ballantidium coli infection recently and have gone over all the available literature and all authors state that the disease is excessively rare, and as far as I know the number of published cases is not over 175. Therefore, Dr. Eastland's observation covering one hundred cases is certainly a most notable one.

The disease, while its history dates back a great number of years, has not been overlooked and has been found by most observers, even in tropical countries, to be exceedingly rare. The only case I have ever seen was one reported by Drs. Bel and Couret in New Orleans a few years ago. Nevertheless, I have had my optics wide open looking for not only the free forms, but also the encysted forms of the organism, both of which are so extremely characteristic that they can not be mistaken for any other protozoa. The negative organism measures 200 microns and are ciliated. They burrow through the mucosa into the submucosa of the bowel wall, where they form nests of foci of infection and eventually a fistulous tract is formed leading into the free lumen of the bowel. We do not possess a specific drug for the infection, as Dr. Nisbet has stated. Emetin and ipecac have proven of doubtful value. Intestinal flushings are necessarily disappointing because the disease is not confined to the mucous membrane of the bowel, but the seat of the disease, or focus of infection, is in the submucosa.

Dr. W. O. Nisbet (closing).—I, like Dr. Simon, would be very glad, indeed, to have a full report from Dr. Eastland's large number of cases, because no other observer has found this infection so abundantly as far as I can learn from American literature. I am glad to know that Dr. Simon is getting out his record, because this is one form of dysentery that we should know more about. The presence of blood and mucus in the stool is common in this infection, and I think all authors agree that there are not many cases that do not show blood and mucus.

I am sorry that Dr. Barrett is not here to give us some report of his studies of the organism.

ILEO-COLITIS*

By N. C. WOMACK, M.D.,
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Ileo-colitis, as referred to in this paper, is an acute inflammatory process involving portions of the ileum and colon. Its etiology is always bacterial, which, for the purposes of this discussion, are the various forms of the dysentery bacillus, supposedly about fifteen in number, gas bacilli, which are always present even though the other

forms are given as the causative agent, streptococci, and rarely, bacillus pyocyaneus. Conditions predisposing are, first, age usually from six months to four years, improper diet, bad hygienic surroundings and any condition producing a low resistance. The symptoms are diarrhea, fever, toxemia, loss of weight, vomiting, and a varying degree of acidosis. Diarrhea will show from ten to twenty or more stools in twenty-four hours and macroscopically will show mucus, blood and an albuminous fluid composed of blood plasma and cells. The fever is of a septic type ranging from 100 to 104, depending upon the amount and degree of toxemia. The toxemia is usually marked from the beginning, depending upon the amount of absorption from the inflamed bowel and the amount of kidney involvement. In cases where pyelitis or pyelonephritis is marked, the symptoms are not unlike the uremic attacks in older persons and in those cases terminating fatally are often preceded by uremic convulsions. Loss of weight is due to stopping the intake of food or the inability of the stomach to retain same, and the enormous loss of body fluids via the bowel. Vomiting is not a constant nor a distinguishing symptom. It is usually brought on by the administration of substances which disturb the digestion, improper feeding and medication. Acidosis is a result of the disturbance of the alkali status by the loss of body fluids and the toxemia present, but is not an important factor within itself.

Pathological Anatomy.—Lesions in the bowel vary from a slight turgesence or swelling of the mucosa to a pseudo membrane involving extreme areas. The mesenteric lymph glands are always involved, especially the aortic and ileac groups, which are in direct communication with the lymph glands of the kidney.

Complications.—The most important is pyelitis, due to the colon bacillus, which is a gas-producing organism. At times one is at a loss to know which is the primary infection, so constant is the kidney involvement. In 1915 I began a routine examination for pyelitis of all urines in children and was immediately struck with the universal occurrence of pyelitis in all cases of ileo-colitis. Urines obtained within a

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few hours of the onset of the disease, in one instance within two hours, invariably showed evidences of pyelitis due to the colon bacillus. Since that time I can not recall a single instance where a diagnosis of ileo-colitis was made that the examination of the urine failed to give a laboratory diagnosis of pyelitis. In all cases the laboratory work was performed by the Mississippi Hygienic Laboratory or the National Pathological Laboratory of Chicago. I wish to make the point that pyelitis is the most important single factor in the disease and cases are saved or lost to the extent that the pyelitis is successfully or unsuccessfully treated. Upon the improvement of the kidney the condition immediately assumes a more favorable prognosis and in my experience the bowel condition immediately comes under control by reason of the higher resistance set up in the patient. To establish properly the importance of the bowel trouble, *per se*, I would place it third as to the cause of death, with pyelitis first and starvation second. I wish further to make a point of the case presented for treatment. The baby may have a history of an attack of ileo-colitis last summer, or the summer before, or even three summers ago, in which the mother dates the present trouble to an attack of ileo-colitis with the statement that it has never been entirely well since that time; that upon the slightest indiscretion in diet the bowels move several times with slight fever and vomiting, which condition is usually relieved by a purgative followed by a restricted diet. Or, the case may present the above symptoms with anuria, swelling of the extremities, face and all the symptoms of a chronic Bright's disease. A culture of a sterile specimen of this urine will show the colon bacillus in large quantities and treatment directed towards relieving the pyelitis will first relieve the symptoms of Bright's disease, and secondarily, cure the bowel trouble. I have had so many of these cases with the history identical that when a case is presented the diagnosis can be anticipated.

Treatment. — Treatment is directed along three major lines. First, treatment of the pyelitis; second, feeding; and third, treatment of ileo-colitis. The pyelitis

should be treated by making an autogenous vaccine and giving, in large and rapidly increasing doses, depending upon the reaction. Large amounts of water and hexamethylen in large doses with an acid urine are indicated.

Feeding. — In feeding every effort should be made to approach the caloric demand of the patient. This can only be done by selecting a diet that will be taken care of in the digestive tract and by forced feeding at regular intervals. I will attempt to describe the routine diet as used in the institution with which I am connected. Our results are so far very gratifying. Wheat flour is boiled for fifteen hours in a gunny sack and is then baked until it is thoroughly dry. The outside layer containing the bran and protein is cut away and the inside pulverized. A heaping teaspoonful of this is added to four ounces of soda water, sweetened with evaporated milk and fed to the baby with a spoon every three hours. If any quantity is vomited, an estimated equal quantity is given again. In forty-eight to ninety-six hours the stool loses its mucus and blood and as a rule becomes dark and possesses a good deal of body. No forms of protein, elixirs or wines are given. No enemas, irrigations of any kind are used. They not only do harm but cause the greatest agony to the patient. Soda water is given in certain amounts at regular intervals until the urine becomes alkaline; then plain boiled water is substituted.

The medical treatment should be symptomatic. If there is marked prostration, frequent squirting stools, calomel in doses from 1/24 to 1/48 grains and morphia in doses from 1/50 to 1/125 grains should be given by mouth every three hours until the bowel quiets down from its continual spasm. Splinting a spastic bowel carries as much rational as splinting a broken arm.

As a summary, I would say that ileo-colitis is mainly due to a gas-producing bacteria that, in my opinion, is an attenuated or malignant form of the colon bacillus. Second, that there is always an attending pyelitis in which the colon bacillus in great numbers is found and that this pyelitis may ante-date, and certainly is the immediate complication of, ileo-colitis, and assumes the major roll from the stand-

point of the cause of death. Third, in the treatment of ileo-colitis, first attention should be paid to the kidney. Fourth, forced feeding of a selected carbohydrate diet with plenty of water should be given. And fifth, all forms of rectal irrigations or alimentation should be strictly interdicted on the ground that they not only do no good, but are distinctly harmful.

Discussion follows paper of Dr. Harper, page 409.

TREATMENT OF ENTERO-COLITIS IN INFANCY*

BY W. W. HARPER, M.D.,
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To treat entero-colitis successfully, one must make a distinction between the cases due to the gas bacillus and those due to the *B. dysenteriae*.

"Group 1.—Shiga.

"Group 2.—Park and Hiss.

"Group 3.—Flexner.

"Group 4.—Harris."

As the gas bacillus thrives only on a carbohydrate diet, this infection is best combated by withholding carbohydrates and giving proteins. On the other hand, carbohydrates furnish media not favorable to the growth of the *B. dysenteric* group and is the food of preference in the early stages of *B. dysenteric* infection. After a few days, proteins are gradually added to the diet. However, there are cases due to the *B. dysenteriae* which do better from the beginning on a protein diet.

Again, one should remember that in entero-colitis there will be cases in which the infection is principally in the lower ileum, while in others the lower colon bears the frontal attack. In the former, owing to the rich lymphatic supply, there is early and profound toxemia, rapid desiccation of the tissues, and a marked tendency to acidosis. Examination of the urine often reveals a severe nephritis.

Stool examination shows an absence of the lactic acid bacilli. These are the natural intestinal flora and are the baby's best

ally. Their absence indicates that the intestinal canal has surrendered to the invading bacteria.

The indications for treatment are:

1. Prompt cleaning of the intestinal canal by catharsis and enema.

2. Withdrawal of all food for 24 to 48 hours.

3. Sowing intestinal canal with virile strains of lactic acid bacilli.

4. An abundance of water by

(a) Mouth

(b) Rectum

(c) Hypodermoclysis

5. Free administration of alkalies and if acidosis threatens, the use of carbohydrates.

6. Adopting measures to prevent urinary suppression.

7. Early return to the breast or bottle.

As an initial purge, the writer prefers castor oil. If the first dose is vomited, a second dose is given at once, and if this is vomited, a third dose is given. From the three doses sufficient oil will be retained to act. A soda enema (two teaspoonfuls of soda bicarbonate to a quart of warm water) is given every six hours for the first 24 to 48 hours. These enemas not only clear the bowels of foul feces, but they furnish water and alkalies to the tissues. All food is withdrawn at once and water forced—the minimum amount of water to equal the amount of milk taken in health. To encourage the drinking of water, it may be given as iced tea, lemonade or orangeade sweetened with saccharin, one tablet to the pint. If the baby refuses to take the fluids, or if there is marked nausea or emesis, the fluid should be supplied by hypodermoclysis, giving 6 to 8 ounces every 6 to 8 hours to an infant six months old. Sterile tap water is rapidly absorbed, is the least irritating to the kidneys in its elimination, and all in all is the most satisfactory solution to use. Should acetone appear in the urine indicating an impending acidosis, the solution should contain 1 per cent citrate and 2 per cent glucose. The sites of election for the hypodermoclysis are the axillae, the buttocks, and the thigh. Avoid the tissue of the abdominal walls, as injections there render the abdominal muscles so painful that the patient will not use them to expel

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