a gastric fistula, a value of -0.610 . Meunier¹³ in one subject found the freezing point lowering to be -0.350 . He suggests that this may be of therapeutic importance in the administration of medicaments.

The specific gravity is inversely proportional to the total acidity, as may be seen by consulting Chart 5. This is as one would expect. If the cryoscopic index remains the same as we have previously shown that it does, then in higher acidities, the lighter hydrochloric acid molecules must replace other and *necessarily heavier molecules*. If the cryoscopic index is to remain the same, the total number of dissolved particles (ions and molecules) must remain the same. What these molecules are which are thus thrown out of solution we are at present unable to say; but, perhaps, when the nature of these precipitated molecules is discovered, it may explain certain symptoms which are observed in cases of hyperacidity. This point is under observation in this laboratory at the present time.

The specific gravity indicates that the gastric residuum is one of the lightest fluids of the body, if not the lightest.

CONCLUSIONS

1. We have been able to confirm the finding of our previous investigation, that "the accepted limit of the normal residuum of the empty stomach as 20 c.c. is false." The average volume of the residuum, in over 100 normal cases, in the present investigation was 52.14 c.c. This finding throws considerable question on the value of an increased residuum in the diagnosis of ulcer.

2. The residuum found by us in every case had all of the qualities of a physiologically active secretion.

3. We believe that the gastric glands are never inactive, and cite experiments to demonstrate that even in the absence of normal stimuli (food, psychic, etc.), these secretions appear.

4. There is a definite relationship between the character of the residuum and the character of the gastric secretory response to a stimulus, as a test meal, for instance.

5. From the standpoint of osmotic pressure, there is a constant tendency toward the formation of a secretion in the stomach.

6. Both colorless and bile-colored residuums may be found, and the two may occur in the same individual.

7. The colored residuums appear more frequently in higher acidities and vice versa, a fact which is explained by the greater frequency of regurgitation in the former condition. This regurgitation has for its purpose the partial neutralization of the high acid stomach contents.

8. Total and free acidity vary directly with one another. It is pointed out that free acidity was rarely encountered until the total acidity exceeded 10. The averages in this series of studies were 29.9, total acid-

ity, and 18.5, free acidity. The value of acid figures over 70, with an increased quantity of residuum, is emphasized as of diagnostic value.

9. There is a definite relationship between the quantity of pepsin and the total acidity for low acid values. As high acid values are approached, this relationship disappears.

10. Trypsin was found almost constantly in the residuum. It is shown to be inversely proportional to the free acidity. This is explained by the more complete closure of the pylorus in high acid conditions, in conjunction with the destructive action of acid on trypsin.

11. The average cryoscopic index of -0.470 , as compared to an index of the blood equivalent to -0.560 , gives evidence of a tendency for osmosis of material to take place from the blood into the lumen of the stomach.

12. High acidities are shown, by a comparison of the cryoscopic index and specific gravity data, to be accompanied by a throwing out of solution of certain molecules, the character of which is unknown at the present time.

13. The residuum is one of the lightest fluids of the body, having an average specific gravity of 1.0056. This point is not without significance.

Chart 7.—The relation between pepsin content and cryoscopic index of the residuums.

Chart 6.—Relation of the cryoscopic index to total acidity of residuums.

THE FALLACY OF THE INDISCRIMINATE INTERNAL USE OF BULGA- RIAN BACILLUS

WITH SOME EVIDENT DANGERS

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In a great variety of cases, the indiscriminate and empiric use of the Bulgarian bacillus as a therapeutic agent not only causes distress, but often, also, evil results. If its use is continued it produces a condition approaching acidosis.

An acid-producing organism, when used in internal medication in conditions in which there are anemia, cachexia, and emaciation, only adds more fuel to the fire by further increasing the acidosis which has been already produced.

That acid-forming organisms multiplying in the alimentary tract tend to neutralize the normal alkaline secretion of the intestines is not questioned. When taken by patients suffering from emaciating diseases, they evidently do neutralize it altogether, as will be shown later in the cases to be reported. By reducing the alkalinity of the intestinal secretions these organisms tend to diminish the alkalinity of the blood, thereby aiding in the production of a general acidosis.

When such a case is closely observed after their use the following symptoms may be noted: increased blood pressure, deepened respiration, increased urinary

output, sweating, digestive disturbances, aggravated constipation, and increased nervous irritability. All of these point to an increased acidity or a decreased alkalinity of the blood.

Within the last year I have observed a number of patients suffering from various cachectic conditions who had been given or who had taken Bulgarian bacilli on their own initiative, in whom the condition referred to above was noted. In some of them the symptoms manifested were alarming and distressful.

The following cases will emphasize the statement that extreme caution should be exercised in prescribing these acid-forming organisms:

CASE 1.—Mr. J., aged 36, had pulmonary, intestinal, and peritoneal tuberculosis. Bacilli were found in both stool and sputum. His temperature was subnormal, and he felt lethargic, tired and cold. The blood pressure was 126, respiration 20. The bowels were loose, requiring little catharsis, though the patient had some intestinal distress. On the advice of a friend he took Bulgarian bacilli for four days. His blood pressure rose to 138, respiration to 24, temperature to 100, his pulse being full and bounding. He perspired profusely, was very nervous, had a great amount of distress in the bowels, and became extremely constipated. The abdominal distress lasted until large quantities of alkalis were given, when the symptoms subsided.

CASE 2.—Mrs. C., aged 54, had carcinoma of the pancreas and stomach with slight diarrhea. The blood pressure was 146, the urinary output scanty, pulse 60 and very weak. Her physician gave her Bulgarian bacilli for four days. The abdominal distress so increased that it had to be controlled with morphin. The blood pressure rose to 164, pulse to 98, full and bounding, the bowels became constipated and required drastic medication with local measures to move them, the urinary output was greatly increased, the patient became very nervous and vomited. Alkalis in liberal quantities both by the bowels and by mouth gave her relief. This woman was very thin and emaciated. The condition of acidosis gave her great distress.

CASE 3.—Miss M., aged 33, had pulmonary tuberculosis. Her blood pressure was 96. She was thin and emaciated, the skin being cold and dry. She had some gastro-intestinal disturbance, was slightly constipated and drowsy. The urinary output was scanty. Through the influence of some friends, she took Bulgarian bacilli for three days. She became very nervous, vomited, had severe headaches, the intestinal disturbance became quite severe, and the constipation was aggravated. Blood pressure was 112. There was profuse perspiration. A very noticeable increase occurred in the urinary output. It took several days with liberal doses of alkalis before this patient became comfortable.

I have noted this aggravation of symptoms following the use of Bulgarian bacillus in diabetes, nephritis, cancer, pernicious anemia, tuberculosis, in extremely constipated individuals, and in some aged persons.

In my judgment, Bulgarian bacilli should not be given in any form of tuberculosis, cancer, diabetes, gastric hyperacidity, gastric ulcer, or to very old, infirm, weak, emaciated persons, or those suffering from starvation, fevers, or wasting diseases, or in any form of toxemia, catabolic or chemical. Neither should it be given in cases in which beta-oxybutyric acid together with acetic acid and acetone are excreted in the urine—the condition known as acetonuria. This class of patients will not safely tolerate an additional acid producer, and this is especially true in diabetes.

Patients to whom an anesthetic is to be administered should under no circumstances be given Bulgarian bacilli nor should this organism be given afterward,

until all danger of acidosis is past. The conditions mentioned all tend to cause acidosis, which is probably the ultimate cause of death in all of them. Therefore, it is quite apparent that anything that accentuates this condition is dangerous.

The Bulgarian bacillus may be useful in suitable cases, but these are limited and should be selected with exceeding care and caution.

When the entire human organism is in a state of chemical equilibrium, of balance or equipoise, in which the opposing forces (acid and alkali) exactly counter-balance each other, then the ionic equilibrium is such that the acid formed by the Bulgarian bacillus is quite sufficient to swing the chemical pendulum of the entire human organism into the grave and uncertain condition of acidosis.

In all cases in which acidosis is not and cannot be promptly controlled death inevitably results. Why then, in such grave conditions, should that risk be taken with an absolutely empirical medication? Why should we play with the powder when the fuse is lighted?

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FOREIGN BODIES IN THE THROAT

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The following is the report of a case in which a brass key and a large eye-screw were found, at necropsy, lodged in the larynx and pharynx:

The patient was a male negro, aged 40, deaf and mute, admitted to Dixmont Hospital after having committed murder while under a delusion of persecution. The case was regarded as one of paranoid praecox, as the man had many typical symptoms of that disease. Chronic nephritis, pericarditis and valvular disease of the heart also were present. The Wassermann test was negative. From the time of commitment he worked daily on the hospital farm until three weeks previous to his death, when he became disabled from an attack of rheumatism. While undergoing treatment for this illness, he was seized with what appeared to be an acute gastritis, marked by vomiting after taking nourishment, and died three days later of exhaustion.

Postmortem findings confirmed the presence of the diseases named and, in addition, led to the following discovery:

Lodged in the larynx was a brass key, 2 inches long, its ring end resting on the cords; while in the right anterior corner of the pharynx was found an eye-screw, 1½ inches long, its screw end extending upward about a quarter inch above the lower border of the opening into the larynx. No signs of inflammation were discernible, but the epiglottis showed slight excoriation on its under surface, which may have been due to the pressure of the upper end of the key at time of swallowing. Both articles were wrapped in cloth, much decayed and very foul-smelling. Although evidence is lacking to fix the exact time of the lodgment of these foreign bodies, the nature of the circumstances as well as the appearance of the articles at necropsy, as indicated above, seems to justify the assumption that they had been present in the throat for at least three weeks.

With the exception of the comparatively mild vomiting which occurred only after eating, there were no violent symptoms of coughing, gagging or choking, such as would be likely to accompany the presence of foreign bodies in the throat.

The supposition is that this man, having found these articles while working outside, recognizing their utility for a special purpose he had in view, and fearing to be deprived of them during the search to which all patients submit at bedtime, sought to conceal them in his throat, intending when necessary to recover them by regurgitation.