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Woodhull, Alfred A. 1837-1921.
Royal College of Surgeons of England

Publication/Creation

Atlanta, Ga. : Dunlop, Wynne, printers, 1875.

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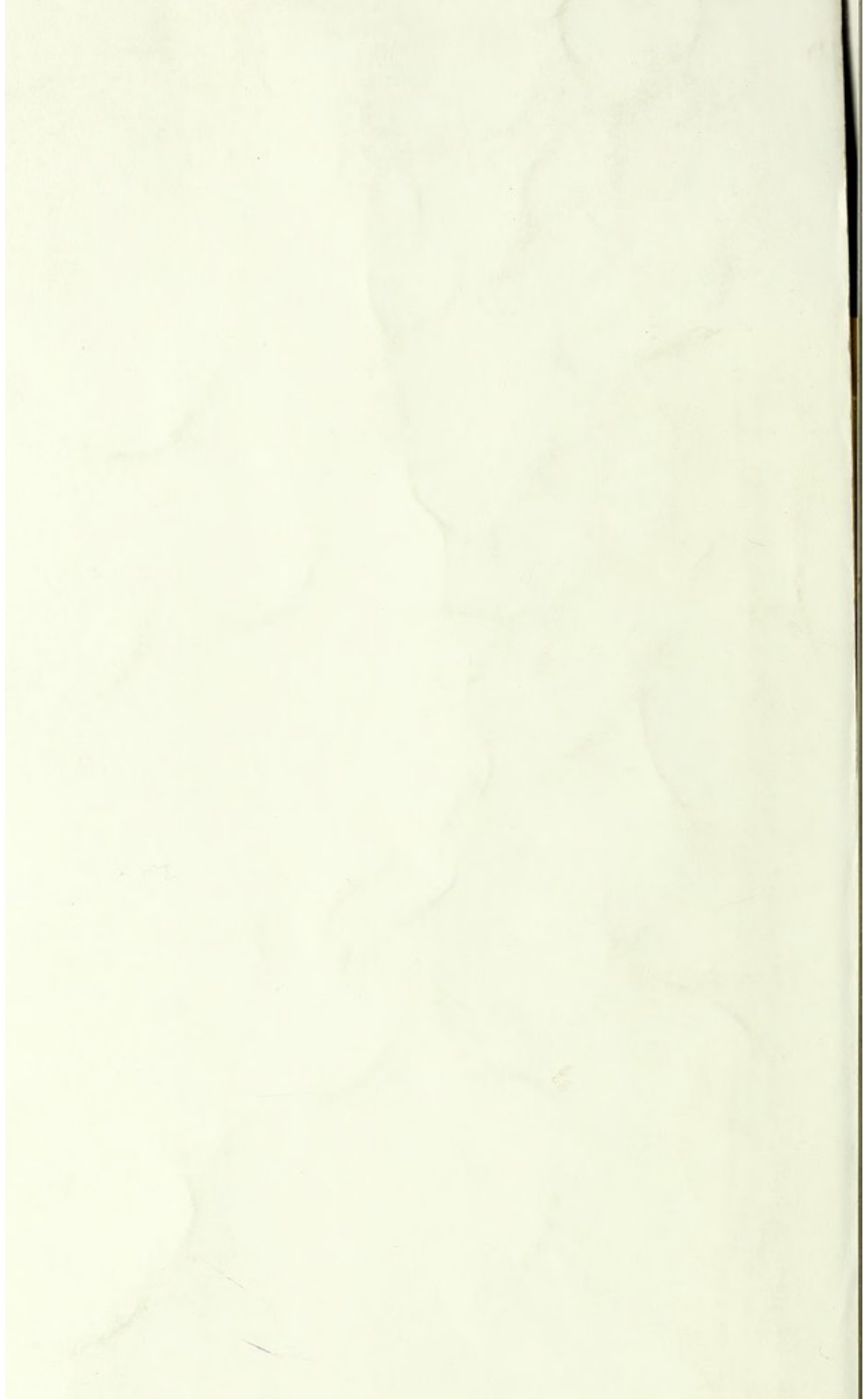
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CLINICAL STUDIES

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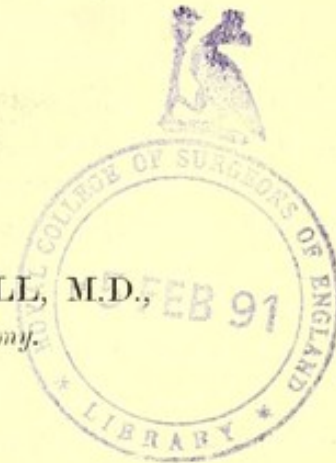
WITH

LARGE NON-EMETIC DOSES

OF

IPECACUANHA.

By ALFRED A. WOODHULL, M.D.,
Assistant Surgeon U. S. Army.



RE-PRINTED FROM THE ATLANTA MEDICAL AND SURGICAL JOURNAL.

ATLANTA, GEORGIA:
DUNLOP, WYNNE & CO., PRINTERS, 11 NORTH BROAD STREET.
1875.

MEMORANDUM.

This paper, prepared as a Special Report to the Surgeon General of the Army, was completed early in October, 1874. It was forwarded to that officer, and the retained copy was read before the Atlanta Academy of Medicine 19th and 26th of the same month. While transcribing it for the press Dr. Duckworth's papers and the original French documents referred to came into my hands, requiring certain interpellations and additional notes, and delaying the MS. until this date. I believe that no essential fact in this new matter has been overlooked, and I am glad to say that I have detected nothing requiring a change in my previously expressed opinions, while some apparent confirmations have been discovered.

I am under great obligations to Assistant Surgeon Billings, U. S. Army, in charge of the Surgeon General's Library, for the use of books in that collection otherwise inaccessible to me.

The references marked with an asterisk (*) are derived at second-hand. Those not so marked I have personally examined.

A. A. W.

MCPHERSON BARRACKS,
ATLANTA, GA., 28th November, 1874.

CLINICAL STUDIES WITH
LARGE NON-EMETIC DOSES OF
IPECACUANHA:

WITH A CONTRIBUTION TO THE THERAPEUSIS OF CHOLERA.

These clinical notes, and what seems to me a reasonable deduction from them and from certain appended quotations, are respectfully offered for the consideration of the profession.

Much that follows is not new, but merely corroborates the recorded experience of others. Reading and observation, however, teach me that the influence that ipecacuanha exerts over dysentery and certain forms of diarrhoea is not practically recognized by many physicians who, while they have read of its power, hesitate to employ the remedy. Notes of such cases may, therefore, be useful by inviting renewed attention to a subject which, in some parts of our country, is of vital interest. The opportunities at my disposal were taken advantage of to press the use of the drug further than is commonly done; and, that others may form an intelligent judgment, all the circumstances attending its administration have been carefully noted, although in some instances it may be that no positive benefit followed, and the cases have been narrated in greater detail than would be proper in a report simply covering admitted therapeutic ground.

It follows, therefore, that, besides the confirmatory cases, others are recorded which, so far as I know, belong to a new class. Whatever similar experience other medical men may have had, this is certainly original; and attention is invited to the route by which it was reached, but especially to the results attained. Finally, a suggestion of possible value is advanced for the consideration of those who may have the opportunity to use it. The cases are entered chronologically. All in which the drug was

used in this way are reported, and no essential condition that was observed, either for or against the method, is omitted.

Having had at other posts a moderate experience that was favorable in the treatment of dysentery by large doses of ipecacuanha, and being acquainted with the East Indian reports on the subject, I resorted to it here at the beginning of the warm season.

CASE I.—C. D., who had suffered with a severe diarrhœa several days, came upon the sick list 19th May, 1874, and was at once admitted to hospital. He had fever, severe pain in the bowels, small bloody discharges with straining—in short, dysentery. He was at once put to bed, and was given tinct. opii *m. xv.*, followed in half an hour by pulv. ipecacuanhæ gr. xx., in as little water as possible, and a sinapism was applied to the stomach. This was repeated four hours afterward. There was no emesis; the bloody discharges at once ceased; the pain and tenesmus gradually passed away; a stool, soft but not dysenteric, occurred in the middle of the day; by evening he expressed himself as feeling very comfortable. No more medicine was given, but he was kept in bed two days. He was sent to quarters 22d, and returned to duty 24th May.

CASE II.—J. H. F., a soldier of twenty years' service, seasoned, and in good general health, although an occasional hard drinker, came upon the sick report 29th May, 1874, with a typical case of acute dysentery. The attack was recent, but the symptoms were severe, and he was suffering extremely. He was immediately put to bed and was given tinct. opii *m. xx.*, followed in twenty minutes by pulv. ipecac. gr. xxv., in a small quantity of water, and by a sinapism. The bloody stools ceased forthwith, and he began to perspire and to feel relieved. The dose was repeated in six hours, and ten grains more were given at 9 P. M. There was no vomiting. One or two copious evacuations, without pain and bloodless, occurred during the day, and by noon he declared himself much better and free from pain. The next day (30th), with no other treatment, he was quite well, but very weak. The prostration remained several days, but there was no return of the disease itself.

CASE III.—A. H. was admitted to hospital 7th June, 1874, for a severe attack of diarrhœa with a dysenteric tendency. He was first given magnes. sulph. *ʒiv.*, olei ricini *f.ʒij.*, tr. opii *m. v.*; but no particular improvement following, the ipecacuanha was resorted to, as in the previous cases, with prompt relief. He was returned to quarters 10th, although a bronchial catarrh kept him on the report till 16th June.

CASE IV.—W. H., in hospital with a severe diarrhœa. The ordinary remedies not relieving him, and as he complained of a

severe pain in the transverse colon, although no blood was passed nor were there any direct symptoms of dysentery, the experiment was tried of giving, with the tincture of opium and mustard as usual, twenty-five grains of powdered ipecacuanha, at 9 P. M., 19th June, 1874. He slept well that night, felt much better the next day, was returned to quarters 21st, and to duty 23d June.

CASE V.—B. R., admitted with a severe diarrhœa, 19th June, and, complaining almost identically with the preceding case, received two large doses of ipecacuanha, on 20th. One of these induced some vomiting, but the severe pain in the colon ceased, although the diarrhœa lingered a number of days longer. Returned to duty 9th July, 1874. (*See Case XV.*)

CASE VI.—W. B. O. was admitted to hospital, 16th June, 1874, in a jaundiced condition from some functional hepatic derangement. He improved sufficiently to be returned to quarters 24th. At sick call, 27th, however, he was so changed in appearance and condition as to require immediate re-admission to hospital. He asserted that the greater part of the previous day and night he had suffered frequent and painful purgings and vomitings. He was at once (6:30 A.M.) given a bed. On visiting him at eight o'clock he said that he had had seven stools and as many attacks of vomiting within the past hour and a half. These were painful, the discharged matter was dark brown, there were constant abdominal pain and great thirst, his face was haggard and pinched, his skin was cold and bluish, his pulse very feeble, and his general condition one of great prostration.

Having Cases IV. and V. in mind, where severe abdominal pain, although much less in degree, subsided after the use of ipecacuanha, and believing, as I did, that this drug exerted a direct influence upon the intestinal excreting surface, and possibly upon the liver, I regarded this as a fair case in which to employ it, provided it could be retained. He was therefore at once given *tr. opii m. xx.* as preliminary. In a few minutes he threw up at least part of it, but *pulv. ipecac. gr. xxv.* was nevertheless administered, and a sinapism applied. This was retained, and the vomiting and purging at once ceased. By noon he felt remarkably better and was quite bright. One copious operation, without pain, occurred in the middle of the day. *Pulv. ipecac. gr. xx.* was repeated at 2 P.M., but, taking a cup of tea a couple of hours afterward, a part of it was then rejected. At night he said he "felt like a new man," and he certainly looked like a different person. There was no further trouble in this case from this acute attack; convalescence progressed regularly, and he was returned to duty in a few days.

CASE VII.—C. C. was admitted to hospital, with a well-marked case of ordinary acute dysentery, 1st July, 1874. The ipecacuanha treatment was at once adopted, and the bloody

stools ceased with equal promptness. He remained in bed that day and got up on the 2d. On the 2d he had two stools before 4 P.M., each marked with a trace of blood. He was again put to bed and given, in the same manner, ipecacuanhæ gr. xx., which was easily retained, and the next day he was returned to duty.

It will be observed that, at first using this remedy after the familiar East Indian method, I was led to its employment in violent irritation of the colon without bloody discharges (Cases IV. and V.), and that in these it answered well. I was then induced to try it in the case (VI.) which resembled cholera morbus, from its manifestly good effects in violent intestinal irritation, and that here it was equally successful. By reflection upon these cases and upon its apparent mode of action, I formed the opinion that it might prove of service in cases of genuine cholera morbus, and also that it would be worthy a trial in Asiatic cholera. An early opportunity occurred to test it in the former disease.

CASE VIII.—E. B. was reported very sick, in his quarters, 9 A.M., 6th July, 1874. I found him lying on his bunk, complaining of great thirst and of severe cramps in his legs and feet, which men were rubbing. At this time his face was shrunken and bluish, his hands were blue and the ends of his fingers wrinkled, his skin was cold and clammy to the touch and was bathed in cold perspiration, his pulse was extremely feeble. I think that he might fairly be called in a state bordering upon collapse. He had fallen to the ground from the sudden and severe seizure of cramps in the legs a few minutes before. His Captain saw him while he was yet lying on the floor, and in describing him said: "His hands and face were blue, he appeared shrunken, he had severe cramps, and he looked to me like a corpse or a dying man." His general health had been good up to the preceding night; ate for dinner on 4th fresh mutton and blackberry pie; knows of no other exciting cause. About 10 P.M., 4th inst., was attacked with a painless diarrhœa, and between that hour and reveille he had eight or ten dejections, the first two or three of which were quite copious. He does not know their color. He had also four or five attacks of vomiting; does not know its appearance, as it was discharged out of doors in the dark. At sunrise he felt better, and did not think it necessary to report sick. Drank coffee for breakfast, threw it up, and the diarrhœa returned. Was intensely thirsty, but vomited all the water he drank. About 9 A.M., while walking to a water-pail, fell to the ground in a severe cramp. I then saw him, and had him immediately carried to the hospital, and withheld all fluids.

9:15 A.M.—Admitted hospital in the condition already described. Had epidemic cholera been prevalent, this would probably have been considered a case of that disease. The Hospital Steward,

who had seen cholera asiatica, was at once reminded of it by his appearance. Temperature in the mouth $103\ 4\text{-}5^{\circ}$ F.; pulse not counted, but very feeble. 9:30.—Given *tr. opii m. xx., aquæ f. ʒj.* (The prescription was dispensed as written, but an error of the pen doubled the water.) A sinapism was put over the stomach. Eight or ten ounces of watery fluid was almost immediately vomited; nevertheless he took at 9:50 *pulv. ipecac. gr. xxv., aquæ f. ʒij.* At 10:15 skin warmer, no cramps, no vomiting, pulse fuller. At 10:30 vomited six or eight ounces of fluid like the first. At 10:45 a thin, light-colored, sour and acrid-smelling discharge from the bowels; cramp in the left foot. At 11 took *pulv. ipecac. gr. xx., aquæ f. ʒij.* At 12 M. temperature in the mouth, $97\ 3\text{-}5^{\circ}$ F. At 1 P. M. vomited eight ounces brownish liquid; bowels moved soon afterward, much as before. At 1:30 felt quite easy, free from all pain, skin warm, face bright, pulse much better, and general condition good. At 2:45 vomited about two ounces yellowish fluid. At 4 drank some tea; rejected the first part and retained the latter; retained also some bread. 5 P. M. Pulse, skin and general condition natural; feels quite well and hungry; tongue a little furred; temperature 99° . To stay in bed the remainder of the day, but to take no more medicine.

6th July—Feels perfectly well, but is retained at the hospital as a precaution.

7th July—Remained well all day yesterday. Duty.

This, in my judgment, is so remarkable and, so far as I know, is so entirely without precedent as to treatment, that I prefer to let it stand without comment. We cannot legitimately reason upon a single case, when we remember how wonderful are some of the recoveries that follow the unassisted efforts of Nature.

CASE IX.—J. M., in hospital since 14th June with orchitis, which is now nearly relieved, complained, 6th July, 1874, of constant griping pains in the bowels, with four or five stools, small, hard and painful, with straining, in the course of the day. The last occurred at 4 P. M., since when he has had constant griping, intestinal pain. At 9 P. M. gave *pulv. ipecac. gr. xxv.*, shortly preceded by *tr. opii m. xxv.* The abdominal pain ceased in half an hour; he went to sleep about 10 o'clock and slept soundly all night, with no nausea and no movement of the bowels.

7th July—Entirely free from all pain, and feels well.

P. M.—Pains recurred much as yesterday. Gave experimentally twenty-five grains of ipecacuanha, without laudanum or mustard.

8th—The medicine was retained, but the bowels moved several times with some general pain and rectal suffering. The abdominal pain continuing, gave *ol. ricini f. ʒi., tr. opii m. v.* Several passages followed, but the suffering was not relieved. Toward evening both pain and diarrhœa continued with some straining. At nine o'clock gave *tr. opii m. xx.*, followed by *pulv.*

ipecac. gr. xxv. The pain ceased in half an hour; he fell asleep at ten o'clock and slept well all night, having some perspiration toward morning.

9th.—Entirely free from pain; bowels not moved.

P.M.—Bowels were quiet all day till four o'clock, when and at five o'clock, slight motions, with pain, occurred. A dose of Squibb's diarrhoea mixture given at nine o'clock.

10th.—Slept well, and had no further trouble, except from a slight attack of piles. Duty, 15th July.

The foregoing case is given for what it is worth. Some may chiefly attribute the relief to the laudanum; but, taking it in connection with the series, I think that the *ipecacuanha* may claim a share. The dose on the night of the 7th, without an adjuvant, clearly shows that twenty-five grains of *ipecacuanha* is not necessarily an emetic, even when no tolerance has been previously established.

The following case indicates that it may sometimes be used to relieve disagreeable symptoms in the course of a continued fever.

CASE X.—R. B. G. is now well advanced in the first week of an attack of bilious remittent fever.

6th July, 1874.—During the day he has had four or five painful fluid passages from the bowels; tongue is brown and furred; has taken no purgative for a day or two; anticipates, from his present feeling, a restless and sleepless night.

9 P.M.—Gave *tr. opii m. xxv.*, followed by *pulv. ipecac. gr. xxv.* and a sinapism.

7th July, 9 A.M.—Slept well all night, and had one large, soft, blackish operation, without pain, at five o'clock. Feels very comfortable, has no abdominal uneasiness, and tongue is cleaner.

P.M.—Had some abdominal pain, and was therefore ordered twenty-five grains of *ipecacuanha* at nine o'clock. This was imprudently given without laudanum or mustard, and, being restless and drinking a little citric acid water, he threw up the medicine in a few minutes. The vomiting was of short duration, and he afterward slept soundly.

He was very comfortable the next morning, and had one loose, yellowish passage, about noon, without the intervention of any laxative. This patient passed successfully through a severe attack of fever, but the drug was not employed with him again.

CASE XI.—F. H. W. had four dysenteric discharges—small, painful, bloody, with straining—during the night of 6th July, 1874. He attributes his condition to unusual diet on 4th. Admitted hospital 7th. 9 A.M.—Feels badly, but has had no passage since five o'clock. Temperature normal. As a precaution, and also as an experiment, was put in bed and given twenty-five grains of *ipecacuanha*, without opium. 4 P.M.—Very comfort-

able; skin warm and perspiring; some abdominal pain that existed at admission gradually passed away; was a little nauseated about one o'clock, but did not vomit. 9 P.M.—Gave ten grains of ipecacuanha, without an adjuvant.

8th July.—Retained the medicine last night easily; feels well to-day. 9th July, duty.

This man had a severe attack of dysentery in 1863, beginning exactly like this, which led him to report at once for treatment. He is of excellent character, and his assertions may be relied on.

In the following case I have some doubt as to the truth of those statements that rest solely upon the patient's testimony. The man's character is not good, and it is possible that he exaggerated or fabricated the symptoms related. In that event the case merely shows that large quantities of ipecacuanha may be taken without vomiting.

CASE XII.—F. W. claims to have had troublesome diarrhœa for more than a week or ten days, for which he has taken various ineffectual medicines of his own prescribing. Yesterday the pain was more severe, and in the night he had several small passages, marked with blood.

9th July, 1874. Has gone several times to the closet, with ineffectual straining (tenesmus). Has now constant tormenting pains; no fever; tongue a little coated. 9 A.M.—Given *tr. opii m. xv.*, *pulv. ipecac. gr. xxv.*; cautioned to drink no fluid, and to remain strictly at rest. An hour and a half later was found sitting up in bed playing cards. Was required to lie down, when he fell asleep. 12 M.—Vomited a little bitter fluid, and slept afterward. 3:30 P.M.—Went to the closet and passed urine, but nothing from the bowels; did not strain; had no pain; tongue somewhat coated. 6 P.M.—Given *tr. opii m. xv.* and *pulv. ipecac. gr. xxv.* At seven o'clock a sinapism was applied for nausea, and at eight o'clock he felt entirely easy in every respect.

10th July.—Vomited about eight ounces bitter (?) fluid, of whitish (?) color, about half past eight last night. In the night had a copious fluid passage, after which he felt entirely relieved. Feels quite well this morning; allowed to get up. No further medicine was used in his case, and he was returned to duty 13th July.

In this connection it may be noted that, treating an officer for a complaint in which constipation was an incidental symptom, he was given, experimentally, 9:30 P.M., 10th July, 1874, *tr. opii m. xx.*, followed by *pulv. ipecac. gr. xxv.* This was retained four hours, during which time he slept, and it was then thrown up with about four ounces of reddish fluid, presumably food. There was no other symptom dependent upon the drug.

The following case is too long and uninteresting to reproduce in detail. This is, however, a faithful abstract of its essential features:

CASE XIII.—J. H. has—10th July, 1874—suffered some time with an obstinate and irregular diarrhœa, not dysenteric, apparently due to hepatic torpor with malarial depression. Nitro-muriatic acid, taraxacum, quinia, and other ordinary remedies were ineffectual. The bowels sometimes moved painfully six times in twenty-four hours. Ipecacuanha, in 20-30 grain doses, was given eight times, sometimes with laudanum and mustard and sometimes without, 10th-14th, inclusive. Five of these doses were followed by vomiting, varying in quantity from three ounces to nearly a pint. Returned to duty 18th, but relapsed and taken again under treatment 22d July. Six doses, from twenty to thirty grains each, were given between 22d and 29th inclusive. Emesis occurred only once, to the amount of twelve ounces, during this interval. Ipecac., gr. vj., was given every six hours, without producing nausea, 30th July—2d August inclusive. Eighty grains, in three doses, was given without emesis between 2d and 5th. Substantially no treatment occurred between 5th and 14th August. At this time the tongue was large and flabby, and there were two or three loose, painless passages daily. Took twenty grains ipecacuanha with laudanum and mustard, 15th, without vomiting and the same 16th, when emesis followed. No treatment from 17th to 25th inclusive. On 26th ordered quin. sulph., pulv ipecac., aa. gr. vj., ext. bellad. gr. $\frac{1}{4}$, four times a day. The man rapidly improved, and by 11th September he was sufficiently well to join his company, under marching orders, for duty.

The preceding was probably the case least suited for ipecacuanha in the series.

CASE XIV.—Captain F. is of delicate constitution and is so readily nauseated that he can excite vomiting by a mental effort. He is subject, especially in warm weather, to attacks like the following, which generally last for more than one day. On the morning of 25th July, 1874, which was very hot, attendance at a court martial, in full uniform, for several hours, fatigued him very much. Between twelve and one o'clock he went into the town of Atlanta, and was suddenly seized with nausea and cramp-like pains in the bowels, compelling his immediate return to the post. He felt better after resting, but on sitting down to dinner, and before eating, the pains returned with increased violence, obliging him to lie down. A flannel saturated with laudanum and spirits of camphor was applied, and the suffering subsided in half an hour, when he fell asleep, awaking in two hours in a profuse perspiration. (The room in which he was lying was quite close.) When cooler he sat up, but instantly the pain returned with great violence, accompanied by nausea. At this time I first saw him.

He was at once given twenty grains of powdered ipecacuanha in a very little water, with no adjuvant treatment except enjoining absolute abstinence from motion, conversation, food or drink. He was not told the name of the medicine. In seventy minutes he vomited rather less than half a pint of yellowish fluid, with what appeared to be a part of the powder floating upon it. The nausea was of no duration, and the vomiting was at one effort and not severe. He began to feel easier soon after swallowing the powder, and supposed that he had taken an opiate. After vomiting he felt entirely relieved, and two hours later drank some tea. He slept quietly through the night, and went to duty in the morning. A large semi-fluid operation from the bowels (color not noted) occurred at 9 A.M. Captain F. volunteered the remark that no previous attack had yielded so readily.

In the foregoing case there was no known error of diet, but the exciting cause appears to have been fatigue and solar heat, acting upon a delicate subject.

CASE XV.—B. R. (*See case V.*) This man had been returned to duty, from sick with diarrhœa, 9th July, 1874. On careful inquiry it proved that he had had some trouble with his bowels during the entire interval, but not enough to prevent him from attending to duty. He however came again on sick report 27th July, saying that he had been taken sick at 4 A.M. the day before, when he first noticed blood in his stools. Had abdominal pain, with numerous small, painful discharges, with straining (tormina and tenesmus,) throughout the day. Estimates that he had at least twenty stools between reveille and taps. Slept hardly at all last night, by reason of the disease. Thinks that he went to the sink ten times in the night. Went three times between reveille and sick call (5:45 A.M.). Admitted hospital 6:30 A.M. Between that hour and eight o'clock had two stools. All of these, say thirty-five in twenty-eight hours, were small and accompanied by pain and straining. He described them as bloody also. Those passed in hospital were small, of a jelly-like or glairy fluid, uniformly reddish throughout, but not streaked with blood. There was pain in the abdomen, the tongue was covered with a thin white fur, the skin was harsh and dry, the pulse somewhat rapid and wiry and the general appearance one of fever, although the thermometer under the tongue only indicated 97 3-5° F.

8:30 A.M.—Given tr. opii *m.* xv., followed in twenty minutes by pulv. ipecac. gr. xxx. and a sinapism. 2 P.M.—Rested perfectly quietly and easily all the morning, entirely free from pain and from nausea. The bowels moved somewhat copiously but without pain at 1:30 P.M. This discharge was perfectly liquid, and free from the glairy character of the previous ones; it was yellow in color and with it were particles resembling curdled milk that floated on the top. His skin was moist and gently perspiring, and his pulse soft. 3:15 P.M.—Bowels again moved. 3:20.—Ipecac. gr. xxx. without tr. opii and with a sinapism. 4:20.—Vomited about two

ounces. 5:45—Bowels moved, and ten minutes later four ounces was thrown from the stomach. 6:30.—Vomited about four ounces, and a stool followed. 8.—Temperature 99°; stools examined and found like the one previously described; has no pain and no special uneasiness; tongue moist and cleaning off; has neither eaten nor drank in the hospital, and is now thirsty but not hungry. 9 P.M.—Tr. opii *m. xx.*, followed by ipecac. gr. xx.

28th July.—Vomited in the night at 11 and 2 o'clock, quantity and character undetermined; had two painless passages in the night; bowels moved at 8.30 A.M.—stool tolerably copious, fluid, yellowish, with some of the curdled milk appearance. Temperature 98 3-5°; has no pain of any description, and is comfortable; pulse natural; skin moist and pleasant. 1:20 P.M. Bowels moved, much as before. Bowels moved at 4:30, 5:30, 6:30, P.M.; discharges thin, but more natural in color; there was a little straining, but no pain. 9 P.M.—Tinc. opii *m. xv.*, followed by pulv. ipecac. gr. xxv.

29th July.—Bowels moved at 11 P.M. and 4 A.M. without pain; discharges liquid, but natural; no emesis; tongue normal; feels well. Ordered a dose of Squibb's diarrhoea mixture at 8:30, and of Hope's mixture at eleven o'clock.

Evening.—Had four small, brownish, fluid passages, approaching the natural color, with very slight pain, during the day. 8 P.M.—Hope's mixture, f.ʒj. 9 P.M.—Ipecac. gr. xxv.

30th July.—Three thin, dark discharges before daylight; vomited at 3 A.M.; bowels moved at eight o'clock; tongue clean and natural. R. Acid. sulph. arom., tr. opii *c.*, aa. *m. xv.* aquæ, f.ʒij. every two hours. P.M.—Bowels moved twice, without pain, since dinner.

In this case the bowels gradually acquired their natural tone, chiefly under the use of mineral tonics; the man's general feeling was healthy and comfortable at all times. He was returned to quarters 4th, and to duty 11th, August.

The particulars of the following case are from the notes of Acting Assistant Surgeon, S. S. Beach, who had charge of it, and who kindly supplied me with them.

CASE XVI.—R. T., not quite three years old, the daughter of an officer, is reported, 4th August, 1874, to have had very loose bowels for the past ten days, the motions consisting of undigested food and watery secretions. Found her in the evening with great thirst; strong craving for fruits and vegetables, which had been largely indulged; fever, reported to have occurred every day for the past three; pulse 110; lips scarlet; tongue red at the edges and tip, covered with a closely-lying, light-brown coat, from the centre back; has six to nine stools every twenty-four hours—generally two in the night—preceded by some pain, and followed a disposition to strain; character like the first, but with more mucus, no blood. Dr. Beach observes: "Ordinarily I

should have given a dose of calomel and Dover's powder, followed by castor oil, laudanum and turpentine; but, learning of the successful use of ipecacuanha in similar cases," he ordered pulv. ipecac., gr. vij., in a paste with water, preceded fifteen minutes by tinc. opii camp. *m. x.* on going to bed. Withheld all drink, except cold tea in small quantities.

5th August.—For half an hour last night the child complained of thirst, then slept till 2 A.M., perspiring freely. Had two stools, half an hour apart, similar to the former ones, except that there was less watery mucus and pain. At seven o'clock had a painless discharge, resembling the ipecacuanha paste. 10 A.M.—Pulse 90; skin cool and moist; lips less red; edges of tongue more pale, coat white and raised; less thirst; general appearance bright and playful. Allowed only cold tea, dry toast and boiled rice. No medicine. 7 P.M.—Had no fever to-day; lips paler; tongue cleaner and paler; drank nothing but tea to-day; continues bright and playful; had two slight evacuations from the bowels, both natural and without pain or straining, since 7 A.M.

This child regained its usual health by simple attention to its diet.

As it resulted, probably some other would have been better practice in the following case; but it is recorded as an illustration of the subject.

CASE XVII.—Mrs., aged about twenty, the wife of an officer.

Evening, 6th August, 1874.—This lady, who has not heretofore been under my care, tells me that she has suffered a good deal during the summer and has been treated for an affection of the liver. Yesterday and to-day has had much pain in the hepatic region, where there is tenderness on pressure; has had pain under the shoulder blades; and to-day there have been severe recurring pains across the abdomen, about the level of the umbilicus. The bowels are regular, and the appetite, until to-day, has been fair. The tongue is not coated, but is marked by the teeth. Has been feverish to-day, and has drunk much water. Directed, on going to bed, to take morph. sulph., gr. 1-6, followed in ten minutes by a sinapism, and, as soon as that begins to be felt, by pulv. ipecac., gr. xx, in a teaspoonful of water.

7th August.—The patient took the medicine as directed, and soon fell asleep. After exactly one hour's sleep, she awoke violently sick, and vomited, with great effort, one quart of thin, yellow, sour (not bitter) liquid. There was much straining, and some blood was thrown up at the close of the effort. It appears that in her case emesis is always violent and painful. There was, however, neither any preliminary nausea nor any after the vomiting ceased. In three-quarters of an hour she was again asleep, and she slept until morning. Awoke feeling very weak and faint, but is much better after breakfast. At 7:30 A.M. had a copious,

painless, greyish operation from the bowels. Tongue a little less flabby; no fever; soreness remaining over the liver, but no acute pain as yesterday; the abdominal pain continues in the form of occasional griping, but is less severe than yesterday. R.—Potas. bromid. ʒj., aquæ f.ʒj: a teaspoonful occasionally.

P.M.—There is some hepatic soreness, but the abdominal pain has ceased. She has been actively engaged in the house and in the town all day, and considers herself well.

This patient went North on a pleasure trip on the night of 10th, up to which time there was no return of the disorder.

CASE XVIII.—Lieutenant B., æt. 23, very robust and of good general health. For several weeks this officer has experienced occasional abdominal pains in the region of the transverse colon, which have gradually increased in frequency and severity. For the last ten days has felt them daily, and twice in that interval has taken mercurial cathartics under the impression of 'biliousness.' Latterly his bowels have been quite loose and his appetite has been poor.

22d August, 1874.—Became thoroughly chilled while freely perspiring, and had much pain in the abdomen and three passages from the bowels.

23d.—Felt pretty well this morning, but about noon had a severe pain near the umbilicus followed by a painful passage. Had four motions from the bowels in the course of the afternoon, and, besides, went several times to stool ineffectually. All of these attempts (successful and otherwise) were accompanied by tenesmus and by considerable abdominal pain. The dejections were moderate in size, and were of a slimy mucus, uniformly colored with blood, with some bloody-looking serous fluid in addition. His head aches, eyes are a little injected, tongue lightly coated with a thin whitish fur, pulse 84, and temperature 100 2-5° F. Ate a light tea at 7 P.M. 9:20 P.M.—Gave tr. opii m. xx., and applied sinapism to epigastrium. 9:35.—Gave powdered ipecac. gr. xx. in water f.ʒij. This was retained without nausea for (as he estimates) a little more than an hour, when, having a tickling sensation in the fauces from a slightly elongated uvula and from some catarrhal secretion from the posterior nares—(he had lain perfectly flat upon his back during this interval, and the titillation was thus more easily excited)—the effort of coughing, or the faucial irritation, induced vomiting, and he threw up six or eight ounces of fluid resembling the tea taken in the evening. No nausea followed, and in fifteen minutes the dose was repeated with the laudanum but without the mustard. He immediately fell asleep and slept (as he estimates) about two hours, during which time he perspired profusely. He then awoke with a sensation in the throat like that felt before (he had again been lying on his back), and he also had some nausea. A small amount of fluid was then thrown up with, as it appeared, the medicine. He again slept and perspired, and about 4 A.M. had

another slight attack of vomiting. The whole quantity thrown up did not exceed twelve ounces.

24th.—He had no abdominal or other pain in the night, and he had no inclination to go to stool; his headache disappeared; skin moist; felt well but languid; temperature 98°; pulse 70; bowels flatulent but without desire to go to stool throughout the morning; ate an ordinary and moderate breakfast and dinner; about three o'clock had an almost natural operation, closely followed by another. 5 P.M.—Had a thin passage, preceded and followed by some griping, and accompanied by a little straining. Had no other disagreeable feeling. Took a light tea at seven o'clock. At bed-time took pulv. ipecac. gr. xx., pulv. opii gr. j., in pil. iv. No mustard was used.

25th.—The pills caused no nausea nor vomiting. The skin was moist all night, as it has been since the first dose, but there was no excessive perspiration. Ate his usual breakfast. Between 9 A.M. and noon had three loose, yellow passages, with a slight tendency to strain, the last one near its termination being of a light reddish tinge. At 12:30 P.M. took a teaspoonful of Hope's mixture. There were several loose passages in the afternoon, with some uncomfortable feeling but no blood. At bed-time took pulv. ipecac. gr. x., opii gr. j., in pills, without mustard.

26th.—Slept well all last night; had no nausea whatever. Had one soft, dark passage this morning, without straining or any disagreeable feeling. Has felt well all day. 27th.—Duty.

This officer, in a conversation upon his sensations and upon the effects of the medicine, asserted that he experienced no nausea that appeared caused by the drug, and that he was confident the vomiting on the night of 23d was primarily due to the irritation of the fauces.

The following case certainly shows that twenty grains of ipecacuanha may be readily retained in some instances, and probably illustrates its remedial effects in occasional forms of abdominal pain.

CASE XIX.—M. F., of good general health and habits, admitted hospital 27th August, 1874. It appears that late on the night of the 25th he indulged in wine, confectionery and other unaccustomed food, and on the 26th had, between 4 and 5:30 A.M., three sharply painful, thin operations from the bowels, coming on with much suddenness and severity. 6 A.M., 26th—Given magnes. sulph. ʒ iv., magnes., sod. bicarb., aa. ʒ j, pulv. rhei., pulv. zing., aa. gr. v., aq. menth.p., q. s. His bowels moved freely between 8 and 10 A.M., and again several times about 4 P.M., and he also made several ineffectual efforts.

27th.—Bowels moved once in the night, and again, with pain, griping and quickness of action at 5 A.M. Taken into hospital. 11 A.M.—Bowels have not moved since five o'clock, but he has a

feeling of great fulness, heaviness and painful oppression in the lower abdomen. Tongue a little coated. Put to bed, and given pulv. ipecac. gr. xx., opii gr. j., in pills. No mustard was used. A little nausea but no vomiting followed, the abdominal uneasiness quickly disappeared, and he felt quite well in an hour or two. Arose at five o'clock and took supper.

28th.—Remained free from all pain and inconvenience, and was returned to duty.

The three cases immediately succeeding illustrate the ease with which the ipecacuanha frequently is retained, and the slight nausea that happens even when there is emesis; and I think that the change in the character of the stools and in the accompanying sensations may fairly be attributed to it.

CASE XX.—C. S. This man had been ill several weeks with a very mild and open attack of enteric fever. For some days he had had marked looseness of the bowels, generally having two alvine discharges in the night, and three or four in the day. These gave no special pain.

29th August, 1874.—He reports that for the last thirty-six hours he has had very severe and increasing pain with each passage, that the stools had become more consistent, and that he has had sharp suffering extending across the abdomen near the umbilicus, while the actual motion has been accompanied by excruciating pain (the description reminding one of ulcer of the rectum,) and has been followed by tenesmic straining. He has also had several ineffectual promptings to empty the bowels, with straining. 6 P.M.—Gave ipecac. gr. xx., opii gr. j., in pills.

30th.—Felt a little nausea soon after taking the medicine, and again about 8:30 P.M., upon getting up to urinate, but neither sensation was severe, and no sinapism was required. Slept perfectly well from taps to reveille, which he had not before done during his illness. Had a copious, foamy, light yellow dejection, without pain and with but very little discomfort, at 11 A.M. Had no other stool during the day. 9 P.M.—Gave ipecac. gr. x., opii gr. j., in pills.

31st.—Again slept well all night and had no operation through the night or to-day. No abdominal pain.

1st September.—Had one copious, painless passage, similar to the one of 30th, in the night, and another at 7 A.M. Slept well and feels materially better in all respects.

None of the symptoms for which the ipecacuanha was given in this case returned.

CASE XXI.—B. T. A., in the last and convalescent stage of a mild but well-marked attack of typhoid fever. Complains that for several days his stools have been costive, and that he has had great distress and pain when the solid, scanty dejections were voided with straining.

31st August, 1874.—Gave experimentally, at 3 P.M., ipecac. gr. xx., opii gr. j., in pills. 7 P.M.—Has not been nauseated, except when lying on the left side; feels very comfortable.

1st September.—At nine o'clock last night had a severe, cramp-like pain in the stomach, which was relieved by a sinapism, but there was no nausea. Bowels not moved, either in the night or day. 9 P.M.—Gave tr. opii *m. xv.*, and fifteen minutes later ipecac. gr. xx., in pills.

2d.—Felt no nausea last night, and went to sleep promptly. Was awakened at 10:30 P.M. by vomiting, without preceding nausea. "Threw up less than a pint of sour or bitter fluid. It wasn't much. Don't know what made me vomit. Didn't feel sick, but I waked up vomiting. Didn't feel sick afterwards. Went to sleep pretty soon." He slept the remainder of the night. As his bowels had not yet moved, gave him *ol. ricini f. ʒj.* at 10 A.M. (It is possible that the vomiting was due to the mode of administration. The tincture may have expended its local influence before the pills dissolved.) His bowels moved three times in the course of the day after the oil was given, the first passage being of natural consistence, and the other two thin. None gave pain. There was no further intestinal pain in this case.

CASE XXII.—P. N., has been feverish and has had severe abdominal pain, with flatulence, but with neither diarrhoea nor constipation, for several days.

1st September, 1874.—Nearly all this morning had severe pains, starting from the region of the bladder and passing toward the umbilicus. About noon they lessened a little, and at 2 P.M. he took ipecac. gr. xx., opii gr. j., in pills. He had no nausea, but the pain in the bowels required a sinapism near the umbilicus. Temperature at half past five, 100° F. About this time the pains lessened materially, and he fell asleep and perspired gently; took opium and quinine in combination at tattoo, and slept fairly all night.

2d.—The pain returned about 7 A.M. Drank a little tea, and then vomited moderately. Had pain all the morning, again diminishing toward noon. At 12:30 P.M. took ipecac. gr. xx., opii gr. j., in pills. Had no nausea in any degree. 6 P.M.—Temperature 102° F.; bowels moved naturally morning and evening. 9 P.M.—Took ipecac., gr. xxv., opii gr. j., in pills, and, during the night, pills of quinine and opium.

3d.—Had no nausea whatever and no pain in the bowels last night. Had one painless, natural operation in the morning.

It would appear that the ipecacuanha here exerted some positive aperient effect, for between noon of one day and sunrise of the next this man took in combination three grains of opium, which manifested itself in a feeling of fulness in the head, and by other disagreeable sensations, and yet he had a natural defecation in the evening and morning. His abdominal troubles ceased

and his other symptoms were treated by other means. See Case XXIV.

CASE XXIII.—D. K., aged seven years, an officer's son. When in health a robust and vigorous boy, was, after a week's sharp attack of remittent fever, left with a diarrhoea that assumed a dysenteric tendency. There were from six to eight stools daily, and after each there was a small mucoid discharge, generally mingled with blood and always passed with straining. There were also occasional tenesmic feelings and ineffectual efforts at stool. I am told that on two previous occasions he has been seriously ill with a complaint that commenced in exactly this manner, and obstinately lasted for months, and which, after resisting changes of climate and a great variety of treatment, finally yielded to injections of the acetate of lead.

2d September, 1874—He has been sick in this manner, without treatment, four days. The first passage in the morning is natural, but each successive one through the day becomes worse. He has had six stools to-day, all with straining, with consecutive mucous passages and with some blood, and has also made two ineffectual efforts. In other respects his health, except as he is yet weak from the fever, is fair. 9 P.M.—Took tr. opii c. m. xx., aq. f.3j., followed in fifteen minutes by pulv. ipecac. gr. x., aq. f.3j., with a few drops of paregoric to disguise the taste. Upon taking this he at first said "It makes me feel sick," but he almost immediately went to sleep without vomiting or further nausea. He slept undisturbed all night.

3d.—His bowels were moved earlier than usual this morning, and, in all, he had four stools during the day. None of these were painful, there was no straining and no blood was passed, and there were no ineffectual efforts. One passage was accompanied by some mucous slime. 9 P.M.—The medicine was repeated exactly as last night.

4th.—He fell asleep immediately after taking the medicine last night, and slept quietly for an hour and a half, when he awoke vomiting profusely. This was so sudden that there was no time even to procure a vessel, and the discharge was copious, including his tea and perhaps the remains of his dinner. There was no pain, the vomiting was accomplished in one act, there was no subsequent nausea and he slept well the rest of the night. The bowels remained a little loose for a day or two, but not painfully nor unnaturally so; and attention to diet was the only further care.

His parents expressed themselves gratified and greatly surprised at the prompt and favorable termination of this attack, for their previous experience had led them to dread a long-continued and serious illness.

In the following case the good results may be ascribed by some entirely to the emesis. Unquestionably this was of advan-

tage, but it is probable that the intestinal canal was in such a morbid state that the mere removal of the irritating contents of the stomach would not have stopped the discharges. Under any circumstances the case at least shows that a large dose of ipecacuanha may be retained soon after the rejection of another.

CASE XXIV.—P. N., (*see Case XXII.*) has been indisposed for some days, although without any special abdominal trouble since 3d inst.

6th September, 1874.—Diarrhœa began about 7 A.M., and about twelve stools were passed before dusk. These were thin, greenish with white specks, and were accompanied by blood in quantities averaging half an ounce. The motions were sometimes painful and sometimes painless. There was, however, constant pain in the lower bowels; he had headache; the tongue was slightly coated; and the temperature at 5:30 P.M. was 99 1-5° F. He had taken through the day small doses of acetate of lead and opium ineffectually. Had eaten nothing except a little milk and some tea. 6:15 P.M.—Took, immediately after a motion, tr. opii *m.* xxv., and in fifteen minutes pulv. ipecac. ʒss. in water f ʒij., and used a sinapism. 8 P.M.—Vomited suddenly and without antecedent nausea. The ejected matter was less than a pint, but embraced the half-digested milk and beef that he had eaten the previous day. It was sour and acrid to the taste. 9:30 P.M.—Took ipecac. gr. xx., opii gr. j., in pills. No sinapism.

7th.—The last medicine was retained quietly, and the patient slept well. There was no abdominal pain last night or this morning. There were only two operations in the course of the day, both a little thin but free from pain and with no abnormal appearance.

This man remained practically well during the remainder of September.

The foregoing are all the cases in which large doses of ipecacuanha have been employed at this post during the past summer, except when administered for the distinct and primary purpose of procuring emesis. They are reproduced in detail, (except the long case XIII., which is faithfully epitomized,) in the hope that they will lead to a wider trial of this method, and, especially, that investigation into the confessedly obscure action of this drug may be excited.

As was premised, the successful treatment of dysentery in this manner is common in India; and it may be that it is pursued by a number of physicians in this country. In fact, after this series had well advanced my attention was called to nine cures of that disease by this method, in the summer of 1873, by Dr. Thomas M. Woodson, of Gallatin, Tennessee, (*Amer. Practitioner*, ix., Jan.,

1874, p. 31); and after it was completed to another series by Dr. John Stephen, of Pennsylvania (*vide infra*). But that it is not general here is unquestionable.† This is not surprising when we observe the persistent manner in which it has been ignored by systematic teachers of medicine. Maclean is the only writer of this class who has at all developed it. By him its value is clearly and satisfactorily set forth. (Art. Dysentery, Reynolds' *System*; foot-note, Dysentery, Aitken's *Practice*.)

Before its revival in 1858 by Mr. Docker,‡ (7th Fusiliers,) of the British Army, writers of text-books quite naturally would not delve into medical antiquities to treat of obsolete practices or of presumed delusions. But although its efficacy has been so well proven in India, the most of the later writers appear to have thought it inapplicable to other climates. Aitken in his latest edition (*Sci. and Prac.*, 3d Am. fr. 6th Eng. ed., 1872, i., p. 658,) yields to the weight of testimony, and gives in his adhesion to this treatment. But in his earlier editions he merely introduces in a foot-note a letter from Professor Maclean, giving it in the text a half-hearted sentence concluding "but the disease though mitigated is seldom cured by these means." Niemeyer (Am. fr. 8th Germ. ed., 1871, ii., p. 673,) in an elaborate article upon epidemic dysentery, only refers to ipecacuanha as a preliminary emetic when the stomach is overloaded; and treating of catarrhal (or sporadic) dysentery (i., p. 547,) does not mention it.‖ Trousseau (*Clinical Medicine*, Eng. fr. 3d Fr. ed., 1873, ii., p. 486,) at the beginning of the attack prescribes ipecacuanha in emetic doses, and advises about twelve grains every ten minutes until vomiting is induced, following it that evening or the next day by salines. He seeks emesis for its evacuant effect. Watson (Am. fr. 5th Eng. ed., 1872, ii., p. 581,) briefly outlines the non-emetic method of using large doses, prefacing it with the remark that it "counts many experienced advocates." Dr. Hartshorne, the American editor, adds, "more confidence is felt by American practitioners generally in the use of ipecacuanha in small non-emetic doses [implying that

† After this page was in type a note from Dr. C. E. Munn, U. S. Army, informs me that Dr. Bancroft, of the Pennsylvania Volunteers, now of Denver, Colorado, and Dr. DeWolf, 1st Mass. Cav., now of Northampton, Mass., employed this method successfully in treating dysentery as it occurred in their commands in South Carolina [probably in 1863.]

‡ Pouchoune, (p. 10) says by M. Segond, of Cayenne. (*See later.*)

‖ Heubner, in Ziemssen's *Cyclopaedia*, is also silent.

larger quantities are nauseating or emetic]; one-half to three-quarters of a grain, with a smaller amount of opium, every two, three or four hours, according to the case. Acetate of lead is also much employed," etc. Neither the author nor his editor encourages its use. Dr. George B. Wood, after describing the treatment he thinks best, writes: (5th ed., ii., p. 633,) "Ipecacuanha has been thought to exercise a peculiarly favorable influence, and some practitioners have confided the cure chiefly to that remedy." He then briefly refers to "asserted" cures by large non-emetic doses. In his summary of the approved treatment of dysentery (p. 637,) he does not mention it. Flint, (*Practice*, 4th ed., 1873, p. 372,) who probably represents the most advanced general practice in this country, in sporadic dysentery "places reliance on purgatives and opium." Among the recognized but secondary methods, he says: "Ipecacuanha has been considered a valuable remedy in dysentery. Some have attributed to it a specific curative influence, and have advocated its employment in 'as large doses as can be borne,' and then quotes Maclean. In his earlier editions he does not comment upon it, but in the latest, he reports: "I have resorted to this plan of treatment in a considerable number of cases in Bellevue Hospital, but without a very satisfactory degree of success. In a small proportion of cases the disease was either arrested or favorably modified by it; but in the majority of cases it had no apparent influence on the disease." In epidemic dysentery he makes no reference whatever to it. Neither Meigs and Pepper (4th ed., 1870,) nor West (4th Am. fr. 5th Eng. ed., 1866,) refer to ipecacuanha in the dysentery of children, except in minute diaphoretic doses. Enough has been quoted to show that the plan here illustrated is probably followed by few practitioners.†

Besides this, a careful study of the leading authorities in therapeutics who refer to its employment reveals that those who have not had personal experience with it look upon the drug as necessarily emetic, and at the treatment as essentially of that

† Since its revival, ipecacuanha has been used in France in intestinal affections chiefly in the form of the Brazilian draught (*potion bresilienne*): viz. 10 grammes of the braised root boiled in 200 grammes of water until it is reduced to 100 grammes, and then sweetened. (*Étude expérimentale sur l'action thérapeutique et physiologique de l'Ipecacuanha et de son Alcaloïde*, par G. A. Polichronie, Docteur, etc., Paris, 1874, pp. 100; pp. 28-9.) This would not be non-emetic in its action.

character. That this remarkable misapprehension is very common, the following quotations demonstrate:

Headland (*Action of Medicines*, 2d Am. ed., p. 283,) says "Ipecacuanha is in the first place a neurotic, in the second an eliminative." He then illustrates its neurotic character by its action as an emetic, and thinks it acts on the vagus and cannot act on the sympathetic for two reasons. 1. Because "other parts of this nerve would be influenced at the same time. But this does not appear to be the case." 2. "Such action could not be suddenly and violently evidenced, for the natural action of this nerve is slow, chronic and persistent." And he adds, "at all events the effects for which they are used could not be produced by an affection of this nerve." He considers it (p. 318,) to have a specific action on the bronchial mucous membrane, and to thus act as an eliminative. He speaks of it (p. 335,) as indirectly a diaphoretic when given in emetic doses, but makes no allusion to its possessing any influence upon the intestines. Pereira (3d Am. ed., 1854, ii., p. 624,) clearly limits its power in large doses to that of an emetic, and, referring to its former use in dysentery, says: "In severe forms of the disease no one, I suspect, would now think of relying on it as his principal remedy, but as an auxiliary its efficacy is not to be denied. Sir George Baker and Dr. Cullen consider it to be of most benefit when it acts as a purgative, but this can hardly be its *modus methendi*." He regards (p. 628,) its efficacy to be due in part to its diaphoretic properties; "But its tendency to produce an anti-peristaltic movement of the intestines doubtless contributes to its anti-dysenteric properties." He then observes without comment, as if it were simply an isolated and peculiar fact that should be recorded, "Mr. Twining gave large doses (gr. vj.) with extract gentian without vomiting." Dr. G. B. Wood, (*Therapeutics*, 1856, ii., p. 435,) after describing it as an emetic, speaks of dysentery as a "complaint in which ipecacuanha has long enjoyed peculiar credit," and says "it has been given in it in two different methods: in one, in large doses with a view to its full emetic effect; in the other, in smaller doses, repeated so as to sustain a nauseating impression, or operate on the bowels." This is the first clear intimation we have of its intestinal influence. He then adds that Mr. Playfair's method "is to give, at the beginning of the attack, from thirty to sixty grains of the powder with as many drops of laudanum. If it vomit, the dose is to be repeated." Elsewhere (*Dispensatory*,

13th ed., p. 497,) he says, "Ipecacuanha is in large doses emetic, in smaller diaphoretic and expectorant. * * In quantities not quite sufficient to vomit, it produces nausea and frequently acts on the bowels." To this last property he does not appear to attach any special value. It is not unusual for therapeutists to speak of the relaxation of the bowels that often accompanies nausea as an effect of it. Is it not as rational to attribute the nausea and the catharsis to different manifestations of the same cause? Because they occur simultaneously, or nearly so, it is not necessary to suppose that the one creates the other. Later Dr. Wood remarks, "In dysentery it has been supposed to exert peculiar powers," but he does not intimate what those powers are nor how they are to be brought into action. And in treating of its uses, he gives no intimation that it may be employed in bowel affections, except as an emetic, otherwise than in doses of a quarter or a half-grain. Stille (*Therapeutics*, 3d. ed., 1868, ii., p. 390,) remarks that "in all doses it is apt to relax the bowels if they are in a healthy state," and "the laxative action of ipecacuanha, when given in small and repeated doses, cannot well be questioned." He cites Piso, Murray and Richter as vouchers for its value in large doses in dysentery, but adds, "Pringle, however, thought that it succeeded best when it operated by stool as well as vomited. He indeed laid it aside on account of the distress produced by its action"—implying thereby that its primary, most powerful and normal action in dysentery is emetic. Dr. Stille thinks that when the testimony is narrowly examined it is evidently only of "advantage over other vegetable emetics or mild cathartics when the disease is epidemic or assumes bilious characters with bitterness of the tongue and a foul mouth." Further on in his article, however, he gives a full account of the Indian method; but, very strangely, under the head of Administration he only mentions its employment as an emetic, nauseant, expectorant and diaphoretic. Waring in his admirable treatise (*Practical Therapeutics*, 2d Am. fr. 3d. Lond. ed., 1871, p. 356,) gives a succinct and lucid account of its use in dysentery, crediting the paper chiefly to Professor Maclean, but offers no opinion as to its mode of action. He is careful to show that emesis is by no means a necessary consequence of taking twenty, thirty or more grains into the stomach; and he and Maclean are the only original writers that I have seen who do so state. They both appear to have had personal ex-

perience in its use. Dr. H. C. Wood, (*Therapeutics, etc.*, 1874,) the latest systematic writer to whom I have had access, says, (p. 364,) "in large amounts it causes vomiting, accompanied * * by a decided increase of the secretions * * * of the salivary glands and of the mucous membrane of the bronchial tubes and of the stomach." "Whether given in large or small doses it is very apt to act upon the bowels, to increase and to modify their secretions." "In 'bilious dysentery' it will often produce large tarry discharges; * * the mechanical effect of the vomiting induced by it in these cases, however, must not be lost sight of; yet it does not seem to me at all sufficient to account for the result, especially as some observers state that the effects noted are produced even when little or no vomiting occurs." Treating of its use in this disease, he writes, (p. 368): "I think, however, its beneficial action is best seen in 'bilious dysentery' and in malignant dysentery, as is indicated by the fact that its use is most common in tropical climates." That the disease is more common in those climates and its treatment may be better understood there, is a plausible explanation of this fact. He continues: "In dysentery it is best to begin with a full emetic dose, or with ten grains, repeated every half hour until emesis is produced. Two or three hours after vomiting, fifteen drops of laudanum should be exhibited followed in twenty minutes by five grains of ipecacuanha in *pill-form*; this should be repeated every two or three hours, the amount of the opium being lessened and that of the ipecacuanha increased, according to circumstances. The object is to have as much of the ipecacuanha retained as possible. Another plan is to give larger doses (twenty grains) repeated every two, four or six hours, mustard being applied to the epigastrium; and it is said that after two or three doses tolerance is established and the drug retained." It will be observed that the idea of primary emesis underlies this, the latest American teaching, as well as most of the others.

These quotations have been made at some length to show the drift of the authorities upon the treatment of dysentery and upon the action of ipecacuanha in that disease, and as the Apology for this paper.

But analysis of the cases herein reported demonstrates two facts with reasonable clearness. The first is the promptness with which the ordinary sporadic dysentery yields to large doses of ipecacuanha. The second is that ipecacuanha in twenty and

thirty-grain doses is not necessarily followed by emesis.

Cases I., II., III., VII., XI., XV., XVIII., seven in all, were of well-marked dysentery, which yielded without delay to the influence of the drug. In neither of these cases was there a single bloody stool after the first dose was swallowed, and relief from the abdominal pain began promptly and was complete in from three to twelve hours.

Cases XII., XVI., XXIII., XXIV., four more, were of diarrhœa with a marked dysenteric tendency, which yielded with almost equal readiness, and in general terms might be classed with the preceding, making a dysenteric total of eleven.

In cases IV., V., IX., X., XIII., XIV., XVII., XIX., XX., XXI., XXII., eleven more, enteric pain, sometimes with and sometimes without diarrhœa, was relieved and natural stools were procured with varying degrees of promptness and of comfort.

Cases VI. and VIII. were of severe cholera morbus, one of which most certainly immediately responded to the drug, and the other either did likewise or there was a remarkable coincidence.

The facts concerning emesis are best shown in a table like the following. The tabulated doses were of twenty, twenty-five and thirty grains.

Mode of Administration.	Retained perfectly.	Vomited within an hour.	Retained at least an hour, but vomited subsequently.	Total.
With opium and mustard..	16	2	8	26
With opium only	20	9	29
With mustard only.....	3	1	3	7
With no adjuvant.....	2	1	1	4
Aggregate.....	41	4	21	66

Besides these, four ten-grain doses were given to adults, a seven-grain dose to a child of thirty-four months, and two ten-grain doses to a child of seven years, being seven more, all but one of which were retained.

We thus find that seventy-three so-called emetic doses of ipecacuanha were administered, and that forty-seven of these provoked no vomiting whatever. Examination of the twenty-six cases where vomiting occurred shows at least two that, from the very trivial character of the ejection and from the prov-

ocations that induced it in each of them, may be transferred to the non-emetic list. These are: 1. Case VI., where two hours after the second dose had been taken, forty-five grains in all, a cup of tea was drank and a part of it was thrown up; 2. Case XII., where, three hours after taking twenty-five grains and having meanwhile sat up, "a little bitter fluid" was vomited. There were also two other instances, in case XVIII., where there was at least a foreign element of aid, but, as in these it is doubtful, they will be retained in the emetic list.

We find, then, that in forty-nine out of seventy-three consecutive instances, that were not selected and in many of which it was avowedly given as an experiment, practically no vomiting resulted from the medicine.

All the cases approaching dysentery yielded promptly to the treatment, and the only ones of this kind in which there was any vomiting were the XVth, after the character of the stools had changed and when the medicine was rashly given without both adjuvants; the XVIIIth, which see; and the boy's (XXIII) after the blood and straining ceased.

The only decided failure, in ordinary indisposition, to retain the medicine, proper care being taken in its administration, was in the case of the lady (XVII), who, after an hour's sleep, had a violent paroxysm of vomiting; and even here we may infer that the movement of the bowels and the general relief the next day was due to the drug.

Further, we find that of the twenty-four cases in which vomiting did happen, but four of them occurred within the first hour.

The other conditions observed in the series are not numerous enough to yield general deductions. Attention may be invited, however, to case XIII., where six grains was taken every six hours for three days, and afterward four three-grain doses for more than a fortnight, in none of which instances was there vomiting.

There are two methods of administration: On an empty stomach give from fifteen to twenty-five minims of the tincture of opium in a small quantity of water; fifteen or twenty minutes later apply a counter-irritant to the epigastrium, and at the same time give the powdered ipecacuanha in as little water as possible. With care a little more than two fluid-drachms of water will make thirty grains of ipecacuanha into a paste sufficiently liquid to be swallowed. Or, for those who take pills easily, that form

may be employed. In such cases the opium, in the proportion of one grain to twenty, may be incorporated in the pill. Twenty-five grains of ipecacuanha can be put up into two boluses, or twenty grains of that drug and one of opium will make up in four pills. Laudanum might be used in the pill form of ipecacuanha, one advantage of which is that the local effect of the opiate is not dissipated before the other drug begins to be absorbed. Recumbent rest must be strictly maintained and no food nor drink be taken for at least four hours, and usually longer. The dose may be repeated in from two to six hours, or, should the first be rejected, the second may be given as soon as the stomach is settled. In India sixty and more grains at one dose have been retained. I incline to think that, where the stomach is empty, the medicine acts non-emetically in direct proportion to the severity of the attack. As a rule, patients should not be told the name of the medicine, in order to guard against its mental influence; and they should be warned to exercise self-control against incipient vomiting. I apprehend that some plan closely approaching that just indicated must be strictly followed, or the ordinary emetic overflow may occur, to the disgust of the patient and to the disappointment of the physician. In Dr. Woodson's experience, "vomiting followed in all the [nine] cases but one in from fifteen minutes to twelve hours." In these "fluids of all kinds were denied the patient for two or three hours before and after taking the medicine." I conceive that four hours is a better minimum of abstinence. But notwithstanding that disagreeable symptom they all promptly recovered. When we remember how mild the vomiting of ipecacuanha usually is, there are few patients who would not willingly endure it, if necessary, to escape the suffering and danger of an attack of dysentery. But I trust that it has been demonstrated that emesis is not a necessary result of this mode of treatment.

Notwithstanding the smallness of this series, I think that the results attained, confirmatory as they are of the earlier traditions and of the recent Asiatic experience, warrant, on purely empirical grounds, a greatly extended trial of this treatment in dysentery, and point to the restoration to the drug of its old title, "*radix anti-dysenterica*."

In this connection attention is invited to the following modern reports of the use of this drug in affections of the bowels. The list does not profess completeness, but it may assist others who

care to investigate the subject. Some Indian papers are: Docker, (*Lancet*,* July, Aug., 1858, pp. 113, 169;) Cornish, (*Madras Med. Jour.*,* Jan., 1861, p. 41; *Ranking's Abs.** xxxiii., p. 91;) Blacklock, (*Madras Med. Jour.*,* Jan., 1861;) Donaldson, (*Edin. Jour.*,* v., p. 583;) Ewart, (*Indian Ann. Med. Sci.*,* 1863, p. 396; *Brit. For. Med.-Chir. Rev.*,* xxxii., p. 58;) Cunningham, (*Edin. Jour.*,* vii., p. 25). (None of the foregoing papers have I been able to examine.) Dr. Richard Whittingham, Surgeon Peruvian Navy, contributes a paper on its use in tropical dysentery (*Am. Jour. Med. Sci.*, 1860, xl., p. 379). In simple specific dysentery, either common or bilious, he gives from half a drachm to a drachm of the powder fasting or early in the morning, and says, "The medicine is *not* given as an *emetic* but to produce its specific action on the disease." He also gives an enema of ipecacuanha night and morning. The above is repeated for three days: or he gives ten grains with one grain of opium every six or eight hours, and uses vegetable astringents such as pomegranate root. Such cases are well in a week or ten days if seen early. In other varieties the treatment is modified accordingly. In the malignant form he relies on nux vomica and opium. The mortality in hospital is less than two per cent. of the cases seen before the colon is ulcerated. Dr. E. H. Janes (*Am. Med. Times*,* 1861, iii., pp. 28, 274,) gives an abstract of treatment of acute dysentery by large doses of this drug, with statistics of the result. Dr. A. A. Hœhling, U. S. Navy, (*Med. and Surg. Rep.*, 1868, xix., p. 327,) reports ipecacuanha as the chief reliance in the treatment of this affection in Chili, and cites a case as a type where a man ill five weeks was restored to health in seven days mainly by the use of this drug. Dr. John Stephen, of Reading, Penn., (*Med. and Surg. Rep.*, 1870, xxiii., p. 419,) reports three cases of severe acute dysentery cured immediately by ipecacuanha in doses of from thirty to eighty grains. These are well worth study, and are presented by that gentleman as examples "out of quite a number" that all yielded in the same manner to the same means. He considers it "as much of a specific in acute dysentery as is quinine in intermittent fever." Dr. A. P. Morrill (*Med. and Surg. Rep.*, 1870, xxiii., p. 503,) confirms the experience quoted and recalls the usual practice on this point fifty years ago in the Southern States. Dr. Dyce Duckworth (*St. Bartholomew's Hosp. Rep.*, 1871, vii., pp. 111-113,) quotes corroborative modern evidence from Mr. Hunter, Belize, Dr. Yandell, [Louisville?] Dr. Clark, London, and

Mr. Eccles, Bombay, the last-named frequently using emetia as a substitute for the powder.†

In favor of the treatment of chronic dysentery with large doses of ipecacuanha, somewhat in the manner of that of the acute form, evidence is gradually accumulating. Dr. H. D. Bulkley (*Am. Medical Times*, 1862, iv., p. 64,) reports four cases of chronic dysentery and diarrhoea in which ten-grain doses were administered. Of these one patient vomited, but all were immediately relieved. Dr. Bulkley refers to Dr. McKidd's article, (*Edin. Med. Jour.*,* July, 1861,) where a diarrhoea of ten years' standing was promptly cured by the administration of ten to twenty grains every twelve hours. I have the impression, but cannot vouch for it, that certain forms of chronic diarrhoea are now habitually treated by large doses of ipecacuanha in at least one of the New York hospitals. Dr. Bulkley's article contains this sentence: "It is said that the native doctors of Constantinople invariably give large doses of ipecacuanha in dysentery, and that their treatment of it is very successful." Dr. Willshire, (*Lancet*, 1832, ii., July, p. 62,) reports a grave case of chronic dysentery with severe exacerbations, which, after thirty days' unsuccessful treatment, immediately improved upon a prescription in which four grains of ipecacuanha three times a day held the chief place. Dr. W. E. Whitehead, U. S. Army, reported (*Pacific Med. and Surg. Journ.*,* iv., p. 11,) three cases treated successfully by large doses of ipecacuanha; and under date of August 24, 1874, he writes me, "Since that time I have treated many cases of chronic dysentery after the same plan and always with satisfaction to myself." To this I may add the memorandum of a case in Colorado, several years ago, of which I kept no notes, where, after exhausting the ordinary round of treatment, I supplied the patient, a civilian, with a number of twenty-grain powders, directing him to take one whenever an exacerbation came on. There was no attempt to use it systematically, but he was relieved for the time by one or two doses whenever he saw fit to employ them. It appears also (*Med. Record*, 1871, vi., p. 384, fr. *Med. Times and Gazette*,*) that, at the English Hospital, Metz, during the late Franco-Ger-

† The latest essay on this subject known to me is Polichronic's. That, arriving after the completion of this paper, has compelled certain additions to the text at the last moment. Attention is invited to it as probably the latest monograph on this subject. The author freely confirms all that has been said of the power of the drug over dysentery.

man war, "the most obstinate and fatal disease the physicians had to deal with was dysentery of a very chronic character." After other methods "the ipecacuanha treatment was then tried, and with fair success; doses of five to fifteen grains of the powder were given three or four times a day; it rarely caused vomiting, except at the first dose, sometimes not even then." Dr. Duckworth (*St. Barth. Rep.*, 1871, vii., p. 116,) quotes Akenside as saying of the use of the drug, "*Neque interest utrum acuta sit dysenteria, an chronica: utrum sanguinem habeant dejectiones, an muco tantum constant.*"—(*De Dysenteria Commentarius*,* 1764, p. 39.) Duckworth (p. 143) reports a case of chronic dysentery cured by enemata of ipecacuanha, and further says (p. 117), "It is a fashion in India to employ an injection of the drug in dysentery.†

* * The plan was tried in the hospital [St. Bartholomew's] in the case of a woman, * * who was sinking apparently from uncontrollable dysenteric diarrhœa, which ensued after an operation for strangulated femoral hernia." It was successful after the usual remedies had failed. "No nausea or vomiting occurred." (This case will be referred to in a subsequent section of this paper.) He also quotes a successful case in a child reported by Dr. Hillier (*Med. Times and Gaz.** Jan., 1864,) but adds that when attempted "in those very obstinate cases of diarrhœa which occur when the lower bowel is the seat of tuberculosis and ulceration" it failed. But on the contrary we have the experience of M. Chouppe (*Practitioner*, No. lxxiii., July, 1874, p. 58, fr. *Bul. Gen. Ther.*,* June 15, 1874,) who has used it by injection "with very satisfactory results in the diarrhœa of tuberculous patients and in the choleric diarrhœa of young children.‡ In these cases "vomiting was never observed."|| Of the seventeen cases of phthisical diarrhœa thirteen were cured and two improved.§

† See Dr. Whittingham's article already cited.

‡ MM. Bourdon and Chouppe followed Trousseau in using the drug in infantile cholera, changing the administration from the mouth to the rectum. (Polichronie, *op. cit.*, p. 19.) M. Polichronie gives in detail M. Chouppe's five cases of infantile cholera and adds one by M. Huchard. There was one death in the six, which is attributed to errors of diet.

|| Inflammation of the rectum, passing off when the treatment is suspended, frequently follows these enemata. M. d'Ornellas, using emetine, met with it in every case; M. Chouppe, using ipecac., found it in only five cases in thirty-four. (*LeProgres Medical*, No. 28, 11th July, 1874.)

§ Polichronie (*op. cit.*, pp. 29-31) gives details of one case of acute and three of chronic dysentery treated by enemata of ipecacuanha. One of the last was unsuccessful.

(*Sup. Med. News and Lib.*, Nov., 1874, p. 211.)

On the other hand there are two articles in the *Medical Times and Gazette* (1873, i., pp. 102, 194,) upon the failure of ipecacuanha in chronic dysentery. But no claim has ever been set up for its uniform success in that form of disease.†

Finally, attention is invited to a group of singular cases reported by Dr. James D. McGaughey (*Phil. Med. Times*, 1872, ii., p. 407,) as epidemic duodenitis. The treatment he found most useful was active purging, the free use of ipecac., cantharidal blisters over the tender points; and generally after free purgation, a thorough relaxation with ipecac., and a blister, the pain began to decrease. I cannot help suspecting that "the free use of ipecac." was an essential element of the cure.

The preceding pages give in detail my own recent experience, with a *resume* of the modern literature of ipecacuanha in dysentery. There are many interesting points thereby suggested, which my field of personal observation has not been wide enough to embrace. But for a consideration of some of them, and for a pursuit of the subject in one direction, attention is invited to the remainder of this paper.

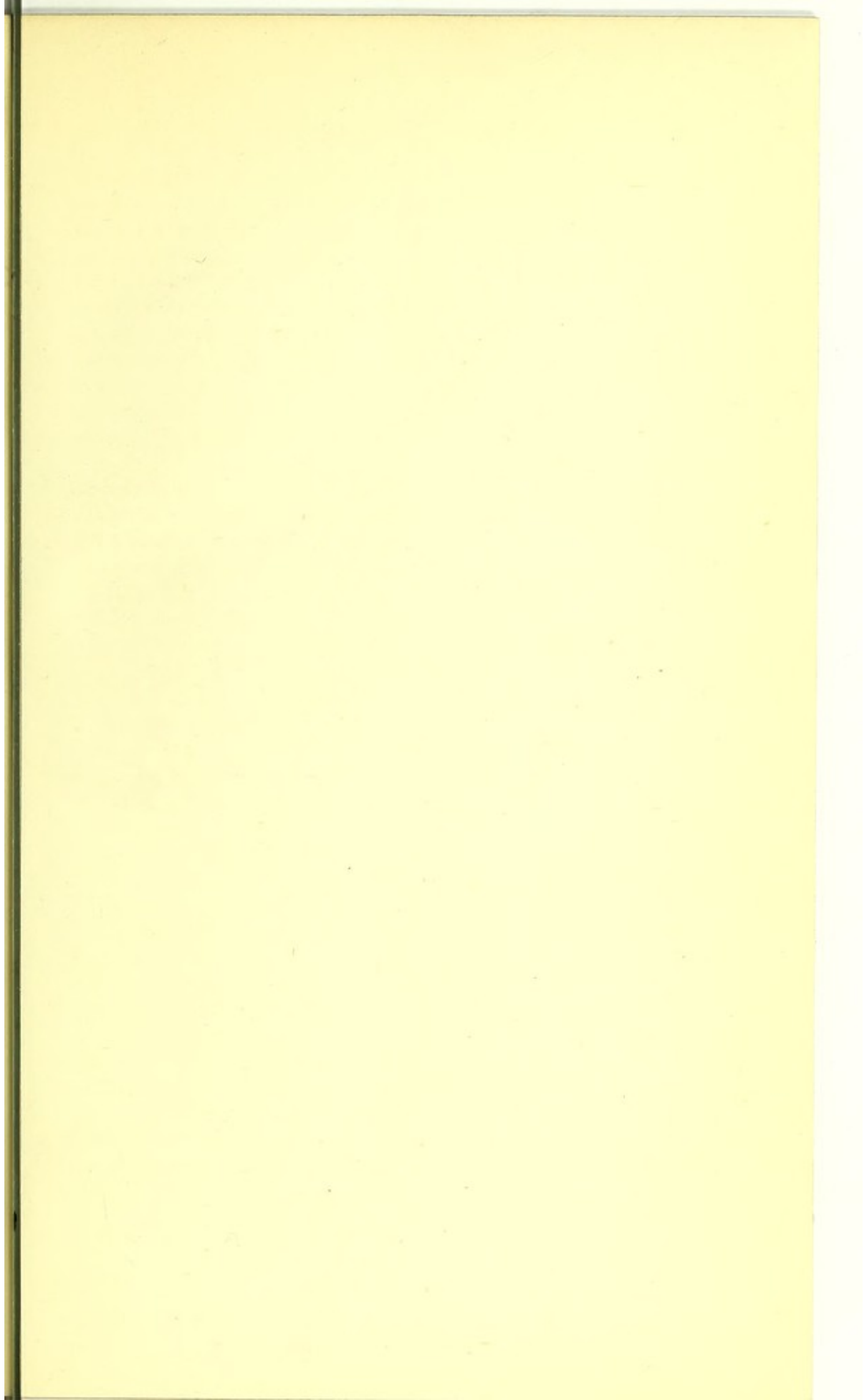
While engaged in these observations, and in the reflections to which they gave rise, and being led up, as it were, by the cases developing under my eyes, to employ ipecacuanha in large non-emetic doses in cholera-morbus, its possible usefulness in Asiatic cholera occurred to me. Aware that abstract reasoning not fortified by clinical experience at every step is seldom trustworthy in medicine, I have nevertheless felt it a duty, in view of no treatment having yet secured a fair degree of success, to expose the train of thought that leads to the supposition that this drug may prove useful in that disease. I do this with diffidence but not deprecating legitimate criticism, and with less reluctance because, at the worst, it will only add one innocent failure to the long list of unsuccessful trials, while it may develop the germ of cholera-control.

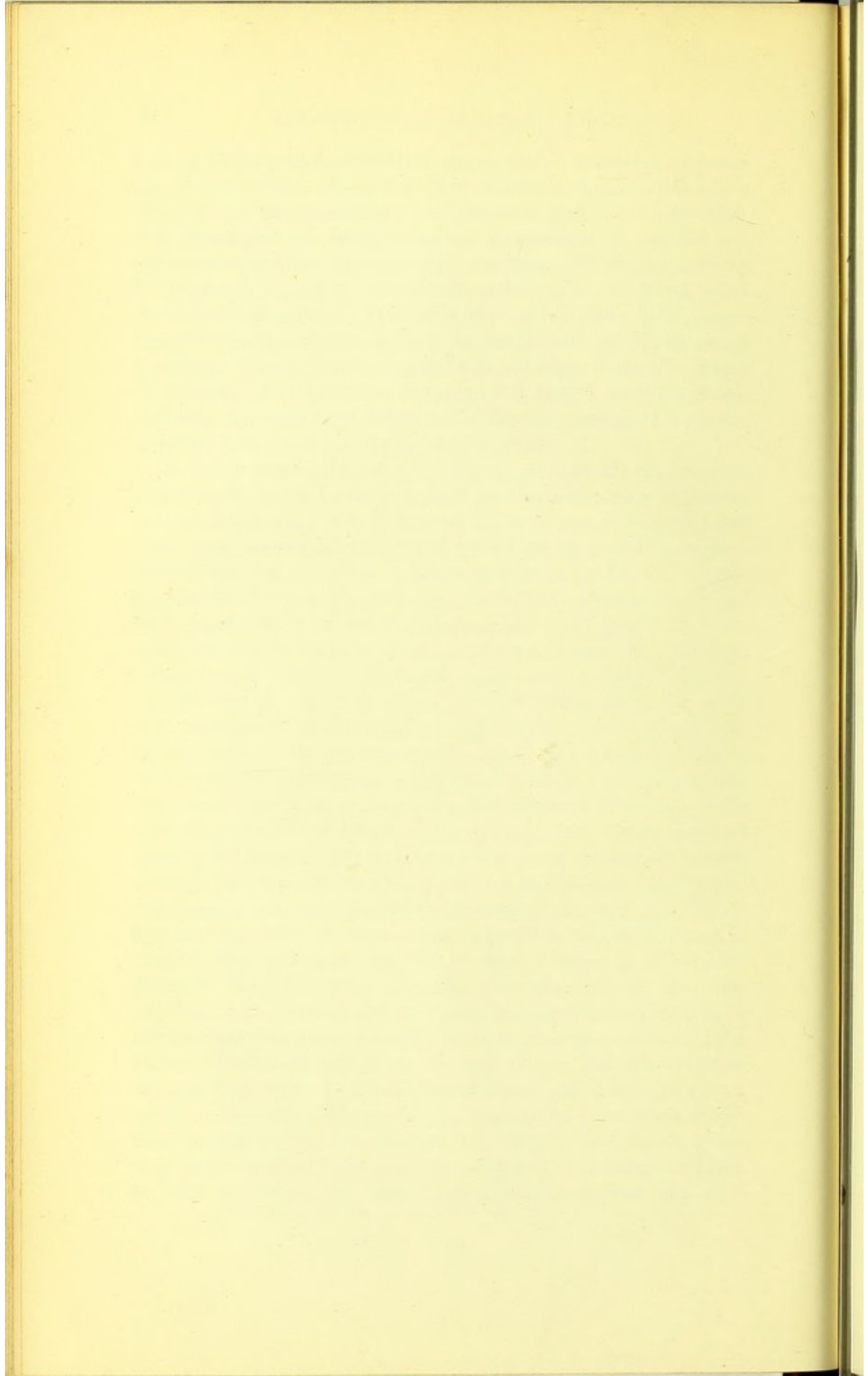
To explain my belief involves a recapitulation of the pathol-

† Maclean declares that many cases of the chronic form are not the result of unhealed ulcers, but are met with where no breach of surface is detected. The drug is indicated in an acute outbreak during a chronic attack. (Duckworth: *St. Bart. Rep.*, vi, 1871, p. 116.) Is it not possible that there is a flaw in the common teaching as to the essence of dysentery? On this subject more will be said later. Meanwhile hear Trousseau: "*l'ulcure est comme un bourg brule; ce n'est pas la guerre, c'est l'effet de la guerre.*"

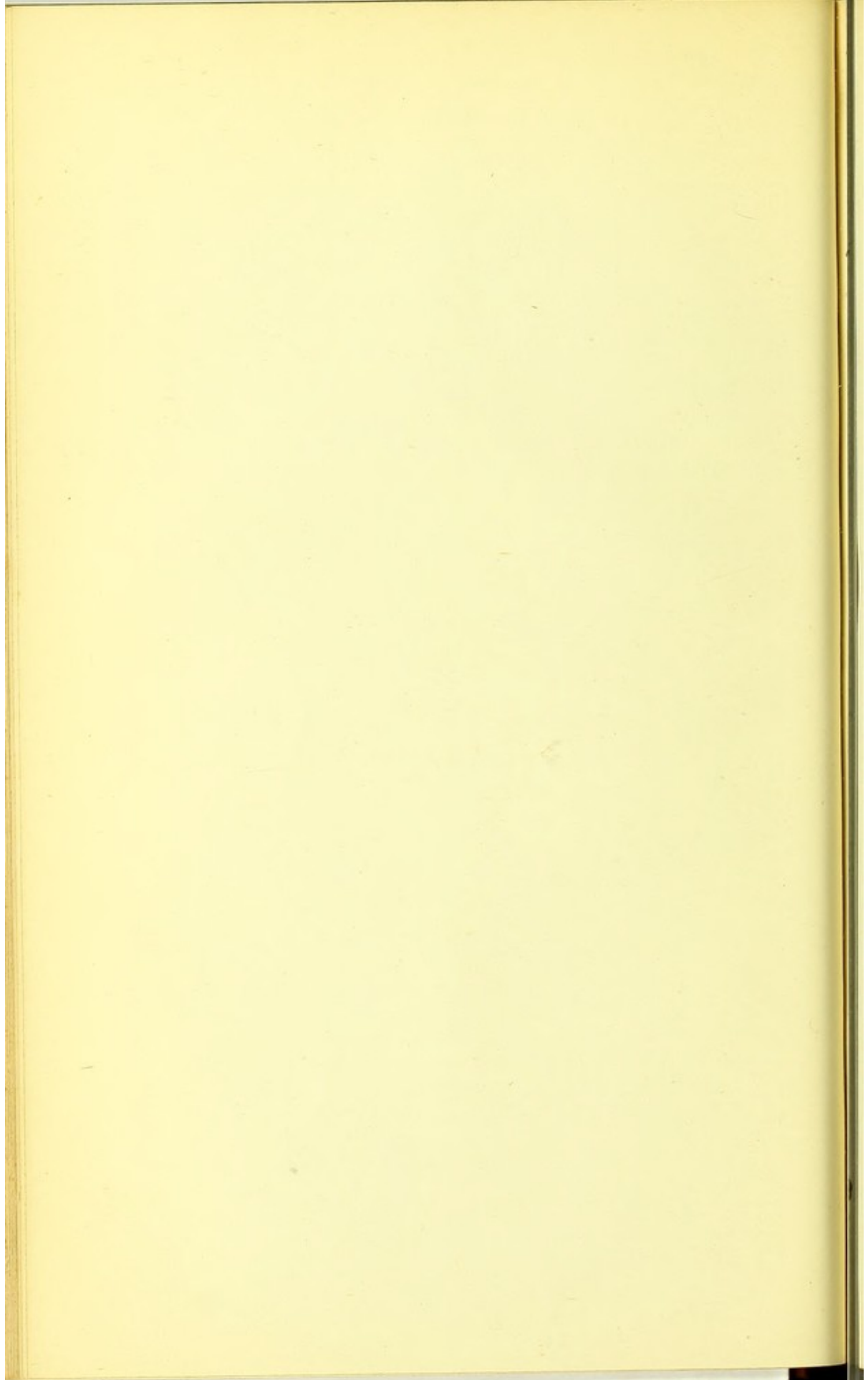
ogy of cholera, and something more; and I therefore embrace the opportunity to discuss, at the same time, the possible mode of operation of ipecacuanha in dysenteric and other affections. And although I can fairly claim the proposition as original, my subsequent studies have brought me upon indications, notably Dr. Waring's (*op. cit.*, p. 361,) which, although not identical, point in the same direction. I conceive that priority has little precedence over originality as a claim to credit, and that both are of small importance when compared with efficiency in the alleviation of disease. Those hints to the same end that I have found are faithfully recorded, and I only ask a careful reading of both the practical and theoretical parts of this paper.

It is not practicable even to enumerate here all the conceits that have been put forth to account for the phenomena of Asiatic cholera, but a brief notice may be taken of one advanced a few years since before more seriously taking up the probable explanation of the disease. The distinguished names of Dr. Geo. Johnson and Sir Thomas Watson have given to the poison-to-be-eliminated hypothesis a certain foundation, and have drawn to it an attention that its abstract merits might not command. This hypothesis is, in brief, that the cholera phenomena result from the introduction of a specific poison into the blood, where it rapidly self-multiplies and spoils certain blood-constituents which are then ejected through the mucous membranes of the alimentary canal; that the poison circulating in the blood excites contraction of the muscular walls of the minute pulmonary arteries, arresting or diminishing the flow of blood in the lungs, which is the essential cause of the cholera collapse; that the copious discharges express nature's efforts to throw off a noxious material, and really form, therefore, a necessary part of the process of recovery; and that if the pouring forth of the vascular excretion be checked, (as it possibly may by opium,) the risk of fatal collapse is thereby increased. They therefore advocate "the evacuant or cleansing practice," and propose not to excite increased excretion, but to facilitate the discharge from the mucous canal of matters lodged there. Gentle elimination is the key-word. But this practice (except when abused by being transformed into active purging,) seems to be really little more than abstention from active interference, and a trust that nature will effect a cure, as we know that she often does. Its greatest merit is that it leaves no room for and reprobates the opium and alcohol treatment, and it is

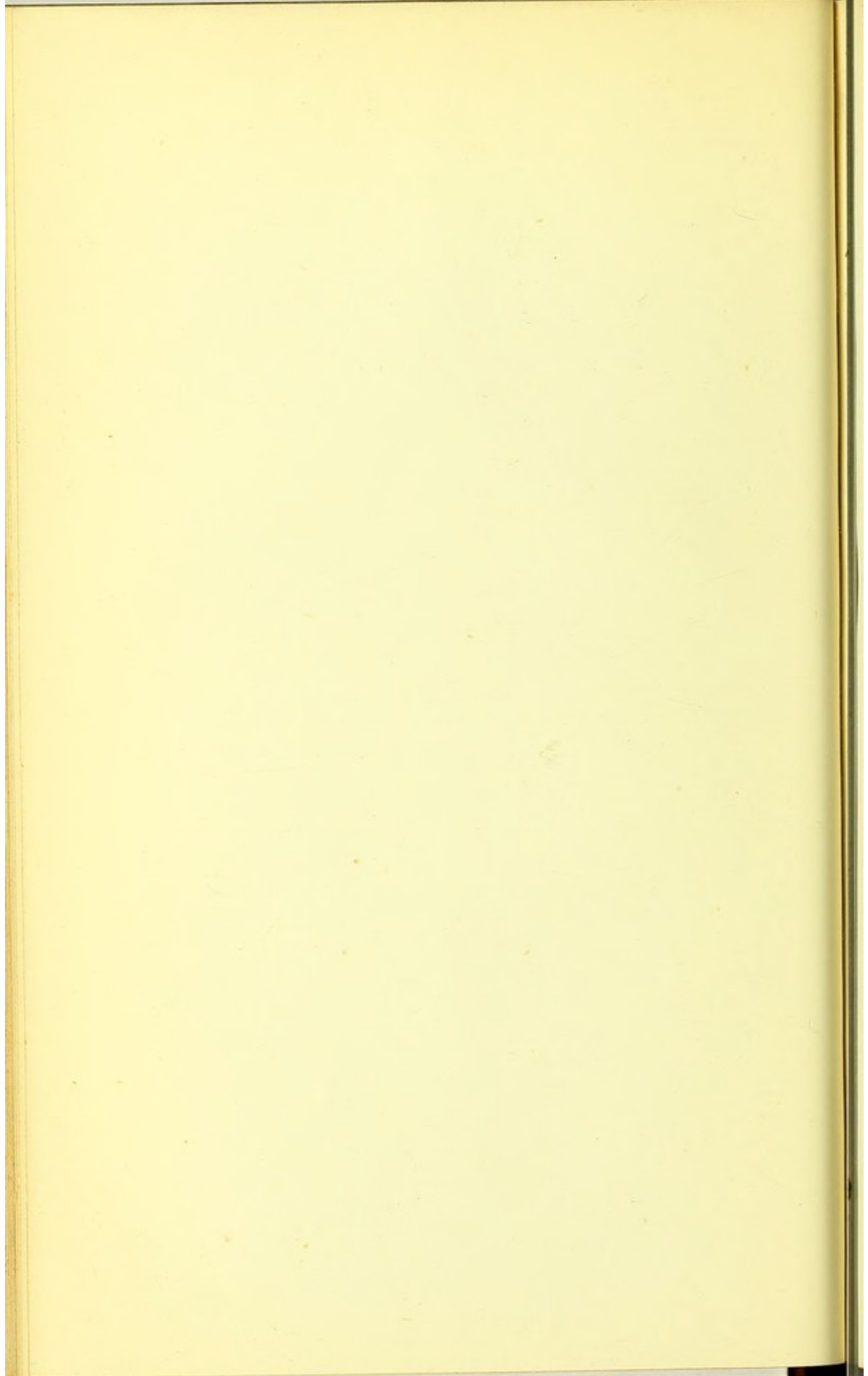






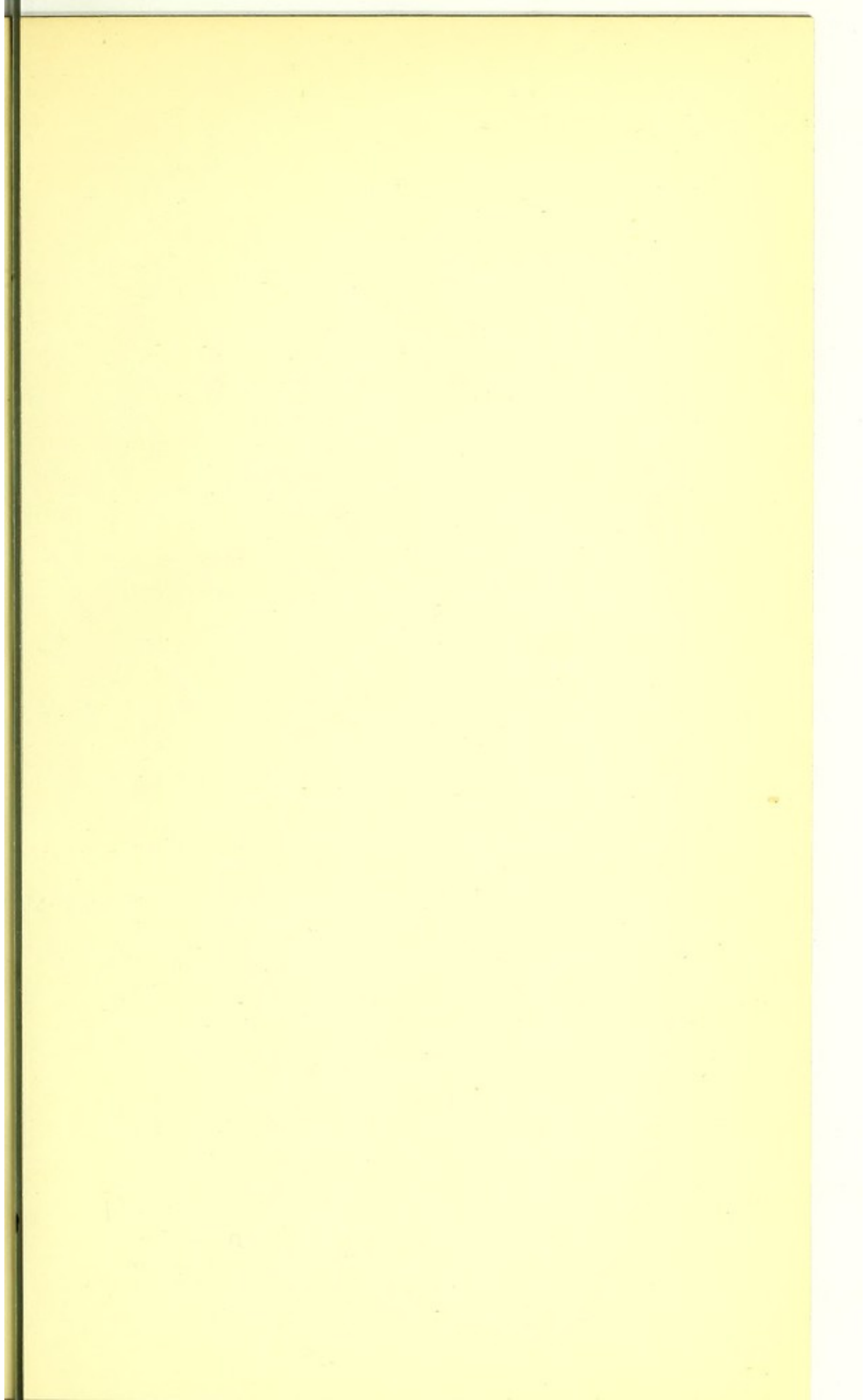


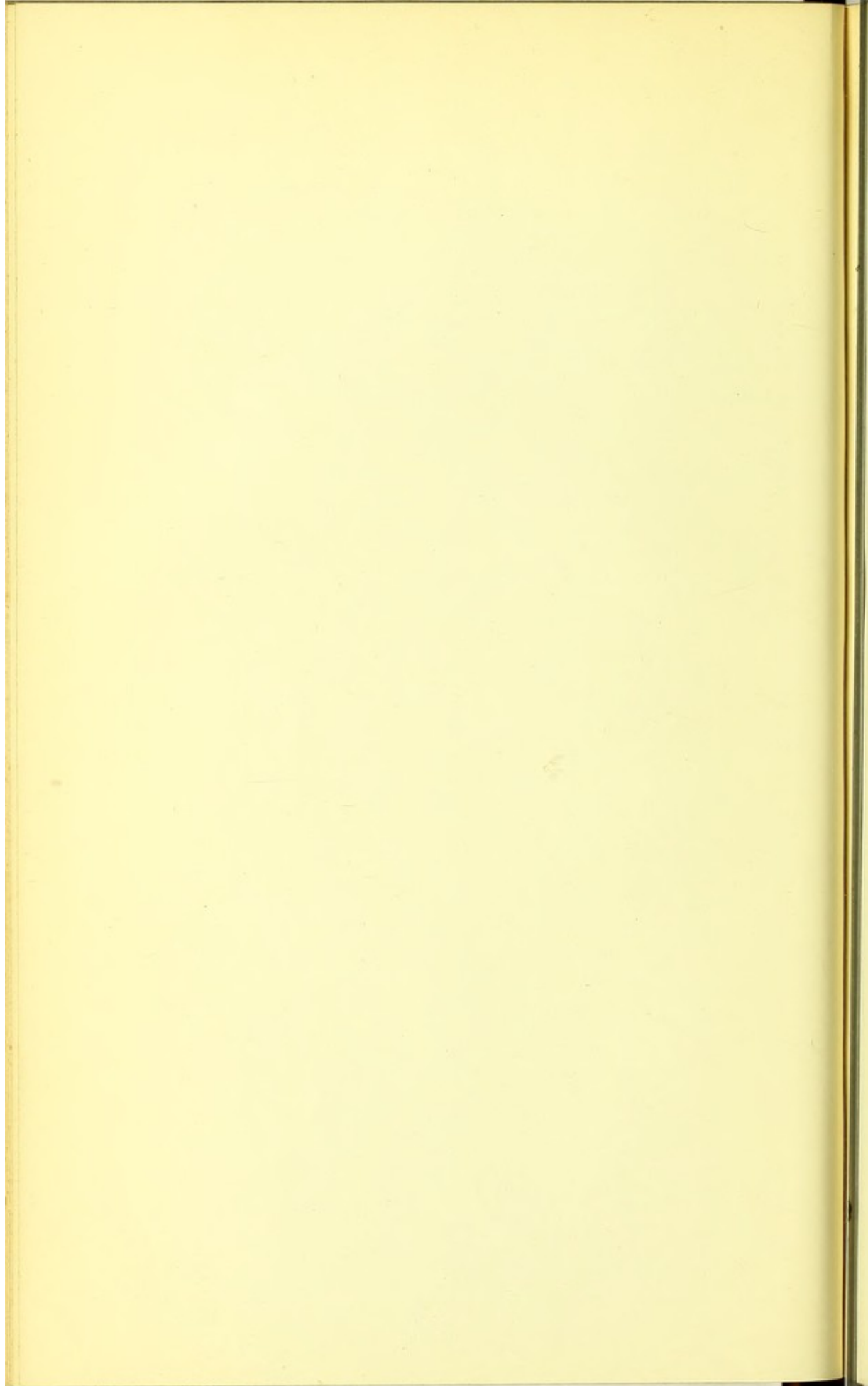


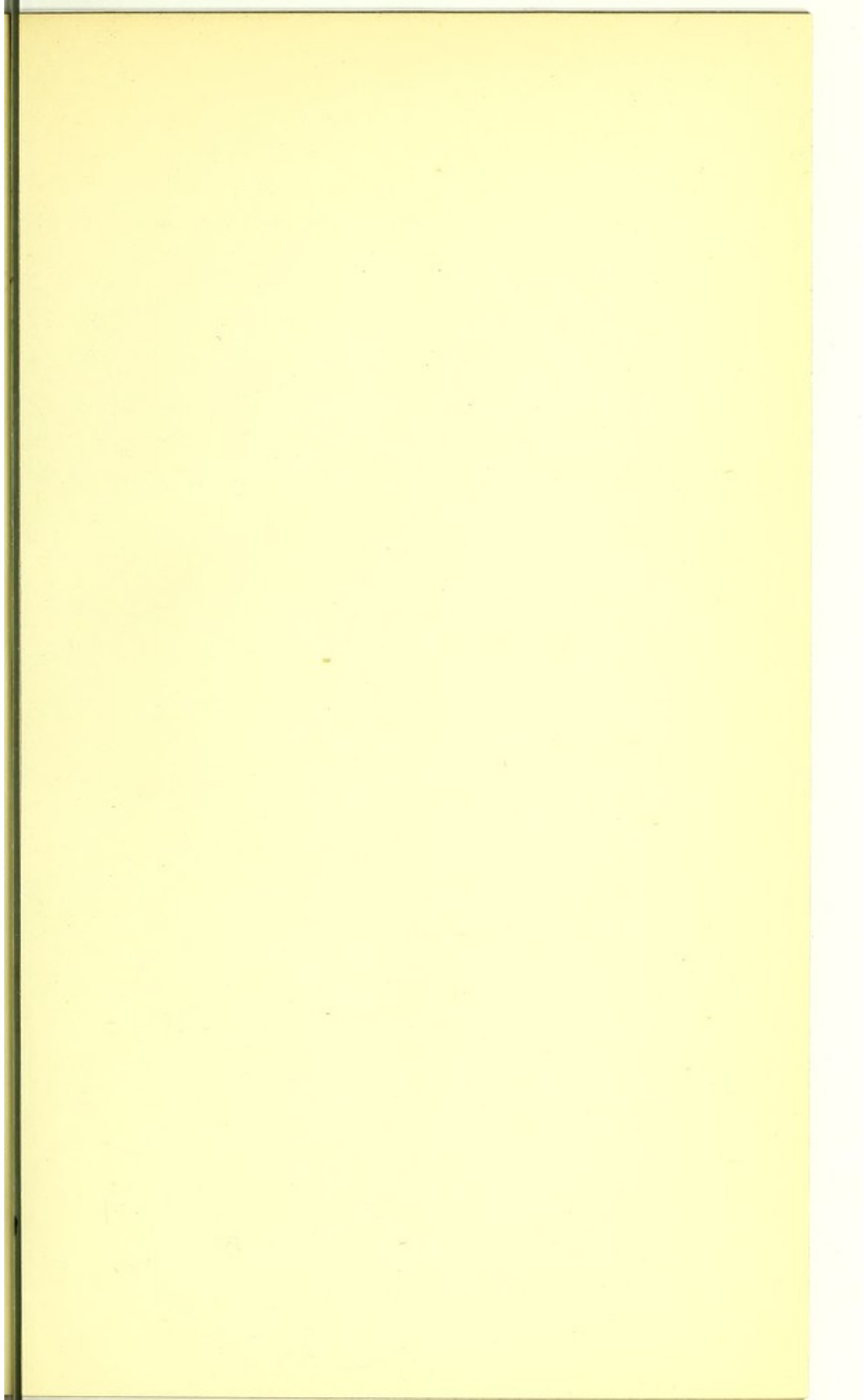


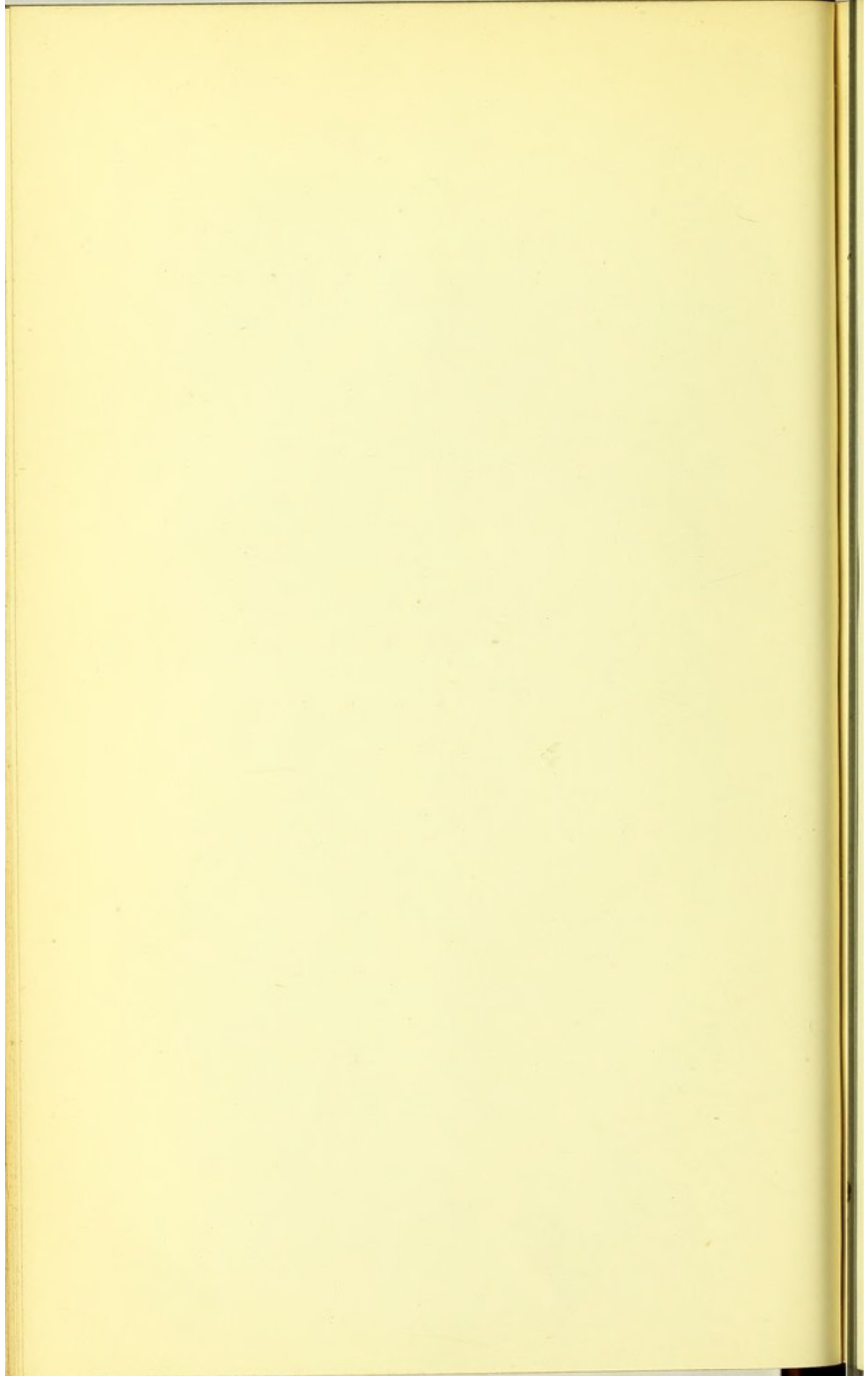




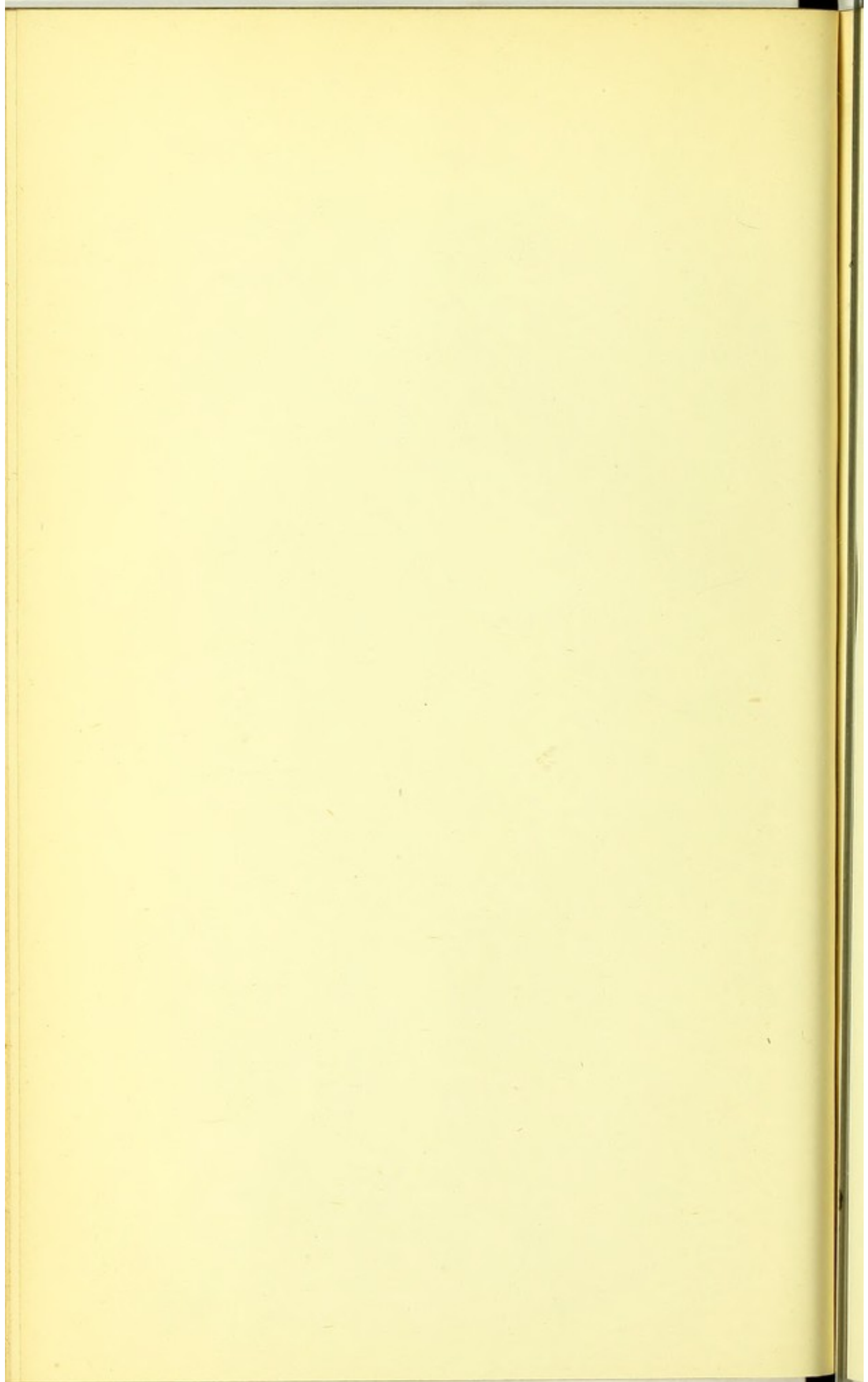




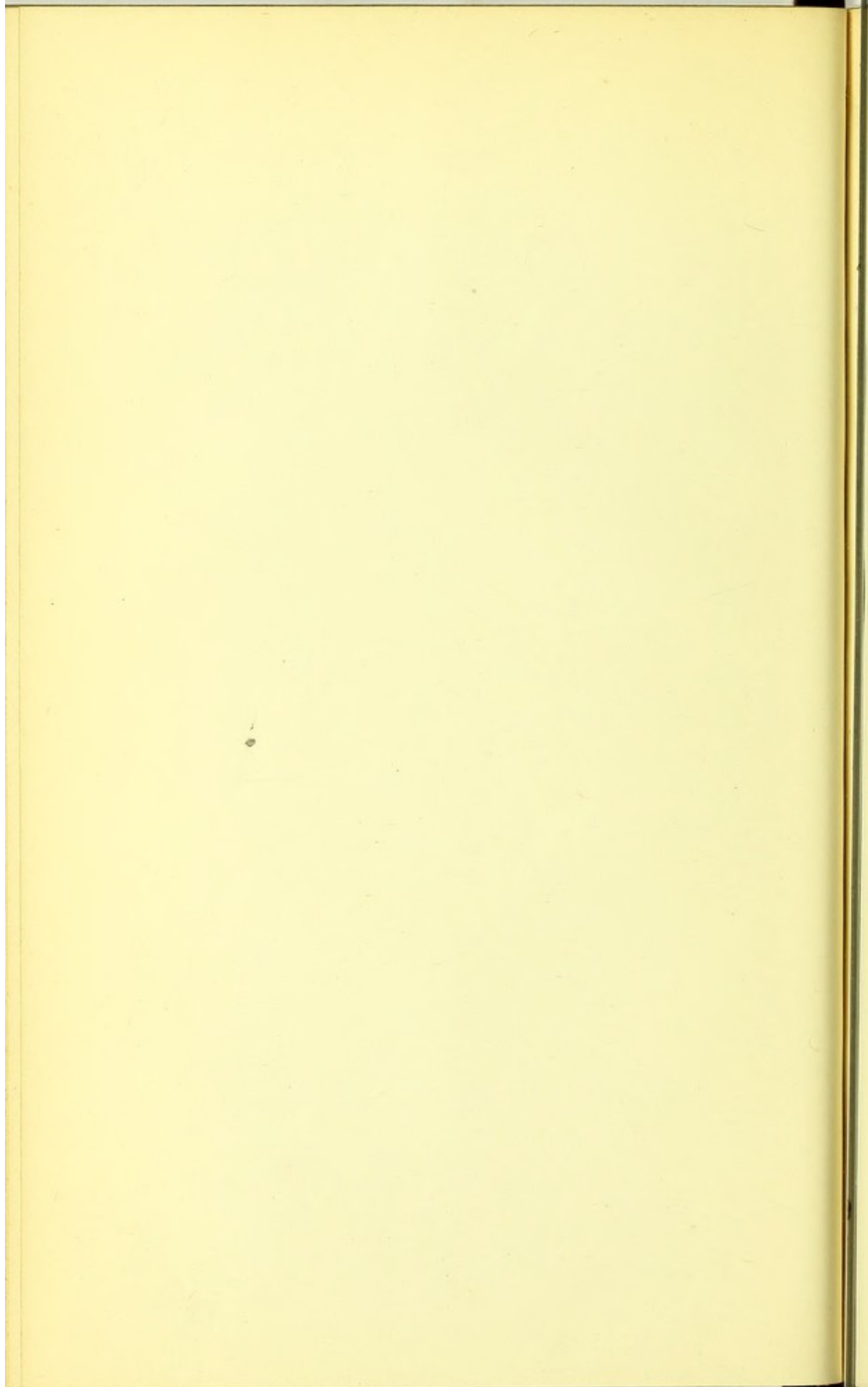






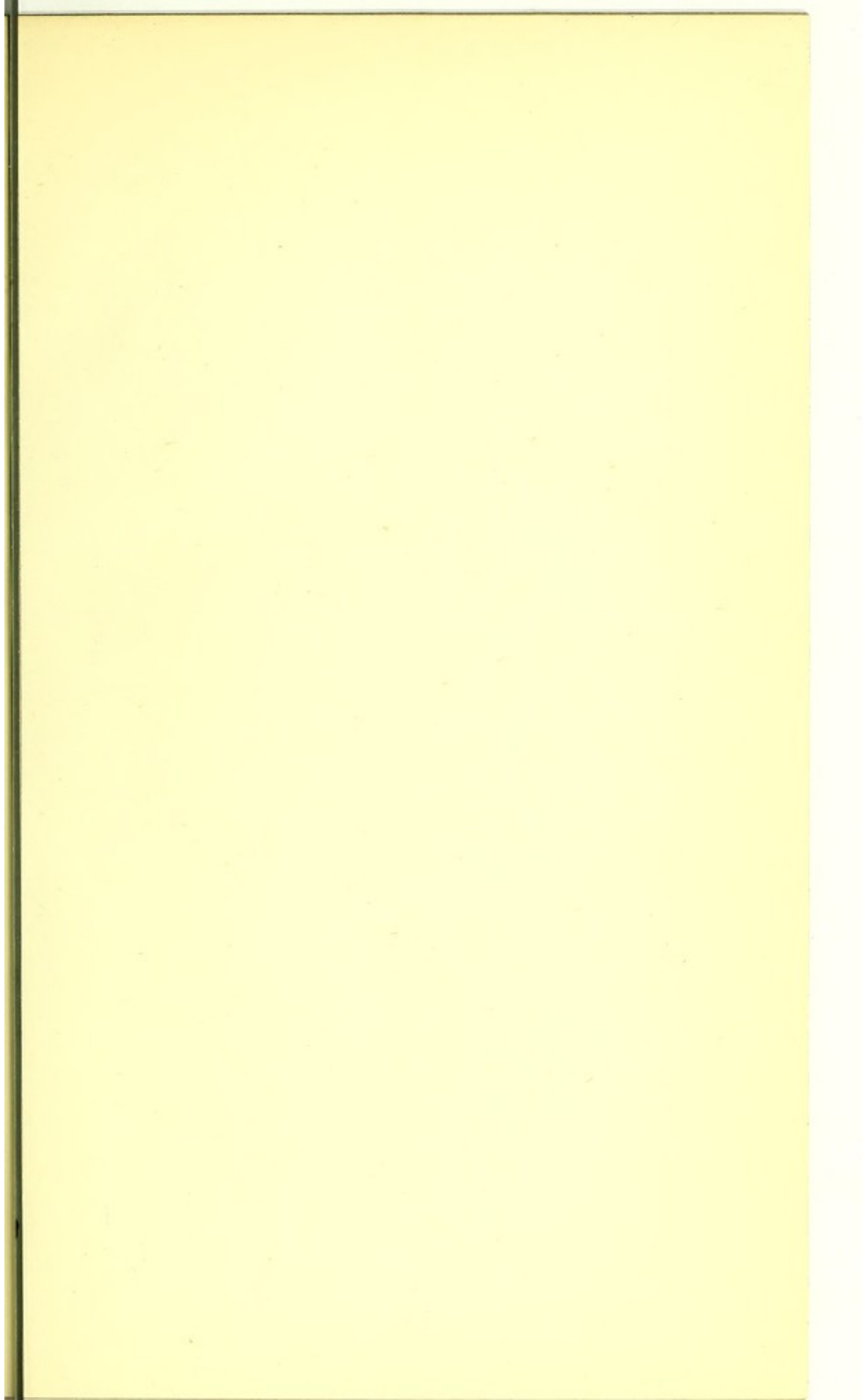


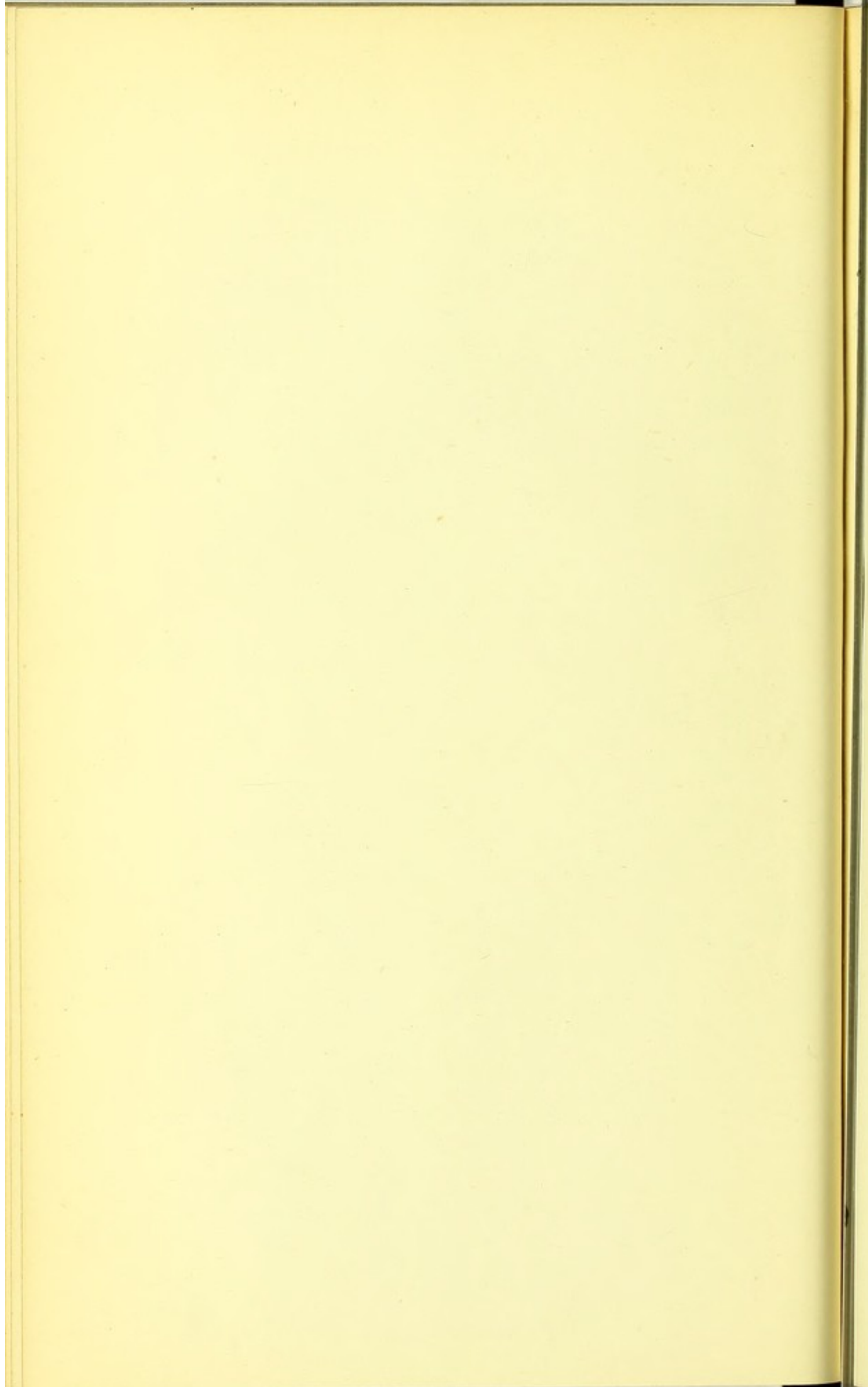




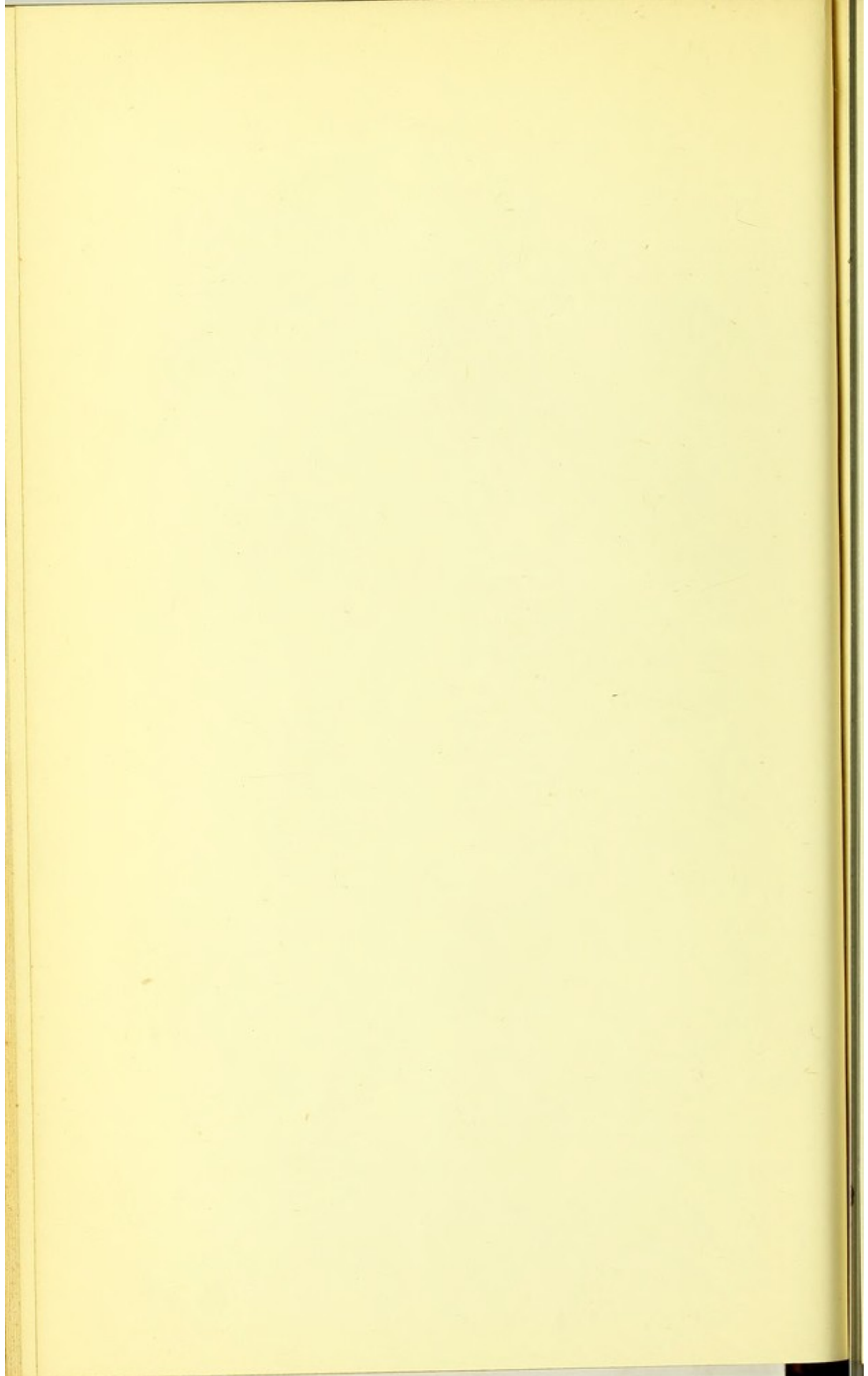


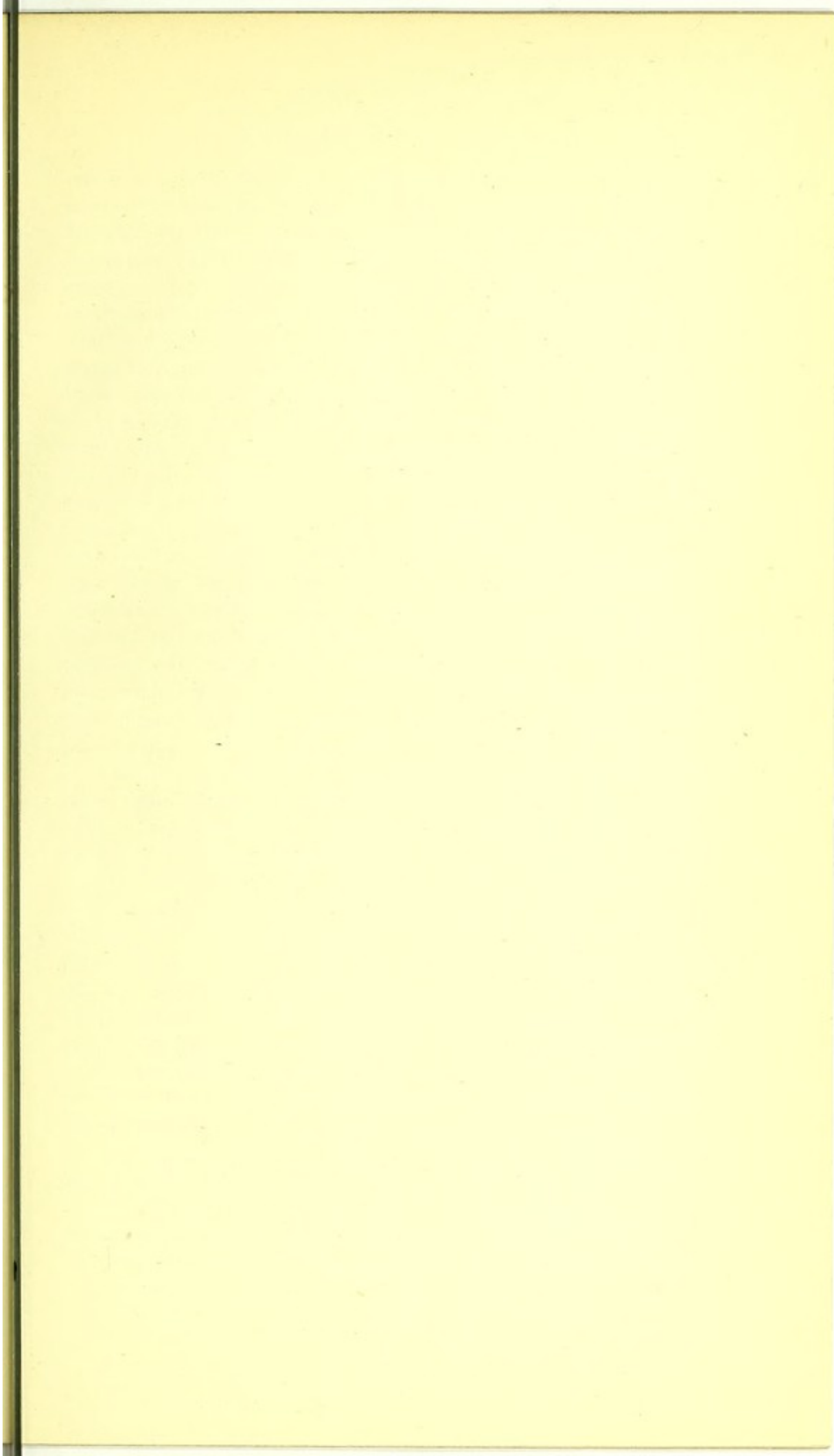


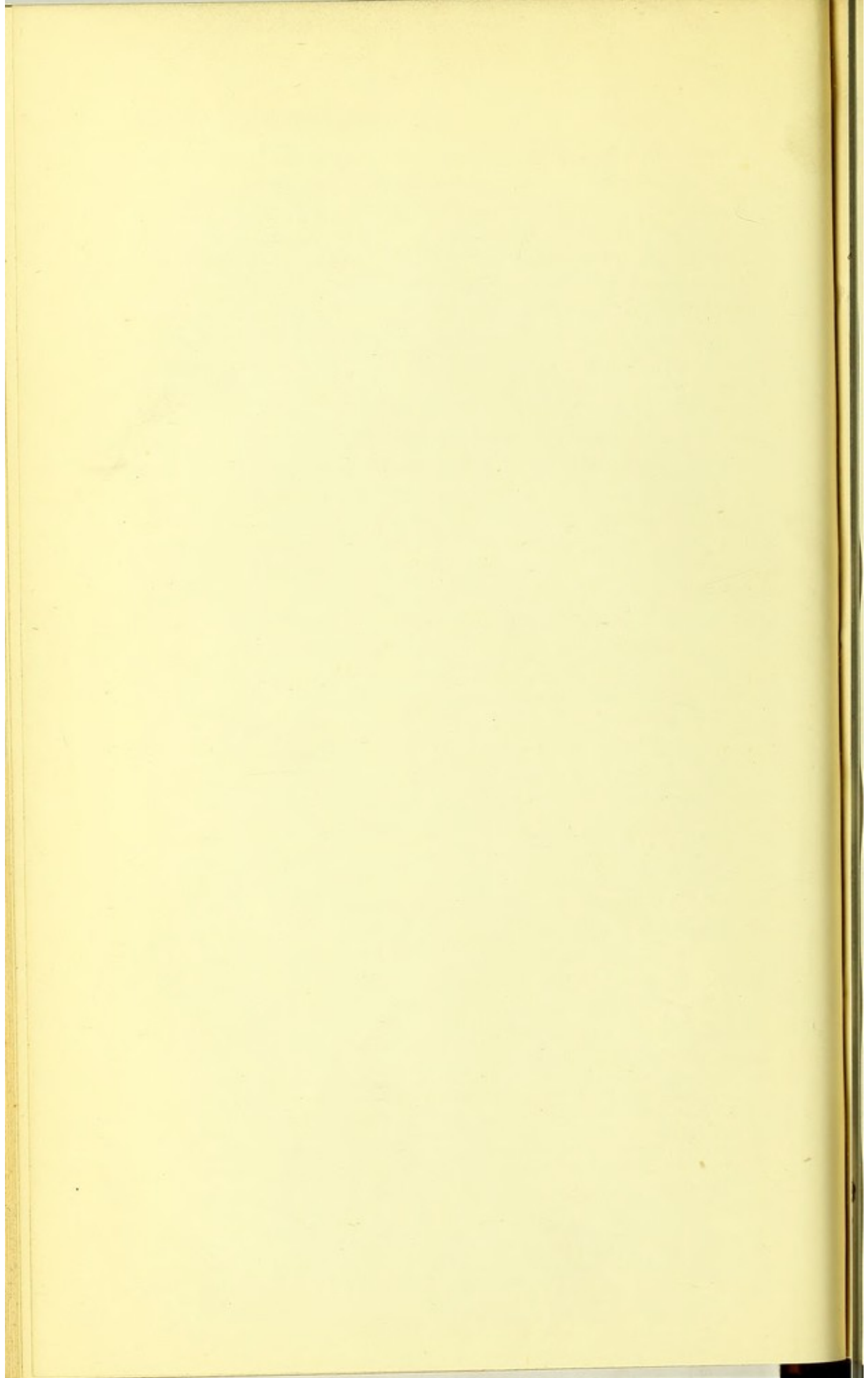












one direction or the other emesis will occur. In this view ipecacuanha instead of being a sedative, as it is so often styled, is a sympathetic [ganglionic] stimulant that exalts one side of the beam, and with the disturbed balance tonic vomiting, so to speak, occurs. The vomiting of irritability or exhaustion, on the other hand, results from the depression of the beam, and its equilibrium is restored by the positive influence of the drug. A more comprehensible comparison may, perhaps, be found, in what we know relative to the human temperature. When that is below a certain point we are ill; the addition of heat carries it up to the norm and we are well; but the same degree of heat added in health creates illness. Figures at best are imperfect guides and these are very rude, but it is only by some such comparison that I can bring myself to understand how our ordinary experience with the drug can be reconciled with its well-established control over the morning-sickness (irritability) of pregnancy, with its influence in certain forms of atonic dyspepsia, and with (as I believe) its efficacy in the vomiting of cholera morbus and allied diseases. It seems to me that we must either fall back upon some such notion, or must suppose that there is another principle besides and antagonistic to the well-known emetia, the reputed and generally-recognized essence of the drug.

This paper treats of ipecacuanha as a whole. Some of the later therapeutical experiments have been made with emetia, "pure" and "impure," which is certainly an active agent; but in whatever form administered it is usually, and often violently, emetic, and in excessive or repeated doses it is certainly dangerous. I have had no experience with it, but I greatly question whether the chemical mutilation to which the vegetable is subjected by its extraction does not radically destroy some essential quality. Although analysis seems to leave no room for any other active principle, it might be worth while to institute a series of careful experiments with the residuum after emetia is removed.†

I therefore regard *ipecacuanha* as a peculiar but direct nervous stimulant, acting chiefly and probably entirely through the medium of the sympathetic system.‡

† Dr. Squibb, of Brooklyn, informs me under date of 11th November, 1874, that "there is very much Ipecac now in the market that is of very doubtful character. It is a large size root, produced in the West Indies, is cheap, and is used either as a substitute or adulterant of the true Rio Ipecac. Perhaps half the powdered Ipecac sold may be made from this variety."

‡ Sunderlin, of Berlin, (*Handbuch der Speziellen Heilmittellehre*,* 1825, ii.,

The empirical fact remains, whatever explanation we may attach to it, that ipecacuanha is a valuable remedy in the sweats of phthisis, (and why not in others that are colliquative?) in passive hæmorrhages from the uterus, lungs, etc., in certain active hæmorrhages on the authority of Trousseau, in the collapse of cholera morbus, and in various forms of diarrhœa and dysentery. It does no violence to any known physiological or pathological fact to suppose that all these morbid states may be different manifestations of deranged sympathetic [ganglionic] action. For, as the ordinary malarial poisoning shows itself sometimes in an intermittent, sometimes in a remittent, and again in a neuralgia or hemi-crania—all disappearing under the influence of quinine—so, these various just-mentioned, but not necessarily identical, conditions may admit a common causative chain binding them together and leading them to yield to the same element of cure. That is to say, we may look upon those classes of disease, including serous diarrhœas and cholera infantum, and also the profuse cold (or passive) perspirations of consumption, cholera and fright, as brought into existence by various, and it may be dissimilar, direct or reflex disturbances of the ganglionic system. These may be generated by any impression, moral or physical, operating upon a nerve-centre. Where it is from irritating ingesta, the causes operate as long as the foreign bodies remain: where it is from an emotion, like fear, the effect passes off as equanimity returns. It is unnecessary, by multiplying illustrations, to trace the family likeness through all its gradations to the fully-developed type of the profoundest sympathetic disturbance.

And I here interject a paragraph, framed after this paper was written, that at least abuts upon, if it may not actually be an extension of, our theme. Dr. Wilson Fox, in his work on Diseases of the Stomach, now re-printing in the *Medical News and Library*, treating of hæmorrhage from that viscus, writes (Oct., 1874, pp. 248-9,) to this effect: in some of those capillary hæmorrhages which arise from congestion, there is probably, in addition to the congestion, "some alteration in the coats of the capillaries * *." "In the same manner are probably produced the hæmorrhages of yellow fever, and of other [?] malignant intermittents, as also those which occur in relapsing fever, typhus fever, cholera, purpura, scurvy and hæmorrhagic variola. In other cases, though

p. 38,) nearly fifty years ago taught that emetia exercised an exhausting stimulus over the eighth pair of nerves. (Duckworth, *op. cit.*, v., 1869, p. 221.)

probably referable to the same source, its mode of origin is less explicable; as when it follows severe surgical operations or blows upon the back or epigastrium, or even a remarkable case reported by Empis, where the invasion of tubercular meningitis was associated with uncontrollable vomiting with hæmatemesis." I have no desire to appear wise above what is written, but it appears to me that a profound sympathetic [ganglionic] derangement is an essential factor in all these conditions. The alterations in the blood that may occur in the various diseases named are of course to be reckoned, but the want of nervous power [paralysis, shock,] is most probably an important element—and that, to my mind, is the only rational explanation of the "less explicable" cases noted.† Why sometimes the outpouring is serous, sometimes hæmatoidal, and sometimes of pure blood, our present knowledge is not sufficiently refined to demonstrate.

Now cholera is *sui generis* only in the peculiarity of its reproductive power. Professor Stille, in a comprehensive lecture on this disease, asks (*Phila. Med. Times*, iii., p. 648,) "In what does sporadic cholera differ from malignant epidemic cholera?" and answers, "only in its cause and its degree. Its mechanism is the same," and that the epidemic "differs from the sporadic form chiefly by the intensity of its cause, the gravity of its symptoms and the nature of the special cause that produces it." Meigs and Pepper (*op. cit.*, pp. 378–399,) make a strong argument for

† I would account for the case of ipecac-cured dysentery, occurring after an operation for hernia, in St. Bartholomew's Hospital (*St. B. Rep.*, vii., 117,) in this manner, i.e., by the nervous shock: and I suppose that the diarrhoeas of the tuberculous that have been cured by ipecacuanha depended not on ulceration, but on irritation, perhaps from morbid deposits.

I suppose also that "the puerperal state," in the complications of which unquestionably ipecacuanha has been used with advantage, especially in France, has its peculiarity in the shocked and susceptible condition in which the abdominal sympathetic is placed as the result of the profound uterine disturbance lately undergone.

And in like manner the purest form of dysentery is that induced by climatic or epidemic influences, and not that caused mechanically (by irritating ingesta). The occurrence of bloody stools, often regarded as evidence of inflammation, is not such proof. And it outrages all analogy to suppose that a violent form of such disturbance yields at once to a medicine whose general antiphlogistic properties are no better proven than those of the drug in question. Is it not more reasonable to regard *dysentery at its inception as the manifestation of a peculiar ganglionic intoxication, and to consider the intestinal inflammation, with its consecutive ulceration, a result of the malady, but not the primary or radical affection?*

the practical identity, saving the feature of self-propagation, of cholera infantum with the epidemic disease.† Dr. Da Costa reports (*Am. Jour. Med. Sci.*, no. cxv., 1869, p. 124,) a case of sporadic cholera with intestinal lesions found at the autopsy identical with those of epidemic cholera, although in life the discharges were not similar nor were there cramps. Dr. Edward Goodeve says (*Reynolds' System*, i., p. 172,) "It must be granted that symptoms similar to collapse may be produced by poisons without any purging. I have seen people under the influence of malarious poison in Calcutta lie for hours as cold and pulseless and as embarrassed in breathing as in cholera." As once before quoted in this paper, the "rice-water flux * * may occur also in other cases in which, as in cholera, there is a neuro-paralytic condition of the digestive canal" (Sedgwick, *Lancet*, Dec., 1871, p. 644). And the large number of cases cited by Mr. Sedgwick in his Analogy show one or another pathological phase of the pestilence duplicated in some other affection.

But there is more than a casual or accidental relation between cholera and certain other so-called blood diseases, and particularly are septic cholera from poisonous gases and epidemic cholera closely allied. Singularly, it has been suggested‡ that cholera and dysentery are antagonistic; but really one tends to increase the liability to and the danger of the other, and the latter is a not infrequent sequel to the more dreaded disease. And in attempting to develop this feature of the case I trust that I may not seem to be pressing the doctrine of the correlation of diseases too far, nor may I, by an indiscreet advocacy, bring ridicule upon the powers of a valuable medicine. Just as our scientific vision gains a wider range, do we better see the alliances that seemingly different conditions sustain with each other. If such a figure may be tolerated in a serious paper, I would say that, possibly, cholera, dysentery and the periodic fevers are a triune dæmon, each of whose faces represents a peculiar influence to be propitiated by especial offerings. We may never detect the real essence of this malignant trinity, and may never weave a spell that shall completely exorcise it: but all things are possible to the patient and the

† Polichronie, (*op. cit.*, p. 33,) writing of the different forms of diarrhoea in children, speaks of "le cholera infantile, qu'il est souvent presque impossible de distinguer du véritable cholera asiatique."

‡ I have met with this opinion in my reading, but have mislaid the reference.

daring, and it is a worthy ambition to unravel such a secret and to compose such an incantation.

There are certainly some very remarkable similarities in the apparent origin if not in the outward expression of these diseases;† and, speaking generally, not universally, we may include cholera morbus or the sporadic form under the wider category; just as the ordinary catarrhal dysentery is but a variety of the epidemic disease. In both, the contagious or catholic estates embrace the subdivisions. Niemeyer distinctly asserts that epidemic dysentery is closely allied to cholera (*op. cit.*, ii., p. 667,) and points out some marked constitutional similarities. Dr. Woodson noted in connection with his series of dysenteric cases near Gallatin, Tenn., treated by ipecacuanha in the summer of 1873, (*ante.*) the interesting fact that “previous to their outbreak a diarrhœal tendency had been observed in the same district which if not a consequence of was at least coincident with the prevalence of epidemic cholera at Nashville and Gallatin.” It is well known that by a number of very respectable medical men it has always been held that Asiatic cholera is essentially a malarial disease; that it is only a virulent modification of the ordinary swamp fevers. And, as Niemeyer says, (*op. cit.*, ii., p. 622,) “we do not know why, but great epidemics of intermittent have often preceded epidemics of Asiatic cholera. In hot countries cholera and intermittent and oftener dysentery and intermittent frequently prevail at the same time;” and later (p. 637), speaking of the course of the severer forms of remittent fever, he states that in some cases there are “symptoms of cholera or dysentery.” “Hersch [Hirsch] says it is a well-known fact, that malarial fever has preceded outbreaks of cholera, not

† While this paper is passing through the press I have received the British Army Medical Department Reports for 1872. (London, 1875, pp., 557,) and find that Deputy Surgeon-General Munro therein (pp. 266-274,) expresses the opinion that remittent, intermittent, congestive remittent [pernicious], cholera, yellow fever and heat apoplexy [insolatio] are different degrees of paralysis of the sympathetic nervous system, and that quinine is the remedy most to be relied on in all of them. He does not include dysentery in the group, and he denies the existence of malaria.

And I find that I have overlooked until the last moment the comprehensive remark of Professor Maclean who, speaking of malaria, in which he is a firm believer, says (Reynolds' *System*, i., p. 52,) “It is the cause of intermittent and remittent fevers, and their sequels: it ‘underlies’ the cause of dysentery and cholera;” etc. This was printed in 1866, and fairly coincides with the views expressed in the text as well as far antedates them.

only in single places or particular regions, but in an almost pandemic distribution, and there is every reason to believe that malaria and cholera devastate the same ground." (Peters, *op. cit.*, p. 127). Now (Aitken, 1st Am. ed., i., p. 381,) "it may be stated, as a general proposition, that there is no country where paludal fever exists in which dysentery is not an endemic and prevailing disease. * * This connection is so intimate that a given number of persons being exposed to the action of paludal miasmata—as, for example, a boat's crew sent ashore in a tropical climate—the probabilities are, that of the men returning on board, part will be seized with dysentery and part with remittent fever. Paludal fever and dysentery, moreover, are not only conjoined in locality, but they often co-exist, precede or follow each other in the same individual, so that the fever frequently ends in dysentery and the dysentery in remittent fever." Further, M. Marey (*Gaz. Hebdom.*,* Nov. 24 and Dec. 1, 1865; by Burrell, *op. cit.*, p. 137,) finds a resemblance "between cholera and paroxysmal fevers, which latter he considers as under the control of the vaso-motor system of nerves." Now the vaso-motors themselves, although not derived from, are in great measure influenced by the sympathetic. And in this connection there is invited study of a valuable paper by Dr. Enrique M. Estrazulas, in the *American Journal of the Medical Sciences* for July, 1873, (no. cxxxi., p. 74,) clearly detailing the spontaneous origin of epidemic cholera in the camps of the allied and the opposing armies at and near Estero Bellaco, at the junction of the Paraguay and Parana rivers, in 1866, during the Paraguayan war, and the circumstances under which it occurred. He makes no claim for the purely paludal origin of the disease, but the facts presented distinctly show, I think, that for this pestilence along with the dysentery and malarial fevers that ravaged the forces, there could be found, in the general subtropical decomposition that prevailed, a common factor of production.†

And if we may speculate upon etiological affinities, we may certainly dream over therapeutical resemblances. There are few drugs limited to a single or specific action. The more familiar that we become with the materia medica, the more clearly do we see that classes of remedies operate in the same general manner, that few medicines are limited in their usefulness to any solitary pathological indication, and that individual remedies often have

† See also an article on *Cholera: Does it originate de novo?* by Dr. W. Alston. (*N. Y. Med. Jour.*, xxi., 2, Feb., 1875, p. 126.)

very varied action. It is in this very province, the action of medicines, that there is the least accurate knowledge. Even the so-called specific, quinine, has other powers than simple anti-periodicity, and these come into operation as necessities vary. We are justified in supposing that it is thus with ipecacuanha. As a specific it may be an emetic, but it has other applications. Final analysis may ultimately prove that the same drug always exerts the same kind of influence; but the conditions under which it is exerted so fluctuate that we are authorized in calling the modified manifestations different powers. Nor need we multiply illustrations of the unexpected modifications that size of dose and condition of patient induce. Twenty grains of calomel will produce no annoyance, when a fourth of that amount would be painful and irritating; half an ounce of the tincture of digitalis will restore strength to the trembling pulse in delirium tremens, when half a drachm would cause the heart to flutter more wildly. The tolerance of opium in peritonitis, and of alcohol in snake-bite, are well known. The frequent tolerance of ipecacuanha in dysentery is established; its rejection in cholera is not proven, and is by no means necessary.

If the pathological and therapeutical views here expressed are well-founded, we are not to look for one drug as a cholera-specific or antidote—a neutralizer, as vaccination antagonizes variola—but we will find that various ganglionic and vaso-motor stimuli may profitably be employed in cholera, and that ipecacuanha may be used in other disturbances of the sympathetic and vaso-motor systems, as indeed I believe has already been illustrated. Just where its maximum of power with the minimum of resistance are to be found, is yet entirely unsettled. In confirmation of this general view is explained the action of atropia, which is understood to cause contraction of the capillaries, and which has been used hypodermically with a certain degree of success.† But the most valuable therapeutic contribution hitherto made to this subject is the employment of the bromide of potassium, based on the pathological hypothesis herein expressed. Thus, in 1873, Dr. William Pepper, on theoretical grounds, suggested (*Phila. Med. Times*, iii., pp. 651, 742,) its intravenous injection in solution. I do not know that this has been put in practice. Dr. Pepper, however, has been anticipated in its general use by Dr. James

† Ergot, whose action is of the same general character, has also been used, but not very successfully.

Begbie, of Scotland, (*Edin. Jour.*, 1866, xii., pp. 488, 490,) who, from identical reasoning, recommended it, and on whose recommendation it was used in the Leith and Edinburgh Cholera Hospitals. Dr. Begbie says that "although not possessing the properties of an antidote to the poison of cholera, though not a specific to the shock of this terrible disease, [it] has certainly stript it of some of its terrors." This view has received an independent but strong support by a series of cases published by Dr. Salvator Caro, (*Med. Record*, iv., p. 195,) in 1869. That paper gives in detail twenty out of one hundred and sixty-three cases, running through all the morbid states, from a simple serous diarrhoea to cholera infantum, dysentery and septic cholera, and embracing young and old, where it was successfully used. And the conclusions of one of the latest investigators, Dr. Robert Amory, (1872,) give abundant theoretical confirmation. He has satisfied himself, (*Phila. Med. Times*, ii., p. 335,) that: "The effects of the drug are produced by its direct action upon the blood-vessels or the vaso-motor system which controls the contraction of those vessels, which explanation may account for all the physiological or therapeutical conditions brought about by the exhibition of the drug."†

But recurring to M. Marey's opinion, that both cholera and the periodic fevers are due to vaso-motor disturbances, we find that Dr. John Murray, late Inspector General of Hospitals, Bengal, in his *Observations on the Pathology and Treatment of Cholera*,* (1874,) strongly advises in the premonitory stage the use of two-grain doses of quinine three times a day (Review in *Phila. Med. Times*, iv., 1874, p. 636); and, on the other hand, we are reminded that the emetic action of ipecacuanha, under the idea of producing 'a shock' or of 'breaking up the habit,' (an explanation savoring more of mediæval mysticism than of modern therapeutics,) has been frequently invoked in the treatment of an ague, especially when obstinate. And in the *Indian Medical Gazette** for June, 1872, (*Phila. Med. Times*, ii., p. 416,) Udhooy Chand Dutt, a civil medical officer in India, reports the cure of seventy-four out of seventy-six cases of intermittent, in from three to five days, by the administration of minute doses of ipecacuanha.‡ It

† H. C. Wood considers (*op. cit.*, pp. 281, 283,) "no decisive proofs have, however, yet been offered of the truth of this favorite dogma."

‡ It was formerly an English, and is yet a common Italian, practice to administer an emetic of ipecacuanha at the beginning of an intermittent at-

is perfectly conceivable that the sympathetic may be affected in a way to give rise to the intermittent phenomena of miasmatic [paludal] disease, although it does not follow that we can explicitly describe or accurately paint the actual histological conditions involved, and that moderate [or 'alterative'] doses may correct that state. Such an hypothesis explains the pseudo-choleraic collapse of certain grave forms of the disease, and encourages in them the non-emetic employment of the drug. For the absence of the choleraic discharge does not militate against the idea that the same division of the nervous system may be deranged with different manifestations.

And as, returning to the pathology of dysentery, which in grand outline resembles cholera and where the general fever and so-called inflammatory condition of the first stage are not proportional to the suffering, we find that when ipecacuanha is properly given before organic changes [ulcerations] occur relief is speedy, so we are bound to consider that the drug in some way, directly or indirectly, antagonizes the toxic principle, allowing health to return. If anything in practice is certain, it is that bleeding and calomel will not abort acute dysentery and that ipecacuanha fairly abolishes it. We have at the least, therefore, a fair presumption in our favor when we anticipate that the hy-drorrhagia of the more alarming pestilence may cease † as promptly as the smaller and more hæmatoic discharges of the commoner disease. But it requires faith and a certain kind of courage to administer to a patient, already sadly vomiting, what for two hundred years has been the type of an emetic. But, used with care, I am confident that it checks that symptom if it de-

tack; and although the French think that it is only useful by relieving gastric embarrassment, many claim that it has a febrifuge action analagous to that of quinine. Polichronie (*op. cit.*, p. 24,) regards it of sufficient interest to merit renewed research.

NOTE.—Between the time of writing this paper and that of printing this portion of it, I have experimented with non-nauseating doses of ipecacuanha in intermittents, and have found in more than twenty consecutive cases that it controlled the disease as promptly as quinine would have done. I hope to be able soon to publish the details. Meanwhile clinical studies, with careful notings of pulse and temperature, could easily be made, and would probably compensate for the trouble.

† It is to be remembered that, during this very summer [1874] cholera infantum, so analagous to Asiatic cholera in its manifestations, yielded promptly to ipecacuanha in the hands of MM. Choupe and Huchard (*vide supra.*)

pende on no extrinsic cause. It is the first step that counts; that taken, the rest are easy. Authentic empirical illustrations of its power dot medical records for at least sixty years. Give ipecacuanha freely but cautiously—cautiously does not mean timidly—in the vomiting of exhaustion, and it will arrest it. There is no invariable human formula, but anti-emesis quite as often as emesis will be the expression of its function.

There are two additional fragments that I desire to introduce into this mosaic before it leaves my hands, imperfect and perhaps unintelligible to others as it may even then remain.

The first concerns the condition of the gall-bladder in collapse and the absence and reappearance of bilious stools. An essential, if not the pathognomonic, symptom of the disease, notwithstanding its misnomer, is the absence, not the flow, of bile; and a large section of the profession has sedulously occupied itself, by the employment of calomel and other presumed cholagogues, in the attempt to re-establish that discharge; for the reappearance of bilious stools is universally hailed as a sign of convalescence. Now the gall-bladder is generally found filled in collapse, (notwithstanding that vomiting is supposed to mechanically force out its contents,) and the retention of bile is only the sign, not the cause, of the disease. Undoubtedly bile flows because convalescence begins; health does not return because bile flows. And we may readily understand why this is so when we remember that the muscular tissue of the gall-bladder is unstriped, and is under the nervous control of the sympathetic. If that nerve is paralyzed this receptacle does not give vent to its contents; when the sympathetic reasserts its power the discharge reappears.

The second is the following. Mr. Sedgwick, (*Lancet*, Dec., 1871, p. 646,) in a sentence opposing the purgatives of the Johnsonian teaching, uses these words: "a careful and scientific investigation of the stage of convalescence, especially with reference to the occurrence of temporary glycosuria," etc. From this I do not understand whether he refers to temporary glycosuria as a well-known and admitted fact, or means to suggest that it may occur and should be looked for. I have found no other reference to its existence in the authorities that I have been able to consult. For myself, I do not know whether sugar is present in the urine that begins to appear with the establishment of reac-

tion, but, if this should be the case, it seems to me susceptible of an explanation, curious from the nice interplay of somewhat complicated conditions and affording another argument for the employment of the drug. (It may seem presumptuous to seriously ask attention to so much that is supposititious. But the suggestion may at least lead to investigation by those better prepared for investigation.) We know, or at least we believe, that diabetes depends on the dilatation of the capillaries of, and on the consequently more rapid circulation of blood through, the liver, and that it follows the paralysis or exhaustion of that part of the sympathetic that supplies it. Professor Cyon (*Brit. Med. Jour.*,* Dec. 23, 1871, quoted in *Phil. Med. Times*, ii., p. 196,) has shown that the fibres composing the annulus of Vieussens particularly preside over the hepatic circulation, and that their irritation induces the diabetic condition. But if the entire sympathetic is cut or paralyzed diabetes does not occur, because "those parts of the nervous system contain the vaso-motor fibres for the vessels of the intestines: and when they are cut, the vessels dilate, and blood accumulates in them to such an enormous extent that there is either too little blood remaining, or it is under too low pressure for the circulation in the liver to become increased above its normal, even though its vessels be dilated." We know, however, that the liver is found gorged with blood when death occurs in collapse, or, that is to say, when its sympathetic fibres are paralyzed. We may therefore naturally infer that when reaction begins and the circulation tends to recover its usual tone, more blood than usual passes through the liver under the combined effect of the partly dilated vessels and the increased force of the circulation, and we might therefore look then for the temporary glycosuria that could occur neither in the profound stage nor when the health and the normal circulation are restored. And this pathological condition gives support to the therapeutic view here advocated, when we remember that, as long ago as 1862, Pecholier announced (H. C. Wood, *op. cit.*, p. 364; fr. *Gaz. Med.*,*) "that in animals killed by it [ipecacuanha] no hepatic glucose can be found."† The inference of course may be drawn that it suspends the glycogenic function because it acts upon the vaso-motors (through the sympathetic) in directly the reverse manner in which traumatic injury or cholera poison is active.

† Pecholier, (*op. cit.*, p. 40,) " nous avons constaté des efforts des vomissements, * * * la disparition du sucre dans le foie."

The disease paralyses the nerves and dilates the vessels; the drug stimulates the nerves and contracts the vessels.

These explanations of the two conditions just described satisfy my own mind and, so far as I am aware, have never heretofore been published.

As a matter of course, the whole materia medica has been ransacked for a cure for the pestilence that has girdled and devastated the globe. And in these trials so common a drug as ipecacuanha has been frequently employed, but generally, if not universally, as an emetic. Dr. George Johnson has used it in his eliminative practice (and it would be interesting to analyze his statistics with a view to observe if the so-called tolerance was established, and whether there was any observable connection between the degree of his success and the amount of this medicine that was retained). Peters writes (*op. cit.*, p. 139,) "Waring says, the mortality has been very large under its use when given in full emetic doses. Others say it has been given successfully in five or ten grain doses every five or ten minutes. It causes violent attempts at vomiting, but after three or four doses tolerance is established. In the Paris hospitals, in 1865, ten to twenty grains were given whenever there was much vomiting." I have not been able to discover the originals or the particulars of any of the three statements just cited, but they all seem to refer to its emetic use.† Waring, however, after reprobating its emetic use as an eliminative, does say (*Prac. Therap.*, p. 361); "A far more promising practice is to administer it in very small, often-repeated doses, in the manner employed in hæmorrhages by Mr. Trenor. In the latter affections, even when a state of collapse supervened, the vital powers recovered themselves in a striking manner under the use of ipecacuanha; and the same remedy seems to merit a trial in cholera, even in the stage of collapse; the many points of similarity between cholera and profuse hæmorrhage would alone

† M. Decugis writes (*loc cit.*, p. 40.) "Cholera.—At its first appearance, in 1832, the physicians, struck by its resemblance to dysentery, proposed ipecac. M. Grisolle believed the remedy to be a specific (*crut a la specificité de ce médicament*) against the cholera; but in 1849 he was obliged to recognize the slight utility of the administration of that substance. M. Brignet employed it also at the Charité with as little success: for ourselves, we have known, during the epidemic that scourged Toulon in 1865, that ipecac did not more than other remedies succeed in assuaging the grievous attacks of that terrible disease."

suggest its probable utility. The more recently ascertained facts with regard to the power of minute doses to arrest vomiting are strongly in favor of its probable efficiency."† If it is allowable to discuss hypothetical conditions in the absence of practical demonstration, I should say that one of the differences between the hæmorrhagic and choleraic conditions is, that in the former the capillary lesion is, so to speak, passive, the result of exhaustion; while in the latter it is active, being impressed by the positive toxic element: and that, while small doses might be trusted to restore the capillary tone in the one or negative condition, unless we embrace the homœopathic doctrine of attenuations and potencies, we must use larger quantities to antagonize the active morbid influence. It is my belief that emesis is influenced less by the size of the dose than by the manner of its administration. "The doses given by Mr. Trenor varied from gr. j.-ij. every fifteen or thirty minutes until nausea was felt," (Waring, *op. cit.*, p. 360,) while in a large series of cases published by Dr. Samuel Pye, "The average quantity which he gave was only two grains, yet it generally produced vomiting three or four times, and sometimes oftener." (Stille, *op. cit.*, ii., p. 391.) On the other hand, I have repeatedly given twenty-five grains without inducing vomiting, and one and two drachms have been similarly administered in East Indian practice.

A corroborative suggestion to the therapeusis proposed in this article I have found in a paper by George Barnard, Esq., Surgeon 6th B. L. I., (*Am. Jour. Med. Sci.*, no. cxiii., Jan., 1869, p. 246,) who takes the ground that cholera is practically an intense inflammation of the mucous membrane, and advocates its treatment by grain doses of tartar emetic every fifteen minutes until vomiting ceases, and further says: "30 grains of antimony's ally, ipecacuanha, will have the same effect given in the same way every quarter of an hour. See Docker's case of forty grains ipecac in advanced collapse, (*Lancet*) and 392 cases by Dr. Carl Muller, Vienna." I should hardly be willing to subscribe to the

† Of this, although it occupies a prominent place in his valuable article on the drug in question, it is proper to observe that I was unaware when I used it in large doses in the cases of cholera morbus, and when it occurred to me that it might be available in epidemic disease. It may also be noted that Dr. Waring regards ipecacuanha as a sedative, (*op. cit.*, p. 356,) and offers no rationale for its presumed action in such cases, except indirectly and by implication.

pathology advanced or to the antimonial treatment advocated, but the implication that ipecacuanha has been actually employed in this manner is extremely interesting. The references are so indefinite that I have been unable to verify them; but if it should prove that three hundred and ninety-two *successful* cases of the use of ipecacuanha in large doses are on record, that ought to settle the question empirically, whatever may be ultimately demonstrated as its mode of operation.

I earnestly entreat of those who may be tempted by anything that has been said in these pages to use large doses of ipecacuanha in the diseases discussed, that they will carefully adhere to the non-emetic method. Without doubt untold suffering has been endured during the past two centuries from the gradual abandonment of the remedy after its triumphant introduction into Europe and before its recent revival in Asia—a disuse for which this disagreeable and wholly unnecessary concomitant is chiefly responsible. In practical medicine the least things are sometimes important.

I neither have the opportunity nor claim the ability to prepare an exhaustive essay upon these interesting subjects, but I have made this paper as complete as my means would allow, knowingly omitting nothing *pro* or *contra*. I have preferred to err on the side of prolixity, by actually quoting the authorities and carefully explaining my own meaning, than to be charged with misrepresentation or assumption as to the views of others, or with ambiguity and cloudiness upon my own part. And I have entered every reference as I have consulted it. I trust that I may not be charged with that vaulting ambition which o'erleaps itself, in the choice of a subject. The subject indeed forced itself upon me, and being present, I have sought to treat it honestly and fairly, with a simple desire to increase the means of relieving human suffering.

If, as I sometimes hope, the work that the theoretical part of this paper represents has any value, it is chiefly due to those skilful and earnest laborers in the domain of science who have collected the material and have unselfishly offered it for the public good. I have merely selected certain cuttings, and have drawn them into relationship. The little portal that I have built I hope may prove a minor entrance to the great cathedral of the common weal. It may be but a doorway to some subterranean or useless

gallery, or at best be fit only for transformation into a fantastic gargoyle to carry off the waste water of the scientific skies. Should it be so, the material has not been damaged and it can easily be re-wrought. If happily the former, but little praise belongs to the lucky designer who has stumbled upon the carefully-hewn and generously-given blocks.

