the nervous system for their action. One of the features of the action of albumoses is the production of coma, and in anthrax this coma is the special action of the base or alkaloid. Coma is a feature of jequirity and of snake poisoning. The final action of the albumoses in diphtheria is the production of coma, but their special action is to produce a paralysis dependent on nerve degeneration. It is quite possible that other products from diseases will be found to produce a peripheral palsy.

The effect on the respiration which is observed in snake poisoning is ascribed to the action of the poison on the central nervous system, and when working at jequirity I came to the conclusion that its action on the respiration was also central. In diphtheria, however, where there is peripheral degeneration of the phrenic nerve, it is difficult to say how far the respiratory attacks are dependent on a peripheral nerve degeneration, and how much they are due to an effect on the centres of respiration. Apart from mechanical obstruction, dyspnoea is one of the features of diphtheria in its acute stage, and it is possible that it may be due to an effect on the central nervous system; but here, again, it is difficult to exclude a peripheral action on the phrenics, for, as I have shown, the diphtheria products are special nerve poisons, and they may cause degeneration of the nerves even during the short course of the acute disease.

Question of Immunity produced by the Chemical Products.—There is one question which I have left untouched, namely, that of the conferring of immunity against the disease by the means of the chemical products. This is, of course, an important effect. We have been considering the chemical products of an infective disorder or of the primary infective agent as specific in reproducing, when injected into animals, the symptoms of the disease. But it is evident, if the chemical products are capable of protecting an animal against the invasion of the primary infective agent, that this action must be essentially a specific one. For example, we could not suppose that the chemical products of anthrax would protect against diphtheria, or those of diphtheria against anthrax, but that only the products of anthrax could protect against the invasion of the bacillus anthracis. I wish to speak of the matter only in a general manner. I am, however, not at all sure that in all diseases there is this protection; I cannot conceive how the products in diphtheria could protect against the acute disease.

In discussing the chemical products formed by the primary infective agent outside the body or in the natural disease, I have not mentioned any substances except those that are effective in producing the symptoms of the disease. There are some who have considered that such chemical products may consist of a "vaccine" and a "toxine." There is not the slightest evidence of this. There is no evidence of the existence of any chemical "vaccine" separable from the chemical "toxine," and I need, perhaps, hardly point out that such a "vaccine" has never been isolated. It was a term invented to explain phenomena which were not properly understood. There is also no evidence that there is any particular chemical substance which stops the growth of a pathogenic micro-organism. When grown in a flask it will not develop indefinitely, and it stops, not because there is an antitoxineformed, but because it is choked by its own chemical products in the same manner as peptic or tryptic digestion may be inhibited by the accumulation of the digestive products.

In bringing these lectures to a conclusion, I wish to express my thanks to the medical officer of the Local Government Board for granting me permission to bring the subject before this College. The work was done for the Local Government Board and in the laboratories of the conjoint Colleges, where every facility is given for the prosecution of research.

THE MEDICAL PROFESSION IN CALCUTTA.—The recent census gives the following return of persons earning their living by the practice of medicine and subsidiary arts in Calcutta: Practitioners holding diplomas, 1,081; *kabirajs*, 163 male and 14 female; dentists, 4 male and 3 female; midwives, 2 male and 810 female; hospital assistants and apothecaries, 95 males; compounders, nurses, etc., 666 male and 29 female. Under the head of chemists and druggists are entered 158 males and 245 females.

ON SOME SOURCES OF ERROR IN TESTING FOR SUGAR IN THE URINE.

By GEORGE JOHNSON, M.D., F.R.S.,

Consulting Physician to King's College Hospital; Physician Extraordinary to Her Majesty the Queen.

It has happened to me not infrequently to be consulted by patients who were being treated for glycosuria, but in whose urine I found no trace of sugar. The explanation of this not uncommon error is the fact, not generally recognised, that normal urine contains two substances—namely, uric acid and creatinin—which resemble glucose in their reaction with the tests commonly employed for the detection of sugar.

The urines which are most likely to be erroneously diagnosed as saccharin are those of high specific gravity—1030 or more—and which contain the normal reducing agents in larger quantity than usual. Such urines, added to Fehling's solution previously boiled, rapidly decolorise the blue liquid, and would precipitate suboxide of copper, but for the fact that the ammonia resulting from the disintegration of the nitrogenous creatinin keeps the suboxide in solution. The phosphatic sediment which results from the action of the alkali in Fehling's solution has sometimes been mistaken for cuprous oxide. The reducing action of uric acid and creatinin upon cupric oxide has led to the erroneous assumption that a trace of sugar is to be found in all normal urines. That no sugar is present in normal urine is conclusively proved by the observation of my son, Mr. G. Stillingfleet Johnson,¹ to the effect that when all the uric acid and creatinin have been removed from such urine by precipitation with mercuric chloride, which has no action upon glucose, all reducing action disappears, and no trace of sugar is to be found.

Moore's liquor potassæ test has, to my knowledge, misled an inexperienced observer in this way. Liquor potassæ often contains lead from the bottles in which it has been kept, and when this lead-contaminated liquor potassæ is boiled with albuminous urine, the sulphur of the albumen combines with the lead to form a dark sulphide, which an unpractised experimenter may mistake for the brown colour produced in saccharine urine.

Some years since² I introduced the picric acid and potash test for glucose; and after ample experience of all other tests including Dr. Pavy's ammonio-cupric modification of Fehling's, I feel justified in declaring that for accuracy and ease of application, both as a qualitative and quantitative test, it surpasses all others.

One great advantage is that all the ingredients employed in this method are stable, whereas it is notorious that all alkaline copper solutions speedily undergo change in keeping. The picric acid test, though not affected by uric acid, is, like copper, reduced by creatinin.

When a drachm of normal urine is boiled with the same volume of a saturated solution of picric acid, and half a drachm of liquor potassæ, a claret-red colour is produced, a colour which, compared with the standard, indicates what, if glucose were present, would be 0.7 grain per fluid ounce.

A good practical rule is this: That if in any specimen treated as before stated a red colour appears through the liquid in a test tube about half an inch in diameter, no glucose is present.³ The smallest quantity of glucose in addition to the creatinin, when acted on by the picric acid and potash test, renders the urine so intensely dark-red that no light passes through the liquid.

The presence of albumen, whether in small or large amount, does not interfere with the quantitative analysis of saccharin urine by the picric acid process, and this constitutes another advantage over the copper method, which requires a previous separation of the albumen.

And here I once more insist upon the fact that in picric acid we have the most absolutely trustworthy qualitative test for albumen; whilst Esbach's process with picric acid is a very accurate quantitative method.

¹ *Proc. Roy. Soc.*, vol. xliii, pp. 493–534.

² *Lancet*, November 18th, 1882.

³ For full particulars as to the picric acid test for sugar, see the author's *Medical Lectures and Essays*, p. 795, J. and A. Churchill; also *Two Lectures on Albumen and Sugar Testing*, Smith, Elder, and Co.

By adding a solution of picric acid to an equal volume of urine, and subsequently boiling with half the proportion of liquor potassæ, we are enabled in the course of about two minutes to test for albumen and sugar in the same specimen of urine.

I have proved by innumerable observations that not a trace of albumen is to be found in normal urine, and that albuminuria, like glycosuria, is a pathological condition.

REMARKS

ON

SOME OBSCURE CASES OF ENLARGEMENT

OF THE

SOLITARY AND AGMINATED FOLLICLES

OF THE INTESTINE.¹

By WALTER G. SMITH, M.D., F.R.C.P.I.,

Physician to Sir Patrick Dun's Hospital;

AND

ALFRED R. PARSONS, M.B., B.Ch.,

Late House-Surgeon in Sir Patrick Dun's Hospital.

[WITH COLOURED ILLUSTRATION.]

DURING the summer months of 1891 there were admitted to Sir Patrick Dun's Hospital, Dublin, four cases of a very acute nature, which exhibited peculiar features as to symptoms and pathological appearances and yet presented a striking similarity among themselves in their clinical history, course, and rapid termination, and on *post-mortem* examination disclosed conditions apparently differing from each other only in degree. We shall, first, briefly give the clinical history and describe the pathological appearances presented by each case, and then proceed to discuss them.

CASE I.—T. R., aged 12 months, was brought to hospital about 5.30 P.M. on May 29th, 1891. On examination it was found that life was extinct. The child appeared to have been well nourished and tolerably carefully minded. The history obtained from the mother was as follows:—He had been in good health with the exception of an attack of convulsions eight days previously. This attack lasted only three minutes, and consisted chiefly in "working his hands." The movements ceased on the mother clapping the child with cold water. From that date he appeared to be perfectly well till the sudden onset of the fatal illness, which attacked him about one hour before his admission to hospital. Having partaken heartily of his dinner of bread and milk, he was sitting on the bed playing with his sister, when she suddenly noticed that he was looking queer. His mother took him up in her arms and shook him, after which he vomited and then became stiff. His respiration was noisy, so, on the recommendation of some neighbours who had meanwhile come in, the mother brought him to hospital, where, on admission, it was found that the child was dead.

Post-mortem Examination.—Pathological appearances were confined to abdomen. There was no peritonitis; the liver and kidneys presented no abnormal features; the spleen appeared somewhat enlarged, was firm, and on section the Malpighian corpuscles were very distinct, round, pale in colour, and varying in size from a mere dot to the head of a small pin. The mesenteric glands were greatly enlarged, tolerably firm, and rather pale. There was general enlargement of the adenoid tissue throughout the large and small intestines. Peyer's patches were raised $\frac{1}{8}$ inch above the surface, and in some of them the individual follicles stood out very distinctly. A few of the patches looked a little irregular on surface, but otherwise there was no indication of any ulceration.

CASE II.—P. E., aged 4½ years, admitted about 8 P.M. on June 4th, 1891, in a somewhat stupid condition. His mother stated that on the previous night the child was put to bed apparently quite healthy. About 3 A.M. he awoke with a shout, but, after being taken into his mother's bed, slept till 9 A.M., and then, on awakening, vomited. He had an attack of convulsions during the day but, in the absence of his father, his mother did not think it advisable to bring him to hospital. On admission the child was in a listless, semi-stupid condition, but sufficiently conscious to put out his tongue when told to do so. His temperature was 101° F., pulse 160, respirations 28. He slept very fairly during the night, took a good deal of milk, and conversed occasionally with the other patients in the ward. At 9.45 A.M., the following day, a fit came on beginning with convulsive movements of the right arm; later the right leg and muscles of the neck and back became involved, causing considerable opisthotonos. Twitching movements were observed only in the right arm, but the right leg became quite rigid, and soon the left arm and leg were also engaged. The eyes most of the time remained in a state of conjugate deviation to the right, but sometimes were conjugated to the left, and occasionally squinted. The mouth was drawn slightly to the right. The patient became paler, none of the reflexes could be excited, and he gradually became more and more comatose, till respiration ceased at 11.20 A.M.

Post-mortem Examination.—The body was that of a well-nourished male child. There was no indication of any external injury. A very detailed examination was made of the brain and membranes, but not the slightest lesion capable of recognition by the unaided eye could be detected. The

thoracic viscera presented no abnormal features, with the exception of a few collapsed pulmonary lobules. In the abdomen the pathological appearances were confined to the spleen, mesenteric glands, and intestinal tract. The spleen was firm, if anything enlarged, and on section showed the Malpighian corpuscles scattered like points through the pulp. The mesenteric glands varied in size from a pea to a small bean; were pale in colour and firm in consistence. In the duodenum the solitary follicles were numerous and considerably swollen. On the valvula conniventes they looked like rows of beads arranged along their crests. In the jejunum also the solitary follicles were enlarged, and on passing into the ileum it was seen that Peyer's patches were abnormally manifest, being raised above the surface, and presenting a peculiar corrugated appearance, but no ulceration was present. The solitary follicles in this part of the intestine were likewise numerous and distinct.

CASE III.—M. A. K., aged 4½ years, was admitted to hospital about 7.45 P.M. on June 21st, 1891, in an unconscious state. The mother stated that the child appeared perfectly well till the forenoon of the day of admission. In the morning she attended mass and catechism; but as she said she was feeling poorly during the latter, her sister was told to take her home. About 1 P.M. she complained of pain in the abdomen; she was put to bed and shortly afterwards became unconscious. It was, however, possible to arouse her sufficiently to give her some castor oil, which she vomited almost immediately. On admission to hospital, seven hours after the onset of illness, some embarrassment of respiration was noticed. In about ten minutes, twitching of the left side of the mouth occurred, followed by rigidity alternating with jerking movements of the left arm. Later the right side also became involved. There were conjugate deviation of the eyes, slight internal strabismus, and numerous irregular movements of the globes also present. Opisthotonos was occasionally manifest. She vomited some dark-coloured fluid. Respirations were laboured, and on auscultation coarse rales were audible over the chest. During the few hours she lived after her admission there was no marked diminution in the severity of the convulsions, and the temperature, which at 8 P.M. was 103°, rose at 10 P.M. to 105°, and at the time of death, 11.20 P.M., reached 108°.

Post-mortem Examination.—The body was that of a well-nourished female child, aged about 5 years. Rigor mortis absent except in lower extremities. The head presented no sign of injury. Careful examination of the brain and its membranes failed to discover any morbid lesion. Both lungs were oedematous; the glands on the posterior aspect of the root of each lung were slightly enlarged. The right auricle of the heart was greatly distended with blood. The liver and kidneys were apparently normal. The spleen was firm and of normal size. The mesenteric glands were greatly enlarged, pale, and firm. The duodenum and jejunum presented numerous swollen solitary follicles. In the ileum Peyer's patches became increasingly evident as one approached the ileo-caecal valve, where they were distinctly raised above the surface of the surrounding parts. They were pale in colour, and presented no indication of ulceration. The vessels on the external wall of the intestine, corresponding to the site of Peyer's patches, were injected. In the colon numerous white roundish spots were to be seen shining through the wall. On opening the gut, these were found to be the enlarged solitary follicles, each with an evident depression in its centre.

CASE IV.—M. H., aged 3 years, admitted to hospital at 1 P.M. on August 6th, 1891, in a convulsive attack. As far as could be ascertained from the mother, the child was in good health till the previous day, when she complained of pain in the abdomen. At 11.30 A.M. on the day of admission the child was seized with a convulsion, involving, as stated by the mother, chiefly the right side. At the time of admission the movements were also chiefly confined to the right side, but later on the left became involved, and this was accompanied by some arching of the back and contraction of the left pupil, the right remaining dilated. Towards evening the child became quieter, and was able to take some liquid nourishment. The pulse was 192, and the temperature 103° F. She passed a tolerably good night, but at 6.30 the following morning the movements again set in, and she gradually sank, and at 12.30 P.M. respiration ceased.

Post-mortem Examination.—The body was that of a well-nurtured child. The pathological features were confined to the abdomen, and involved only the following organs: The spleen, normal in size, was apparently somewhat harder than usual. The mesenteric glands were enlarged to the size of small beans; as a rule, firm and pale, though some were of a brownish-red colour. In the duodenum and ileum the solitary follicles were enlarged; in the latter also the agminated glands were abnormally prominent. The whole of the patch was enlarged, but in addition to this there were ridges of a reddish-brown colour and of gelatinous consistence passing across the surface of the gland. This appearance was lost after the specimen had been in spirit for twenty-four hours, but it is the cause of the shaggy character which the patches now have.

From the foregoing clinical histories it will be noticed that all the cases occurred in children under 5 years of age. Each child was apparently in perfect health till the sudden onset of this fatal affection. In no case, except the first, who was said to have had an attack of convulsions one week previously, from which he apparently quite recovered, and seemed to enjoy in the interval excellent health, could any history of any illness, shortly before the final one set in, be obtained. The onset was invariably tolerably acute, accompanied in Cases I and II by vomiting, and in Cases III and IV by pain referred to the abdomen. Later on convulsive movements manifested themselves; these, as far as we had an opportunity of observing them, were generally unilateral in origin, but soon spread to the other side and then became general. At times the movements were violent, and attended by complete unconsciousness, the patient presenting the appearance of a child suffering from very acute meningeal inflammation. Accompanying these phenomena we had an elevated temperature, quickened respirations, and a very frequent pulse. The dura-

¹Read in the Section of Pathology at the Annual Meeting of the British Medical Association, held at Bournemouth, August, 1891.