

suffered the greatest annoyance on a damp day from rhythmic deflections of the string, for which we could account only by the assumption that they were telegraphic code. These signals persisted after disconnecting all wires leading away from the apparatus table, and even after disconnecting one end of the string. We found that our table, painted a dead black with carbon paint, was acting as a large capacity and discharging itself into the string. Proper attention to the insulation promptly corrected the difficulty. The source of the rhythmic variations we assumed to be electric waves from nearby wireless stations. We report this to illustrate a source of trouble which may be easily avoided by proper attention to the installation.

Finally, we have already, in the first part of this communication, urged the advisability of the adoption of uniform methods of work by all who engage in the study of electrocardiograms. The subject at best is beset with difficulty, and if each worker adopts a nomenclature of his own it renders far greater the labor of understanding his communications. Uniformity of nomenclature, uniformity regarding sensitiveness of the instrument, and the taking of all three leads will do much to prevent confusion.

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### IPECAC IN THE TREATMENT OF INTESTINAL AMOEBIASIS.<sup>1</sup>

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THE temporary cessation of dysentery in amoebic infections has been an easy thing to bring about in the majority of cases, but the eradication of the infection was long our despair. The former could generally be accomplished by merely keeping the patient at rest in bed on a suitable diet; in an attempt to accomplish the latter, we treated our patients during four years with copious enemas of normal salt solution, quinine solutions in varying strengths up to 1 to 250, thymol solutions up to a strength of 1 to 500, and quinine and thymol combined in solutions of 1 to 500, and 1 to 1000, respectively. We treated many patients with intestinal amoebiasis both with and without dysentery, and some for prolonged periods of time. Among those with dysentery we never eradicated an infection and amoebæ always reappeared within a few days after treatment was discon-

<sup>1</sup> Read at a meeting of the American Society of Tropical Medicine, St. Louis, June 11, 1910.

tinued, and were present when the patients left the hospital. Among the patients without dysentery we cured the infection of one with 1 to 500 quinine enemas, and of two with enemas of quinine and thymol, 1 to 500 and 1 to 1000 combined.

We have used the bismuth treatment advocated by Deeks and Shaw<sup>2</sup> without success, but we did not give this treatment a thorough test. However, within a short time following the presentation of the paper by Deeks and Shaw to the Medical Society of the Canal Zone, we admitted to Colon Hospital five patients with recurrences of dysentery, for which they said that they had been treated with bismuth at Ancon Hospital. These patients all had amœbæ in their stools. We cannot feel, therefore, that the conclusions of Deeks and Shaw are justified, and experience has taught us that it is very difficult in Panama to follow one's patients and to make repeated examinations of stools.

**IPECAC TREATMENT.** On account of the recommendation of English physicians, especially Manson,<sup>3</sup> ipecac also was tried, but in an unenthusiastic manner. Without the salol- or keratin-coated pills the doses given were necessarily small, vomiting was frequent, and the ipecac that was retained had no effect upon the amœbæ. We were skeptical about it, as about bismuth, chiefly because of our knowledge of the pathological conditions with which we had to cope, for it was to us inconceivable that any drug given by the mouth could reach the colon in sufficient amount to be parasitocidal to amœbæ buried deep in the gut wall or protected in ulcers by a thick layer of tenacious, necrotic material. Local applications and surgical interference held out, to our minds, the greatest hope of success in the treatment of this *bête noir* of tropical and subtropical diseases.

However, after Dock's<sup>4</sup> communication on the subject, and after one of us had talked with him and with Boggs, of the Johns Hopkins Hospital, who also had used ipecac successfully, we determined to give the drug a thorough trial. We present our cases in detail at the end of the paper. They have been grouped according to the presence or absence of dysentery, according to the length of time that we were able to follow them, and according to the success or failure of the treatment. By "dysentery," we mean the condition manifested by abdominal pain, tenesmus, diarrhœa, and stools containing blood, pus, and mucus.

Eight cases of amœbiasis with dysentery were followed for six weeks to five and one-half months, with repeated examinations of stools for amœbæ. All were successfully treated with ipecac. Case III is the most striking and convincing case that we have had. Three cases (IX, X, and XI) of amœbiasis with dysentery were successfully treated also, but were followed less than six weeks. Three

<sup>2</sup> Medical Record, November 13, 1910.

<sup>4</sup> New York Med. Jour., July 10, 1909.

<sup>3</sup> Tropical Diseases.

cases (XII, XIII, and XIV) of amoebiasis without dysentery were successfully treated and followed two to five months. In four cases (XV, XVI, XVII, and XVIII) of amoebiasis without dysentery, the ipecac treatment failed. The four unsuccessful cases all belonged to the group of amoebic infections without dysentery; one patient was so susceptible to irritation by ipecac that he could not be thoroughly treated; three were not "bed patients," and the diet was not carefully regulated; none could be considered thoroughly treated. The amoebæ of one of these patients (Case XVI) corresponded to the description of *Entamoeba histolytica*,<sup>5</sup> with Wright's stain the endoplasm took a pale blue stain, the ectoplasm a darker blue, the protoplasm was vacuolated, inclusions were present, the nucleus was ill-defined, and the chromatin scattered; in the fresh specimen the amoebæ were large, active, vacuolated, and the ectoplasm was distinct. The amoebæ of two of the patients (Cases XV and XVII) were small, sluggish, and the ectoplasm was not well defined; the endoplasm stained a deeper blue than that of *Entamoeba histolytica*, the ectoplasm a very dark blue, the chromatin was scattered and more abundant, and the nucleus ill-defined. The amoebæ of the fourth patient (Case XVIII) seemed to be *Entamoeba histolytica* in the fresh specimen; in the stained specimen, however, they resembled those of Cases XV and XVII, but were much larger.

It is quite probable that different strains of amoebæ will prove to vary in their susceptibility to ipecac. We found this to be the case, apparently, in connection with quinine. The motility of some strains of amoebæ was readily checked by a 1 to 1000 solution of quinine sulphate, and the amoebæ assumed a granular, less refractile, degenerated appearance in from twelve to fifteen minutes. On the other hand, we have experimented with a strain, the amoebæ of which, in fresh stools mixed with quinine so as to make a 1 to 250 solution, retained their motility six to nine minutes; and in 1 to 500 solutions, fifteen minutes. It seems possible, therefore, that a certain number of patients may harbor amoebæ that have the power to resist ipecac, and that a certain number of failures may be expected.

*Preparation of Ipecac.* Salol-coated pills were used in all the cases except one (Case VI), in which ipecac in capsules was used. Our pills were obtained from one of the reliable drug houses in the United States. The first lot of pills were covered very thinly with salol, and vomiting not infrequently followed, usually three to eight hours after ingestion of the pills. Occasionally, pills were found in the vomitus. In one instance we filtered the vomitus, which had a strong acid reaction, and immersed several of the pills in it. The salol coat was gradually dissolved, and within an hour or two the pills were disintegrated. When Simon's<sup>6</sup> article, in which he suggested a salol coat  $\frac{1}{8}$  inch thick, appeared, we compromised and

<sup>5</sup> Jour. Infec. Dis., 1908, v. No. 3.

<sup>6</sup> Jour. Amer. Med. Assoc., 1909, lili, 1526.

ordered pills with a salol coat  $\frac{1}{8}$  inch thick. Vomiting has not occurred with these pills, but we have found that they sometimes pass through the alimentary canal before the salol coat is dissolved.<sup>7</sup> We must be careful, therefore, on the one hand, not to have a coat that is too thin, and, on the other hand, to have it thin enough to be readily dissolved in the intestine. The  $\frac{1}{8}$  inch coat of the pills that we have used is certainly thick enough, and perhaps slightly too thick.

*The Dosage and Administration of Ipecac.* We have tried several systems of dosage and administration. Two patients (Cases III and IX) were given 80 grains to begin with at 9 P.M., and the dose was reduced 5 grains each night until a dose of 10 grains was reached. One patient (Case VI) was treated successfully with ipecac in capsules beginning with only 40 grains. The ipecac was preceded by an opiate. Three patients (Cases I, II, and XII) were given 120 grains during twenty-four hours, and amœbæ were never found afterward, excepting one five months later in Case XII. This is a rapid method, but we do not feel that it is a sure one. It was attempted in Case XVI, and failed, and, moreover, excited a severe dysentery. In Case VIII doses of from 40 to 80 grains were given at intervals of from two to seven days.

We agree with those who advocate beginning with 60 grains, or, better, 80 grains, of ipecac, and reducing the dose gradually until a dose of 10 grains is reached. As a rule, it is unnecessary to continue the treatment longer, and usually advisable not to do so, for the small doses may serve only to keep up a catarrhal condition of the bowel, already excited by the large doses. Such a catarrhal condition with mild diarrhœa seems to be commonly produced.

**DIET IN THE TREATMENT.** Food plays an important part in the treatment. The pills may be delayed in the stomach by solid food or by milk curds, until the salol coating is corroded and vomiting is excited. We have seen milk curds containing disintegrated ipecac pills vomited several hours after ingestion. One patient (Case XII) took 60 grains at night three hours after eating a light dinner, 40 grains the next morning immediately after a light breakfast of coffee and toast, and 20 grains at noon after luncheon at which some asparagus was eaten. There was no nausea or discomfort until two hours after the luncheon, when an extraordinary pulpy gelatinous mass of asparagus containing disintegrated ipecac pills was vomited. Furthermore, the residue from too much food must certainly serve to embed and scatter the ipecac so that it cannot come into thorough contact with the gut wall. While we believe that many infections may be eradicated without stringent dieting, still in all cases no solid food or milk should be given for

<sup>7</sup> In the discussion of the paper Simon stated that the salol coat of pills freshly prepared with fused salol was more easily dissolved than the salol coat of the pills that we used. The freshly prepared pills are probably more reliable.

at least six hours before the ipecac, and no food of any kind for three hours before. To insure success, the patient should be kept in bed on liquid diet, milk should not be given during the six hours preceding ipecac, and no other liquids for three hours. We make it a practice to keep the patient lying on his right side because of the possibility that gravity may help the progress of the pills into the pyloric end of the stomach. We have begun now to flush the colon with normal salt solution during the afternoon. The pills are given about 8 or 9 P.M.

**SUMMARY.** 1. We despaired of success after four years of experience in attempting to eradicate intestinal amoebiasis by means of rest, dieting, and lavage of the colon. We used copious enemas of normal salt solution, quinine, thymol, and quinine and thymol combined.

2. We have apparently cured 14 amoebic infections with ipecac: 8 with dysentery, followed six weeks to five and one-half months with repeated examinations for amoebæ; 3 with dysentery, followed less than six weeks; 3 without dysentery, followed two to five months. We have failed to eradicate the infection in 4 cases, but these were not thoroughly treated.

3. The thickness of the salol coat of the ipecac pills must be carefully regulated so as to prevent vomiting on the one hand, and on the other, the passage of intact pills through the intestinal canal.

4. Probably the best dosage and method of administration is to begin with 60 or 80 grains at bedtime and decrease the dose 5 grains daily until a dose of 10 grains is reached. Rapid cures may sometimes be effected by giving 40 grains three times during twenty-four hours.

4. The patient should be at rest in bed and on liquid diet; no solid food or milk should be given for at least six hours previous to the ipecac, and no liquids for three hours previous. No opiate is necessary.

5. Our experience indicates that a large proportion of amoebic infections can be eradicated by ipecac treatment. It is far superior to any treatment that we have hitherto tested, and it should always be given a thorough trial before surgical treatment is attempted.

#### REPORT OF CASES.

##### A. CASES OF INTESTINAL AMOEBIASIS WITH DYSENTERY TREATED SUCCESSFULLY WITH IPECAC AND FOLLOWED SIX WEEKS TO FIVE AND ONE-HALF MONTHS AFTERWARD.

**CASE I.**—No. 20725, white, American; on the Isthmus six months; admitted November 2, 1909.

**History.** Dysentery in the Philippines in 1909, lasting six weeks, on account of which the patient was sent home. He recovered

and did not have dysentery again until he came to the Isthmus. About one month ago he began to have diarrhoea, tenesmus, and bloody stools, for which he received bismuth treatment at Ancon Hospital. On admission to Colon Hospital, the patient had estivo-autumnal malarial fever, diarrhoea, tenesmus, and bloody stools. Microscopic examination of the stools showed large, active amœbæ. Copious enemas of normal salt solution were given twice daily for thirteen days, and then enemas of 1 to 1000 quinine solution twice daily for thirteen days. At the end of this time, November 27, amœbæ were still present in the stool, though the dysentery had ceased.

*Treatment.* On November 29 the patient was given 120 grains of ipecac in three doses of 40 grains each, morning, noon, and night.

*Subsequent History.* The treatment was followed by a recurrence of malarial fever, November 30, and by a sharp attack of diarrhoea with bloody stools lasting about one week. There was no further intestinal trouble, however. The patient was last seen in May, 1910, more than five months after treatment.

*Stool Examination.* During the dysenteric attack following ipecac the stools were negative for amœbæ, and none were found on subsequent examinations. Examinations were made December 3 and 13, 1909, January 29, February 7, 12, 17, and 20, March 26, April 7, April 13, 1910.

CASE II.—No. 20994, white, American; on the Isthmus eighteen months; admitted November 17, 1909.

*History.* Dysentery about eleven months before admission; treated at Santo Tomas Hospital, in Panama, for six or seven weeks; was better for one week, but then the dysentery recurred. Three weeks after discharge from Santo Tomas (eight or nine months before present admission), he entered Ancon Hospital and received bismuth treatment for six weeks. Dysentery has persisted intermittently since discharge from Ancon. Entered Colon Hospital first on September 16, 1909; the diagnosis made was amœbic dysentery; amœbæ were present in the stools; treated until November 14 (nearly two months) with enemas twice daily of normal salt solution, alternating with enemas twice daily of 1 to 1000 quinine solution. Dysentery improved, but amœbæ were still present on discharge. Three days after discharge the patient was readmitted (present admission) to Colon Hospital with dysentery associated with large, active amœbæ.

*Treatment.* Ipecac in 5 grain salol-coated pills, 120 grains in three doses of 40 grains each, was given November 4, 1909.

*Subsequent History.* The patient vomited one hour and three hours after the first dose, and three pills were ejected. No further vomiting. A slight diarrhoea for one day followed the ipecac, and then the stools became formed and movements normal.

*Stool Examination.* The patient was under observation until May, 1910 (five months), and there was no recurrence of dysentery. All stool examinations made after the ipecac treatment were negative for amœbæ. Examinations were made November 26, December 10, 12, 1909, March 22, April 17, April 29, 1910.

CASE III.—No. 21743, white, American; on the Isthmus three and one-half years; admitted January 8, 1910.

*History.* Dysentery three years ago with abscess of liver; operated on at Ancon Hospital with good recovery. Four attacks of dysentery since: (1) February, 1909, in Ancon Hospital, eight days, treated with bismuth; no irrigations; (2) June, 1909, Colon Hospital, nineteen days, amœbæ found, no diarrhœa, but severe burning sensation in lower abdomen; treated with copious enemas of normal salt solution twice daily; improved; (3) July, 1909, Colon Hospital four months, slight diarrhœa on admission, intense continuous burning sensation in lower abdomen, numerous amœbæ in stools; appendicostomy, July 19; cecum and ascending colon were found to be enormously thickened, purple in color, extensively diseased; irrigations through appendix twice daily for eight weeks with 1 to 4000 and 1 to 3000 quinine solution, then no irrigations for about eight weeks; improvement; (4) January, 1910 (present admission), two months after last discharge, nine to thirty movements daily, tenesmus, blood, mucus, intense pain.

*Stool Examination.* Mucus, blood, pus, enormous numbers of large, active amœbæ, distinct ectoplasm, vacuolated; many with red blood-corpuscles engulfed; stain with Wright's stain like amœbæ of "Cochin China Dysentery;"\* that is, they take a darker blue than *Entamoeba histolytica*, and contain an enormous quantity of chromatin diffusely scattered; no discernible nucleus.

*Treatment.* Ipecac, 80 grains at 9 P.M., January 9. The dose was decreased 5 grains each night until reduced to 5 grains January 24. Patient vomited twice, six and seven hours after the first dose and twice, four and ten hours after the third dose. The patient was discharged February 6, about one month after admission.

*Subsequent History.* While in the hospital the number of stools per day decreased to two or three; they were semisolid and contained mucus. By February 20 the stools had become normal. Patient was under observation four and one-half months after treatment.

Examinations for amœbæ were as follows:

January 10. Ipecac begun January 9. Amœbæ found in only one of seven preparations examined.

January 11. A few amœbæ found without difficulty.

January 12. Three preparations examined, many amœba-like bodies found, but no motile ones seen.

\* Annales de l'Institut Pasteur, March, 1909, t. xxiii, No. 3.

January 14. One motile amoeba found in searching four preparations.

January 15. Negative for amoebæ.

January 16. Negative for amoebæ.

January 17. Negative for amoebæ.

January 27. Negative for amoebæ.

January 28. Negative for amoebæ.

February 2. Negative for amoebæ.

February 5. Negative for amoebæ.

February 13. Patient returned for examination (discharged one week ago). He has had four or five movements daily, semisolid stools with mucus, but no blood, pain, or tenesmus. Stool examination: Semisolid, masses of mucus, no blood or pus, no amoebæ. (Four preparations examined.)

February 20. One or two normal formed movements daily, no mucus, no pain. Stool examination: Negative for amoebæ, blood, pus, or mucus.

March 20. Stools formed, normal, one daily. Two stools examined, both negative.

April 24. Stools formed, normal; two preparations negative for amoebæ, blood, pus, mucus.

May 29. Patient in excellent condition, bowels regular, stools normal. No stool obtained for examination.

CASE IV.—No. 21362, colored, Colombian; on the Isthmus three days; admitted December 13, 1909.

*History.* Dysentery began two months ago; diarrhoea, blood, abdominal pain. During first week in hospital patient had three to five movements a day, some tenesmus, mucus, and blood. Large active amoebæ were found.

*Treatment.* Ipecac, 40 grains December 15, in one dose; 35 grains December 16; 30 grains December 17; 25 grains December 18.

*Subsequent History.* No nausea or discomfort after ipecac. One stool a day after December 20. Discharged December 29; has been under observation five and one-half months. No further intestinal trouble.

*Stool Examinations.* January 3, 1910, large amoeba-like bodies, no motility.

February 1. Negative for amoebæ.

March 18. Negative for amoebæ.

April 20. Negative for amoebæ.

May 30. Negative for amoebæ.

CASE V.—No. 21487, white, American; admitted from U. S. S. Prairie, December 23, 1910.

*History.* Dysentery three years ago in Guam, L. I. Was in hospital fifty-four days; severe attacks of diarrhoea at intervals since then; last attack seven months ago. Present attack began three days ago, severe diarrhoea, fifteen or sixteen movements a

day, griping and tenesmus, no blood. On admission patient had diarrhoea, two to nine movements a day. Microscopic examination showed blood and pus; no amœbæ were found in first three examinations; the fourth examination revealed large active amœbæ.

*Treatment.* Copious enemas of normal salt solution twice daily for two weeks, then discontinued, and rest and dietetic treatment given for about two weeks. Treatment with ipecac was begun January 24, 9 p.m., 80 grains; January 25, 75 grains; January 26, 70 grains; January 27, 65 grains; January 28, 60 grains.

*Subsequent History.* Ipecac treatment was followed by diarrhoea, with six to thirteen movements daily for one week, then two to five movements for another week. No blood, some mucus. After the second week there were from one to three or four movements daily; stools were semiformal and at times contained mucus. Patient was under observation until March 19, 1910, about eight weeks after ipecac treatment was begun.

*Stool Examinations.* All negative for amœbæ, January 25, February 2, 5, 8, 18, 20, 21, March 4, 8, 1910.

CASE VI.—No. 21644, colored, Jamaican; on the Isthmus five years; admitted December 31, 1909.

*History.* Sick three months with dysentery. On admission patient was having from four to eight movements per day, with tenesmus, blood, and mucus. Microscopic examination showed large, active amœbæ, having the staining characteristics described by Craig<sup>9</sup> for *Entamoeba histolytica*.

*Treatment.* Treatment with ipecac in capsules was begun December 31, 1910. The three initial doses were 40 grains given at 8 p.m. on succeeding days, then 30 grains daily for two days, 20 grains daily for two days, 10 grains daily for eleven days. The ipecac was preceded by an opiate.

*Subsequent History.* No vomiting after ipecac; a mild diarrhoea persisted during the ipecac treatment. After treatment was begun the patient was under observation a little over six weeks.

*Stool Examinations.* All negative for amœbæ, January 11, 13, 24, 25, February 13, 16, 1910.

CASE VII.—No. 21857, colored, Jamaican; admitted January 17, 1910; on the Isthmus four years.

*History.* Exploratory laparotomy on previous admission and a peculiar condition of the liver found, thought to be gummatous. Patient admitted this time with œdema of the feet and legs and ascites. He had had pain in his bowels for three weeks with diarrhoea, passing blood and mucus. Two examinations of stools, January 18 and 22, were negative for amœbæ, but positive for blood and pus. The patient was having from three to five movements a day. On February 18, innumerable large, active amœbæ

<sup>9</sup> Loc. cit.

were found; these were vacuolated with well-defined ectoplasm and stained like *Entamoeba histolytica* with Wright's stain.

*Treatment.* Ipecac, 40 grains February 19, 20, and 22; 35, 30, and 25 grains February 23, 24, and 25.

*Subsequent History.* No nausea or vomiting and no increase of diarrhoea during treatment. Diarrhoea reduced from four to six movements daily before, to one to three after treatment. Patient was under observation for nearly two months after ipecac was given.

*Stool Examinations.* Negative for amœbæ, February 18, March 17 and 25, April 10, 1910.

CASE VIII. No. 22,005, white, Italian; on the Isthmus twenty-seven months; admitted January 26, 1910.

*History.* Diarrhoea for two weeks with as many as twenty movements a day, great weakness, distress after eating for one year. Hemorrhoids. Examination of stools showed mucus, blood, and innumerable amœbæ, large, active, vacuolated, with well-defined ectoplasm. They stained unlike either *Entamoeba histolytica* or *Entamoeba coli*<sup>10</sup> or the amœbæ of Cochin China dysentery. The amœbæ, on account of their size and their stain affinities, gave one an impression of solidity: they seemed massive. The endoplasm took almost a red stain because of the enormous quantity of chromatin, and the ectoplasm was almost a blue black; the nucleus was well-defined and rich in chromatin (Wright stain).

*Treatment.* Ipecac, 80 grains on January 27; 40 grains, January 28 and 30, February 6, 11, and 14.

*Subsequent History.* Vomited several times three to six hours after taking ipecac; had no diarrhoea. Was transferred to the surgical side and operated on for hemorrhoids February 21. Re-admitted March 20, 1910, for another operation on an old ventral hernia. Under observation over two months and had no further dysenteric trouble.

*Stool Examinations.* January 28, amœbæ present. Examinations negative for amœbæ, January 30, February 9, 16, 17, 18, 20 and 21, March 21.

B. INTESTINAL AMŒBIASIS WITH DYSENTERY TREATED SUCCESSFULLY WITH IPECAC AND FOLLOWED LESS THAN SIX WEEKS.

CASE IX.—No. 21345, white, Scotchman; has lived in Nicaragua; on the Isthmus one day; admitted December 12, 1909.

*History.* Dysentery two and one-half years ago, with several recurrences of active dysentery since, and diarrhoeal attacks nearly every month. He was treated in Ancon Hospital during one dysenteric attack, was in bed thirteen days, and received large doses of bismuth. He has been in England for eighteen months, and while in Liverpool had dysentery and was treated in a hospital there. The present attack began one week ago on shipboard *en route* from

<sup>10</sup> Craig, loc. cit.

England to Colon. He has been having intense abdominal pain, tenesmus, and diarrhoea, and stools have contained mucus and blood. On admission, the patient was having four to nine movements daily, pain was intense and required morphine, the stools were thin, contained blood, and numerous small mucous masses, which were composed almost entirely of amœbæ closely packed together in the field of the microscope. These amœbæ were large, active, vacuolated, had a well-defined ectoplasm, and contained numerous red blood corpuscles; fourteen corpuscles were included in one amœba. They stained with Wright's stain like amœbæ of Cochin China dysentery. Numerous amœbæ were found December 12, 14, 15, and 17.

*Treatment.* Ipecac was begun December 18, 8 P.M., 60 grains; December 19, 80 grains; December 20, 60 grains; dose decreased 10 grains each night until a dose of 10 grains was reached.

*Subsequent History.* Patient vomited a few times six or eight hours after taking the ipecac. The stools decreased in number during the treatment; before discharge, January 8, 1910, only one formed normal stool was passed daily. The patient left January 8, 1910, for Nicaragua, and has not been heard from. He was under observation nineteen days after the first negative stool examination.

*Stool Examinations.* Two amœbæ found December 20 in five preparations. Stools negative for amœbæ, December 22, 23, 24, 30, 1909, and January 2, 3, 5, 8, 1910.

CASE X.—No. 21356, colored, Bolivian; on the Isthmus two years; admitted December 13, 1909.

*History.* Sick three months with dysentery. On admission, four to ten movements daily; stools contained mucus and blood and innumerable large, active amœbæ, vacuolated with well-defined ectoplasm and staining with Wright's stain like *Entamoeba histolytica*.

*Treatment.* Ipecac was begun December 15, 8 A.M., 40 grains; dose decreased 5 grains a day for three days; only four doses given.

*Subsequent History.* No vomiting; diarrhoea persisted, but stools decreased in number while ipecac was being given; stools then became normal for two weeks; then there was a mild diarrhoea for ten days after patient was given "full diet." He was discharged January 17, 1910, in good condition, with normal stools, one month after ipecac treatment was begun.

*Stool Examinations.* Negative for amœbæ, December 18, 22, 25, 1909, January 1 and 8, 1910.

CASE XI.—No. 23304, white, American; on the Isthmus five years; admitted April 17, 1910.

*History.* Onset three days ago with diarrhoea; passed blood two days ago. Never had dysentery before. On admission patient had five to twelve movements daily, with pain and tenesmus; stools contained blood and numerous active amœbæ.

*Treatment.* Ipecac, April 18, 9 P.M., 60 grains; April 20, 40 grains; April 21, 30 grains; April 23, 20 grains.

*Subsequent History.* No discomfort from treatment, two to four movements daily when discharged April 27, 1910. Patient was seen May 21, and he was in good condition, and had had no recurrence of intestinal trouble. He was under observation one month after ipecac treatment was begun, but the stool examinations covered only eight days.

*Stool Examinations.* April 19, a few amœbæ, blood, and pus.

April 20. No amœbæ or blood, some mucus.

April 22. Stool semisolid, negative for amœbæ, blood, and mucus.

April 24. Stool negative for amœbæ, normal.

April 27. Stool negative for amœbæ, normal.

C. CASES OF INTESTINAL AMOEBIASIS WITHOUT DYSENTERY TREATED SUCCESSFULLY WITH IPECAC AND FOLLOWED FOR SIX WEEKS TO FIVE MONTHS.

CASE XII.—White, American; on the Isthmus four years.

*History.* The patient had been under observation two years, had never had dysentery, but had had occasional mild attacks of diarrhœa, and bowels showed a tendency toward looseness, two to four semisolid movements daily. There had never been blood in the stools, but some mucus, and the patient was frequently troubled with flatulency. Many examinations of stools during two years had always shown the presence of numerous large, active, vacuolated amœbæ with well-defined ectoplasm. They stained with Wright's stain like *Entamoeba histolytica*. Rest and dietetic treatment and enemas of normal salt solution, quinine and thymol had no effect upon the amœbæ. They averaged fifteen to twenty per field (B and L, 1 ocular,  $\frac{2}{3}$  objective) of the microscope a few days before treatment with ipecac.

*Treatment.* January 2, 1910, Ipecac, 60 grains, 9 P.M.; January 3, 40 grains, 8 A.M., and 20 grains, 1 P.M.—120 grains during twenty-four hours.

*Subsequent History.* Patient vomited two hours after the last dose of ipecac, and two or three pills were ejected. The treatment was followed by diarrhœa for two days. There was some tendency toward flatulency and mild diarrhœa for several weeks, but there has been no trouble now for three months. The patient has been under observation for five months since the treatment.

*Stool Examinations.* Negative, January 4, 10, 18, February 2, 13, April 25. On May 27, after a prolonged search, one amœba was found. This amœba was twelve microns in diameter, was very sluggishly motile, no ectoplasm could be seen, no vacuoles and no engulfed bacteria could be made out. It appeared to be *Entamoeba coli*, and was not, we believe, a relic of the former infection. Only one was found.

CASE XIII.—No. 21322, white, American; on the Isthmus twenty months; admitted December 10, 1909.

*History.* Pain in lower abdomen for two weeks; has been having alternating attacks of diarrhoea and constipation; never passed blood. No diarrhoea or constipation in the hospital. Stool examination showed small amœbæ which could not be definitely classified, no blood.

*Treatment.* December 21, ipecac in 5 grain salol-coated pills, 80 grains at 8 P.M.

*Subsequent History.* Stool examinations December 22 and 23, negative for amœbæ. Patient was discharged December 24, but returned for examination January 3, 1910, when numerous amœbæ were found. On January 9, amœbæ were still present, and patient was advised to return to the hospital for more thorough treatment. He did so on January 10 (No. 21755).

*Second Treatment.* Ipecac was begun January 10, an initial dose of 80 grains being given at 9 P.M. This dose was decreased 5 grains each night for one week until a dose of 50 grains was reached, when the treatment was discontinued.

*Subsequent History.* Vomiting occurred once, and a mild diarrhoea persisted during the treatment, but quickly cleared up afterward. The patient was last seen May 30, 1910, about four and one-half months after the treatment. He was in excellent health and stools were normal.

*Stool Examinations.* Negative for amœbæ, January 11, 12, 13, 15, 16, 17, 18, February 6 and 22, April 3, May 30.

CASE XIV.—No. 21529, white, American, on the Isthmus three and one-half months; admitted December 27, 1909.

*History.* Diarrhoea more or less continuously for nineteen years; at times passed blood; no tenesmus for ten years; has been unable for ten years to void urine without having a bowel movement. Mild diarrhoea in the hospital, no hæmorrhoids, no abdominal tenderness, no tenesmus, no blood in stools, but numerous large, active amœbæ, about five per field (B and L, 1 ocular,  $\frac{3}{4}$  objective) of the microscope.

*Treatment.* Ipecac was begun December 29, 80 grains at 9 P.M. The dose was reduced 5 grains each night subsequently until a dose of 10 grains was reached.

*Subsequent History.* No nausea or vomiting was caused by ipecac; diarrhoea was increased during the treatment to five or six movements, but subsided when ipecac was discontinued. Patient was discharged January 17, 1910; he was then having one or two movements daily. He was seen last February 27, 1910, and up until that time he had been having three or four stools daily, semi-formed, normal color, no mucus or blood, no tenesmus. He was under observation nearly two months after ipecac treatment was begun.

*Stool Examinations.* Negative for amœbæ, January 3, 5, 6, 7, 14, 30, February 13 and 27, 1910.

D. INTESTINAL AMŒBIASIS WITHOUT DYSENTERY TREATED UNSUCCESSFULLY WITH IPECAC.

CASE XV.—No. 21336, white, Frenchman; on the Isthmus six years; admitted December 11, 1909.

*History.* Amœbic dysentery and liver abscess in 1907; operated on at Ancon Hospital with good recovery. No recurrence of dysentery. Stools showed a moderate number of small sluggish amœbæ (7 to 14 microns); ectoplasm fairly well defined; small vacuoles, greenish refractility, no red blood cells engulfed. They stained with Wright's stain a rather dark blue for *Entamœba histolytica*; the ectoplasm stained more deeply than the endoplasm, the nucleus was ill-defined, and the chromatin scattered.

*Treatment.* Ipecac in 5 grain salol-coated pills begun December 22, 9 P.M., 80 grains; December 23, 70 grains; December 24, 65 grains; December 26, 60 grains; December 27, 55 grains; December 28, 50 grains.

*Subsequent History.* The patient vomited several times six to eight hours after taking ipecac and had a mild diarrhœa, which quickly subsided. A second course of ipecac treatment was given, but the patient did not return for examination.

*Stool Examination.* December 29, 1909, negative for amœbæ. January 2, 1910, negative for amœbæ. January 9, 1910, a few small amœbæ like the ones described above.

CASE XVI.—No. 22721, white, American; on the Isthmus five years; admitted March 14, 1910.

*History.* Constipation six months, burning sensation in abdomen one month. Loss of weight; no diarrhœa. Stools contained numerous large, active amœbæ that stain like *Entamœba histolytica*.

*Treatment.* Ipecac, March 15, 60 grains; March 16, 40 grains.

*Subsequent History.* Ipecac treatment excited a severe dysentery, and had to be discontinued. Patient discharged March 23, 1910.

*Stool Examinations.* Negative for amœbæ, March 17, 20, and 23. On April 15, numerous large, active amœbæ were present.

*Second Treatment.* The patient took three doses of ipecac, 50 grains, on successive nights before readmission to the hospital. A dysentery was excited again, and the amœbæ persisted.

*Second Admission.* May 9, 1910. Patient returned to the hospital and is still under treatment. Each attempt to give large doses of ipecac excites a dysentery, and not more than twenty grains can be given. The failure of the ipecac treatment in this case seems to be due rather to the idiosyncrasy of the patient than to the ineffectualness of the treatment.<sup>11</sup>

CASE XVII.—No. 23586, white, American; on the Isthmus five years; admitted May 3, 1910.

*History.* Amœbic dysentery in Ancon Hospital in 1907, active dysentery for three months. Mild attack of dysentery in 1908,

<sup>11</sup> Recovery subsequently followed the use of 20 grains of ipecac daily for a prolonged period.

duration ten days. Treated both times with quinine and thymol irrigations; has been feeling weak, with malaise and indigestion, two months. Tendency to constipation. No diarrhoea. Before admission, patient's stools were examined, and small sluggish amœbæ were found resembling those in Case XV. Ipecac was given, beginning with 40 grains and decreasing 5 grains daily until doses of 10 grains were reached. There was no disturbance from the treatment. The patient then returned for examination and the same kind of amœbæ were still present. He then entered the hospital.

*Treatment.* Ipecac, May 4, 80 grains; May 6, 60 grains; May 8, 9, and 10, 50 grains each day.

*Subsequent History.* Some abdominal discomfort and diarrhoea during treatment. The pills were a new lot, with a thicker salol coat, and a few, at least, passed through the alimentary canal without dissolving and were found in the feces. The patient was discharged May 15, 1910.

*Stool Examinations.* May 7, amœbæ, mucus, stool formed.

May 8. Amœbæ, stool semisolid.

May 9. Amœbæ, stool semisolid.

May 10, 11, 12, and 15. Negative for amœbæ.

May 22. Patient returned for examination. He has been constipated since discharged, has small, hard stools, feels very badly, weak, and easily fatigued, sweats profusely. Stools formed, no blood or mucus, numerous small amœbæ like those found on previous examinations and in Case XV. The patient promises to return for treatment.

CASE XVIII.—No. 23918, white, American; on Isthmus ten months; admitted May 20, 1910.

*History.* Never had dysentery; present illness began four days ago with diarrhoea. Patient had no diarrhoea in the hospital, and stools were normal in appearance. Microscopically there was no blood or pus, but very numerous large, active, vacuolated amœbæ with well-defined ectoplasm. With Wright's stain the endoplasm took a good blue, darker than the pale blue of *Entamoeba histolytica*, the ectoplasm was deep blue, the nucleus ill-defined, and the chromatin abundant and scattered. They resembled more closely the amœbæ of Cochin China dysentery.

*Treatment.* Ipecac in 5-grain salol-coated pills, May 22, 60 grains; May 24, 50 grains; dose decreased five grains daily for five days until a dose of 25 grains was reached. The patient was allowed "full diet" during the treatment.

*Subsequent History.* Patient vomited once during treatment; no diarrhoea; discharged May 30, 1910.

*Stool Examinations.* May 28, negative for amœbæ.

May 30. Numerous amœbæ like those described above.