The recent work of Fellenberg, McClendon, Hercus, and others, having emphasized the difficulties attendant on the estimation of iodine in soils and water, led me to think that more refined methods of analysis might possibly reveal significant differences in the iodine content of the two waters. Accordingly on my return to India in 1925, so as to settle the matter finally, I secured the co-operation of three chemists: Major C. Newcomb, M.D., F.I.C., I.M.S., Chemical Examiner to the Madras Government; Mr. B. Viswanath, F.I.C., Agricultural Chemist to the Madras Government; and Dr. R. V. Norris, D.Sc., Professor of Biochemistry, Indian Institute of Science, Bangalore. Each undertook to examine independently the published methods of iodine determination in soil and water, and to select the method which he found gave the most reliable results or to evolve another for himself. While their preliminary investigations were in progress I obtained, through the kindness of Captain P. Savage, I.M.S., medical officer of the school, and of Lieut.-Colonel J. Cunningham, I.M.S., Director of the Pasteur Institute of India, Kasauli, samples of soil and of water concentrates from both Sanawar and Kasauli. The concentrates of the old and of the new water supply were prepared, with minute attention to detail, by Colonel Cunningham, after the manner recommended by McClendon. Meanwhile each of the three chemists had evolved a method of iodine estimation which appeared to be satisfactory; their methods, however, differed in detail. The samples of soil and water concentrates were then sent to them at Madras, Coimbatore, and Bangalore respectively; each chemist being unaware of their source. The results are given in the table.

Sample.	Iodine Content in Parts per 10,000,000.		
	I.	II.	III.
Old water supply of Sanawar school ...	1.0	Trace	Trace
New water supply of Sanawar school ...	1.0	Nil	Nil
Sanawar hillside soil ...	35	16	30
Sanawar garden soil ...	8	5	30
Kasauli hillside soil ...	45	32	10
Kasauli garden soil ...	10	4	0

Column I, Major Newcomb's results; Column II, Mr. Viswanath's results; Column III, Dr. Norris's results.

The details of the methods of iodine determination adopted by the three observers will be given in a future report on the relation of iodine in soil and water to goitre, when the various technical difficulties and sources of error will be dealt with by them. Meanwhile it may be said that their results, arrived at independently, show a close correspondence and a general agreement* in regard to the following points with which this paper is mainly concerned:

1. The soils and waters of both Sanawar and Kasauli are poor in iodine.
2. There is no significant difference in the iodine content of the soil in the two places.
3. The old water supply of the Sanawar school contains appreciably more iodine than the new, which contains little or none; thus confirming the previous reports of the Chemical Examiner, Punjab, in regard to the new supply.

It is obvious, therefore, that the disappearance of goitre from the school cannot be attributed to the presence of iodine in the new water supply.

The conclusion arrived at in my first report, that endemic goitre in the Sanawar school was due to the bacteriological impurity of the old water supply, is thus substantiated; and the prediction that it could be eradicated by the provision of a chemically and bacteriologically pure water supply has been justified by the disappearance of the disease.

REFERENCES.

- 1 McCarrison, R.: *Indian Journal of Medical Research*, 1914, i, No. 3, pp. 1 to 53.
- 2 McCarrison, R.: *The Aetiology of Endemic Goitre*, London, 1913.

* The differences in the results of the three observers are not significant; they fall within the limits of experimental error.—R. McC.

CARCINOMA OF THE COLON.

AN ADDRESS GIVEN TO THE GLOUCESTERSHIRE BRANCH OF THE BRITISH MEDICAL ASSOCIATION

BY

R. P. ROWLANDS, M.S., F.R.C.S.,

SURGEON TO GUY'S HOSPITAL.

THE results of primary operation for carcinoma of the colon are good, contrasting favourably in this respect with cancer of the stomach or rectum. It generally kills by causing intestinal obstruction, and if we avoid this by removing the growth at an early stage the hope of cure is a good one. The disease usually originates as an ulcer or occasionally as a papilloma. It spreads slowly in the wall of the bowel and takes a long time to infect the lymphatic glands or to invade the liver through the portal vein. Mr. F. T. Paul¹ has pointed out that there are three main types of this disease. I will quote his words.

"The three varieties of carcinoma are: (1) The large soft fungating 'encephaloid' type; (2) the small hard 'scirrhous' type; and (3) the infiltrating 'colloid' type. All may be said to be primarily columnar-celled growths originating in the intestinal glands, and all ulcerate, but they follow different paths of evolution, and attain different degrees of malignancy which it is important to recognize. The scirrhous variety is always unmistakable. It produces the hard ring stricture of the bowel, and is more common than colloid cancer, but much less frequent than the soft fungating type. This latter may usually be as easily distinguished from the colloid form of growth by the following characters: It is softer to the touch. There is a good deal of fungating growth within the bowel, but generally not much solid infiltration of the bowel wall. There are usually numerous large soft glands in the neighbouring mesentery, which are septic and not malignant. In colloid cancer, on the other hand, there is a hard-edged ulcer with no fungation. There is dense hard infiltration of the bowel wall, often attaining a thickness of from one to two inches, and giving it a solid feel. The glands, if affected, are not soft, but hard and glistening. . . .

"*Misconceptions Regarding Cancer.*— . . . The really important misconception, however, concerns the relative malignancy of the three varieties of cancer. Usually the big, fungating, encephaloid type of growth is regarded as the most malignant; the colloid as being intermediate, and the scirrhous, or ring stricture, as the most benign. This arrangement is entirely wrong and out of accord with clinical experience. The colloid is the most malignant type, the ring stricture comes next, and the fungating type is the best—it being one of the least malignant kinds of cancer met with in the body.

"It is a clinical fact of considerable importance, to which I have often referred at our local medical society, that the up-growing forms of cancer are essentially less malignant than the down-growing, ulcerating and shrinking types.

"The most common sites for the fungating type of growth are the rectum and caecum, though it often occurs in the sigmoid, and occasionally at any other part of the large bowel. Colloid cancer chiefly selects the rectum, and ring stricture the sigmoid, though neither is limited to these regions."

SYMPTOMS AND SIGNS.

The symptoms and signs are insidious in their onset and generally develop in a patient approaching, at, or over middle age. They consist of "indigestion or flatulent dyspepsia" of the intestinal type, with alternating diarrhoea and constipation; there are many urgent calls, with more or less futile attempts, to empty the bowels; naturally formed motions are rarely passed, but small pieces with, perhaps, blood and slime. Occult blood is generally found when the patient has been for some days on a meat-free diet. The abdomen gets somewhat full and distended, colicky pains are frequent and are associated with visible peristalsis. A tumour is often felt on bimanual examination of the loin or pelvis, but it is difficult or impossible to feel a growth of the splenic flexure.

Radiographic examinations after opaque meals or enemas are often of great value, especially if the findings are constant and repeated, but there are many fallacies associated with this method. Examination with the sigmoidoscope is far more reliable as regards the part of the bowel that is within its reach, but the instrument has to be used with care and discretion. In many early cases the diagnosis cannot be established without exploratory operation, and this should be undertaken whenever there is grave doubt, for it allows the growth to be removed in its early and hopeful stage.

When chronic obstruction is succeeded by acute, often the result of inflammation or plugging of the stricture by

a scybalum or sometimes by a faecalith, the abdomen becomes greatly distended, but its shape and size are very different from those due to obstruction of the small intestine, one or both flanks being full and prominent. The size and shape of the caecum become evident during spasm and pain, and other parts, such as the transverse or sigmoid colon, may become visible during colic. The patient himself may point to the site of the obstruction, having noticed pain, and especially gurgling, at a particular spot, or the medical attendant may make this observation.

DIAGNOSIS.

Cancer of the colon is often mistaken for other diseases of the colon, especially ulcerative colitis, dysentery, and sprue. We ought to be very uneasy about the diagnosis of chronic colitis, and always seek the cause of it by thorough examinations. Many patients who have been treated for one or more years for ulcerative colitis come at last to the surgeon too late for radical operation; the same is true of dysentery and sprue.

Diverticulitis of the pelvic colon mimics carcinoma to a remarkable degree, but in this disease there is usually a history (sometimes of over twenty years) of recurrent attacks and fever, with incomplete obstruction and pain, perhaps swelling, in the left iliac fossa. There is rarely any history of blood and slime, and careful radiographic examinations after opaque meals and enemata demonstrate the presence of diverticula in the colon. The most conclusive evidence is the finding of opaque spots in the bowel after the meal or enema has been evacuated, some of the opaque material having been retained in the diverticula. In the interval of the attacks these patients are often quite well. The diagnosis is most important, for operation is not always the best treatment for diverticulitis. It is possible, however, for the two diseases to coexist, as actually happened twice in my experience.

Papilloma and adenoma of the colon may be mistaken for carcinoma. One of my patients, a middle-aged woman, had severe remittent rectal haemorrhage on and off for nineteen years; when at last operation was performed there were five papillomata of the pelvic colon, one of which had become carcinomatous at the base.

Appendicitis with chronic suppuration has not uncommonly been mistaken for carcinoma of the caecum or ascending colon, but here there is usually a definite history of acute and sudden onset of pain with fever. In some cases exploration is necessary to settle the diagnosis.

Tuberculosis of the caecum, forming a massive swelling, sometimes simulates carcinoma, and so does volvulus of the pelvic colon, causing acute obstruction. In several cases where I expected to find carcinoma of the colon I fortunately only found pericolic bands, division of which brought cure. In some instances a gall stone, impacted in the narrow pelvic colon, has been mistaken for cancer, and in some a faecalith has led to the same mistake.

In old people ordinary faecal impaction with irritating diarrhoea has often been mistaken for cancer, but the mistake is easily discovered upon examination of the rectum and finding scybalous masses there. Rectal bleeding due to other causes has led to error. For instance, I remember a man who had very severe rectal haemorrhage, causing him to faint; sigmoidoscopy some days later showed blood in the pelvic colon and an apparent stricture. Carcinoma of the colon was diagnosed, but this diagnosis was not confirmed at the exploration; the source of the bleeding was found to be internal piles, which were successfully removed.

Almost any other abdominal tumour may be mistaken for carcinoma of the colon, or vice versa. I recently mistook a distended and very large gall bladder, measuring eight inches in length, for a growth of the caecum and ascending colon, but the absence of serious intestinal symptoms, and especially the history of previous attacks of biliary colic, should have prevented this mistake.

The diagnosis is not complete until it has been ascertained whether the growth is removable, therefore it is vital to look for signs of secondary growth in the liver and peritoneum. Rectal or vaginal examination often discovers secondaries in the pelvic peritoneum, rendering a radical operation impracticable. Before advising such a

severe operation as removal of cancer of the colon it is also necessary to ascertain the state of the general health and of the viscera, especially of the kidney.

TREATMENT.

1. The ideal is to discover the growth early and remove it without delay, thus to cure the patient at one operation. End-to-end union, after removal of the growth, is nearly always the best and most economical, but for growths of the caecum, ascending colon, and hepatic flexure, for which the lower six inches of the ileum, the caecum, and the right colon have to be removed in order to effect a cure, it is better to make an end-to-side union between the ileum and transverse colon.

To attain success in these resections careful preparation of the patient, accuracy in sewing, perfect haemostasis, scrupulous cleanliness, and free drainage are essential. In order to drain the colon freely and prevent gaseous distension and undue tension upon stitches it is sometimes necessary to add caecostomy or to use a rectal tube passed up into the colon through the anastomosis.

CASE I.

A medical man, aged 48, was one of nineteen children. His father and one brother died of cancer of the bowel. He himself had suffered for years from piles from which bleeding had often occurred. For the last two years there had been a good deal more bleeding from the bowel, and this had often been associated with pain in the left iliac region. In March, 1910, the bleeding became more severe and came on quite apart from defaecation. He gradually got into poor health and wasted a good deal, and a fortnight before I saw him he fainted. Mucus and much blood escaped from the rectum. The patient saw several consultants and was referred to me for operation on October 19th, 1910.

I felt an elevated growth high up in the rectum. I could not find any stricture, but only what appeared to be an ulcer occupying one side of the bowel. During the examination the growth receded out of reach, clearly showing that it was fairly high in the bowel but had intussuscepted into reach. Then the receded growth could be felt through the anterior wall of the rectum. It was thought that an abdomino-anal resection would be the best operation.

The bowels were well cleared out and the patient was kept at rest for three days and carefully prepared on a diet leaving little residue. Morphine, gr. 1/3, and atropine, gr. 1/150, were injected an hour before the operation on October 22nd, 1910, and axillary saline infusion was also commenced and continued during the operation, five pints in all being given. Open ether was administered by Mr. Plumtre. The abdomen was opened through the lower and inner part of the left rectus and the growth was at once found in the lower part of the sigmoid loop about nine inches from the anus. It was freely movable, and some enlarged glands were felt in the meso-sigmoid. The liver and lumbar glands were normal. The high Trendelenburg position was adopted, and it was decided to resect the growth abdominally and join up the colon end to end. This was carried out, nine inches of bowel and the lymphatic area being removed. Microscopic examination of the enlarged glands showed inflammatory changes only. End-to-end union was performed with two silk sutures. The first was a continuous Connell and the second a continuous Lambert suture. The packs were removed and the rent in the mesentery was closed as far as possible with catgut sutures, and the bowel was replaced. The peritoneum was cleansed of blood and the wound was completely closed in layers. The operation lasted an hour and a quarter, and at the end of it the patient was not collapsed. On opening the piece of bowel removed it contained no faecal matter, only a little blood-stained mucus. An ulcer, two inches long and one and a half inches wide, with rampart-like edges was seen; the mucous membrane around it was much congested and inflamed. The ulcer did not encircle the bowel or appreciably narrow the lumen; it had clearly obstructed and caused pain only by intussusception. There were very few enlarged glands in the mesentery, except quite close to the growth, which was a columnar-celled carcinoma.

The patient did very well; the wound healed without any trouble, and he left the home within a month. He was at work in his busy practice within two months of the operation. He remained well for thirteen years and then died of an acute abdominal catastrophe—probably ruptured duodenal ulcer.

2. If obstruction has already developed an attempt should be made to overcome this by rest in bed, restriction of diet, and the use of enemata, but too much time must not be wasted on this endeavour. If enemata are successful the patient may be carefully prepared, as above, for a one-stage radical cure; but if the bowels refuse to act, prompt relief by operation must be given.

(a) *Caecostomy*.—In very grave cases, when the distension of the caecum is visible, blind caecostomy (Stiles) may be performed under local or general anaesthesia. This is practically devoid of risk. Subsequent examinations may reveal the cause and site of the obstruction and a secondary

operation may be successful in removing or short-circuiting the growth. In most cases of acute obstruction, however, the cause and site are not clear, therefore an attempt to perform a blind caecostomy may be disastrous. As already mentioned, the colon may be obstructed by bands, volvulus, or foreign bodies inside it; in one famous case a medical man suffering from acute obstruction was first explored in the left loin, in an attempt to perform left lumbar colostomy, but the descending colon was empty; a similar attempt on the right side was also futile, the ascending colon being empty. The patient died on the table, and at the autopsy the cause of obstruction was found to be a gall stone impacted near the lower end of the ileum. For these reasons I prefer to explore the abdomen, very carefully and gently, under light general anaesthesia, with the hand introduced through an opening in the right iliac region only just large enough to admit the folded hand. The liver is examined for secondary growths, the site and cause of the obstruction is discovered, and, if it be a growth, its removability is ascertained. While doing this, in a recent case, the caecum was discovered in the splenic area, showing how futile a blind caecostomy would have been. If there are no secondary growths and the primary carcinoma is removable, valvular caecostomy is performed, but if there is no hope of resection, either a short-circuit or a colostomy is made, for caecostomy as a permanent means of draining the bowel is intolerable, on account of the frequent and irritating fluid actions. As a rule it is worth while to run a slightly greater risk in these cases in order to avoid an artificial anus.

(b) *Colostomy* is better than caecostomy for certain cases: (1) when the growth is irremovable and short-circuiting is impracticable, as mentioned above; (2) when the obstruction is low down in the colon. For instance, when the growth is in the pelvic colon and the bowel just above it is greatly distended and more or less paralysed, caecostomy does not provide sufficient drainage, so that the descending colon remains full and inflamed for several weeks, making it difficult or impossible to perform a satisfactory secondary resection. Therefore in these cases a colostomy, slightly above the growth, is the best preliminary treatment.

(c) *Short-circuit.*—As already mentioned, this is very successful as a permanent measure when the growth is irremovable. It is also valuable in some cases when the obstruction is not too severe and the patient is fairly fit. For instance, a lady with a growth at the splenic flexure, causing complete obstruction for a fortnight, was treated by making a short-circuit between the middle of the transverse and pelvic colon. Nearly two months later the growth, which had shrunk to half its former size, was successfully excised, the patient remaining well now, six years later. In this case the resection was made easier and safer by the preliminary short-circuit, there being no need to make an anastomosis but only to tie and invert the ends of the colon near the one already made.

(d) *Primary Resection after the Method of Paul.*—Whereas it has been proved that primary resection with restoration of the natural channel is very dangerous treatment for acute and complete obstruction of the colon, the mortality being well over 50 per cent., it has not been sufficiently appreciated that the danger lies not so much in the removal of the growth (provided it is well and swiftly done), but rather in the union of soft, inflamed, and damaged tissues, which too often in the past led to leakage at the line of suture, which cannot stand any gaseous or faecal distension. When free drainage is provided the resection and even reunion may not be too dangerous. In many acute as well as chronic cases the method of Paul (often wrongly called that of Mikulicz) is safe, the growth being removed and the ends of the colon above and below being drained with Paul's tubes. The artificial anus thus made may close spontaneously or be closed later by a comparatively safe minor operation.

The chief objection to this method, which is rarely suitable except for mobile pelvic or transverse colons, is that the lymphatic glands cannot be widely removed. In spite of this, however, very good permanent results have been obtained.

CASE II.

A married woman had suffered for many years from constipation, which during the last few months had been getting worse; no blood or slime had been noticed. In the middle of December, 1910, she was seized with severe abdominal pain; the bowels were not opened and she passed no flatus. During the following fortnight the patient was kept in bed and was given opening medicine without avail, generally vomiting it; she had one enema without effect. She took little food and had very little sleep. At the end of the fortnight the pain and sickness were better and she was sent to Guy's Hospital. The abdomen was greatly distended and three times during half an hour visible peristalsis could be seen about the position of the caecum. The patient was then suffering from severe colic. She had shifting dullness in the flanks. The abdomen was neither tender nor rigid. The temperature was subnormal. Chronic intestinal obstruction, due to growth of the colon, was diagnosed, and it was thought probable that it was somewhere about the transverse colon. Rectal examination revealed no growth in the pelvis.

Operation.

On January 2nd, 1911, the abdomen was opened by displacing outwards the lower part of the right rectus. The caecum was at once seen to be distended, and the small intestines were also very distended. A large amount of clear fluid escaped from the abdomen. On passing the hand into the pelvis a growth was felt about nine or ten inches from the anus. It was a small contracting carcinoma. The bowel above it was greatly distended. It was seen that, although it would be possible to make an anastomosis between the ileum and the bowel below the growth, it would not then be possible to perform a secondary resection of the growth. Moreover, the patient's condition was bad. Therefore a small muscular separation incision was made in the left flank, and a loop of bowel containing the growth was brought out through this wound and fixed in position by means of a Spencer Wells forceps passed through the mesentery and clamped on a pad. The incision was then closed and covered with a sealed dressing. A roll of gauze was wrapped round the base of the loop of sigmoid, and then a Paul's tube was tied into the distended bowel, one inch above the growth. The patient was infused about four pints during the night. She made very rapid improvement and regained her natural colour, her face becoming much fuller. She ate and slept well.

Five days later, on January 7th, the growth was removed with the cautery, the lower limb being divided first about two inches below the growth, then the mesentery, a wedge of which was removed, and lastly, the bowel, about three inches above the growth, was divided. The vessels were tied and the two ends of the bowel were sewn together, starting at the mesenteric border and proceeding in each direction towards the free border, leaving an aperture just large enough to admit a small Paul's tube, which was tied in. Two days later the tube was removed.

About three months later, the colostomy not closing, an operation was done to close it and to remove the glands more freely, but unfortunately a pelvic abscess formed and had to be drained, with the result that all the faeces escaped at the wound and none through the rectum. After some weeks the patient was discharged, to come in later for further treatment, but, at the end of three months, she cured herself by passing a bougie through the anus and rectum into the pelvic abscess. From this time the bowels began to act naturally and the wound healed. She was seen, in good health, eleven years later.

(e) *Resection with Drainage by Rectal Tube.*—In some cases, when the growth is in the pelvic colon, primary resection may be carried out with safety, provided the upper bowel is well drained by a rectal tube passed up through the anastomosis.

CASE III.

A man, aged 51, came to see me on April 29th, 1918. He had not had his bowels open for eight days. He had suffered much pain in the abdomen and was more or less collapsed, with a subnormal temperature; he had not vomited, but had felt very sick. He also had a distended abdomen, and the bowels could be seen through the abdominal wall to be in violent peristalsis. He was particularly shrivelled and thirsty because he had abstained from both drinking and eating more than a minimum for three or four days, showing wonderful strength of mind. This had brought him into a very low state. On examining by the rectum I could feel a hard lump in the recto-vesical pouch, between the bladder and the rectum. This was thought, and proved, to be a growth in the dependent loop of the pelvic colon. More enemata were tried without success, and the next day an incision was made to the left of the mid-line, the loop of colon containing the growth was brought out of the wound and the greater part of the pelvic colon, with its mesentery, removed. End-to-end union was made. Then a long tube was passed up into the colon above the anastomosis and sewn to the skin near the anus.

The patient did well, returning home three weeks later. He was heard of as being in good health eight years later.

After-Treatment.

The after-treatment of patients submitted to colectomy is just as important as their preparation before the operation. The commonest error is the too early and too frequent use of purgatives, whereas the ideal is to let the bowel rest in peace. As soon as possible I give half to one ounce

of pure liquid paraffin morning and evening and get the patient on full diet, generally within three days of the operation, with the result that the bowels usually act normally after three or four days. Sometimes the action is delayed without any harm. Occasionally it is necessary to run olive oil into the rectum through a soft catheter. No strong purgative or ordinary enema is given.

REFERENCE.
1 *Selected Papers*, 1925.

THE ESSENTIAL OIL TREATMENT OF CHOLERA.

BY

ALEXANDER CANNON, M.B., CH.B. LEEDS,
CANTON.

RECENTLY Dr. Tomb introduced in the Asansol Mining Settlement, Bengal, a treatment of cholera by an essential oil mixture made up as follows:

Spt. aether. ...	...	...	...	m xxx
Ol. caryoph. ...	...	...	...	m v
Ol. cajup. ...	...	...	...	m v
Ol. junip. ...	...	...	...	m v
Acid. sulph. aromat. ...	...	...	...	m xv

One drachm, in half an ounce of water, to be taken every half-hour (in case of cholera); total average dose 8 drachms. One drachm, in half an ounce of water, daily, is an excellent preventive.

This mixture should be given immediately, when practicable, but it is claimed (and here it has been proved) that in 95 per cent. of cases recovery will be secured within a period of seven hours from the onset of symptoms. No special care need be paid to subsequent dieting. Vomiting, purging, and intestinal pains appear to be immediately controlled by this mixture. As little supervision is requisite, the value of the method in mass treatment of natives is obvious.

Manson-Bahr and others state that the cholera vibrio may be found in the stools for as long as forty-four days after the patient has commenced convalescence. Bacteriological examination so far shows that following the administration of Dr. Tomb's mixture the vibrio ceases to exist after a period of from six to twelve hours from the commencement of the treatment, thus apparently reducing the quarantine period from forty-four days to twelve hours. This is a matter of considerable importance from the shipping point of view, as it is not necessary to keep a ship in quarantine for more than twelve hours, since everyone on board (passengers and crew) can be treated as a potential cholera case and given a dose of the mixture every half-hour for four hours (which is sufficient to cure a case of cholera, seen within seven hours of the first symptoms, up to 95 per cent. recoveries, and practically 100 per cent. if given as soon as symptoms appear).

I have bacteriological proof that this mixture can also clear up a case of typhoid fever within twenty-four hours, which is a matter worth investigating, as this might prove an infallible mixture for those diseases where the germ is present in the intestines, etc.

The few cases of cholera we have had here had not taken the essential oil mixture once a day as a preventive. Most of these, when first seen, had marked choleraic symptoms with the typical rice-water stools, and on bacteriological examination, which in some cases was confirmed by Surgeon Commander R. Buddle, R.N., the cholera vibrio was found to be present, and in large numbers, in every case. Only one patient died, and he refused treatment until twenty-four hours after symptoms appeared, when I was called in to see him for the first time. He was in the algid state, and before an intravenous saline injection could be given he died. All other cases recovered in from seven to twenty-four hours of commencing treatment; those recovering in seven hours had immediately resorted to the treatment, and those who took longer to recover had awaited until their symptoms were so marked that treatment had to be strictly enforced. I append a few brief notes of cases.

Case 1.—A man, aged 35, had violent cramps, vomiting, and rice-water stools. On microscopic examination the cholera vibrio was found to be present. The essential oil treatment was given

within two hours of the commencement of symptoms. Six hours later no vibrios were to be found.

Case 2.—A man, aged 32, had symptoms similar to those of Case 1, but no vomiting. Microscopic examination showed the presence of the cholera vibrio. He was given the essential oil treatment within five hours of the onset of symptoms. The vibrio ceased to exist after ten hours.

Case 3.—Lieutenant B., R.N., aged 26, also had symptoms similar to those of Case 1. His doctor at first treated him with opiates, but when he became worse the essential oil treatment was resorted to, and after eight doses at half-hour intervals the patient began "to feel himself again." Although both the surgeon commander and I had confirmed the diagnosis by microscope, when the patient was examined at the Naval Hospital, Hong-Kong, eleven hours later, no vibrios were found.

Case 4.—A woman, aged 26, with symptoms similar to the previous case and also marked tenderness over McBurney's point. The case was not notified to me until at least thirty hours after symptoms had appeared, and the patient was in a very weak condition and passing stools every minute or so. Essential oil treatment was immediately carried out, and within twenty-four hours the patient was convalescing.

Case 5.—A Chinese coolie, aged 48, had typical symptoms, as briefly described in Case 1; they began at 4 o'clock. Treatment by essential oils was commenced immediately, and at 9 o'clock the same evening the patient went home free from vibrios, and therefore a non-carrier.

Case 6.—This patient was a Customs officer, aged 32. His symptoms were similar to those of the other patients. Nine hours after treatment by essential oils no vibrios were to be found.

Case 7.—This patient, a commissioner, had the typical symptoms, but without any marked cramps; they commenced at 3.30 a.m. Microscopic examination showed numerous cholera vibrios to be present in the stools. Essential oil treatment was resorted to at once. At 6 a.m. the patient felt that he had taken a turn for the better; he was up the next morning by 10 o'clock. The stools were examined under the microscope and no vibrios found. At 2 p.m. the same day he resumed duty, although feeling rather weak.

Case 8.—In this patient, a nurse, the symptoms commenced with marked vomiting, then diarrhoea, which rapidly took on the appearance of rice-water stools. There were severe pains around the umbilicus, and the patient was so certain that she was dying that she did not want anyone to come near her and take risks. Essential oil treatment was given, and before sunrise the next morning she was well on the way to recovery.

This treatment could no doubt also be used in some kinds of intestinal toxæmia and in certain influenzal and rheumatic conditions. There seems to be no doubt that as a preventive and cure for cholera it is very efficient.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

TRAUMA AND SARCOMA.

THE relation of trauma and malignant disease is a question which has always been debated in surgery, and cases clearly illustrating such a connexion are of considerable interest. It is now generally recognized that an important predisposing factor to carcinoma is the presence of chronic irritation, which may be a condition of mild, oft-repeated injury, either purely mechanical—as is often the case in epithelioma following the irritation of a jagged tooth—or mechanical together with a chemical factor, as is seen in mule-spinner's cancer of the scrotum.

Sarcoma, however, is often stated to follow upon a single injury, usually of a mild degree. Coley¹ has found a history of such trauma in 225 out of 970 cases of sarcoma, and the definite statement is made that a single injury may give rise to sarcoma of the breast, such a history having been obtained in nearly 10 per cent. of cases of this condition.

Boyd² states that sarcoma may arise after injury to bone, but the injury must not be of such severity as to give rise to a fracture. This apparently controverts a statement by Johnson and Lawrence³ that sarcoma may arise at the site of a fracture; in the latter case, however, it is often impossible to decide if the tumour was caused by or gave rise to the fracture. Sarcomatous change in the callus has been given as the primary cause. Cerebral tumour (? sarcoma) is said² to have followed a slight head injury. It is also stated³ that sarcoma rarely develops in a pre-existing benign tumour, but may occasionally occur in neurofibromatosis and endothelioma.

¹ Keen's *Surgery*, vol. 6.

² Boyd's *Surgical Pathology*, p. 160.

³ Choyce's *System of Surgery*, vol. i, p. 498.