administration of pancreatic emulsion.
24. Exophthalmic goitre...	Died. Pancreas showed chronic interstitial inflammation, with areas of small-celled infiltration.
25. Exophthalmic goitre...	One examination made a few days before discharge from medical ward.
26. Gastric ulcer ...	Four analyses made after operation, reaction positive with distinct glycosuria.
27. Malignant disease of stomach	Woman, aged 63. Abdominal pains eight months' duration. Marked pancreatic reaction with considerable glycosuria. May be secondary to malignant disease.
28. Chronic pancreatitis...	

SLIGHT REACTION.

Other 18 cases gave a slight reaction. In 5 of these cases there was no trace of deposit visible to the unaided eye, the reaction being determined by microscopic examination only. This group includes cases of bronchopneumonia, appendicitis, myelogenous leukaemia, malignant disease of the liver, cardiac disease, chronic nephritis, chronic bronchitis, arterial sclerosis, chronic intestinal obstruction due to new growth, simple catarrhal jaundice, and a fatal case of lymphosarcoma. In the last mentioned the reaction was negative on repeated examination after the patient's admission to hospital, but the reaction was positive on two occasions during the last week of life.

NEGATIVE RESULTS.

A negative reaction, in many instances after repeated examination, was given in 75 cases. They included cases of

jaundice due to calculus in the common bile duct (the calculi being passed per anum), jaundice due to malignant disease, gastric ulcer, duodenal ulcer, indigestion and constipation, malignant disease of stomach, abdominal aneurysm, malaria (aestivo-autumnal), cancer of the uterus, rectal carcinoma, various diseases of heart, lungs, kidneys, and bladder, and a fatal case of anaemia and thrombosis.

The last mentioned is of special interest. During the last few days of life the symptoms, fever, collapse, abdominal pains, etc., closely simulated acute intra-abdominal inflamma-

tion, and the reaction of the urine was negative on two examinations. At the *post-mortem* examination the pancreas appeared perfectly healthy, and on microscopic examination of different parts of the gland an unusually good picture of a perfectly normal gland was found.

COMMENTS.

It is of interest to refer in greater detail to some of the data which appear to warrant the conclusion that this reaction in the urine has a special relation to pancreatic disease. These data are furnished both from the clinical and pathological standpoint. For clinical facts reference may be made to the following cases:

Case 2, acute pancreatitis, successfully operated on by Mr. Caird, in which ten analyses were made, the reaction becoming less pronounced, and finally being negative on the patient's discharge from hospital cured.

Cases 4, 8, 12, and 21, recently under treatment in Sir Thomas Fraser's wards, are also noteworthy. Case 4 is especially interesting since there was a useful control. Two seamen were admitted to the wards on the same day suffering from well-marked malaria of malignant type. One of these (Case 4) was distinctly jaundiced; there was marked tenderness on pressure in the epigastric region, and the urine gave a pronounced pancreatic reaction, which became negative coincidently with the disappearance of the jaundice and the tenderness on pressure in the epigastric region. The other sailor was not jaundiced, the epigastric region was free from tenderness on deep pressure, and the pancreatic reaction was invariably negative (four analyses).

Case 8 is instructive, since the pancreatitis was associated with, and apparently a sequel of, duodenal ulcer, and was further complicated by glycosuria, doubtless of pancreatic origin. As already indicated, it was found at the operation by Mr. Caird that the pancreatitis was secondary to malignant disease.

Case 12 illustrates another point, namely, the development of the reaction in consequence of the congestion and catarrh, probably of infective origin, that may be present in advanced cardiac disease. In this patient the reaction was negative on admission, later the reaction was positive though slight, a pronounced reaction developing coincidently with the occurrence of jaundice, epigastric tenderness, and a general increase in the severity of the symptoms. At the *post-mortem* examination the duodenum showed intense catarrh, the ampulla of Vater was distended with muco-pus and the pancreas showed considerable swelling and detachment of the secreting cells with much oedema of the interstitial tissue.

Case 21 appears to show that the pancreatic reaction in the urine may result from a disturbance of the function of the pancreas from pressure of a faecal mass.

In this patient there was an ill-defined tumour in the region of the hepatic flexure, the subjective symptoms being abdominal pains and general weakness of some years' duration. The pancreatic reaction in the urine became negative coincidently with the relief from the constipation and general improvement in the patient's condition.

Cases 9 and 10 have special interest from the surgical point of view.

In Case 9, a female patient, deeply jaundiced, the reaction was negative on two occasions in December, a slight positive reaction was obtained on January 10th, the day before operation, the operation revealing several calculi impacted low down in the common bile duct with extensive adhesions around. The reaction became very pronounced, and the patient died on the fourteenth day, the pancreas showing the naked-eye and microscopic appearances of recent inflammation. The history of this case suggests that the chances of the patient's recovery were lessened from the fact that in the few weeks prior to operation the inflammation round the bile duct had extended and involved the pancreas.

CASE 10.—This patient had a well-defined tumour in the epigastric region, with a pronounced pancreatic reaction in the urine, and slight glycosuria. At the operation Professor Chiene found that the tumour was an enlarged and indurated pancreas.

Before leaving these cases it is of interest to note that I have recorded in the above series no fewer than 5 cases of chronic pancreatic disease, which exhibited a marked pancreatic reaction, with associated glycosuria. Some details of two of these are given above (Cases 8 and 10). The others are Case 27, in which the *post-mortem* findings confirmed the diagnosis of chronic pancreatic disease; Case 26, a patient under the care of Professor Greenfield, regarded as pancreatitis secondary to duodenal ulcer; and Case 20, in Sir Thomas Fraser's wards, in which the pancreatitis may be secondary to malignant disease of the gland. In this connexion it is of interest to note that in 65 consecutive cases of chronic pancreatitis operated on by Mayo Robson, glycosuria was detected in 4 cases only.

From the pathological point of view, the facts so far obtained in the *post-mortem* room confirm the conclusion

arrived at from the clinical data as to the relationship of the pancreatic reaction to disease of the pancreas. In one patient, a case of chlorosis with widespread thrombosis, dying with a high temperature and symptoms resembling acute intra-abdominal inflammation, the reaction was negative on repeated examination, and the naked-eye and microscopic appearances of the pancreas were in all respects normal; whereas in 7 cases which gave a marked positive reaction, definite inflammatory or degenerative changes were present in the gland.

GENERAL CONCLUSIONS.

My results confirm the conclusion arrived at by Mayo Robson and Cammidge, that there is a definite and important relationship between the pancreatic reaction in the urine and disease of the pancreas. My results differ from those of Cammidge in so far that I have recorded a higher percentage of positive results in cases similar to those that may have been included in that author's list of control cases. Cammidge found in a group of cases described as miscellaneous—other than those having a direct surgical interest in relation to disease of bile ducts and pancreas—that 4 only out of 92 gave a positive reaction. The higher percentage of positive results recorded in my series may possibly be due to the fact that I made use of many serious medical cases of a nature commonly associated with advanced arterial disease, and chronic catarrhal conditions in the intestinal tract, conditions that are frequently attended with degenerative or inflammatory changes in the pancreas and other glands. My results lead me to divide the cases in which the pancreatic reaction was present in my series into the following groups:

1. A group in which there was definite clinical or pathological evidence of serious organic disease of the pancreas—for example, acute and chronic pancreatitis, usually associated with disease of the bile ducts.
2. A group in which the reaction in the urine is associated with pronounced arterial sclerosis, a condition usually accompanied by more or less sclerosis in different glands.
3. A group in which the reaction is dependent on congestion and catarrhal conditions of the gland ducts and substance, with associated toxæmia—for example, advanced heart disease, appendicitis, pneumonia, malaria, and the like.

This division is, it is hardly necessary to add, somewhat arbitrary, as most cases are in all probability of mixed origin. If these facts are kept in view, and this urinary reaction is carefully studied along with the other clinical features of a case, I have no hesitation in saying that this new test will prove of great value both to physicians and surgeons in the diagnosis and treatment of pancreatic disease.

I have much pleasure in expressing my indebtedness to Sir Thomas Fraser and other senior colleagues at the Royal Infirmary for the facilities afforded me in this investigation.

THE THERAPEUTIC USES OF NORMAL SERUMS.

By E. C. HORT, M.R.C.P. EDIN.,
LONDON.

In two papers recently published by the *Lancet* of December 21st, 1907, and February 15th, 1908, I have shown that the ulceration and destruction of tissue which characterize many diseases may be due to a deficiency in the patient's serum of bodies that normally restrain autolysis or self-destruction of tissue. I have also shown that, acting on these lines, I have been able in a number of cases of disease, both infective and noninfective, to inhibit such self-destruction by the internal and local administration of normal serums rich in anti-destructive bodies. This internal and local use of normal serums that I have employed in order to limit cell destruction in disease is, I believe, original. So also, as I have said in the papers referred to, is the giving of tuberculin and staphylococcal and other vaccines by the mouth, a practice which I began early in 1907, and which Dr A. Latham has subsequently and independently employed.* In 1905 Well of

*It was shown, however, by Copeman in 1894 in his work on *Variola* and *Vaccinia* that in 1810 vaccine crusts given by the mouth produced in six days in a young girl 180 vesicles, all of "clearly vaccine type."

Paris gave intravenous and subcutaneous injections of normal serums in hæmophilia, hoping thereby to increase the coagulation power of the blood to a deficiency in which he, I think, on insufficient grounds, attributed the hæmorrhages. It was, in fact, this work that first suggested to me the possibilities inherent in normal serums.

In Australia M. Paton has for years been treating diseases other than diphtheria with antidiphtheritic serum, and has used "simple plasma" in tuberculous and asthenic conditions with a view to increasing nutrition. Metchnikoff, again, has for some time been using heated serum as a local application with a view to increasing phagocytosis. Of this work and of Paton's I was ignorant till after I had published my own observations, which were based on the use of untreated serum given for a very different reason.

The inhibiting power of serum on autolytic processes *in vitro* has been recently the subject of much experimental investigation. Such inhibition has been shown to be present when the serum of one animal is allowed to act on the tissues of another.

In the appended list of cases it will be seen that the arrest and cure of such lesions as are referable to auto-destruction of tissue are remarkable illustrations of the inhibiting power of serum. There can be no question, as to the direct action of the serum on local lesions such as the cases of varicose ulcer which had for many years resisted all other methods of treatment, including prolonged and absolute rest. In the cases of visceral ulcer, especially gastric, I am inclined to attribute the good results gained to the same local action.

In the cases of arrest by the serum of progressively destructive lesions caused by the tubercle bacillus, such as I observed whilst treating hæmoptysis, it seems highly probable that such arrest is due to a heightening of the inhibitory power of the blood. It is this observation, reported in the *Lancet* in connexion with a case treated in June, 1907, that encouraged me to continue serum treatment in cases of tuberculosis. This raising of the clinical index of the blood's inhibitory power is likely to prove to be the expression of the reaction of the organism to normal serum treatment in all cases of cell destruction, whether due to bacillary invasion or not. It is more than probable that the opsonic index, which after all is only a measure of ingestion prior to lysis of bacteria, will be found to be only a supplemental factor to the true antilytic index of response, which is a gauge not only of antilytic but of restrained lysis. It is conceivable that ingestion and subsequent lysis of bacteria may give rise to an undesirable escape of poisonous enzymes, unless restrained from running riot by antilytic action. Opsonic estimation is and can be only a partial indication of the organism's response to bacillary invasion or vaccine injection. An index of antilytic response may prove to be a far truer guide. It is for this reason that I have neglected the opsonic content in cases treated by normal serum or by vaccines or by both.

That tissue destruction in many bacillary diseases is referable to the development of proteolytic enzymes in the damaged cells is almost beyond doubt, and the arrest of such tissue destruction would appear to be a problem of almost as great importance as the neutralization of the bacillary intoxication. That the antiautolytic power of the serum varies in different diseases has been shown in a rough manner by Diener using Loeffler plates after the manner of Müller and Koltzschmann. It is obviously of great importance to establish an antilytic index or measure of the inhibitory power of the normal serum used, and I am informed by Dr. Golla that his method of gauging it by electrical conductivity, with which he is now investigating the subject, does establish such an index. For the fluctuating changes in the inhibitory power of a patient's serum can be readily followed during an illness dependent on autolytic processes. In dealing with such a universal and important fact as autolysis it is obvious that any power of raising the antilytic index, and hence the reciprocal resistance of the tissues, is of cardinal importance.

The action of normal serum would appear to be a sum of the two opposing actions of an antilytic and auxilytic body. The literature dealing with this antiautolytic power, as determined by experiments *in vitro*, is very large. The older observations on the antiproteolytic action of Oathcart, Landtegger, and Glaesner have