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Carcinoma of the Large Bowel

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CARCINOMA of the large bowel is a serious problem. In the year 1935 in Ulster alone, with a population of 1,287,000, there were over 1,600 deaths from cancer, and of this number some seventeen to twenty per cent. belonged to the large bowel. The figures should probably be higher. Cases are certified as carcinoma of the stomach, intestinal obstruction, cardiac failure, etc., which are in reality carcinoma of the large gut.

SEX.

It is interesting that the figures show that males are more prone to the disease than females, by about 2.4 to 1. The explanation is unknown. Whether carcinoma in one part, as in the breast or uterus, prevents carcinoma developing in other parts by producing a type of immunity, is hard to prove.

SITES OF GROWTH.

The disease has a predilection for certain sites. One would expect that the areas of delay, the cæcum, the pelvic colon, and the rectum, would be most liable to harmful influences. The contents on the left side are solid and more likely to injure the delicate mucosa. Also the left side is not primarily adapted to storage and is probably more readily injured. The part of the cæcal wall opposite the ileo-cæcal orifice is the usual spot where a carcinoma of the cæcum starts. This is the spot most in danger of injury. Wakeley suggests that the alkaline contents of the cæcum abutting on this spot may be a causative factor.

Site of Growth in the Colon.

	J. Hopkins H. per cent.	R.V. Hosp. per cent.
Cæcum and ascending colon	35.3	24.0
Hepatic flexure	9.5	4.6
Transverse colon and splenic flexure ...	13.1	13.7
Descending colon and sigmoid	37.4	57.4
Site unknown	4.7	—

Rectum 6, Colon 4.

Pathology.

The growth starts as a proliferation of the normal mucous membrane, forming excrescences of the size of a pinhead to the size of a pea, or larger. The connective tissue at the base may also proliferate, forming a stalk, and the little tumour is pedunculated; or the tissue may not proliferate at the rate of the surface epithelial cells, and the growth is now a flat sessile tumour. A mucus is secreted by these epithelial cells, which tends to irritate them. Later a cell on the surface takes on a malignant change, and it gradually eats through, transforming the whole tumour into a malignant tumour. If there have been several adenomata, as is frequent, the others remain stationary or retrogress when one takes on a malignant change. The malignant tumour now spreads in the line of least resistance, it spreads more under the mucous membrane than on its surface, and tends to encircle the bowel. Miles reckons that it takes two years to encircle the gut. As it spreads, so it penetrates. It gradually works through the muscular coat. Up to now there has been no glandular invasion and the disease is strictly a local one. When it has penetrated the muscular coat, glandular metastases occur, and the disease is now free to spread without control. In a few cases, circulatory embolism occurs, but the percentage of cases of this mode of spread is negligible.

Dukes makes the following practical classification :—

Type A—confined to mucous membrane.

Type B—infiltrated the muscular coats, but not penetrated.

Type C—penetrated through the muscular coats.

As the tumour grows, the blood-supply of its central area becomes poorer, and it eventually necroses, forming the crateriform ulcer; there is also a tissue reaction at its base with the formation of fibrous tissue. This reaction varies in intensity, but occurs in all penetrating carcinoma. In the bowel this fibrosis leads to stricture formation. Different types of carcinomata are different stages in the same process. By the time a stricture is produced, the growth has penetrated the muscular coats, so that when obstruction arises the tumour is in the B or C stage.

Of one hundred growths examined at St. Mark's Hospital (Gabriel) :—

Stage A	1
Stage B	24
Stage C	75

Yet it takes months for the growth to pass from the A stage to the B stage.

When the growth has penetrated the muscular coats and affected the glands, it may invade the neighbouring structures. Growths in the hepatic and splenic flexures invade the perirenal fat, and where the colon has no mesentery, as in the ascending and descending colon, the muscles and skeletal structures are rapidly involved and secondary growths in the liver are common.

The hyperplasia of mucous membrane may not necessarily be the beginning of malignancy. The raspberry tumour of the rectum in children is a case in point. We have no evidence to suggest that these children develop carcinoma of the bowel. A villous hyperplasia also occurs in colitis and inflammatory conditions. But apart from these inflammatory conditions, this proliferation occurring in adults must be viewed with misgiving.

Numerous islets of proliferated mucous membrane may be scattered over the colon. Malignant change eventually occurs in one, and the neighbouring masses cease to grow. If this malignant area is removed, one of the other islet masses further up the bowel will in time begin to show malignant changes, and the patient will have a recurrence of the disease. In one set of patients the condition of polyposis is not hereditary and the patient has a chance, though small, of escaping carcinoma. But in another set the condition is hereditary (Polyposis Congenita), and malignancy is certain. The taint is handed down according to Mendelian Law. These patients with their inherent tendency do not show any sign of abnormal mucous membrane of the colon till after puberty. Then the condition may appear at any time. Lockart Mummery examined a patient with this tendency at the age of 39, and found the bowel normal, yet four years later the patient had the whole mucous membrane of the colon studded over with these potentially malignant growths. One might well ask what kept this malign influence at bay or what happened that made it declare itself? The answer of this question might settle the cancer problem.

Malignant growths in the colon are of relatively low malignancy. They are slow in invading the glands, and metastases in the liver are not common.

METASTASES (RAIFORD).

CÆCUM AND ASCENDING COLON.

Location	Number of Cases	Per Cent.
Lymph nodes	27 (Wk y. 32%)	40.4
Liver	1	1.5
Other sites	8	11.9
HEPATIC FLEXURE.		
Lymph nodes	8	44.4
Liver	1	5.5
Other sites	3	16.6
TRANSVERSE COLON.		
Lymph nodes	4	28.6
Liver	1	7.1
Other sites	0	0

DESCENDING AND PELVIC COLON.

Lymph nodes	14	19.4
Liver	5	6.9
Other sites	7	9.7

The right side of the colon is more plentifully supplied with glands than the left, and so glandular involvement is more common on the right side.

Even when a growth has existed for a long period and invaded its surroundings, if these are amenable to resection, a cure is not unlikely. An adenoma of the rectum should be looked on as essentially malignant, and a removal with its surroundings, including glands, undertaken. Gordon Watson says in regard to adenomata: "Malignant growth is the final aim of a mucosa which has acquired through hereditary tendency the desire to run riot." Lockart Mummery reports a case in which he removed an adenoma from the rectum. This on microscopical examination was reported as a simple adenoma. Twelve months later it recurred. It was again removed. This time the pathologist reported some evidence of malignancy. Eighteen months later an induration was felt in the surroundings, and the area and rectum removed by an abdominal perineal resection. Sections of the indurated area showed it to be invaded with malignant cells.

In considering the symptoms of this dreaded disease, we must constantly bear in mind the pathological lesion and its possible anatomical surroundings.

First—a vascular bud.

Second—an ulcerating tumour.

Third—an ulcerating tumour and fibrous constriction.

If the lesion occurs in a loose sac like the cæcum, it will tend to proliferate into the lumen as the line of least resistance, likewise in the ampulla of the rectum (fig. 1). In a narrowed area like the descending colon or the recto-sigmoidal junction, the tumour is subject to pressure; it ulcerates more rapidly and causes more constriction (fig. 2).

CLINICAL FEATURES.

Carcinomata of the large bowel is a disease of late middle life. The majority of our patients are between fifty and sixty years of age. One was under twenty years old, five were under thirty years, and one of the patients in the series examined was ninety years old.

One can say little of predisposing causes, except in the case of polyposis congenita already mentioned. Lane blamed habitual constipation; yet hospital figures do nothing to confirm this; and women, who are less prone to carcinoma of the colon, are more prone to habitual constipation.

Now, symptoms are the fruit of a disturbance in normal function. So to detect the earliest symptoms relating to an organ, one must be conversant with its normal function.

FUNCTIONING OF NORMAL COLON.

In the case of the large bowel it is necessary to realise that it is composed of separate sections, each with its proper function. The digestive tract is composed

of a series of collecting chambers with tubes conducting to and from them. Each chamber has its specialised mechanism of filling and emptying. The best understood is the stomach. The cæcum is a type of filling chamber or stomach. Its cardia is the ileo-cæcal opening, its pyloric antrum is the ascending colon and hepatic flexure; its pylorus is at an area about three inches across the transverse colon, which will be referred to as the "hepatic point." As the cæcum fills, its walls relax and its sphincter at the hepatic point contracts; when the cæcum becomes packed full, the stimuli on its walls cause them to contract and the hepatic point to relax. In this chamber or cæcum, the contents are in a semi-fluid state, subject to bacterial digestion and to the active absorption of the products of bacterial digestion.

From this first collecting chamber in the colon the contents are passed on through a kind of conducting tube or gullet. In this tube or "colonic gullet," which comprises the transverse colon, splenic flexure, and descending colon, the contents are squeezed, dried, and pounded, so that they are almost solid. Then on a stimulus as yet unknown, the hepatic point contracts, the colonic gullet relaxes its pounding, and the contents are rushed down into the pelvic colon. This left collecting chamber of the colon (pelvic colon) has only been secondarily adapted for storing, and is never much other than a modified part of the colonic gullet. Its stimuli are to a great extent dependent upon the stimuli acting on the cæcum. The rectum, on the other hand, is more specialised with its pelvi-rectal sphincteric arrangement, its dilated chamber or ampulla, and its sphincteric outlet, the anal canal.

Malignant Growths in the Cæcum.

Malignant growths in the cæcum start in the mucous membrane opposite the ileo-cæcal opening, and tend to spread down to the caput cæci and round towards the ileo-cæcal opening. It is only late in their history that they encroach on this opening and obstruct it. On account of the site of the growth at the beginning and the semi-solid contents of the cæcum, obstruction is a late event in these growths, and hope of cure is then small. The earliest sign must be first—interference with function, i.e., interference with filling and absorption. This shows itself first by the passage of its contents more rapidly than normal, or in other words more frequent motions. At first the patient only thinks that his bowels are more regular, if he is inclined to constipation; or if regular before, he does not notice the unusual laxness. The interference and changes in the function of absorption at first produce little effect, but later as the growth gets larger and pours out its excess mucus and becomes ulcerated, the patient absorbs these toxins and acquires a secondary anæmia. This secondary anæmia may be hastened by the loss of blood from the ulcerated tumour. In seventeen cases of carcinoma of cæcum, blood was noted by the patient in one case. In Wakeley's series of thirty-one cases, it occurred three times. In fact, many patients consult their medical adviser for their anæmia, and do not mention any abnormality in their bowels. In an unexplained case of secondary anæmia the abdomen should be examined for a growth in the colon.

AVERAGE HÆMOGLOBIN (RAIFORD).

Site	Per Cent.	Number of Cases
Cæcum and ascending colon	64.8	36
Transverse colon and flexures	71.4	27
Descending colon and sigmoid	75.5	46

As the walls of the cæcum become more infiltrated, the expulsive powers of the cæcum become less, the ileo-cæcal opening becomes encroached upon, and ileo-stasis is the rule. This shows itself by flatulent indigestion coming on after meals, fullness in the lower abdomen, and windy pains. Finally the ileo-cæcal opening is invaded, and terminal acute obstruction has set in.

CARCINOMA OF THE CÆCUM (R.V. HOSPITAL).

From 1928 till 1937 there were twenty-seven cases of carcinoma cæci. Of these, resection was attempted in thirteen, palliative treatment in fourteen, i.e., roughly fifty per cent. were beyond any surgical attempt to cure.

Of the thirteen resected, five died as the result of the operation = 38.5 per cent.

This leaves eight who survived with hope of cure. All three who were operated upon over five years ago are still alive. The other five have been too recently operated upon to estimate a cure.

PRESENCE OF PALPABLE TUMOUR.

Fortunately, the cæcum is situated in an area that is easily and convincingly palpable. In a series of seventeen cases of carcinoma of the cæcum, a tumour was noted as palpable in fifteen. Possibly under an anæsthetic a tumour might have been palpated in the other two cases.

The tumour in carcinoma of the cæcum is mobile until late in the disease. It may be slightly tender. It is well localised.

Tubercle is more fixed and tends to spread up the ascending colon. An appendical abscess is also fixed and there are more signs of an acute inflammatory condition.

A rise in temperature is not uncommon in an ulcerated growth of the colon. Wakeley found a leucocytosis in fifty per cent. of his cases of carcinoma of the cæcum.

SUMMARY OF SYMPTOMS.

To sum up, one should put down the early symptoms of carcinoma of the cæcum as, first, the passage of more frequent motions, followed by a period of constipation associated with flatulent indigestion, eased by purgatives. Later, in the obstructed stage, purgatives produce pain. Occasionally secondary anæmia, and on occasions blood in the stools. X-ray examination after a Ba. enema will show a filling defect in the cæcum; if this is doubtful, a barium meal should be given. Finally a palpable lump is felt in the right iliac fossa. In doubtful cases the patient should be palapted under an anæsthetic.

ASCENDING COLON AND HEPATIC FLEXURE.

In the ascending colon and hepatic flexure the symptoms are essentially those of an obstructing tumour. Here, on account of the semi-fluid contents, obstruction

is slower than on the left side of the colon, but on account of its relation to the cæcum and ileo-cæcal area, ileo-stasis and reflex dyspepsia are relatively early.

Pain may also be localised on account of the absence of a mesentery, for any attempt at distension pulls on the local parietal peritoneum.

If the growth should begin near "the hepatic point," indigestion is earlier than in any other site in the colon. The growth probably causes spasm and interferes with the emptying of the cæcal chamber, producing early ileo-stasis and its symptom, flatulent indigestion.

A patient previously well begins to complain of flatulent indigestion. He notices his bowels are inclined to be constipated. He thinks his liver is out of order and he takes a purge. This empties his cæcum, and he is cured of his symptoms for several days till the cæcum fills up again. Then his indigestion returns, and he flies to his bottle of "liver salts" or other pet remedy. He is again relieved for several days. He accustoms himself to taking salines regularly, and the warning symptoms are driven off. Later he finds he has to increase his doses, and the laxatives begin to give him griping pains. He feels discomfort in the hypochondrium. He is full of wind, and he goes to his medical adviser.

The history of indigestion, which occurs after meals, and the pain in the hypochondrium may suggest to the doctor a gastric or duodenal ulcer, and the patient is subjected to an ulcer regime. The small meals and the laxatives prescribed may appear to help the patient for a time, but inevitably the symptoms get worse, and he returns, or visits another physician. This time the flatulence, the tenderness in the hpyochondrium, and the relief originally afforded by salines, suggest a gall-bladder lesion. He is now treated for his supposed gall-stones and cholecystitis.

Many patients with carcinoma of the colon go about for months with an unexplained indigestion, until an attack of acute intestinal obstruction shows the origin of their trouble.

It is interesting, on looking over the hospital records, to note how many of these patients have come to hospital for their indigestion, and have had a barium-meal examination of their stomach, and their gall-bladder investigated, before the lesion in their colon was finally run to earth.

From Simple Notes on a Case Sheet.

J. D. complained of indigestion on and off for three or four years. The pain was made worse by food, and he thought it was relieved by powders. He did not vomit, but he felt sick and suffered much from flatulence. For the last three weeks he had got a severe pain in his stomach immediately after meals.

At operation he had a growth at the "hepatic point." This was considered inoperable, and the area was short-circuited. He died in hospital four weeks later.

Transverse and Descending Colon.

The left of the transverse colon and the descending colon are mainly conducting tubes of an almost solid material. Like the gullet proper, the first symptom is the result of the increasing difficulty in the passage of its contents, hence increasing

constipation. As the descending colon and the splenic flexure are fixed, any attempt at distension pulls on the neighbouring parietal peritoneum, giving rise to localised pain in carcinoma of these areas. Localised pain is common in growths of the colon devoid of mesentery. Growths in the middle of the transverse colon, by reason of their nearness to the anterior abdominal, are frequently palpable. In seven cases of growth in the transverse colon, a tumour was palpable in five. In the later stages these growths invade the stomach. This occurred in fifty per cent. of Raiford's cases. Sooner or later a solid piece of fæces blocks the lumen of the malignant stricture, and acute intestinal obstruction has set in.

It is well to bear in mind that in obstructions low down in the bowel, vomiting is a late symptom, just as vomiting is an early symptom and constipation a late symptom in a high obstruction.

Carcinoma of the Pelvic Colon (R.V. Hospital).

There were sixty-eight cases of carcinoma of the pelvic colon. Thirty-four of these were considered capable of resection, i.e., 50 per cent. Of these thirty-four, eleven died as the result of the operation, i.e., 32.3 per cent. Of eleven who survived operation more than five years ago, five are still alive, i.e., 45.5 per cent.

Five-year survival in the Mayo Clinic, 47.7 per cent.

When a stenotic stricture is present, then constipation is marked and only interposed with attacks of diarrhœa. This diarrhœa is composed mostly of mucus and blood, and is liable to come on with a peristaltic rush after a meal. It is due to the distension affecting the circulation of the mucosa and producing ulceration, to the discharges of an ulcerating tumour, and to the irritation of pent-up fæces. The frequent motions of a lesion on the right side are composed of loose watery fæces, that on the left side of small motions of mucus and blood. Constipation and diarrhœa in a colonic growth almost diagnoses a funeral.

Silent Growths.

Although the physician may recognise these early disturbances of the digestive tract that are pointers to a dreaded carcinoma of the gut, the discomfort is so little to the patient that he is frequently unaware of what it portends. It is only when the more severe symptoms of acute intestinal obstruction are present that he visits his medical adviser. This occurred in over one-third of the cases admitted to the Royal Victoria Hospital. These silent growths are more frequently found on the left side.

In series A in this investigation, 34.4 per cent. of patients were admitted in the late stage of acute intestinal obstruction. These obstructive cases are practically all C stage cases, and the operative mortality-rate would be expected to be high and the ultimate outlook poor.

The Higher the Operability Rate, the Lower the Operative Mortality (Gabriel).

	Per cent.
A cases	0
B cases	3.8
C cases	13.0

PERCENTAGE OF THREE-YEAR CURES.

A cases	86.0
B cases	73.0
C cases	19.0

As the years progress the discrepancy between the A, B, and C cases becomes more marked.

The following tables give the number obstructed in other centres, and the ultimate history of the obstructed cases in the Royal Victoria Hospital :—

ACUTE INTESTINAL OBSTRUCTION AND CARCINOMA OF THE COLON.

Name.	Number of cases.	Number obstructed.	Per cent. obstructed.
Burgess	485	173	36.6
Brown	171	43	25.7
Petren	50	21	42.0
R.V.H., Belfast ...	87	30	34.4

ROYAL VICTORIA HOSPITAL, BELFAST.

Obstructed cases.	Died in Hospital.	Resected.	Died from operation.	Lived more than 3 years.	Lived 5 years.
30	14	17	6	3	5

OPERATION.

Colostomy followed by resection	Died	Alive over 5 years
4	2	2
Cæcostomy followed by resection	Died	Alive over 5 years
10	4	3

The mortality of acute intestinal obstruction, excluding herniæ and acute intussuception, is 40.1 per cent. (Burgess).

PELVI-RECTAL JUNCTION.

The symptoms of carcinoma of the pelvi-rectal junction are essentially those due to obstruction. Again it shows itself by increasing constipation and lower abdominal pain, later with ulceration and contracture, blood and mucus are poured out and we get bouts of spurious diarrhœa. At times small pellets of fæces get squeezed past the obstruction and the patient passes small motions several times in the day, but feels he is not emptying his bowel properly. These patients, on account of passing a small motion at least once a day, will frequently deny constipation.

AMPULLA OF RECTUM.

In the rectal ampulla the symptoms are again interference with the filling mechanism of a storage chamber. At first the growth and its tendency to cause emptying may pass unnoticed, unless it bleeds. Later, as it enlarges, the patient feels that he has to pass a motion, but passes little. At a little later stage the mass by its presence causes a constant desire to empty the rectum.

Carcinoma of the Anal Canal

Pipe-stem stools are only likely to occur when the anal canal is narrowed. These patients first notice pain on defæcation. These anal growths are usually implanted on an unhealthy canal, one that has been the site of a chronic sinus, a fissure, or prolapsed piles. These patients think they are only suffering from a prolonged attack of their old enemy. Inspection will show the growth.

Cæcal Pain in Carcinoma of the Distal Colon.

In obstruction of the colon with a functioning ileo-cæcal valve, pressure is transmitted back to the cæcum. The cæcum, having the larger diameter, has the greatest pressure on its walls. As these walls distend, the patient may complain of pain in the right iliac fossa. Patients have been operated upon for acute appendicitis who had in effect a constricting carcinoma of the left side of the colon.

Acute Perforation.

Sometimes acute perforation takes place in cases of colonic new growths. This occurred in 12 out of 205 this series, i.e., 6 per cent. The perforations occur proximal to the growth, the result of internal pressure; or at the seat of growth, following upon local necrosis(70 per cent. in this series). Pressure perforations occur at the cæcal area and occasionally, in pelvic colon obstructions, in the descending colon. In these latter cases there is evidently some kinking at the splenic flexure, and the distension of the colon is localised to the left side. It has been shown experimentally that if the intraluminal pressure is above 15 mm. of Hg, circulation in the capillaries is stopped and necrosis follows : hence one cause of stecoral ulcers, which is a ready site for a perforation. These perforations, therefore, occur on the least vascular part of the gut wall, i.e., the anterior wall of the cæcum. A perforation due to local necrosis may be precipitated by the surgeon handling a growth during an exploratory laparotomy.

On making a diagnosis, we have first the symptoms described which arouse suspicions of a new growth. Abdominal palpation will usually detect a growth in the transverse colon or in the cæcum.

As before stated, palpation under anæsthesia is advisable in many cases. Rectal examination will reveal growths in the rectum and pelvi-rectal junction. If the patient is made to squat on the examining finger and to strain as at stool, a high growth may be detected not felt on the usual rectal examination.

Bimanual palpation is sometimes useful in demonstrating lumps in the pelvis.

X-Ray Examination.

X-ray examination is our greatest help in diagnosis. A "straight X-ray" in the standing position will at times demonstrate a loop distended with air or a fluid level. A barium meal can only be ordered if there is no suspicion of obstruction, as it has, on occasion, precipitated an attack of acute intestinal obstruction. The barium enema is our best ally. It must be remembered that X-ray is only a superimposition of shadows, and a defect due to a growth may be overshadowed. The

filling of the colon with air after evacuation of the barium may show an otherwise hidden growth. Parts of the flexures are superimposed, and an oblique view is advisable, but this necessitates a very heavy exposure. In this series, X-ray gave negative evidence in 15.6 per cent. of cases, and placed the growth in sites removed from the seat of disease in 18.8 per cent., so that the growth remained undetected in 34.4 per cent. It would appear that sometimes growth in one part gives rise to continued spasm in another. X-ray examination has its limitations, and too great a burden should not be placed on the radiologist.

Sigmoidoscopic.

Sigmoidoscopic examination is another help. It may show the growth or one of the surrounding papilloma. It may demonstrate blood coming from higher up the colon. Unfortunately, due to the variations in the fixation of the pelvic colon, it is sometimes impossible to pass a sigmoidoscope up the full thirty cms.

Biopsy.

Whenever possible, a piece of the suspected tissue should be removed with the Bruning's forceps.

Occult Blood.

In a suspect case the test for occult blood should not be omitted. Hurst says that it is present in all cases. In one of the cases cited the test was negative. So, considering the small number on which this examination was carried out, one should conclude that absence of occult blood does not rule out the possibility of carcinoma of the colon.

Test Meal.

Test meals are of little help. Achlorhydria is common in carcinoma of the colon, but in the series examined, normal acid curves were obtained as well as abnormal ones. Our figures are too few to quote for statistics or on which to draw conclusions, as test meals were only done in rare cases.

Laparotomy.

In cases in which there is doubt, a laparotomy should be advised, before the patient is labelled. A growth detected at laparotomy should be handled as little and as gently as possible.

Differential Diagnosis.

It is not my intention to discuss in detail the differential diagnosis of carcinoma of the colon. All causes of flatulent indigestion must be borne in mind and the case investigated accordingly. In the case of blood in the stools, all lesions, from an ulcer in the stomach to a scratch in the anal canal, must be considered. If in doubt as to whether the bleeding is from the rectum or from higher up the colon, the sigmoidoscope is helpful. As a rule, the darker the blood, the higher up is its origin. A tumour due to a localised diverticultis with surrounding fibrosis may be exceedingly difficult to differentiate from carcinoma. Early fixation is more common in diverticulitis, and blood in the stools is uncommon. The middle-aged,

healthy-looking, and probably stoutish patient is a likely subject for diverticulitis. A sigmoidoscopic examination may solve the riddle; an ulcer or papilloma are almost indicative of carcinoma, and a piece should be removed for microscopical examination. The difficulties in diagnosis can be guessed when out of eight cases that were diagnosed as inoperable at laparotomy, four are still alive and well more than five years afterwards. One of these, the only one investigated, showed well-marked diverticulæ on examination by a barium enema. In ulcerative colitis the stools are characteristic and the sigmoidoscope is again of help. If, in spite of these examinations, there is still doubt, a barium enema should be given, which will show the characteristic picture of ulcerative colitis. Other tumours, as secondary deposits from a distal growth and uterine endometriomata, may stimulate a carcinoma in the rectum, but these tumours leave the mucous membrane for long unulcerated, and in uterine endometriomata one may see the characteristic dark cystlike areas with the sigmoidoscope or proctoscope that are diagnostic. Chronic inflammatory conditions as tubercle and actinomycosis in the cæcal area may suggest a carcinoma of the cæcum. Syphilis may simulate a growth in any part. Dolichocolon may simulate carcinoma by attacks of pain, vomiting, and constipation, as well as by the passage of blood. This complaint is, however, of long standing, and the barium enema helps to distinguish between it and carcinoma. If in serious doubt, it is wiser to explore the abdomen at operation. Two conditions may co-exist.

Treatment.

With our present knowledge, the operative removal of the growth, when it is still localised, is the most dependable method of cure. The late results of removal of growths are very encouraging, more so than in most other regions. It would appear from our results, as before stated, that the lesion is for long a local one, and as such gives great encouragement to the surgeon. As an offset to this, these growths are so often late in being submitted to operation, that our hope of complete cure is small and the risks of operative removal are correspondingly increased. In late growths the operative mortality in both palliative operations and those in which a cure is attempted by removal is exceptionally high.

Operability Rate, R.V. Hospital, Belfast.

Carcinoma of the Rectum.

Out of 132 cases, 93 were unfit for resection, i.e., 29.5 per cent. only were fit for resection. The majority of these were in the C stage.

Carcinoma of the Colon.

Out of 205 cases, 99 were unfit for resection, i.e., about 50 per cent.

Other Centres' Operability Rate.

New York	Colon	63.5
London	Rectum	54.0
Belfast	Rectum	29.0
Do.	Colon	50.0

OPERATIVE MORTALITY.

	Per cent.
Wilkie	15
Australian Hospitals—	
Distal Colon	31
Proximal colon	41
Rankin (Mayo Clinic)	9.6
Gordon Watson	17.7
Cheever	17.6
Saltstein and Sandweiss—	
Distal colon	57.0
Proximal colon	39.0
Raiford (resections)	27.4
R.V. Hospital, Belfast (resections)	39.5

It behoves the surgeon, then, to take extra precautions in dealing with these very ill patients. If the patient has been vomiting from acute obstruction, his fluids are depleted and the toxins in his blood are much increased, as shown by the high blood urea so frequently noted. Hence transfusions by intravenous drip method or by periodic mass transfusions are indicated. After introducing warm olive oil into the rectum, an attempt should be made by enemas to relieve the acute obstruction, remembering that a hard pellet of fæcas has probably caused the block. There is nothing to be gained by postponing the relief of an obstruction by colostomy. In cases not obstructed, a period of treatment with saline aperients should be undertaken before any operation. During this period the patient's general health should be built up, his hæmoglobin brought up to normal, his blood-urea level lowered by copious drinking of fluids, his blood-pressure level estimated and corrected as well as possible, and vitamins given to make up for loss of vegetables and to increase resistance. A man should also be trained to use the urinal when lying in bed. An associated enlarged prostate should be dealt with beforehand. In some patients, dilute hydrochloric acid seems helpful. Kaylene and liquid paraffin are also useful. When the tongue is moist and clean and hæmoglobin is sixty per cent. or above, operation may be undertaken. Wilkie recommends a vaccine of streptococci and B. coli given on the eighth and third day preceding operation. Rankin does not place such emphasis on his intra-peritoneal vaccine now, as he did formerly.

In performing a laparatomy to determine the operability of a growth, a para-median incision should not be used, if it is intended to use a paramedian incision on the opposite side some weeks later for the removal of the growth. These com-bined incisions will cut off the blood supply of the linea alba, and sloughing is the result. Some cases of pyelophlebitis are undoubtedly due to this, the infection passing by the ligamentum teres to the liver. The growth should not be handled, as this makes for the spread of infection and has hastened a perforation at the site of the growth.

Spinal anæsthesia, helped, if necessary, by local infiltration of the abdominal wall and with or without gas and oxygen, is to my mind the anæsthetic of choice in these patients.

Colostomies have a surprisingly high mortality. Raiford, in his series, reports a mortality of forty-four per cent. in cases too far advanced for resection in whom a colostomy was performed. In this series the mortality for like cases was forty-six per cent., but inclusion of those colostomies in whom resection was ultimately performed reduces the mortality to thirty-seven per cent. In forty-seven cæcostomies there were ten deaths, giving a mortality of twenty-one per cent. for simple cæcostomy.

It is my impression that the mortality for colostomy would be lower if patients had not to wait some days before the colostomy is opened. These patients are suffering from an acute retention in the intestinal tract with toxic absorption, and the sooner relief is afforded the better.

There is little chance of abdominal-wall infection if the following precautions are taken :—The wound is tightly sewn around the delivered portion of gut, the wound well vaselined, a piece of glove rubber about four or five inches in diameter is taken which has a hole which will just take one's thumb; this hole is stretched so that the protruding gut and its supporting glass rod is manipulated through it. The rubber is then spread over the wound as a protection and it fits so snugly around the gut that there is little chance of leakage from the open gut to the wound. A rubber tube is placed in the gut and fixed by a purse string. About half a pint of warm olive oil is run in and allowed to remain for a few hours. If necessary the gut can be opened thoroughly in eight to ten hours. If the colostomy is placed in the right half of the transverse colon, it does not complicate an operation on the left colon.

A cæcostomy is a very inefficient method of relieving an intestinal obstruction; it may not be any easier to perform than a colostomy, and it does not drain the gut; it is only a type of overflow and safety-valve. I have watched a patient on whom a cæcostomy was performed for an acute obstruction in the pelvic colon, grow weaker and weaker as the days passed, till he was unable to sit up without support. A colostomy was then performed, and he rapidly gained so much strength that he was able to go back to his business an apparently healthy man for eighteen months, before he finally faded away with his disease.

In this series, colostomy and resection had a lower death-rate than cæcostomy and resection, but the cases are too few for one to draw definite conclusions.

Operation	Number	Deaths	Mortality per cent.
Cæcostomy followed by resection ...	30	11	37
Colostomy followed by resection ...	6	2	33

The mortality of primary resections of colonic growths is exceptionally high. In this series there were thirty-seven primary resections, with eighteen deaths, giving a mortality of forty-nine per cent. Practically every other patient died. In the cases that came to post-mortem, peritonitis was the chief cause of death. It

would seem from these results that a two-staged operation is to be desired, unless a type of Paul's operation is performed. In this series this latter operation gave the best immediate results and the best late results. Unfortunately, the operation is practically restricted to growths in the pelvic loop, where the long mesentery allows the glands to be removed with the growth. Local recurrence is said to be common in this operation. It occurred in one case out of six in series A, but in twelve operations there were only two deaths, giving an operative mortality of seventeen per cent. and a five-year cure of sixty-seven per cent. Recurrence in the abdominal wall in Paul's operation is generally placed at ten per cent.

A preliminary colostomy has the advantage of draining the bowel and allowing the atonic poisoned gut walls to recover. Also, when the resection is completed, the site of the anastomosis is not subject to the same strain of distending gases and the passage of fæcal contents. Thus a weak area in the anastomosis is not so likely to lead to disaster. It is well to make sure that the anastomosis is completely healed and that there is no stricture at the anastomosis, before the colostomy is closed. In one case in the series of hospital cases, death was due to the anastomosis giving way at the suture line following the closure of the colostomy. There is no urgency to close a colostomy, as it serves as a safety-valve should local recurrence take place.

Devine cuts off the fæces from the distal part of the colon in his type of colostomy. He then washes through the distal part with antiseptic solution till he considers that this part is sterile. Only then are resection and anastomosis undertaken. I do not think that with an ulcerated growth, sterility is obtained, but the gut is comparatively clean and its walls have regained their healthy tone with good circulation. I think one of my personal cases would have died had he not had a Devine's colostomy. As it was, he only developed a localised abscess, which recovered with free drainage. When an anastomosis is performed in a non-functioning colon, as after a Devine's colostomy, it is essential to see that the agglutinated walls of the crushed ends of the gut are forced open; for there is now no passage of contents to perform this function, as is expected in most modern methods of axial anastomosis. In axial anastomosis I have found the Furniss clamp a useful asset.

In growths low in the pelvic colon, where there is hesitation between attempting an axial union and doing an abdominal perineal resection, the use of Rankin's method of mobilising the floor of the pelvis will frequently save the situation, and allow of axial union. In one case in which I made use of this method, the patient was having normal bowel actions on the fifth day.

In the right side of the colon, end-to-side anastomosis, after Rankin, is preferable to a lateral anastomosis, as the latter type does not completely divert the intestinal contents. At a later operation the right colon and terminal ileum are removed. In severe or complete obstruction of the ascending colon or hepatic flexure, it is necessary to combine this anastomosis with a cæcostomy, as with a competent ileo-cæcal valve, the part between this and the growth is a closed sac and bound to perforate. This occurred in one of the hospital series.

In any anastomosis the gut should be clean and the blood supply should be beyond reproach. Too meticulous care in cleaning away appendices epiploicæ may injure the long arteriole to the anti-mesenteric border. There should be no tension in or within the line of suture.

Shock, the second main cause of death, can be reduced to a minimum by careful pre-operative attention, seeing that the patient is in a desirable condition for operation, spinal anæsthesia, gentle handling, a minimum of loss of blood, and finally gentleness in moving the patient. Douglas Miller has shown by series of blood-pressure records how a patient is shocked by even small changes in position during and at the end of an operation (fig. 3). It is advisable in low colonic growths to sigmoidoscope the patient after an interval. I have in one case detected a small wart just below the anastomosis which was readily destroyed by diathermy in a case where a colonic growth had been successfully resected.

It is difficult to know when to count a patient as cured. These patients are frequently near the end of their allotted span, and if we can prolong their life till its normal decline we should count it as a success. One patient in this series had a small growth removed by a local operation, and came back twenty years later with an inoperable growth in the same site. We have no record of the pathology of the original tumour. Another patient who had a successful resection of the rectum carried out was recorded as having died ten years later from carcinoma of the uterus. This may have been a new growth or it is possible it was a late recurrence of the former rectal carcinoma. Colostomies performed for malignant disease of the colon have been recorded as having lived for five to six years with the growth untouched. However, Rankin's figures seem to show that where the growth has been resected death from recurrence after five years is rare.

Case of Colostomy.

Patients should realise that a colostomy is not a severe handicap. Many professional men have had colostomies for years without their clients being aware of their abnormal opening. The patient should be taught to regulate his colostomy by diet or he can give himself a washout each morning. The colostomy belt is unnecessary, and is dirty and likely to encourage prolapse. A pad of wool with a broad belt protected with a piece of macintosh is all that is required.

R.V. Hospital, Belfast, 1925-1937.
Operations Performed and Mortality.

Description	Number	Deaths	Mortality %		Cures
Cæcostomies	47	10	21.3		0
Colostomies	30	11	36.2		0
Colostomy fold by resection ...	6	2	33.3	2/5	40.0
Cæcostomy fold by resection...	30	11	36.2	2/15	13.0
Primary resections ...	37	18	48.7	6/16	37.8
Paul's resection	12	2	16.7	4/6	66.6

ALL RESECTIONS (FIRST SERIES), 1925-1932.

Operations	41
Died	15
Recovered	26
Lived over 5 years	13

This gives an operative mortality of 39.5 per cent.; but a five-year cure for those that survive operation of fifty per cent.

CARCINOMA OF THE COLON.

SERIES A (OPERATED UPON MORE THAN 5 YEARS).

R.V. HOSPITAL, BELFAST.

Site	Number	Alive
Cæcum	10	3
Ascending colon	4	0
Hepatic flexure	6	1
Transverse colon	2	1
Splenic flexure	8	1
Descending colon	12	1
Iliac colon	6	1
Pelvic colon	31	5
Pelvi-rectal	8	0
	—	—
Total	87	13

i.e., 15% cured.

One case of pelvic colon growth lived over three years after resection; cause of death stated to be cerebral hæmorrhage. Another case died over four years after resection from a perforation proximal to the anastomosis (Paul's operation).

All cases traced except two, who have not been certified as dead in Northern Ireland.

RADIUM AND CARCINOMA OF THE LARGE BOWEL.

In this series there were fifteen cases treated with radium, and all these cases were too advanced for other operative treatment.

Of the fifteen cases, two lived over three years, one lived over two years, four lived over one year, eight lived less than one year.

In a discussion in the Royal Society of Medicine in 1935, Sir Charles Gordon Watson states that he has less recourse to radium than he had before 1931.

There were 149 cases treated with radium. These included:

A—Operable cases who refused surgical operation.

B—Selected inoperable cases.

C—Radium preliminary to excision.

D—Limited perineal recurrence.

He had apparently complete cure in six cases which had been considered inoperable, time of observation ranging from 4½ years to 7½ years.

Disadvantages of Radium in Treatment.

1. Fibrous stricture.
2. An excision may be made more difficult due to fibrosis.

Radium and Pain.

3. Pain may be increased if an overdose has been administered or it may be increased if there is an ineffectual attack on the growth.
4. Radium should not be used in the presence of sepsis.

Advantages.

1. Occasionally a fixed inoperable growth may be rendered operable.
2. Life may be prolonged in inoperable cases, as shown by S. Cade.

Stanford Cade has treated sixty-nine cases of inoperable carcinoma of the large bowel. Of five treated seven years, one is alive; of seventeen treated six years, eight are alive. Some still show evidence of disease.

The Radium Institute of Paris considers that as a rule the malignant tumours of the large intestine are radioinsensitive, that rarely one may find a tumour composed of immature cells, and these are radiosensitive.

In epithelioma of the anus, where the growth originates in the skin epithelium and is not a downgrowth from the bowel, a colostomy followed by radium is the method of choice. Where the carcinoma is a downgrowth originating in the mucous membrane, radium has been disappointing.

Surgery meets with its greatest difficulties in carcinoma of the large bowel. First, a patient with the chronic lesions of advanced years, poor arteries, poor renal function, poor lung æration, and poisoned with the contents of a chronically obstructed gut; second, a field of operation drenched with virulent micro-organisms; third, devitalised tissues on which to work. Yet in this unpromising field the surgeon may work buoyed up with hope. The disease is of low malignancy, and more five-year cures can be claimed than in any other field of surgery dealing with malignancy.

Rankin reports over fifty per cent. of his patients as five-year cures. If we can get the patient in an earlier stage of the disease and lower the operative mortality, there is no reason why these figures may not be surpassed.

Before concluding this paper I should like to express my thanks to the honorary surgical staff of the Royal Victoria Hospital for permission to study their case sheets, from which my statistics are drawn; and to the hon. radiologist of the Ulster Hospital for his co-operation in studying the function of the colon.

Fig. 1—Carcinoma of the cæcum, showing the proliferation found here.

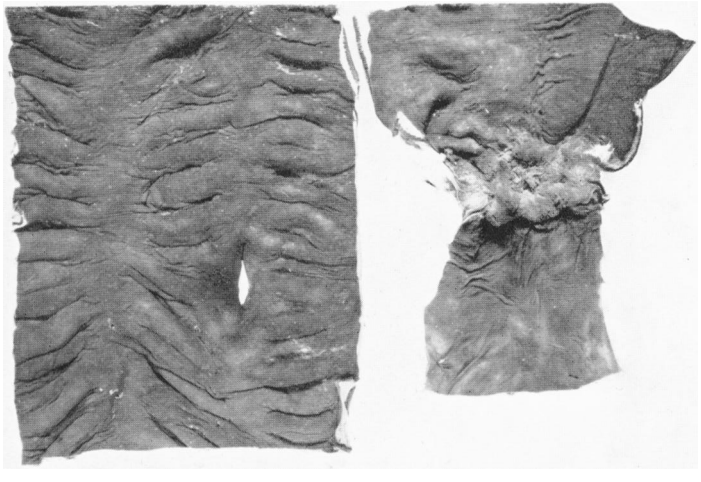
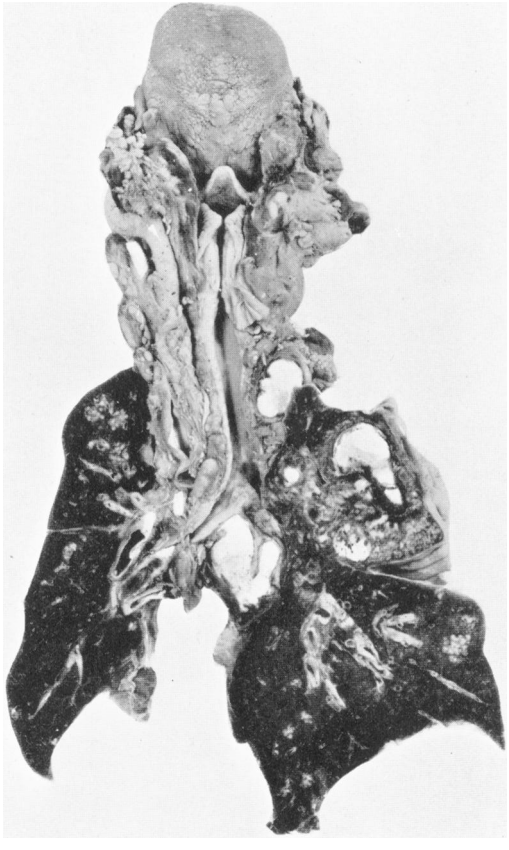
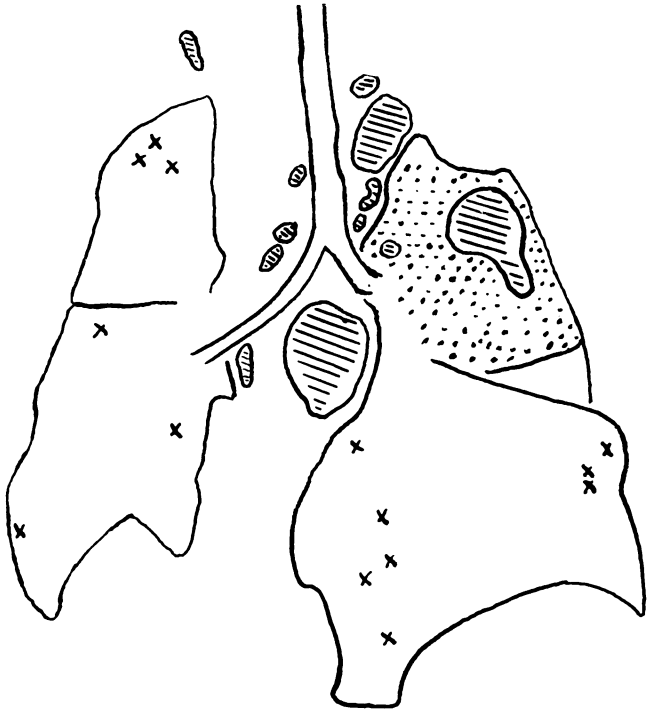


Fig. 2—Carcinoma of the pelvic colon, showing the construction, sterculous ulceration proximal to the growth, and a proximal perforation.





Shaded areas represent the primary lung focus and caseous regional lymph-nodes.

Stippled area represents the consolidation and collapse in the right upper lobe.

Areas marked "X" represent patches of tuberculous broncho-pneumonia.

Recurrent Abdominal Pain in Children

By J. S. MATTHEWS, M.B., B.CH.
from the Belfast Hospital for Sick Children

THIS paper is an attempt to elucidate the common causes of recurrent abdominal pain in childhood of more than a transient nature, and consists of an investigation of all cases admitted to the Belfast Hospital for Sick Children during the years 1934, 1935, and 1936, whose abdominal symptoms were of such a character as to be considered worthy of laparotomy.

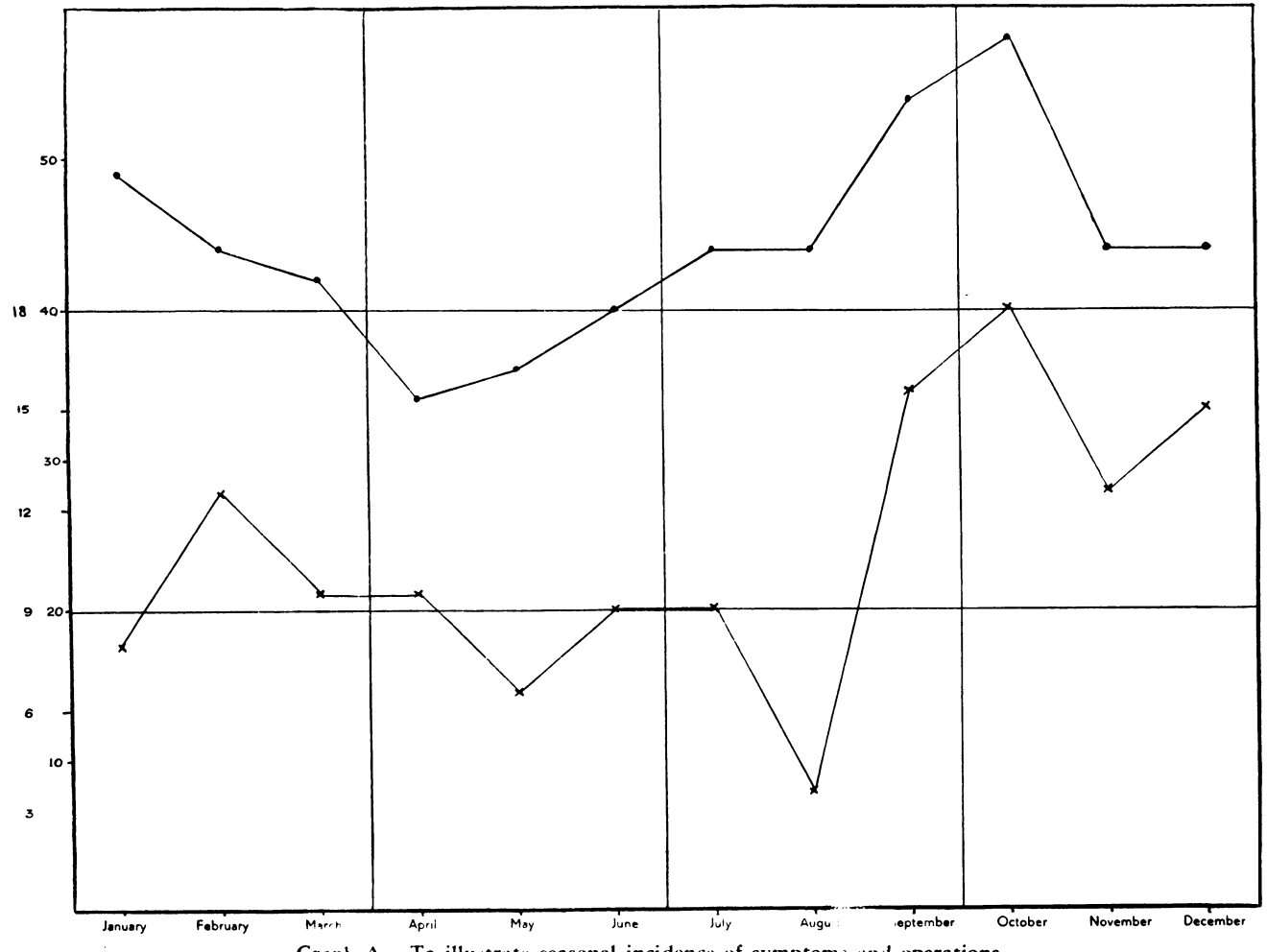
There are 134 cases in all, 130 have been traced since operation, and of these all except five have been personally interviewed and examined; of the four cases untraced, one had removed to an unknown address in England, two others to unknown addresses in Belfast, and the last one died on the evening of operation. Of the five cases traced without personal examination, reports have been received concerning their present welfare, and here I should like to acknowledge the valuable help and co-operation of three colleagues in furnishing reports, one from Derry, one from Dublin, and one from Donegal.

The period elapsing since operation has, of course, varied greatly; the work for this paper was not commenced till near the end of 1936, and yet includes all cases from the commencement of 1934; but no patient was re-examined in less time than six months after operation, as it was felt that less than this would not give a reasonable trial of the treatment adopted.

Of the 134 cases, forty-four were admitted in 1934, thirty-six in 1935, and fifty-four in 1936; and of the total, sixty-three were males and seventy-one females. The ages varied from $2\frac{1}{2}$ years to $14\frac{1}{2}$ years, with an average of $9\frac{7}{12}$ years.

The total time in hospital for the 134 cases was 2,315 days, averaging 17.27 days from admission to discharge, or 13.7 days after operation. This latter figure may give a false impression of length of time, as the majority were under this figure, the average being raised by uncertain pathology in several patients whose abdominal incision varied from the usual grid-iron—being either paramedian or split rectus, with a proportionately longer time for healing. The former figure, too, may seem rather high, but in several cases the type of symptoms suggested varying situations for the pathology, necessitating investigation as in-patients; one patient was a diabetic and required a period of six weeks for diet standardisation before operation. The large majority of cases were seen at the surgical out-patient department, and most of the investigation was carried out there before admission to the wards.

The question of previous illnesses is very interesting, and inquiry discloses the fact that two infectious diseases stand out in advance of all others combined, namely measles and whooping-cough. No less than 114 patients (85.5 per cent.) had previous history of measles, and ninety-three (69.75 per cent.) of whooping-cough. The nearest figure is that of scarlet fever with twenty (15 per cent.), and after that two for pneumonia and one each with diphtheria, meningitis, typhoid,



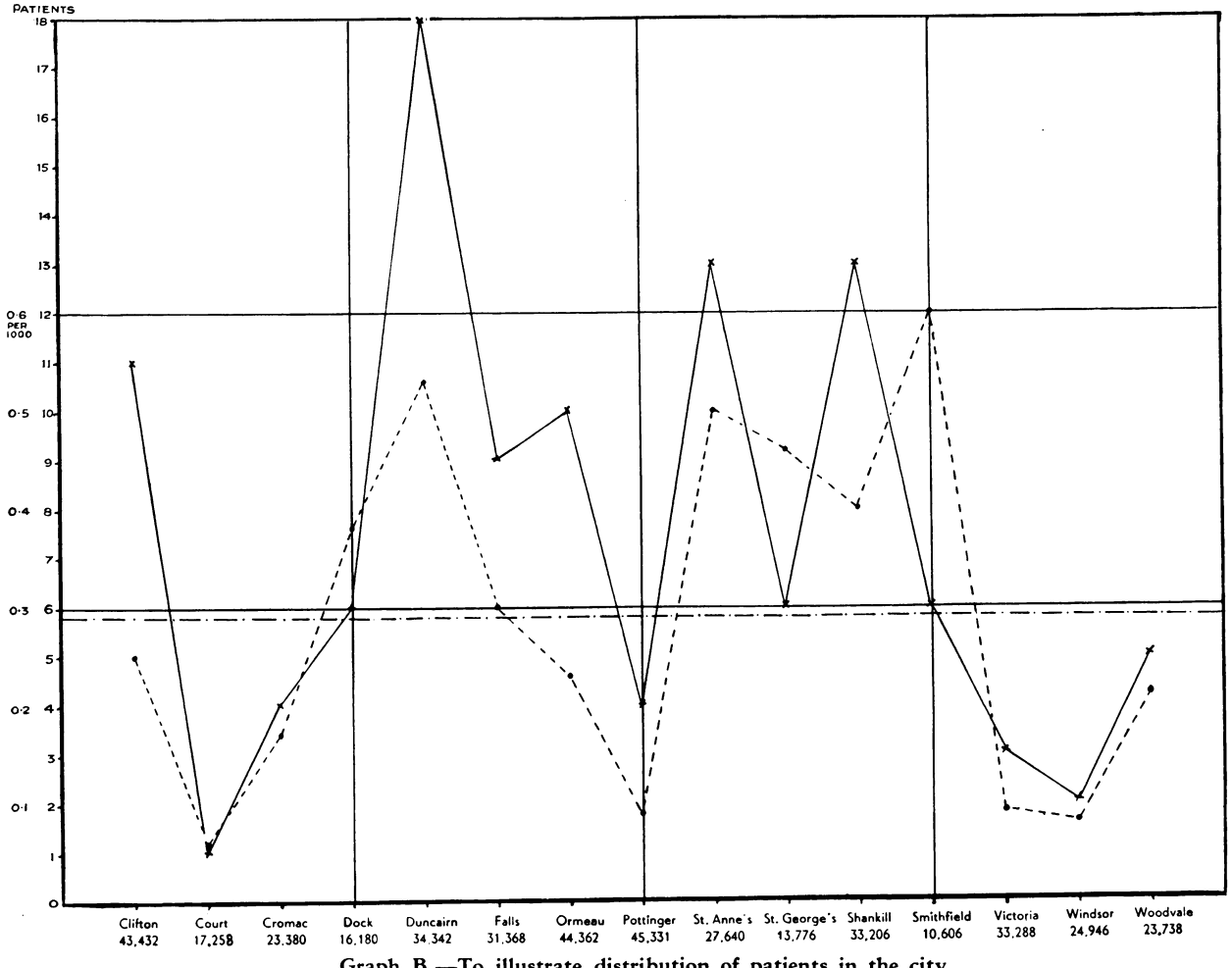
Graph A.—To illustrate seasonal incidence of symptoms and operations.
Upper line represents symptom-incidence; lower line represents operation-incidence.

otitis media, bronchitis, poliomyelitis, and chorea. It may be argued that measles and whooping-cough are common complaints in this age-group, but in view of evidence of living pathology, later to be submitted, it is suggested that the frequency of these two diseases is of more than passing interest. This is confirmed in a control group of cases admitted for burns and injuries and of a corresponding age distribution, where it was found that only forty-nine per cent. had measles and forty-nine per cent. whooping-cough. Of these, thirty-six per cent. had both diseases, and thirty-eight per cent. had neither, while the remaining twenty-six per cent. was equally divided between either disease. Physicians repeatedly remind us that no two diseases are more fraught with potential danger to the respiratory system than these, together with lowering of the general resistance, and it is felt that here may be some etiological factor in the large number of cases of adenitis found, as reported later. Brenneman, quoted by Collins, points out the high incidence of respiratory infections associated with appendicitis in children.

Seasonal incidence has been worked out with some difficulty, mainly arising from the ambiguity of history and of length of symptoms, but an attempt has been made to arrive at a fair figure for both the incidence of symptoms and time of operation, and it is thought that this may best be shown by means of Graph A. This shows that there is an increase in the incidence of symptoms in the autumn and winter, and diminution in the spring and early summer.

The districts of origin of the patients has also been investigated in an attempt to discover any special area prone to supply an excess of material. These findings fall naturally into two divisions—city and country. Each of the fifteen city wards has supplied patients, together with four of the six counties of Northern Ireland and one from the Irish Free State. Apart from the hospitals in provincial districts where an increasing amount of surgery is being performed, it must be remembered that there are two other city hospitals for children—one quite close at hand in the Ava Hospital, and the other on the east side of the city in the Ulster Hospital. These facts will probably account for a certain imbalance between the size of ward and number of patients supplied. County Antrim sent seventeen patients and County Down three, while one came from each of Counties Armagh, Tyrone, and Donegal, i.e., twenty-three of 134 from the country districts. For the city it is felt that a further Graph B may help to clarify the case distribution in the different wards. This graph supplies the population of each city ward for 1937, it gives the actual number of patients from each ward and the number of patients per 1,000 inhabitants of each ward. From this may be seen that Clifton, Duncairn, St. Anne's, and Shankill wards provide 55 patients; the city provides 111 patients in all, and these four wards supply just one less than the eleven other wards together. The number per 1,000 inhabitants shows a relative increase in Dock, Duncairn, St. Anne's, St. George's, Shankill, and Smithfield. The average number of patients per 1,000 inhabitants is 0.29, showing that these wards are more prone to supply material than the others.

The duration of symptoms has been found to vary greatly, and possibly this may give some clue to their severity. The following table gives an idea and is self-explanatory :—



Graph B.—To illustrate distribution of patients in the city.
Upper line gives the number of patients in each city ward; lower line gives the number per 1,000 inhabitants in each ward; straight line gives average number of patients per 1,000 inhabitants.

Duration	Number of patients
One month and under	33
One month to two months	8
Two months to three months	8
Three months to six months	28
Six months to twelve months	26
One year to two years	13
Three years	8
Four years	4
Five years	1
Indefinite	5

This shows the majority to be well under two years, and actually gives an average of 9.17 months.

A great deal of interest and pleasure has been derived from this investigation with much opportunity for insight into human nature, and while it is hoped to be shown that the results are very encouraging, yet mere words and figures can never express the lively appreciation of many parents for the work of the hospital. Such phrases as "never looked behind her," "has done splendid," "appetite like a horse," may not provide the best English prose, but are certainly very expressive. The relative instability of households in districts may be gauged from the fact that over thirty had changed address from the time of admission to hospital until being re-examined. This, of course, adds to the difficulty of the follow-up and accounts for the three untraced cases, but lends further interest when it is possible to follow patients to a new address and usually impresses favourably. Visits have been paid to twelve towns and villages throughout Ulster, to Clogher in the west, Larne in the north, and Bessbrook in the south, and in all but one there was a good reception. In this latter case it was thought unusual and irregular to inquire about patients operated upon, and only with some difficulty was the situation explained and the child examined.

Clinical.

In the clinical examination the following points were looked for in the history and objectively:—Pain; nausea and vomiting; bowel function; tenderness and resistance; tongue; wound.

Pain is a constant symptom, being present in all but one case; it is mainly an intermittent dull to subacute pain felt in the abdomen in a general way, varying much in severity; twenty-six patients (19.5 per cent.) complained of pain in the right side of the abdomen, only one of these mentioned a start in the umbilical region, settling in the right iliac fossa. There were four patients with a left-sided pain, and four others whose pain commenced after food: one felt it most in the epigastrium, and another after exercise.

The duration of an attack varies from two to five days, and the pain may be felt from a few minutes to a few hours in the day, attacks recurring in a two- to four-week cycle.

The onset of pain after food has in all these cases led to their admission to the medical ward, with the idea that the stomach or duodenum was the site of the pathology, but investigation has demonstrated in every case the causative lesion to be situated elsewhere, and mainly in the right iliac fossa.

At re-examination of the 130 cases following operation, only eleven (8.47 per cent.) still complained of pain, and all but two confessed that the attacks were much less severe and less frequent, while twenty others (15.4 per cent.) had very occasional mild attacks, and the remaining ninety-nine (76.2 per cent.) were quite free.

It was found that *nausea* was not a prominent symptom, occurring usually associated with *vomiting*, and even then not always; forty-five patients complained of nausea, that is, almost exactly one-third, whereas sixty-five had vomited, that is, just under half. Taken together, these symptoms are not found nearly so frequently as pain, but must be considered as very definite symptoms necessitating careful examination.

At re-examination only two patients suffered from nausea and five from vomiting (1.54 per cent. and 3.85 per cent.) There were very occasional attacks of nausea in four cases (3.08 per cent.) and of vomiting in six cases (4.6 per cent.).

In the question of *bowel function*, fifty-eight patients (43.5 per cent.) suffered from varying degrees of constipation and two (1.5 per cent.) from mild diarrhœa, the remainder (55 per cent.) being quite regular. After treatment, fourteen patients (10.78 per cent.) complained of some degree of constipation, including two whose bowel function had previously been quite satisfactory and in whom a simple appendicectomy had been performed; one had improved and the remaining 115 (88.55 per cent.) were quite satisfactory.

Tenderness was much more prominent and came next in frequency to the pain itself; eighty-six patients (64.5 per cent.) were tender on abdominal examination, mainly in the right iliac fossa. This tenderness was well defined, but not at all severe in any but two patients; one of these had a kinked, congested appendix, and in the other the cæcum was bound down to the pelvis and kidney by peritoneal bands. Operation reduced these figures to a maximum of nine (6.93 per cent.) in whom tenderness was elicited, and eight more (6.16 per cent.) much less definite, the remaining 113 (87 per cent.) being quite free of tenderness.

Resistance elicited at abdominal examination may well be considered together with tenderness, and was present in twenty-five patients (18.75 per cent.). This is the "guarding" of Rendle Short, and not, of course, the resistance and rigidity associated with involvement of the parietal peritoneum in an inflammatory process originating in the appendix or elsewhere. The abdomen in four cases was described as doughy, but only in two of these was there any sign of abdominal tuberculosis in enlargement of mesenteric glands. The remaining 105 cases (78.75 per cent.) were normal. After operation, four showed some definite resistance, two rather indefinite, and the remainder, 124 (93 per cent.), were normal.

Unfortunately, in forty-five cases the condition of the tongue was not always noted, but in the remaining eighty-nine cases forty-three were furred and forty-six

normal. Occasionally this furring was associated with halitosis. Almost invariably there was a clean, healthy tongue at re-examination.

The condition of the *wound* was carefully inquired into, and revealed a satisfactory outcome. In two cases there was slight keloid formation in the wound and stitch-marks, one case where the scar was rather tender, another which had broken down after operation and healed by secondary intention, and finally one case where there was a slight tendency to development of a hernia. In the case of the patient where the wound had broken down, it appeared to be quite usual for him to have any minor cut or wound become infected, and indeed he has since suffered a stiff wrist-joint following a deep cut on the anterior aspect, which became septic, no doubt involving the wrist and carpal joints. The remaining 125 patients showed the abdominal wound to be perfectly satisfactory.

It was on inquiry into opinions concerning the general health and condition of the patients following operation, that the parents more definitely manifested their feelings regarding the treatment adopted. In order to unify the opinions, it was decided to inquire concerning the appetite and weight. In six patients (4.62 per cent.) the appetite was poor, with twenty-six (20 per cent.) there was little change but still quite satisfactory, while with fifty-one patients (39.27 per cent.) it was described as good and in forty-seven (36.19 per cent.) as excellent. In the question of weight, four patients were said to have lost, twenty-eight (21.56 per cent.) had not lost any but had not gained much, and the remaining ninety-eight (75.46 per cent.) had gained, some a great deal, while most had grown considerably. This was the eulogy department, and it was most interesting and gratifying to hear the comments and unsolicited testimonials.

With regard to the patient which died, the following are the facts. A female child 4½ years old had complained of vague abdominal pains for about four months, with nausea and slight vomiting, suffering from occasional constipation. There was right-sided abdominal tenderness, but nothing else on examination beyond a slight unexplained pyrexia on the evening before operation. The anæsthetic was avertin alone, of which forty-three minims of a strength of 0.175 grains per kilogram body-weight was administered at 10.10 a.m. The operation was commenced at 10.55 a.m., that is, forty-five minutes later. The abdomen was opened through a right split rectus incision, and there was revealed a ptosed cæcum held down by numerous peritoneal bands; these were divided and the cæcum fixed to the posterior abdominal wall. The operation was finished at noon, lasting sixty-five minutes. Later in the afternoon the child appeared to be considerably shocked, and was given intravenous glucose saline and intravenous and intramuscular coramine, but in spite of energetic treatment died shortly afterwards. It is thought there was a special sensitivity to avertin, possibly with a liver less well able to detoxicate this drug, and it may be that the slight evening pyrexia manifested a minor metabolic disorder.

Radiology.

The main aid to the diagnosis of abdominal pain is undoubtedly radiology. Various methods may be used, including screening, straight X-ray picture of the

abdomen, by barium enemata or barium meals. In the series under consideration, only one patient had a straight X-ray of the abdomen, thirteen had enemata, and forty-nine had meals.

The object of the straight X-ray is to determine whether there be any cause for the symptoms apart from the intestinal tract, such as calculi in the renal system or gall-bladder or calcified mesenteric glands. Perhaps the fact that in only one case a straight X-ray was taken will provide a guide as to the usefulness of this method, and a possible explanation is that even if the clinical diagnosis may suggest mesenteric adenitis, and this be confirmed at operation, yet the glands are in most cases non-opaque to X-rays, at any rate in children. In this one case nothing abnormal was demonstrated, either in the X-ray or at operation, the pathology being confined to the appendix. In two cases where barium meals were done, X-ray opaque glands were demonstrated, but confirmed at operation in only one of them, where there were large masses of glands.

Of the thirteen patients who had opaque enemata, four were said either to be normal or to show no gross evidence of disease. Dilatation of the cæcum was demonstrated in two cases, and other two showed ptosis; in three further patients an enlarged loop of colon was demonstrated, two as pelvic and one transverse. Perhaps the outstanding feature in most cases is the lack of tone demonstrated, not only in the dilitation and ptosis of the cæcum, but also in the diminished degree of haustration throughout the colon. Several times repeat X-ray photographs were performed after evacuation of the enema, to see whether any appreciable quantity of barium was retained, but in this series of cases none was found. Such retention of barium would indicate definite stasis of an organic type, but probably would be found more frequently in old-standing disease and in adults.

Following operation where a repeat opaque enema was performed, it was not uncommon to find an incompetent ileo-cæcal valve with considerable quantity of barium in the lower coils of the small intestine.

It is considered, then, that the opaque enema is useful in demonstrating stasis of the intestine as revealed by loss of tone of the colon, and provides a valuable aid in diagnosis. Treatment should be directed along the lines of—

(1) Removing any structure, irritative, inflammatory, or otherwise, such as an appendix or peritoneal bands, which might initiate or aggravate this loss of tone;

(2) Performing a plastic operation on the cæcum itself, to enable it to recover the lost tone.

Lester uses an opaque enema to demonstrate lesions of the right lower quadrant alone; Rose and Carless advise the use of stereoscopic pictures to avoid the wrong interpretation of supposed kinks by the overlapping of shadows: this is specially applicable in the interpretation of photographs of the flexures of the colon.

With regard to the largest group of cases, that of the barium meals, there are forty-nine patients in whom this investigation was carried out. The usual procedure is to use the one meal, and of this to take as a rule three photographs—immediate, four hours, and twenty-four hours after ingestion of the barium; in certain cases this is varied, and pictures are taken at seven hours and thirty-one hours after.

While this procedure serves to demonstrate the stomach and intestines, yet only rarely is the appendix visualised. In an attempt to remedy this the technique was varied, and now a saline aperient (2 oz. of mist. alba.) is given after the intermediate picture is taken. This has resulted in much better and more frequent visualisation of the appendix with correspondingly greater help to the surgeon. This altered technique was adopted at the end of 1934, and some idea of the improvement will be gathered from the following table.

Year	Patients	Meals	Percentage	Appendix seen	Percentage
1934 ...	44	8	18.1	2	25
1935 ...	36	13	41.66	5	38
1936 ...	54	28	53.5	18	64.3

This table, of course, shows an absolute increase of meals, also a considerable relative increase in appendices visualised, and this explains the increased number of meals on the grounds of greater accuracy and usefulness of the photographs.

A further point of technique has been introduced in conncetion with the twenty-four-hour picture. The abdomen is carefully palpated, and over the site of maximum tenderness a radio-opaque object is placed and the photograph taken. In many cases this radio-opaque object is found to correspond with the site of the appendix. The findings of these cases show an interesting variation in accordance with the pathology, showing how this exerts its influence on the different parts of the alimentary canal.

Of these forty-nine cases, there are ten where the only demonstrable abnormality lay in the stomach; this consists of a barium residue at four or seven hours, probably due to pylorospasm of a reflex type, as distinct from organic pyloric stricture. Included here are three cases showing varying degrees of gastroptosis. Following operation (appendicectomy alone), repeat barium meals were performed in seven cases, two of these still showed residue, one slight and the other rather more, while the remaining five showed none.

In another group there were eleven cases where the stomach was abnormally long in emptying, with residue at four hours, and where the appendix was visualised and also abnormal at twenty-four hours. Here again repeat meals were performed after operation in six cases; four showed no residue, one had a slight residue, and in the other case an error was made in the time for X-ray, being at seven hours instead of four hours, so no conclusion can be drawn. This group includes one case where, as well as abnormalities demonstrated in the stomach and appendix, there was heavy scattering of barium in the small intestine.

Taking these two groups together, there are twenty-one patients (42.8 per cent.) demonstrating reflex-pylorospasm and gastric retention; thirteen have had X-ray examination following operation, with nine (69.2 per cent.) showing no residue; three (23 per cent.) where there is still slight residue, and one indeterminate.

In discussing the nerve supply to the ileum, cæcum, and appendix, Lester says that "this is intrinsic and extrinsic. The extrinsic supply comes from the vagus and sympathetic carrying afferent and efferent fibres. The sympathetic fibres pass to the semilunar ganglion, which also connects with the stomach." Reflex pyloro-

spasm is well recognised, and it would appear that, in so far as this condition follows a lesion of the ileum, cæcum, or appendix, the mechanism of its production is by this sympathetic nerve supply via the semilunar ganglion. Lester further states that "where X-ray showed pylorospasm and right lower quadrant abnormality, with or without post-pyloric ulcer, that operation on the right lower quadrant alone gave complete relief in many cases."

A further group consists of those cases where the sole abnormality is found in the small or large intestine, a normal stomach, and the appendix not visualised. There were seven (14.3 per cent.) of these cases, four of which showed intestinal hypermotility, two showed the opposite condition of ileal and right colon stasis, while the last one demonstrated a spastic colon with some tenderness at the lower end of the cæcum, together with a calcified mesenteric gland. Together with these are three further cases where, as well as an abnormality of the gut, the appendix was also considered abnormal. Of these ten cases, seven had repeat meals following operation, and showed that in six cases (85.7 per cent.) the abnormality had disappeared or was much improved, while the remaining one was still the same.

There was one group where the appendix alone was considered pathological, and here were abnormalities of shape, of bore, with varying size of lumen, retention of fæcoliths, prolonged stasis of barium, and local tenderness. For obvious reasons no meals were repeated in this group.

The final group consists of six cases (12.25 per cent.) where no abnormality of any kind was found, and where again no repeat meals were performed.

Altogether of the forty-nine patients, twenty (40.8 per cent.) had repeat meals. This, of course, does not mean that they all had to undergo the complete series of pictures, but only those corresponding to the times of the abnormal pictures of the original investigation. Of these twenty repeat meals, fifteen (75 per cent.) show complete recovery from the previous abnormality, four (20 per cent.) still have the original abnormality in lesser degree, while one is indeterminate.

As aids to diagnosis, Lester uses the following methods of radiology—

(1) Barium enema to show right lower quadrant abnormalities. The advantages of this course are obvious, but he omits to mention other anatomical abnormalities, such as redundant loops of colon. These are mentioned by Morse and Demmer, and the latter quotes three cases of megasigmoid in children whose symptoms completely disappeared following appendicectomy alone. It is difficult to find any writer who uses the barium enema to determine large-bowel stasis in spite of its manifest possibilities of usefulness in this sphere.

(2) Barium meal (a) to include pylorospasm and deformed duodenal cap. This method is commonly used here as mentioned above, and experience shows that appendicectomy alone is often sufficient to relieve all trace of pylorospasm; (b) an appendix angled or kinked is abnormal, also one filled for three days. This is the standard used here, except that it is usually considered abnormal if there is appendicular retention of barium for twenty-four hours; several cases are, however, shown with retention for forty-eight hours and over. Hornung emphasises the value of X-ray examination of the appendix, and quotes a case where the appendix

showed filling at twenty-four hours. In the middle of the shadow was an interruption, and this was found at operation to correspond with a stenosis; Hornung believes that prolonged filling of the appendix is an important sign of chronic appendicitis. (c) "Persistent deformities of the cæcum and terminal ileum are also considered abnormal," and this finds acceptance here.

At this point one other feature mentioned by Lester should be noted, that is, the question of after-treatment. He emphasises this aspect, and states "that constipation is not all relieved at once, but needs the usual medical treatment"; more important is the treatment of gastric symptoms in the matter of bland diet, adequate mastication of food, and regular meals. The reason this is mentioned under the heading of radiology is because of the large proportion of patients showing pre-operative four-hour gastric residue, and the not inconsiderable number showing some degree of post-operative residue. It is thought that adequate after-treatment might still further reduce the proportion of patients with complaints and those showing four-hour gastric residue.

De Martel and Antoine recommend systematic X-ray examination of all patients with symptoms in the right iliac fossa. They emphasise the value of fluoroscopy, as this method gives information on the state of the intestines in time and space, whereas a film shows only a momentary image; it demands, however, more time, and there should be co-operation between the physician and radiologist. They favour the intestinal transit method rather than the opaque enema, though both are indispensable at times. Anatomically, alterations of situation, shape, size, calibre, and specially of mobility and tenderness, should be looked for. Physiologically, alterations in rate of progress of the meal should be noted; they state that the cæcum should be empty twelve to fifteen hours after ingestion of barium, and if later than this there is delay. This arises in painful mechanical syndromes in the right iliac fossa. It is suggested that during times of pain the cæcum empties en bloc and transit is accelerated, but between painful crises the cæcum empties by overflow, and delay is manifest.

Several authors are quoted with widely varying figures for visibility of the appendix—palpation under the fluoroscopic screen helps to reveal certain hidden appendices, but an absence of appendicular image permits of no conclusions as to the integrity of the appendix. Jaisson says the appendix is empty at least in twelve hours after the cæcum. When the appendix is diseased, there are filling defects, kinks, vacuoles, and specially local tenderness and immobility. A retro-cæcal appendix may become visible after the cæcum empties. A healthy appendix should be empty in thirty-six hours, but a diseased one may remain visible for two to three days. According to Spriggs, intestinal hypermotility is a sign of chronic appendicitis, but occurs only rarely.

Pathology.

The subject matter for this falls readily into three main groups :—

1. Chronic appendicitis.
2. Mesenteric adenitis.
3. Abnormalities of cæcum and colon.

There are also several subsidiary groups consisting of minor combinations of the above.

In the group where the appendix alone can be called pathological there were seventy-one cases (53.25 per cent.), and inasmuch as attacks of symptoms have been recurrent, it is claimed that this group consists of cases of true chronic appendicitis. Writers differ as to whether or not there is such a condition. For the affirmative there are Menon, Signorelli and Hosen, Lester, Hertzler, Helwig, Morse, Walkling, and others, while Schrager and Collins do not seem very sure.

Hertzler gives three axioms as criteria of all evidence of chronic appendicitis, and one of these is that symptoms must be permanently cured by appendicectomy. While it is not claimed that all cases have been cured completely of symptoms, yet this group shows the highest percentage of good results, including consideration of all cases of even slight complaint; fourteen patients (19.7 per cent.) of the seventy-one have occasional much less severe symptoms, and the remaining 80.3 per cent. are quite well. These results are just twice as good as those of Melchior quoted by Helwig, with whom only 40 per cent. of patients with chronic appendicitis are relieved by appendicectomy.

In thirty-six cases (50 per cent.) the pathology was attributed to kinks, spiral twists, and hairpin bends of the appendix caused by abnormal peritoneal relations, whether an unusual thickening of the meso-appendix, separate peritoneal bands, or fibrous and vascular adhesions caused by previous attacks. In several cases the omentum was adherent to the tip of the appendix. There can be no doubt that all these play their part, for it has been found frequently on opening such appendices that the wall and mucous membrane are abnormal, usually at the point of attachment of the appendicular end of such bands.

Hertzler states another axiom, and says that "the appendix is a part of the gut and must behave as such," overlooking the two facts—

(1) The gut shows varying form to suit varying physiological needs.

(2) The appendix is a cul de sac.

Surely on this form of the appendix as a cul de sac depends the whole basis of appendicular pathology. Lester speaks of the factors which prevent proper emptying of the appendix. Peritoneal bands inhibit the normal appendicular freedom of movement in the abdominal cavity, and locally hinder peristalsis of the appendix and so of proper emptying. Constrictions in the wall frequently occur at the attachment of these bands. Consequently, faeces entering the appendix passing beyond kinks caused by such bands find an organ which has difficulty in emptying itself, and the fæcal matter becomes inspissated, forming a fæcolith.

Such an appendix becomes much more liable (Helwig) to invasion by the intestinal flora, through an abraded and ulcerated mucous membrane (Lester) producing attacks of appendicitis. Such attacks may cause minimal subjective symptoms; in fact, Hertzler speaks about acute attacks without symptoms. Eventually these attacks are registered with increasing consciousness, and medical advice is sought.

Dealing with the appendix itself, it is considered from the external and internal aspects.

Externally.—The length and size of the appendix does not appear to bear any close relationship to the age of patient or duration of symptoms; in this group nine appendices were considered of disproportionate size or length. The general appearance of the appendix at operation is a useful observation, as eleven of these seventy-two (15 per cent.) showed definite congestion of the superficial vessels in contradistinction to an active dilatation associated with acute inflammation. This would indicate some degree of interference with an adequate circulation to the appendix following stasis. It is considered that in the chronic case the position of the appendix relative to the cæcum or ileum is of considerable importance, that is, whether the appendix lies in the pelvis, retrocæcally, or in a more usual situation.

Internally.—The most striking feature of the interior is the condition of the mucous membrane. Normally it is a pale yellow (Crymble), but in not less than thirty-one cases it is reported to be either pink, red, or reddish blue, mostly of a local distribution, and again frequently dependent upon the position of the external tethering bands. Again, it is found that in nine cases petechial hæmorrhages are present in the mucous membrane, and in a very few free blood. With regard to this question of petechiæ, it is much debated as to what is the full significance. Some maintain that it is a true criterion of the chronic appendix, and that any appendix showing them is pathological; others again claim that their presence or absence is largely a matter of operative technique in clamping the appendicular vessels and the appendix itself preparatory to appendicectomy, thereby causing sudden alteration in the blood-flow, with raised intravascular tension and consequent rupture and extravasation. Referring to this matter, Young mentioned that he had several times stained sections of such appendices to demonstrate the presence of hæmosiderin from disintegrated red blood cells, but always with negative results, it being felt that had such petechiæ been present for any considerable length of time the red blood cells would have broken down with local deposit of hæmosiderin. The inference is that such red blood cells constituting the petechiæ have not broken down, but that their presence is most likely due to recent diapedesis or rupture of minute blood-vessels. Lester maintains that true pathological changes are visible to the surgeon alone, and if we accept this and limit his vision to the gross pathology of the external aspect of organs, it may seem peculiar that these petechial hæmorrhages are present in four cases where it was considered that the whole pathology was enlargement of mesenteric glands. Against this criterion of pathological change (Lester) is the presence of altered mucous membrane, whether local or general, because only one-third of these showed *external* congestion. As it is obvious the surgeon cannot inspect the mucosa before removal, the only proper procedure is to remove the appendix in the presence of recurrent symptoms, even if there be little or no macroscopic changes (Beuttner, quoted Hertzler).

Considering one other feature of the internal aspect, there is the question of fæcoliths as distinct from the mere presence of fæces. They were found in twenty-five per cent. of cases. Possibly this may give some idea of the duration of symptoms in these cases. Here is unquestioned evidence of improper function and

increasing potential danger with each succeeding attack. It is surprising that more cases were not found with coproliths, but possibly the attacks of most of the remainder were of insufficient duration. In several cases the fæcoliths were multiple. Most of the fæcoliths were found at the tip, and of these the majority were distal to a stricture.

It was found that in only two cases where the appendix was opened that thread-worms were present, so that in this series their presence as an etiological factor is not of great importance.

When considering the internal condition of this group of appendices, it should be pointed out that sixteen of the seventy-two appendices were preserved intact for histological examination. In connection with the state of the appendix-wall it was found that thirty per cent. of cases showed definite macroscopic thickening or stricture. In some cases the thickening appeared to be in the muscle layer, giving the impression of compensatory hypertrophy in an attempt to increase the expulsive cleansing power. Aschoff maintains that anatomical changes demonstrable in the appendix are the result of previous acute inflammation. Hertzler thinks this would show an increasing incidence of appendicitis with advancing years, but, as Helwig says, there is no doubt this process in many cases continues to complete obliteration of the lumen, with probable freedom from further attack. Helwig also says that it is a false assumption that appendices showing chronic healing or receding changes cause symptoms; it may be asked, however, why in the absence of other pathology do they have recurrent attacks and why does the removal of such an appendix cause so pronounced an improvement? He further adds, which will receive more general approval, that in an appendiceal lumen of decreased calibre, retention of contents and subsequent bacterial invasion take place with greater ease than in any other type.

Included in this group is one case where, together with the pathological appendix there was a redundant loop of pelvic colon. This loop was left untouched, and the subsequent history justified this procedure, as the patient later had no complaint to offer. Demmer mentions three children with megasigmoid in whom chronic appendicitis was found, and after appendicectomy the symptoms of megasigmoid also disappeared. He suggests that chronic appendicitis might be responsible for megasigmoid. Morse says that at birth and in infancy the large intestine and especially the sigmoid is relatively longer in proportion to the small intestine than in later life, and attainment of adult relationships is often delayed. This produces redundant colon, which is abnormal, and though it is not dilated, is a common cause of constipation. The treatment is symptomatic, and must never be operative.

There were also three of above cases where the cæcum was ptosed, descending into the pelvis, but appendicectomy alone was considered sufficient treatment. Two of these patients still complain, and it is suggested that possibly some plastic operation on the cæcum might be useful in similar cases in the future, to help to overcome the probable physiological dysfunction following an abnormal position of the cæcum.

The next largest group of cases is that where the sole pathology is reported to

be mesenteric adenitis, and there are in all twenty-two cases (16.5 per cent.); five of these are described as consisting of large masses of glands, one of which shows some degree of calcification; in eleven further cases the report is that glands are present, and in the remaining six only a few, localised mainly to the right iliac fossa. As may be expected, this group provides the greatest number of poor results, nine of the twenty-two (40.9 per cent.) complaining, and in rather more definite terms than in the previous group. There is a great deal of disagreement as to the presence and nature of such glands.

Anatomically.—Quain describes the mesenteric glands as consisting of 130 to 150 or more, seldom larger than an almond, most numerous in that part of the mesentery corresponding to the jejunum and largest around the trunk of the superior mesenteric artery. Leaf says that "ten or more glands follow the course of the ileo-colic artery and its branches." These will then drain the lower six inches of the ileum, the ileo-cæcal valve, the cæcum and appendix. Irwin and Schrager both classify mesenteric glands as occurring in three groups :—

(1) close to the mesenteric attachment,

(2) in the mid-mesenteric portion,

(3) at the root of the mesentery,

and diminishing in size when traced downwards. They are small, pale, flat, and moveable, most occurring in the ileo-cæcal sector.

As regards the *pathology*, the concensus of opinion appears to be that most of such glands when enlarged are tuberculous, but in this series only five of the twenty-two could, from the macroscopic appearance, be attributed to the tubercle bacillus. Irwin quotes Huesser, that where glands were found to be tuberculous by pathological examination, the result would have been the same had judgment been based on naked-eye examination alone. The remainder may be tuberculous, but possibly came to operation before the usual picture had had time to develop. A few cases had a Mantoux test performed after operation, with positive results. Morse publishes results—seventeen cases, thirteen tuberculous, seven cases (41.2 per cent.) complained of recurrent abdominal pain; compare 40.9 per cent. in this series of twenty-two cases. He stresses the value of a Mantoux test.

Collins quotes Speese to say that tubercle is an infrequent cause, but this is usually secondary to appendicitis; he himself recommends laparotomy as the only safe course, and advises leaving the appendix if the glands be either acutely inflamed or tuberculous following examination of a frozen section. It would appear to be very questionable treatment to allow an appendix to remain in situ, ready and willing to become the seat of further pathology in the future, necessitating a further abdominal section probably under conditions far from ideal or indeed where surgical intervention might not be procurable. Collins' patients are kept in bed till the eighteenth day; on a bland diet, heliotherapy, and restricted activity for six months, resulting in a cure. When they become healthy, all septic foci are removed.

Walkling compares adenitis and appendicitis in the close similarity of the clinical condition. He maintains that chronic appendicitis may start as such or follow an acute attack, and advises removal of an appendix in cases of adenitis, with

probable automatic cure. This corresponds more with the experience of the present series of cases.

Signorelli and Hosen discuss mesenteric adenitis under three types :

(1) glands discrete, enlarged, inflamed, simulating acute appendicitis;
(2) a mass of glands round a caseous gland or small abscess;
(3) healed adenitis often traced to a chronic appendicitis.

They hold that mesenteric adenitis results from absorption of foreign toxins or bacteria via the gut, that the bacterial content of the gut is influenced by the gastric barrier, whose efficiency varies with the concentration of H.Cl., this being lethal to staphylococci, streptococci, and B. coli, but anthrax and tubercle bacilli pass it. The factors influencing its effectiveness are :—

(1) Number of organisms swallowed;
(2) Hydrochloric acid concentration;
(3) Length of exposure and relative resistance.

Test-meals were performed, using the histamine technique, as a criterion of achlorhydria—this was present in two cases out of twenty-five reported.

The theory is, to strengthen the gastric barrier even in a normal stomach. In cases representing the result of mesenteric gland pathology there was marked improvement with relief of symptoms in all cases. The acid was stopped in two months, and no remissions occurred in nine months. This is most interesting, but obviously open to many objections :—

(1) Diagnosis.—There is no mention of how this was arrived at with accuracy.
(2) Hydrochloric acid is a digestive secretion, and these patients may have been suffering from indigestion.
(3) Apparently a normal gastric H.Cl. concentration is insufficient, so presumably everyone with a normal acid curve should have mesenteric adenitis.
(4) In their series of cases it cannot be correctly determined which organisms may have caused the symptoms. It cannot have been staphylococci, streptococci, nor B. coli, as the normal gastric barrier is lethal to these, also anthrax and tubercle bacilli pass the barrier, and are therefore unlikely to be influenced by increasing the hydrochloric acid concentration.

The figures are, however, very interesting, and further investigation should be carried out and the treatment given an exhaustive trial, as any procedure should be undertaken which will give good results avoiding laparotomy.

Schrager has many points of view in common with our own; he speaks of these cases as being most common in children, specially during seasonal epidemics of respiratory infections, and clinically assume the aspects of the acute abdomen. This is the feature already referred to in the introduction of this paper, as measles and whooping-cough may well be considered as respiratory infections. He also says that enlarged glands are discovered during laparotomy in proportion to the curiosity of the surgeon; many are tuberculous, but of other etiological factors he mentions influenza, throat and respiratory infections; he claims that abdominal

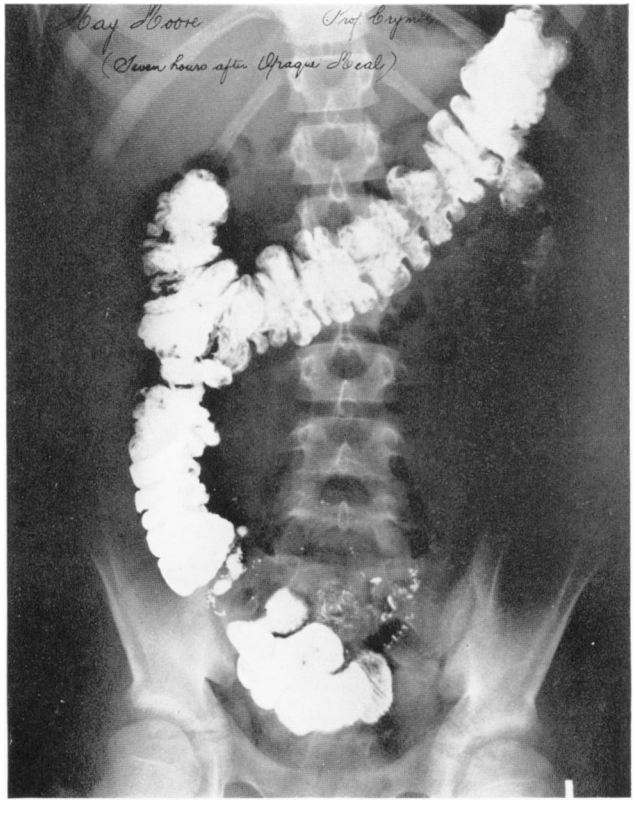


Fig. 1—Barium meal. Seven-hour picture (pre-operative). Shows intestinal hypermotility, head of meal at splenic flexure and commencement of descending colon.

Fig. 2—Seven-hour picture (post-operative). Transit has slowed a great deal. Head of meal now in the lower part of the ascending colon. Operation—few enlarged glands, appendicectomy.

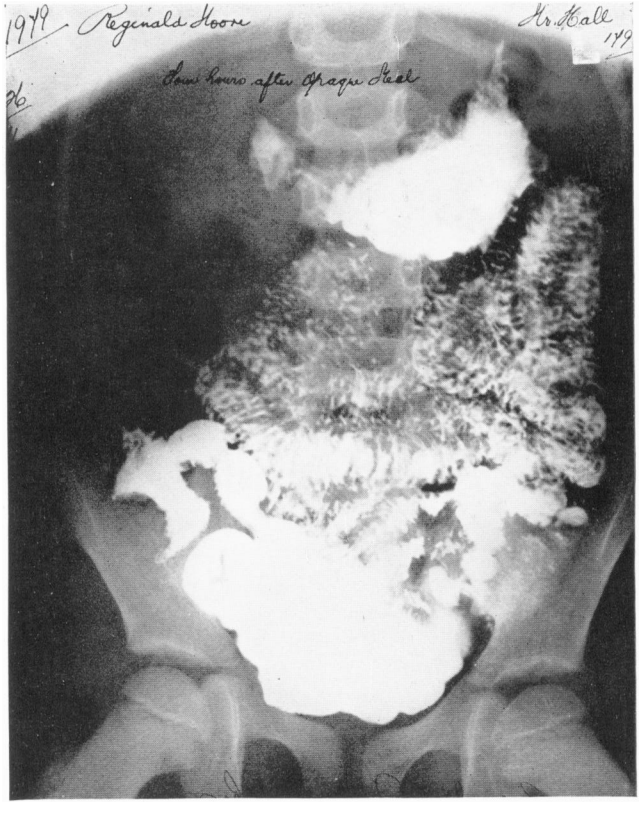


Fig. 3—Barium meal. Four-hour picture (pre-operative). Considerable gastric residue, and small gut scattering.

Fig. 4—Twenty-four hour picture.
Very long kinked appendix; moderate degree of stasis. Operation—corkscrew appendix with cæco-appendicular kink.

Fig. 5—Four-hour picture (post-operative). Stomach now empties satisfactorily.

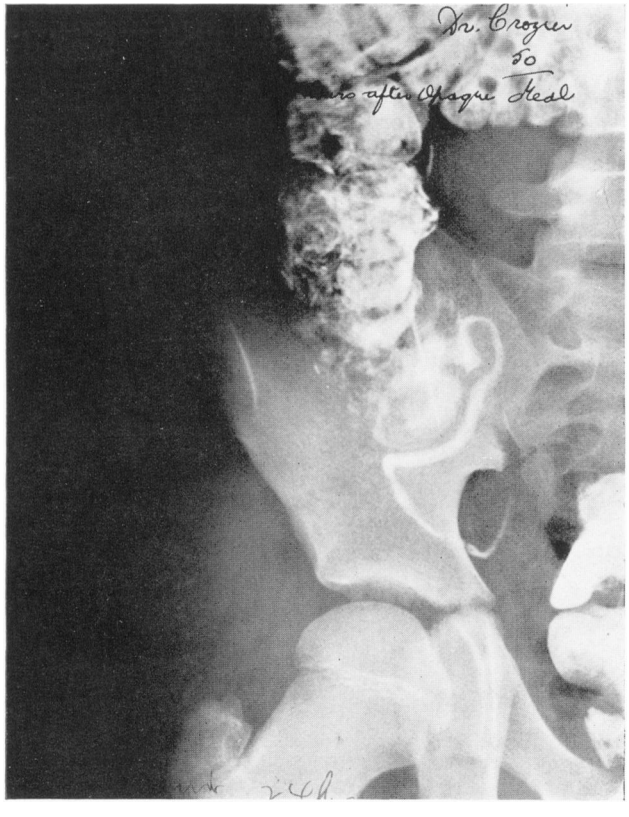


Fig. 6—Barium meal. Twenty-four hour picture. Enormous appendix. Illustrates the use of a radio-opaque object laid on the abdomen at the site of maximum tenderness; this appears to correspond with the base of the appendix.

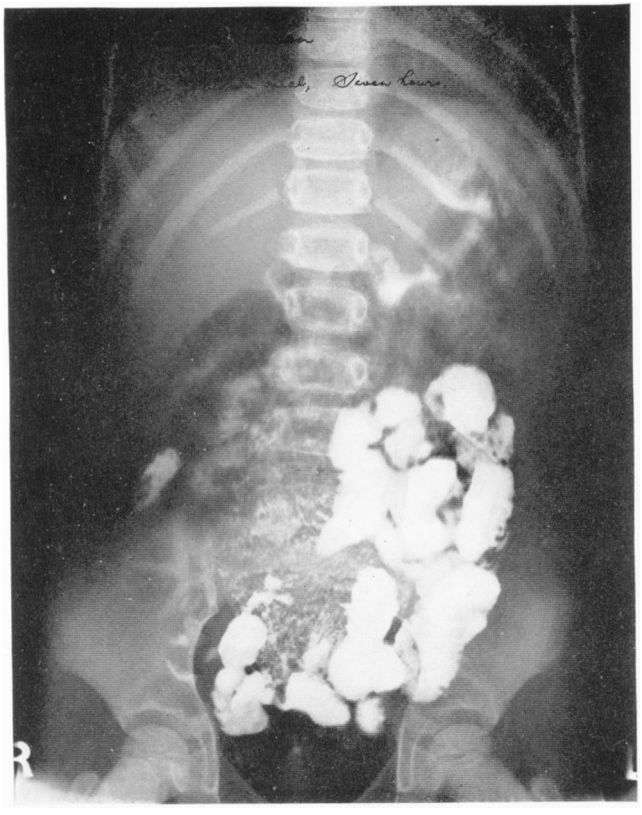


Fig. 7—Barium meal. Seven-hour picture (pre-operative). Well-marked ileal retention. No barium in colon in seven hours. Operation—few enlarged transverse mesocolic glands, appendicectomy.

Fig. 8—Seven-hour picture (post-operative). Stasis overcome. Head of meal in transverse colon and up to splenic flexure.

Fig. 9—L.S. x 25. Hæmatoxylin and eosin. Appendix unopened.

Shows light staining fibrous tissue passing right across appendix lumen. Dark staining muscle-tissue is displaced by contracting fibrous tissue. Many isolated muscle-bundles. Mucous membrane on either side of fibrous tissue.

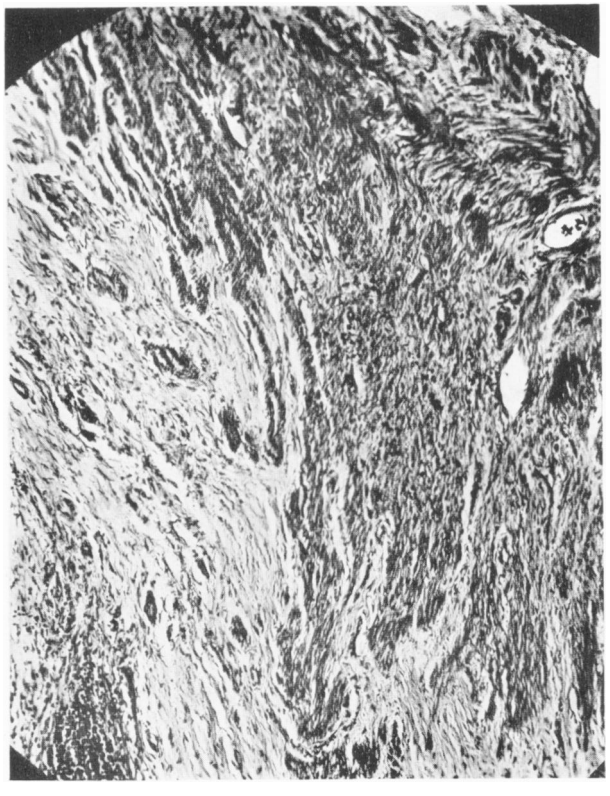


Fig. 10—L.S. x 105. Hæmatoxylin and eosin. High-power photograph of upper portion of previous figure. Further demonstrates warping influence of fibrous tissue in the formation of a potential stricture.

pain is present in twenty-five per cent., and proposes a selective localisation of infection in the colon or small intestine, with secondary involvement of the glands producing pain and vomiting. Occasionally staphylococci and streptococci have been isolated from the mesenteric lymph-glands, morphologically the same as those recovered from the throats of corresponding patients. He maintains that early tuberculosis shows merely a lymphatic hyperplasia, and recommends that if there is a doubt as to the pathology, laparotomy should be performed if the patient is not acutely ill, and vice versa. Many patients with extensive mesenteric adenitis remain well after appendicectomy, and it is suggested that the improvement is due to hyperæmia following operation.

Irwin maintains that most are tuberculous, but agrees with Adami that other organisms may be the cause, and also lays stress on the presence of septic foci. In the presence of gross glandular enlargement, he finds :—

(1) Abnormal irritability of the intestine, with spasmodic contractions, specially of the circular coat on handling. He suggests that the pain is due to irregular peristalsis caused by the cutting off of central control to the autonomic nerves by the swollen glands.

(2) Spasm of the pylorus, seen at operation and in a moderate gastric residue—six hours after barium meal.

Short finds great difficulty in providing a differential diagnosis between appendicitis and adenitis, advises appendicectomy and then removal of enlarged glands if found. He explains the pain of adenitis on the grounds that the splanchnic nerve-fibres of the mesentery traverse the lymphatic glands, that a peristaltic wave pulls upon the subjacent mesentery and the gland between its leaves and irritates the nerve-fibres passing through it; when the wave passes the pain ceases. This rather provides a condemnation of his plan to remove the glands, as he must then interfere with the autonomic fibres, and then again his explanation would indicate that pain was felt with each peristaltic wave, which is not the usual experience.

A further group of cases is provided by a combination of the two foregoing, namely, where both appendix and glands are considered pathological, and of these there are thirteen, six of which would suggest greater disease in the appendix than in the glands, and seven with the glands more affected than the appendix.

Dealing first with the six cases of appendicitis with mild adenitis, it is suggested that the appendicitis is primary and the glands have become secondarily involved, as so often occurs in all areas of the body following mild inflammatory processes; for example, the cervical adenitis following tonsillitis or dental caries. There is always pain and tenderness in such cervical glands, and it would only appear reasonable to suggest a similar train of events in connection with the appendix. The outcome will be that, instead of having an appendicitis only, there will also be an adenitis producing further symptoms, and, as Schrager suggests, the appendicitis may subside with conservative treatment, but later removal will not prevent invasion of lymph-glands, and these may remain active. This is fairly well borne out in the present series, as of the six cases in this group, two (33.3 per cent.) still complained of occasional attacks of pain. The remaining 66.6 per

cent., of course, appear to be cured, and probably in their case the glands were able to recover their normal function. Irwin mentions the rarity of finding tuberculosis in the lower ileum, and concludes with Calmette that tubercle bacilli can pass through intact mucous membrane and leave no trace. Schrager again says that the intestine and appendix may be normal macroscopically at the time the adenitis is apprehended, suggesting that the original lesion may have healed and the mesenteric response persisted. In this group, kinks and twists of the appendix occurred in four cases, and one showed an abnormal meso-appendix, two were unusually large and long, three showed external congestion, and four a redness of the mucosa, while one appendix contained a fæcolith and another showed a stricture in the wall.

In the corresponding group, where the main pathology appeared to be situated in the glands and to a lesser extent in the appendix, there were seven cases (5.25 per cent.). Here it is tempting to think in terms of double pathology, namely, a chronic affection of the appendix and tuberculosis or other infection of the glands; possibly the glands may have become involved, with tuberculosis secondary to the appendicitis. As with the other group, two patients still complain of slight occasional abdominal pain, that is, 28.57 per cent. Considering the pathology, one appendix showed a kink, one had a stricture, two showed external congestion, while only one had red-coloured mucous membrane. By comparing the pathology of the two sub-groups, confirmation is obtained in the belief that in the latter case the appendix is only of subsidiary importance. In assessing the results, it should be pointed out that one of the four untraced patients belongs to this group, so that the improved results in this sub-group as compared with the former are more apparent than real.

The third main group consists of those cases where there was an abnormality of the cæcum. This generally meant ptosis together with dilatation, caused in many cases by peritoneal bands of a congenital type and in certain cases by acquired adhesions. There were sixteen patients (11 per cent.) in whom this was considered the main pathology, and in three others the appendix was also involved in the tethering bands. Appendicectomy was, of course, performed in each case, but as well as this an attempt was made to overcome the ptosis of the cæcum by dividing the peritoneal bands holding it down and by suturing the cæcum to the posterior abdominal wall well above the previous site. Included in the sixteen patients with ptosis of the cæcum are two who also were found to have a redundant loop of pelvic colon. As in the case of the patient with appendicitis and megasigmoid, this loop was left untouched, and results were good in both cases.

Before the results are analysed, it should be pointed out that three of the four untraced cases belong to this group; two of these had removed to new districts and could not be traced there, and the other one died, as already explained. Altogether there were only three patients with any complaints, that is, 18.75 per cent. of the group, or 23 per cent. of those traced, and this compares favourably with the larger group where the appendix alone was pathological. It is unfortunate that this group should be so much smaller than the others and that in it

there should be such a large proportion untraced. In the three cases where the appendix was involved with the cæcum, the results were excellent, and if these cases are combined in the former group, better figures are obtained.

All of these nineteen patients were given normal serum both before and after operation, in an attempt to neutralise the toxins and sepsis associated with abnormal putrefaction in the ptosed cæcum.

References in the literature to this type of case are rather rare. Lester says that kinks and adhesions of the appendix are generally recognised, and that adhesions both congenital and acquired also affect the cæcum and terminal ileum, limiting mobility. Symptoms are doubtless reflex, impulses passing to sympathetic ganglia interfering with normal peristalsis, causing stagnation of intestinal contents and constipation, together with right lower quadrant pain. He explains the pain as due to peristalsis or cæcal distension causing peritoneal irritation by the pull of peritoneal bands; on examination, there is tenderness and gurgling. This explanation of the findings seems reasonable enough, but there appears to be a simpler one and probably of equal merit, that is, the mechanical factor. A ptosed cæcum has greater difficulty in securing efficient emptying, with resulting stasis of intestinal contents, specially so if there are in addition anchoring peritoneal bands.

De Martel and Antoine describe the normal cæcum as having a lateral mobility of about two centimetres, and quote Wilms as stating the criterion of a mobile cæcum to be one whose displacement in both directions reaches and exceeds nine to ten centimetres. They further state that the mobility of the cæcum increases pathologically when the length of the cæcum is increased. It is this abnormal mobility which allows it to become displaced, painful symptoms resulting, caused apparently by mechanical fæcal stasis in the cæcum, with abnormal fermentation, delay of cæcal evacuation, and then cæcal distension and dilatation. Pain may be only mild, as a feeling of weight due to the effort of the organ to empty itself, or becoming more serious as "cæco-colics" or acute paroxysms due to kinks or torsion of the cæcum. In the presence of severe, frequently recurring attacks, De Martel has performed an ileo-sigmoidostomy with good result, leaving the right colectomy for a future occasion, should the need arise.

Irrespective of their intensity, the painful manifestations merely denote a hindrance to the passage of fæces and gas in the cæcum and right colon, and as well as the mobile cæcum as a cause, these symptoms result from adhesions, congenital or acquired, which fix and capture the ptosed cæcum in the pelvis and hinder its contractions. The cæcum in this latter state is a sac more voluminous than usual and inert, having its dimensions increased in all directions, it is barely moveable, undergoing a change of form instead of showing the usual active peristalsis. In this case tenderness on palpation is probably due to an inhibited tendency to displacement of this fixed ptosed cæco-colon. In such a cæcum there must obviously be considerable delay in evacuation in the ascending colon, and this may be accompanied by a certain degree of ileal stasis, with associated minor digestive disorders of a reflex nature.

This condition of the cæcum may be due to periviscerítis of the lower quadrant, as a stage following that of the ptosed fixed cæcum. Lesions of the appendix are very important in its causation, also pre- and retro-cæcal adenitis and tuberculous peritonitis.

In discussing chronic appendicitis in children, Walkling mentions both a mobile cæcum and congenital kinking of the cæcum as differential diagnosis.

Lester lays emphasis on the treatment of these cases, advising thorough freeing of the gut by division of membranes and bands, and mentions that these occur in two types :—

(1) Outside the gut, and avascular;

(2) Inside the gut, and vascular.

Speaking of the treatment of the latter variety, he says it is essential that the raw surfaces produced on division of these bands should be covered by free omental grafts, to prevent their re-formation. This view should find ready acceptance.

It should be obvious that such anatomical irregularities and abnormalities will lead to intestinal stasis with considerable degree of auto-intoxication. Rose and Carless lay down the symptoms arising from intestinal stasis as threefold :—

(1) Mechanical, following distension of stomach, duodenum, or ileum, with special emphasis on prolapse of the colon into the pelvis—this becomes filled with liquid fæcal material which cannot be evacuated.

(2) Inflammatory, such as gastric and duodenal ulceration, colitis, appendicitis, etc.

(3) Toxic, from absorption following putrefactive changes in the gut contents.

The resistance of the individual to bacterial invasion is also lowered, and various infective diseases may supervene.

In treatment they recommend conservative methods for early and mild cases, relying on abdominal massage and remedial exercises to improve the tone of the abdominal wall, with purgatives and diet to increase the motor-power of the colon. In more severe cases and where there is definite obstruction produced by abnormal peritoneal bands, they recommend cæcoplication or even hemicolectomy. In these more severe cases "the cæcum and part of the ascending colon may hang down into the pelvis, and be literally transformed into a cesspool filled with putrid fæcal material, the gut walls are often soggy, thickened, and inflamed."

In discussing treatment, De Martel and Antoine also consider it from medical and surgical points of view. They recommend medical treatment for all cases of simple ptosis of the cæcum or right colon, together with minor degrees of abnormal mobility. In their opinion, medical treatment should be directed to the regulation of :—

(1) Diet; eliminate protein and excess leguminoids, use dairy products, cereals, jam and fruit, and buttermilk in an attempt to overcome the intestinal putrefaction.

(2) Constipation, using mineral oil, agar, salines, and senna. The regular evacuation of the bowel is the very basis of any treatment.

(3) Abnormal laxity of the abdominal wall, using an abdominal belt and postural exercises.

(4) General, tonics for general health and local heat for attacks of pain; medical treatment will help to prepare for surgery if necessary.

Surgical measures are reserved for :—

(1) Aforementioned mild cases when they become much aggravated or when thorough medical treatment fails after extended trial.

(2) All definite organised anatomical lesions.

Operations are only performed after mature reflection and systematic exploration by all clinical and laboratory methods of each system to eliminate any other source of toxic absorption. They consider it is going too far to say that patients with general symptoms which coincide with delay in barium transit of gut should be considered as suffering from chronic intestinal stasis. Surgery aims at providing a normal transit through the proximal colon, and the surgeon should be able to plan his operation beforehand from the data already collected by various methods of examination.

As regards the actual operative procedure, they maintain that fixations of gut and sections of pericolic membranes are not of great practical value, as they are performed on very thin gut of considerable mobility, and it is feared that fixation would be only transitory. An exception is made to this rule for congenital faults of position, specially in children, as often here there is no factor of infection, and fixation of the colon or cæcum may give lasting results if the condition of the intestine and adhesions is favourable.

It is well recognised that many people discredit the work of the surgeon in his diagnosis and treatment, claiming that either surgical interference was unjustified or that the good results claimed were due to the psychological effect of the operation. Surely the surgeon is in a much better position to judge as to the criterion of living pathology and should be trusted to give his honest opinion as to whether anything definite be present or not. It is admitted to be a matter of common experience among surgeons that many adults have great faith in an "operation," but children are usually honest when they have a pain which recurs frequently, and equally honest when they have none, whether this be post-operative or in a symptom-free interval. This objection of the psychological effect of the operation should then be invalid, except in the case where no definite living pathology is observed at operation.

In the present series of cases there are nine such (6.75 per cent.) where no living pathology could be seen, and eight of these have no complaint at re-examination, while the remaining one complains occasionally of slight similar symptoms. In three cases the appendix mucosa showed redness and small petechial hæmorrhages. This is the smallest group of cases, and speaks well for the manner and method of diagnosis as practised in the hospital.

Histology.

Under this heading the microscopic appearances of thirty-five appendices are discussed. These specimens were collected during the three years under consideration, but apart from fixation in formalin, none of them were prepared for

microscopic examination till the end of 1936, consequently some of them do not provide the best histological material. Furthermore, many of these appendices were opened after the conclusion of the operations, so that the condition of the mucous membrane could be inspected. The following table gives the figures:—

Year	Specimens	Opened	Unopened
1934 ...	11	8	3
1935 ...	1	1	—
1936 ...	23	4	19

At first sight it may appear difficult to compare such varying specimens. Advantages of examining an opened appendix are that there is no possibility of difficulty or doubt about the plane of section giving a false impression of the thickness of the various layers, and naked-eye changes in the mucous membrane may be inspected microscopically. As a disadvantage, is the suggestion that during fixation the various layers in the appendix contract unevenly in the opened specimen, producing considerable distortion and artificial disproportion between these layers. Contrasting with this, it is said to be an advantage to fix the unopened appendix and secure even contraction of the layers, avoiding this distortion and disproportion; a further definite advantage of the unopened specimen is that, whether a transverse or longitudinal section be examined, some idea of the anatomical picture is retained. Longitudinal sections are better for examination than transverse, for the structure of such appendices is much more readily seen, demonstrating the site, extent, and degree of the pathological change; this point of view is stressed by Colle. An attempt may also be made to correlate these findings with those seen at operation, specially the results of abnormal peritoneal relations and bands which anchor the appendix. A possible disadvantage of using an unopened appendix is the difficulty of cutting up such specimens preparatory to section. Great care was taken in cutting the unopened appendices in this series for the longitudinal sections, to keep as far as possible directly in the lumen. This was very difficult in the case of appendices which showed spiral twists and bends produced by abnormal peritoneal relations.

Sections were cut in both longitudinal and transverse planes of a thickness of 6 mu, and stained by hæmatoxylin and eosin and by Van Gieson's method for fibrous tissue. Of the thirty-five sections prepared, three proved to be useless for histological purposes—one of these appendices had been opened and the other two kept intact.

Attention has been focussed entirely on the question of the distribution of the fibrous tissue in the appendix. Unfortunately, there does not seem to be any criterion of the normal fibrous tissue content of the appendix, so it is very difficult to assess fibrosis in an abnormal one. Apart from this series, an appendix was removed post-mortem from a baby a few days old, and examination revealed the presence of fibrous tissue in approximately the same proportion as the muscle-tissue. There did not appear to be any intermingling of fibres at the junction of muscle and fibrous tissue. In several cases it has been shown that fibrous tissue stretches right across the lumen in varying quantity, and usually at such places

there is some narrowing of the whole appendix. In almost all cases there has been found an intermingling of the fibrous and muscle layers at their junction, in varying degree, and in several it appears that whole muscle bundles are isolated in fibrous tissue. This is present both in specimens which have been opened and in those kept intact. In certain other cases the muscle-wall is definitely narrowed by extension of fibrous tissue, including one case where in one sector there is no muscle tissue remaining.

It would appear that in the majority of these appendices the muscle tissue is affected in some way by extension of fibrous tissue. The logical deduction is that appendices whose muscle tissue is invaded by fibrous tissue are at a functional disadvantage, peristalsis is hindered, and the contents are not expelled with the normal efficiency, with the result that there is greater opportunity for infection to occur. In certain other cases where fibrous tissue stretches right across the lumen, there is further mechanical difficulty in emptying the appendix.

Colle, reporting on the results of examining three hundred appendices histologically, mentions the existence of both hyperplasia and aplasia of the lymphatic system. The former is associated with hypertrophy of the lymph follicles and hypotrophy of the muscle; the latter is more rare, and in this condition toxins are more easily absorbed. The condition of the lymphatic system is decisive in the production of the various kinds of inflammation, and the connective tissue newly formed during the inflammation is decisive in its healing. The elastic tissue, which is only sparingly present in the normal appendix, shows a remarkable increase connected with the severity and duration of the inflammatory process. In phlegmonous forms this is only moderate, in subacute forms there is profuse development, while in recurrent and atrophic forms it is still more marked. The development of elastic fibres depends on the new formation of connective tissue, and is accordingly specially marked in the muscular and submucous strata. Colle omits to mention the functional disability resulting from this, but says that as a result of its resistance to destructive influences the elastic tissue forms an effective protection against the spread of the inflammation and is therefore an important factor in healing. The innervation of the appendix varies in different people, so that the different degrees of pain caused in more or less intense lesions could be explained directly.

On the grounds of observations, post-mortem and at operation, and in experiments on dogs, Rössle believes that disturbances of the motor function of the appendix are of foremost importance in the pathogenesis and symptomatology of appendicitis. They must lead to defective self-cleaning and to retention and alteration of the contents. This forms a suitable soil for infections, inflammation, and auto-intoxication. Quantitative and qualitative deviations in the structure of the various muscle layers allow a functional interpretation.

Lester states that the appendix is a vestigial organ, and undergoes fibrosis, increasing with age at the expense of the lymphoid tissue. If we accept Colle's view that aplasia of the lymphoid tissue allows a greater ease of absorption of toxins, then Lester's view would appear to indicate that appendicitis should occur

with increasing acuteness with advancing years. This is not the general opinion. Furthermore, the normal fibrosis he speaks of can scarcely be taken into consideration in the age-group under review.

Llambias and Malamud, discussing obliteration of the appendix, state that in material examined by them this was nearly always found to be only partial. They conclude that mere obliteration cannot be regarded as the equivalent anatomical substratum of so-called chronic appendicitis. They overlook, however, the physiological dysfunction which results from these anatomical and pathological changes.

Muir states that cell proliferation may be discussed under the following headings :—

(1) *Wounds or Destruction of Tissue.*—Proliferation is initiated by a breach of cell continuity. The normal relationship of surrounding cells on all sides restrains cell proliferation by tissue tension. If this be disturbed, the cells will proliferate to make good the damage, and then cease, but if the breach be maintained by repeated damage, the cells will continue to multiply indefinitely. This capacity of cells varies inversely with the degree of specialisation, so that repair in a highly developed tissue is often effected by one of a lower order, especially by fibrous tissue. This type might well take place in an appendix where fæcoliths were constantly abrading the mucous membrane.

(2) *Chronic Irritation.*—Here again cell proliferation is a marked feature of the reaction which follows exposure of the tissues to irritants of a mild nature, and again the less highly specialised tissues react most. The presence of abnormal peritoneal relations causes kinks, and these result in improper emptying of the appendix, with resulting excessive absorption of toxins.

(3) *Functional Hypertrophy.*—This usually follows an increased functional demand, but here the specialised cells and not the stroma cells are most affected.

Even in an early stage of acute inflammation some proliferation of the connective tissue-cells occurs, and this becomes more marked as the irritant becomes less intense in its action. In many cases of acute inflammation the irritant persists in a milder form, so that the proliferation of connective tissue continues, or the irritant may be of a mild nature from the first and never lead to acute inflammation.

In the early stages the overgrowth of stroma cells may be comparatively cellular, with the connective tissue fibres delicate and scanty; later the chief change is a thickening of collagenous fibres, whilst cells are relatively scanty. The vascularity of the new tissues varies greatly, but is usually relatively poor when the interstitial growth is dense and fibrous, and contains relatively few cells.

The results of such chronic inflammation and fibrosis are mainly brought about by the tendency of the newly formed tissue to contract, serious effects beings produced by narrowing of orifices or tubes.

Chronic appendicitis may be chronic throughout or may follow an acute attack or result from chronic irritation. It is characterised by proliferative changes and increase of the connective tissue; these changes may be localised or generalised. Local changes result in obliteration of the lumen. General change results in

general thickening of the wall, and the muscular and submucous coats are the seat of diffuse overgrowth of connective tissue.

Anæsthesia.

With regard to the anæsthetics used, it was found that these fall into two main groups and one subsidiary :—

I. Avertin used alone and in combination.
II. Ether used alone and in combination.
III. Nitrous oxide and oxygen.

In the first group, where avertin was principally used, there are three subgroups :—

(1) *Avertin used alone.*—Here dependence was placed upon avertin to provide full surgical anæsthesia, and was used in thirty-seven cases (27.5 per cent.). This figure includes one patient where some quantity of the avertin solution was returned, necessitating slight supplementary anæsthesia with chloroform and ether; also one further patient, where a considerable quantity of avertin was returned, so much as to render the avertin anæsthesia quite insufficient; in this case the supplementary anæsthetic was nitrous oxide, oxygen and ether; later this patient vomited.

In the other cases where it was specified, the anæsthesia was described as good in three patients, very good in fourteen patients, and very poor in one; in eight cases there was no vomiting, but in two this was present; in three others, as well as those mentioned above, some of the avertin was returned, but supplementary anæsthesia was not considered necessary. Two patients moved slightly with the skin incision, and in two others the anæsthesia was described as "light," including the one fatal case. Ten cases remain unspecified.

(2) *Avertin combined with novocain as a field block.*—This method was adopted in sixty-two cases, and was successful except in ten cases, five of which needed supplementary anæsthesia with ether and five others where nitrous oxide and oxygen and ether was used. Taking the total cases together, the anæsthetic was described as "good" in one case, and "very good" in forty-one cases; in seven cases there was some vomiting, but in sixteen cases it was stated specifically that none occurred. Avertin was returned in varying quantity in seven cases, and in five cases the character of the anæsthesia was not specified.

(3) *Avertin combined with ether by inhalation.*—This is a smaller group, consisting of eight cases, including one where oxygen was administered. Of these, the anæsthesia was described as very good in one case, but in four cases it was unspecified; no patient was reported as vomiting, but in two there was some return of the avertin.

Taking the whole group together, it is seen that avertin was the main anæsthetic in one hundred and seven cases (80.25 per cent.). These patients as a rule had premedication of morphia and atropine or hyoscine according to the table drawn up by Boyd. It is difficult to draw comparisons between the different groups, because of the varying details specified. The cases requiring supplementary

anæsthesia were usually found to be those in which some avertin had been returned, subsidiary causes being where premedication had been omitted or because of the operation being commenced very soon after administration of the avertin. Again, others needed a little for the skin incision only. From both the surgeon's and anæsthetist's point of view it may be interesting to notice that the duration of the operation varied from fifteen minutes to sixty-five minutes, with an average of thirty-five minutes and that the average duration of anæsthesia was 7.53 hours, that is, from administration of avertin till the patient awoke.

In the next main group, where ether was used alone or in combination, there are twenty-six patients; this, of course, includes the eight cases in the last sub-group, and if we allow for these, there are eighteen cases distributed as follows :—

Ether alone	3 cases
Ethyl-chloride and ether	8 cases
Ether-nitrous-oxide and oxygen	5 cases
Ether and chloroform	1 case
Ether and novocain	1 case

The results here were uniformly good when taking the group as a whole. It is noted that in only one case was there found any unfavourable symptom—that of vomiting, and where notes were made it was found that all the others were described as "good" or "very good." In the group where ethyl-chloride was used, this drug was, of course, only needed in the stage of induction, and thereafter the anæsthesia was maintained with ether.

The last group is very small and consists of those cases where nitrous oxide and oxygen was used alone, and in all four cases there was a completely satisfactory anæsthesia. This method, of course, lends itself to ready adaptability to meet varying needs.

It would appear then that avertin is the drug of choice for this type of case. As Boyd points out, many need supplementary anæsthesia for the skin incision only, and it is thought that this is much better given as local anæsthetic than as the inhalation type, both from the point of view of better abdominal relaxation and of greater freedom from potential pulmonary complications.

Summary.

1. A series of patients suffering from recurrent abdominal pain has been investigated.

2. Measles and whooping-cough appear to play a considerable part in the etiology of the type of case considered.

3. There is a slight increase in the incidence of symptoms in the autumn and winter, with a corresponding diminution in the spring and summer.

4. Certain districts of the city provide considerably more than an average number of patients per thousand of the population; those districts are where the population is most dense.

5. The results of treatment are very good and compare favourably with those issued from other centres.

6. Radiological examination is of the greatest help in diagnosis, and should be employed in every doubtful case.

Straight X-ray photographs are of little value in children.

If gastric symptoms predominate, a barium meal should be used.

If intestinal symptoms predominate, a barium enema should be used.

If neither predominate, a barium meal is more likely to help; in certain cases both are necessary.

7. Where mesenteric adenitis is suspected, a Mantoux reaction should always be performed. The value of hydrochloric acid in the treatment of the type of case considered needs further investigation.

8. Where the appendix is alone pathological, appendicectomy is quite sufficient; in the presence of enlarged mesenteric glands, appendicectomy in the majority of cases does good, the glands themselves should never be removed. In all cases where the cæcum is definitely ptosed, resulting in stasis, appendicectomy should be supplemented by a fixation operation upon the cæcum; where vascular peritoneal bands are divided, the raw surfaces should always be covered by omental grafts.

9. In the case of younger children, the operation should be performed with the greatest expedition consistent with good work, so that shock may be avoided.

10. After-care is necessary to some degree in all cases, but especially in the following:

1. Where pre-operative X-ray has shown—
   (a) Gastric residue in the intermediate picture of a barium meal.
   (b) Stasis in the ileum or colon.
   (c) Ptosis of the cæcum with or without abnormalities of the colon. In these cases after-care should be dietetic, and include attention to bowel function. Septic foci should be eliminated.
2. At operation where enlarged mesenteric glands are found. General anti-tuberculous treatment should supplement the aforementioned measures.

11. The microscopic appearance of thirty-five appendices is discussed in relation to the disposition of the fibrous tissue. In most specimens the muscle tissue appeared to be affected in varying degree by the extension of fibrous tissue. It is suggested that this may result in disordered appendicular function.

12. Avertin is the best anæsthetic to use. It avoids all mental trauma and provides considerable post-operative sleep. It is scarcely sufficient for the skin incision, but is effectively combined with novocain as a field-block. In case so much avertin is returned as to render anæsthesia useless, it may be supplemented by ether or nitrous oxide and oxygen.

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The Assessment of Nutrition

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NUTRITION might well be regarded as the Cinderella of the sciences; but within recent years people have come to treat it with increasing respect. After all, foodstuffs are only produced to provide nourishment, and the average man spends almost half his working hours earning money with which to buy food. As a result of this increased interest, food, and its relation to health and disease, is now being more closely studied.

Nutrition has been defined by Sir George Newman[1] as "The total well-being and right functioning of the whole body." Magee[2] quotes Cathcart, who terms it a state of "eutrophia" rather than "eusitia," i.e., a state of "well-nourishedness" rather than one merely of "well-fedness." Sir John Orr[3] suggests, "a state of

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The Assessment of Nutrition

By JAMES DEENY, M.D., B.SC., D.P.H., M.R.C.P.I.
Lurgan

NUTRITION might well be regarded as the Cinderella of the sciences; but within recent years people have come to treat it with increasing respect. After all, foodstuffs are only produced to provide nourishment, and the average man spends almost half his working hours earning money with which to buy food. As a result of this increased interest, food, and its relation to health and disease, is now being more closely studied.

Nutrition has been defined by Sir George Newman[1] as "The total well-being and right functioning of the whole body." Magee[2] quotes Cathcart, who terms it a state of "eutrophia" rather than "eusitia," i.e., a state of "well-nourishedness" rather than one merely of "well-fedness." Sir John Orr[3] suggests, "a state of

well-being, such that no improvement could be effected by an change in diet." On the contrary, Harris[4] describes malnutrition as "a departure from optimal health, caused by the use of food, inadequate in quantity or quality."

In assessing nutrition, some compare the individual with the average or normal; i.e., a standard drawn up from the examination of unselected groups. In this respect, Akroyd quotes R. Bensaude and J. Ch. Roux :—"It is unlikely that there exists a normal human type, all variations from which, either pathological, mechanical, or chemical, could be considered as abnormal." There are others who prefer the "optimum," or a standard derived from examination of selected groups who reach a high level of physical development. Actually, there should be a personal standard for each individual, and in assessing the state of nutrition, it should be considered whether any improvement in health would be effected by a change in diet. This is the only true standard to adopt.

Methods used in assessing nutrition fall into three main groups :—

(1) The body is measured, and by the application of certain mathematical formulæ or indices, figures derived which, when compared with standards, give information on the state of nutrition.

(2) By clinical examination, and a formation of the conception of the nutritional state, based on the observation and experience of the physician.

(3) By the application of more specialised tests of a physiological nature.

Somatometric Methods.

Formerly it was thought that measurements of height and weight, when corrected for age, would be enough to determine the exact state of nutrition. While they may serve to detect gross malnutrition, they neither reveal cases of a less marked degree nor do they give information concerning the cause of the condition. Elaboration of these measurements, in an attempt to improve the results, has led to a multiplicity of formulæ, some very ingenious, but all tending to become more and more complicated. These are generally based on tables of averages, or on "normal" measurements, which are not universally valid. Sometimes they have no physiological foundation, and are often inaccurate. They may be used effectively as "screens" or sieves to eliminate from a group persons who have measurements below the normal. These can then be examined clinically and physiologically to determine the cause and degree of malnutrition.

Huws Jones[5] attempted to compare the efficiency in screening of the principal indices. He took 183 boys aged 9 years from poor elementary schools in Liverpool. He divided them into five nutritional groups, labelling them : 5, excellent; 4, normal; 3, slightly subnormal; 2 and 1, bad. Two tests were then applied.

(1) If an index is applied to a group of boys, how many must be screened for examination to ensure the selection of every boy of grade three or below? i.e., how many boys will the index reject, and how many under-nourished boys will be in the rejected group? Obviously the more efficient the index the smaller the total number of boys screened, to ensure the selection of every boy required.

(2) If a group of boys were arranged in order of nutrition, according to a particular index, and the lowest thirty per cent. examined—thirty per cent. was considered the most convenient percentage—as theoretically the least well nourished, how many boys of grade three or below would be found amongst them? The more efficient the index, the greater number of ill-nourished boys will be included.

Table A gives a fair idea of the number and complexity of these indices. As a result of this comparison, Tuxford's index can be seen to be the most effective.

Tables of average weights and heights are not universally valid. In collaboration with H. S. Booker, I made an investigation of a group of male workers in Northern Ireland, and found an almost complete lack of correlation between height and weight.

An attempt has been made to obviate the use of this form of standard in the A.C.H. Index of Franzen and Palmer[6]. Measurements of arm-girth, chest-depth, and hip-width are used to produce a factor, which shows the relationship of soft tissues to body-build. It is of use only when applied to large numbers and when a factor peculiar to the race or type has been established as standard. It has been successful in U.S.A., South Africa, and India[7]. Ashcroft[8] in England found the results given by this method—when employed on adults—were confirmed clinically.

Clinical Examination.

Experience has shown that malnutrition, prolonged for any considerable time, produces changes in the body which may be recognised clinically. Whilst special training and experience in this type of work facilitates assessment, careful clinical examination is always essential. It is important to distinguish malnutrition of exogenous or dietary type, from endogenous, caused by some pathological lesion.

Attention should be paid to history of recent or past illness, reports from teachers, employers, parents, etc.; and to information on home, school, or working conditions. The following should be observed :—Weight, height, general appearance, facies, posture, carriage, condition of mucosæ, hair, skin, and nails; subcutaneous fat, muscular development, colour and condition of skin, brightness of the eyes, mental alertness, teeth, gums, and tongue papillæ. Deficiency in certain food factors is shown by presence of such signs as :—Follicular hyperkeratosis, blepharitis, phlyctenular keratitis, xerosis, Bitots spots, angular stomatitis, hemeralopia, conjunctivitis, dental defects, frontal bossing, rib-beading, pigeon-chest, knock-knee, bow-leg, etc.

Different observers stress certain points in assessing nutrition. In the adult, the tension, condition, and colour of the skin, especially when considered in relation to the amount of subcutaneous fatty tissue present, seems to me to be the most valuable indication of absence of protective foodstuffs from the diet. Among adult workers, I have noticed that malnutrition is often accompanied by a peculiar "darkening" of the face, lack of body hair, and smoothness of the skin.

Just as somatometric and physiological methods are objective in nature, clinical examination is subjective, and so discrepancies—due to the different standards of

Photograph from Prof. Carl Schiötz, Oslo.

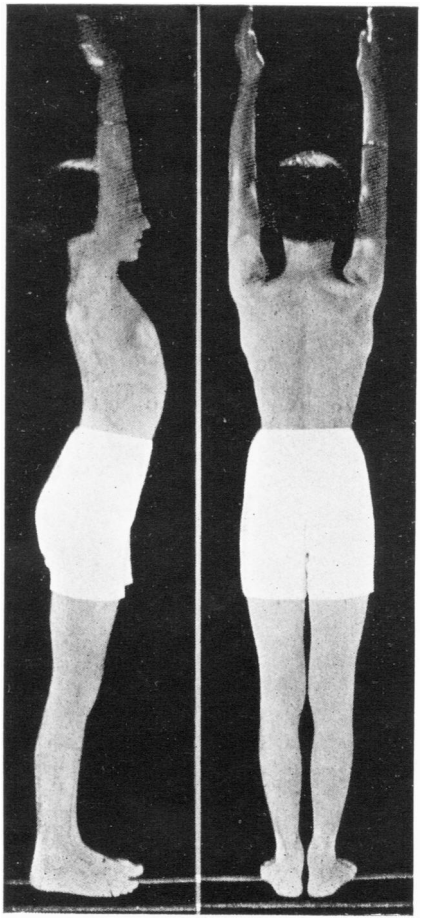

Fig. 1.
Appearance of median furrow. Normal posture, note continuity of furrow. The only defect is, perhaps, that line is a little too sinuous.

Photographs from Prof. Carl Schiötz, Oslo.

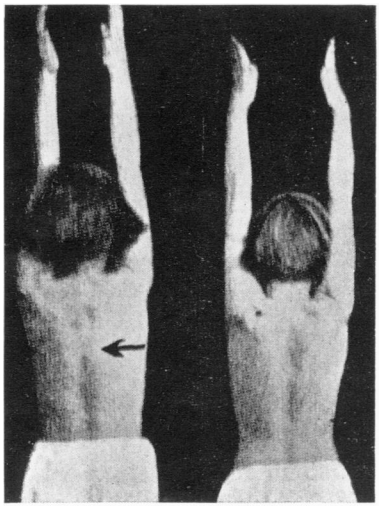

Fig. 2.

Arrow shows break in median furrow; same applies to child on right, only condition is not so marked.

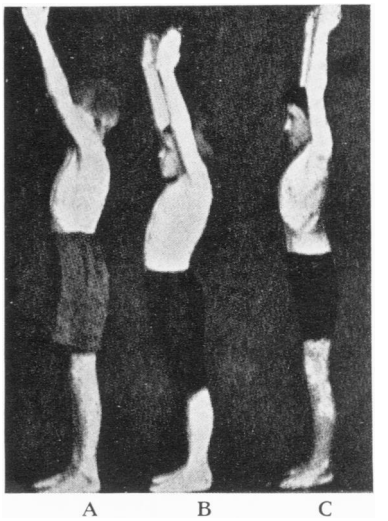

Fig. 3.

Stance of A and B defective. Arms are not held vertical. Thorax does not lift sufficiently to enable arms to assume correct position. C, correct posture.

normality adopted by examiners—are frequently found. In England, to avoid these errors the Dunfermline[9] scale is used. In it subjects are divided into four groups, as follows :—

(1) General condition : excellent.
(2) General condition : good.
(3) General condition : requiring supervision.
(4) General condition : requiring treatment.

Von Pirquet[10] has evolved the Sacratama Index with the idea of standardising values and recording findings. He takes four criteria, which he codifies with the initial letter of a Latin word.

(1) Blood content of skin : Sanguis.
(2) Condition of subcutaneous fat : Crassitudo.
(3) Skin tension : Turgor.
(4) Muscle condition : Musculus.

He uses the five vowels to distinguish the condition :—

I very pronounced.
E pronounced.
A normal
O inadequate.
U quite inadequate.

From this he can make a word descriptive of all four conditions and applicable to each case, i.e., sacratama is normal in every respect; socrotomo is inadequate in every respect; sicretomu is very pronounced blood content of skin, pronounced subcutaneous fat, inadequate skin tension, and very inadequate muscle. Attempts have also been made to express skin, subcutaneous, and muscle conditions in numerical terms.

C. Schiotz of Oslo[11] recommends photography as a means of recording nutrition, and also draws attention to the sign of the dorsal median furrow. Knudsen was first to describe this condition, and claimed that a break or undue sinuousness in the dorsal median furrow was a sign of defective nutrition. This sign appears to depend upon the normal relationship of spinal to thoracic muscles under the influence of properly balanced diet. In carrying out this test, the arms must be held vertically above the head. The accompanying photographs illustrate Knudsen's sign, and the importance of this point (see figs. 1, 2, and 3).

Generally, clinical estimation is still in an unsatisfactory state. The absence of any objective standards, failure to detect early or border-line cases, and lack of any efficient system of recording, combine to give inaccurate and unreliable results.

Physiological Methods.

These are in two groups :—

(1) Tests intended to reveal deficiencies in certain dietary components, whose absence produces specific disturbances in the body.

(2) Tests to show impaired body function, which may have indirectly been caused by malnutrition.

Of the first group of tests—commonly known as the "specific tests"—it is mainly in the detection of deficiency of "protective foodstuffs" that they are of value. Only one or two of these tests are truly specific; yet they fulfil an important function, in revealing conditions of deficiency where malnutrition has not as yet become sufficiently pronounced to be clinically recognisable.

Harris (4) gives the following list of specific tests for partial deficiency:—

Vitamin A—*Dark adaptation*—Blood analysis; liver analysis post-mortem.
Vitamin B—*Urine (saturation) test*—Vitamin B in blood.
Vitamin C—*Urine (saturation) test*—Blood analysis; capillary fragility test.*
Vitamin D—*Blood phosphatase test*—Blood P and CA; bony deformities.*
Iron (nutritional anæmia) hæmoglobin estimation.
Calcium—Spasmophilia (electrical test).

* For detecting advanced deficiency.

NOTE.—The more important methods are shown in italics.

CONSIDERATION OF THESE TESTS.

VITAMIN A.

(1) *Dark Adaptation Test.*—This test is based on the fact that vitamin A is found in large amounts in the retina, and is thought to play an important part in the reversible conversion of the retinal visual purple into its leuco deriviative. Various forms of dark adaptation test are described.

(a) Edmunds[12]—After dark adaptation, the subject views—through Tscherning glasses—letters ranging from black on a white background—in a scale of progressive extinction—to a faint grey. Visual acuity is determined by the number of letters read in varying intensities of light and regulated by the Tscherning glasses worn.

(b) Jeans and Zentmire[13] have modified the Birch-Hirschfeldt apparatus. In their test, an iris diaphragm and Goldberger-smoked screen control a beam of light, which through a perforated plate gives five luminous points. The subject first has his visual purple bleached by a bright light. The time taken to observe three luminous points is noted. After a period of dark adaptation the time is again measured. The rapidity with which adaptation takes place is affected by vitamin A deficiency.

(c) Friedrichsen and Edmund[14] have described a test based on the minimum reflexibility (MR), i.e., the smallest light irritation capable of producing reflex movement in a child's eye, after it has been half an hour in the dark.

(d) Wessely's method[15] depends on examining the reflecting power of the cornea. Vitamin A deficiency impairs the optical properties of the cornea, so that the reflection of a beam directed on it from a standard source of light is defective.

(e) Mutch and Griffiths[16] have adapted Edmund's test, and have rendered it more objective. It is much simpler, and can be used for large-scale investigations.

The theory concerned in dark-adaptation tests for vitamin A deficiency seems satisfactory; but on carrying out tests with Mutch and Griffiths apparatus, I have

TABLE A.

Performance of Indices of Nutrition when applied to 183 Boys, age 9, in Poor Schools. 21 Boys are medically described as ill-nourished.

(1) Index Brief Description	(2) Sources	(3) Correlation	(4) Boys Screened to secure every ill-nourished boy		(5) Ill-nourished boys among lowest 30 per cent. of group	
			No.	Per cent.	No.	Per cent.
W/H	Quetelet ...	0.75	90	49.0	17	81.0*
(W/H) x (381-months)/53 ...	Tuxford ...	0.82	98	53.5	18	86.0
Ht. x O. 455 = Wt. (*T*) ...	Van Noorden ...	0.73	97	53.0	17	81.0
Ht. x O. 214 = Wt. (*T*, I) ...	——	—	87	47.5	18	86.0
Wt. for Ht. (*T*) ...	Baldwin-Wood table	0.56	140	76.5	17	86.0
Wt. for Ht. (*T*, $\bar{3}$) ...	——	0.75	81	44.5	19	90.5
Wt. for Ht. and age (*T*, $\bar{3}$ II ...	——	—	66	36.0	19	90.5
W/H^2	Quetelet, etc. ...	0.63	80	44.0	18	86.0
$W/H^{2\frac{1}{2}}$	Quetelet, etc. ...	0.56	153	84.0	15	71.5
W/H^3	Buffon, etc. ...	0.29	117	97.0	12	57.0
H^3/W	Bobbit	0.31	117	97.0	12	57.0
$^3W/H$	Livi	0.35	168	92.0	13	62.0
W/C	——	0.60	164	90.0	14	67.0
W/HC^2	——	0.16	170	93.0	7	33.5
W/HC	——	0.65	125	68.5	17	81.0
HC/240 = Wt. (*T*) ...	Bornhardt ...	0.66	146	80.0	19	90.5
HC/294 = Wt. (*T* I) ...	——	—	130	71.0	17	81.0
Wt. for Ht. and Chest (*T*, $\bar{3}$)	——	0.54	116	63.5	17	81.0
Wt. for HC^2 (*T*, $\bar{3}$) ...	——	0.55	175	95.5	16	76.0
Wt. for Chest (*T*, $\bar{3}$) ...	——	0.56	174	95.0	14	67.0
Ht. – 100 = Wt. (*T*) ...	Broca	—	182	100.0	7	33.5
C/H	Bruysch ...	0.19	180	98.5	10	47.5
H – (W + C)	Pignet	0.35	176	96.0	11	52.0
Weight	"Poverty, Nutrition, and Growth" ...	0.54	132	72.0	16	76.0
Height	——	0.33	168	92.0	12	57.0
Chest	——	0.51	159	87.0	16	76.0

(*) The number in the previous column is here expressed as a percentage of 21, i.e., of all the ill-nourished boys.

(*T*) A weight prediction formula. The index is the percentage deviation of the observed from the predicted weight.

(I) This is the previous index presented in a form better suited to the present group.

($\bar{3}$) A regression formula obtained from "normally" nourished boys in the group.

(II) In this index allowance is made for age in months.

observed phenomena which, while they may not affect results, go to show that other factors are involved besides the visual purple reversible chemical reaction.

(2) Post-mortem analysis of vitamin A contained in liver—of accidental surgical emergency deaths—has been carried out by means of a colorimetric method[17].

(3) Estimation of vitamin A in blood has little diagnostic value.

Vitamin B.

(1) Estimation of vitamin B^1 in urine by the chemical method of Karrer[18], Pyke[19], and Westerbrink are simple and accurate.

(2) Meiklejohn[20] has applied Schopfer's test in estimation of vitamin B in blood. The growth of a mould (*Phycomyces Blakesleaanus*) has B as a specific catalyst. This method is thought to have further possibilities.

Vitamin C.

Normally vitamin C (ascorbic acid) appears in the urine when the serum content is over 1 mg. per 100 c.c. In scurvy the resting serum ascorbic acid is low. In the normal person a dose of 600 mg. of ascorbic acid is followed by a rise above 1 mg. per 100 c.c. blood, and the appearance of vitamin C in the urine. In scurvy only a slight rise occurs after 600 mg.; but with repeated doses of this quantity, the serum content rises in step-ladder fashion, until the threshold value is exceeded, and ascorbic acid appears in the urine. Methods used for analysis of vitamin C in blood :—

(1) Redox dye 2 :6 dichlorophenolindophenol, which is also very convenient in urine analysis.

(2) Lund and Lieck's[21] depends on the decolourisation of methylene blue in the presence of strong artificial light.

(3) Capillary resistance test of Göttlin[22] depends on the fact that deficiency in vitamin C causes fragility of the walls of capillary vessels. The number of petechiæ appearing on the surface of the arm, after a tourniquet has been applied and maintained at a standard pressure, are noted. For accurate results, if petechiæ appear, vitamin C should be taken; the test performed later and the results noted.

(4) Portnoy and Wilkinson[23] have recently described an intradermal test for for vitamin C deficiency, using the redox dye.

Vitamin D.

(1) Estimation of blood phosphatase—first described by Smith[24]—is an accurate and sensitive test for active rickets.

(2) Blood analysis for calcium and inorganic phosphate can also be carried out.

(3) Radiological tests on long bones.

Iron.—Hæmoglobin estimation by (1) Haldane, (2) Dare, (3) Tallquist methods.

Calcium.—Hyperexcitability to electrical stimulus.

Proteins.—The International Conference on Nutrition of the League of Nations recommended estimation of the total nitrogen, as being likely to give a

accurate indication of total nitrogen intake of the diet. Unfortunately, it requires a twenty-four sample of the urine, which is not always easy to obtain.

(2) The physiological tests of functions liable to be affected by nutrition.

These are many, and include measurements of muscular, respiratory, circulatory, digestive, endocrine, nervous, and urinary systems. Particular attention has recently been paid to basal metabolic rate and blood analysis.

Suitable prominence should be given to Magee[2], who has developed this form of nutritional assessment. He regards functional efficiency as the true test of nutrition, and has therefore devised a test, based upon the power of the lumbar pull on a special dynamometer. Cathcart[26] in confirmation of this has found that in ninety per cent. of public school boys the lumbar pull bears a constant ratio to body-weight. Further tests of similar type have been devised by Woolham[27], and are based on vital capacity.

Owing to the impossibility of excluding factors other than nutrition, these tests have not entered much into general use. There is no doubt that it is along lines such as these that the solution of the problem of nutritional assessment will be found.

Conclusion.

The means of assessing nutrition are still inadequate. There does not exist any single physiological test or clinical method which can accurately gauge the nutritional state. At present this can only be determined by ascertaining the amount of money spent and the kind of food bought, and comparing them with standards which are known to be necessary to promote well-being. It is imperative that more thought should be given to this problem. It affects us largely in Northern Ireland, as the people of this area are known to experience a greater amount of sickness than elsewhere in the British Isles. This is undoubtedly due to the fact that during the past hundred years the working population of our cities and towns have been existing on diets so deficient that it has been impossible for them to maintain good health. When the amount of food exported yearly from Ulster is considered, the extent of the tragedy becomes apparent.

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CASE REPORT

A CASE OF CARBUNCLE OF THE KIDNEY, WITH PERINEPHRITIC ABSCESS AND INTESTINAL OBSTRUCTION

By G. R. B. PURCE, M.C., M.B., M.CH., F.R.C.S.EDIN., AND J. C. ROBB, M.D., M.CH.
From Down County Infirmary.

THIS patient—male, aged 20 years—suffered from recurrent attacks of boils from January till June, 1936. About June, 1936, he began to feel "out of sorts"—loss of appetite, lethargy, and occasional "sweats." He was examined medically, for the first time, at the end of July, 1936. His symptoms at that time suggested one of the typhoidal infections. No pain or tenderness of any kind could be elicited in either costo-vertebral angle. The urine and blood were sterile on culture. The Widal reaction was negative on three occasions. The white blood count was 13,000.

Eventually on 24th August tenderness over the left renal angle was determined, he was admitted to hospital, and on 27th August a perinephritic abscess was opened and drained. Pus showed staphylococcus aureus on pure culture. He left

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hospital on 20th September. There was still some slight discharge from his wound, and his general condition was not as yet satisfactory.

He failed to improve in health, and on 16th November he complained of pain in the region of his scar and also on flexing left hip. The wound was reopened, pus evacuated, and a drainage tube re-inserted.

At this period, the left kidney could be palpated as an enlarged, tender, and movable organ, and a diagnosis of hæmato genous infection of the kidney was tentatively made. As the patient's condition was deteriorating : hectic temperature being present, he was re-admitted to hospital. X-ray showed an elevation of the left cupola of the diaphragm.

On 12th January, 1937, the twelfth rib on the left side was resected—and an abscess in the region of the upper pole of the kidney was drained through the diaphragm. The temperature did not settle, nor did the patient's general condition improve sufficiently to justify the risk of a nephrectomy, and he was again discharged from hospital in March.

During May and part of June, he was in much better health—showing a gain in weight and a normal temperature, but on two occasions staphylococcus aureus was present in the urine. He relapsed about the middle of June, and in the middle of July, his second wound was opened up, a fair amount of pus being evacuated.

He was readmitted, and on 21st October, lumbar nephrectomy was performed. The operation was a difficult one, the kidney being adherent to the peritoneum and surrounding tissues, and possessing a short pedicle. After a stormy few days he settled down to what appeared to be a very satisfactory convalesence.

During the long period of his illness, it had been noted that he was subject to attacks of acute abdominal pain, with distension, and during convalesence a very severe attack occurred, resembling an intestinal obstruction, but this passed off in a few days. He was discharged from hospital on 25th November, 1937, apparently very well.

On 26th November he complained of very sincere abdominal pain, with vomiting, borborygmi, and, on examination, distended coils of small intestine were seen. He was readmitted on 27th November, and at operation the small intestine was found to be obstructed in two places by (1) a band of omentum, (2) by adherence over several feet to inflamed mesenteric glands. These glands were generally enlarged, none of them caseating. There was also considerable thickening of the mesentery. He made an uneventful recovery, and was discharged in good health and free from all symptoms on 22nd December.

Comments.

This case demonstrates how a relatively insignificant primary lesion like a boil may jeopardize the life of the individual, as the result of a secondary metastatic focus in the kidney.

Some of the points to be noted are :—

(1) During the stage of primary invasion of the kidney by metastatic infection, presumably from June until August, 1936, there was no pain or tenderness in the kidney area—only constitutional symptoms being present.

(2) Perinephritic abscess may be a sequel to a localization of organisms in the kidney parenchyma, with extension either by way (a) of the lymphatics which pass through the fibrous capsule from the cortex of the kidney to the perinephritic fat or (b) by contiguity of infected tissues.

For this reason a guarded prognosis should be given in all cases of perinephritic abscess, and the possibility of future operative interference, i.e., nephrectomy, kept in mind.

(3) Carbuncle of the kidney can only be treated satisfactorily by a nephrectomy.

(4) The mesenteric adenitis, which was the cause of this patient's attack of intestinal obstruction, is difficult to explain, but probably took place coincident with the renal infection.

PATHOLOGIST'S REPORT.

Microscopical specimen:

The specimen shows one-half of the removed kidney. Apart from its general contour, and the presence of a relatively uninvolved pyramid, it is difficult to distinguish its nature. The renal tissue is replaced by a dense hard whitish tissue. In areas small abscesses are found burrowing through this firm tissue. In other areas discrete yellowish nodules, measuring from 1—3 mm. in diameter, are seen.

The pelvis is surrounded by dense white tissue.

Microscopical examination:

Histologically the kidney is found to show the results of a long-continued pyogenic inflammatory process. Much of the renal parenchyma has been destroyed and replaced by fibrous tissue. In areas the inflammation is still active, and there are numerous abscesses of varying size, containing numerous gram + ve. coccal organisms. In the older healed areas there are large collections of fat-containing large mononuclears, which probably represent the site of sterile abscesses.

Many of the surviving tubules are filled by polymorphs. Surviving glomeruli show a variable picture. In some the pericapsular fibrous tissue is greatly increased. In others the inflammatory process has invaded the glomerular tuft, leading to its partial destruction, repair by fibrous tissue, and the formation of capsular adhesions.

Diagnosis:

Chronic staphylococcal infection of kidney (renal carbuncle).

J. H. B.

Studies from the Institute of Pathology, Queen's University, Belfast

CASE 2.—AN INFANT WITH A PRIMARY TUBERCULOUS INFECTION.

PATIENT was a female aged seven months, under care of Dr. Allen, Belfast Hospital for Sick Children.

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Clinical Summary.

The mother suffers from an active pulmonary tuberculosis. Three children alive in family, none dead. Child has always been delicate. "Chesty" for past two months; hard cough for past two weeks, then developed hoarseness when crying. Much worse twenty-four hours ago with symptom of obstruction to breathing. Bowels—had green diarrhœa, recently improved. Appetite—feeble. Micturition normal. Was fed on Neaves' Food, and later Sister Laura's Food. Occasional vomiting.

Clinical Examination.

Child looks very ill. Lips blue, breathing obstructed, rate about 50. Pulse 140, poor volume. Lungs—relative dullness over right apex, with high-pitched tubular breath sounds and numerous moist rales. Tongue dry and furred. No abnormal findings in abdomen. Throat appears healthy. No evidence of ear-disease. X-ray chest—confirms consolidation in right upper zone of lungs. Temperature 99°F. on admission, rising within about twelve hours to 106°. Child died eighteen hours after admission.

Anatomical Diagnosis.

Primary tuberculous complex in upper lobe of right lung and regional lymph-nodes. Human strain of bacilli.

Low-grade dissemination by the blood-stream, resulting in tuberculoma of the cerebellum, and scattered tubercles in spleen, liver, and kidney.

Extension in the lungs of the primary pulmonary focus by local lymphatic spread; and by the air-passages subsequent to erosion of bronchi by the tuberculous process.

Tuberculous ulceration of the ileum secondary to ingestion of infective sputum; and caseous mesenteric adenitis.

Pressure on trachea by tuberculous paratracheal lymph-node.

Post-Mortem (Eight Hours After Death).

The body is that of a poorly nourished female infant. Weight 9 lb. 7 oz. Cervical lymph-nodes are just palpable; no other lymphatic glandular enlargement. No jaundice. No œdema. Pupils dilated and equal.

Abdomen.

The peritoneal sac is free from adhesions and contains no free fluid.

The mesenteric lymph-nodes, particularly towards the lower ileum, are enlarged, and some are caseous. There is no peri-adenitis.

Small red transverse deep ulcers of the small intestine are present, and correspond to the regional lymph-node enlargements. The large intestine is free from ulceration, although there is an occasional enlarged lymph-node in the mesentery of the transverse colon.

The contents of the lower ileum and colon are yellow and semi-fluid.

Liver is a little congested, but normal in consistence. The outline of the lobules is visible. There are no notable fatty changes. One small fibro-caseous tubercle

about the size of a pin-head is present in the subcortical parenchyma near the posterior surface.

Gall-bladder contains a little greenish-yellow bile, and appears quite normal. Main bile ducts are patent.

Pancreas appears normal.

Adrenals normal in size; cortical lipoid is diminished; medulla appears normal.

Kidneys.—In medullary region of left kidney there is one very small tubercle similar to that observed in the liver. The kidneys are a little congested, but otherwise show no further changes. Capsule strips normally. No gross pyelitis. Ureters and urinary bladder normal.

THORAX.

Pericardial sac normal.

Heart appears quite normal. Myocardium is firm and in a state of contraction, the venæ cavæ being rather distended with post-mortem blood-clot.

Pleural sacs.—Around the right upper lobe are many rather fragile, recently formed, fibrous adhesions. Both pleural sacs are dry.

Lungs.—Right lung—the upper lobe is very firm and is solid in consistence. In the upper lateral region of the parenchyma of this lobe is a caseous area just over 1 cm. in diameter. It is surrounded by a thin capsule of fibrous tissue. The caseous material has retracted somewhat from this capsule. A medium-sized bronchus communicates with this area. The remaining lung tissue of this upper lobe is largely replaced by a somewhat diffuse mottled grey tissue which appears to be composed of semi-caseous material in which is a fair proportion of fibrous tissue. There is a great caseous enlargement of the regional lymph-nodes, viz., inferior and superior tracheo-bronchial lymph-nodes and para-tracheal nodes. The enlargement affects both sides, but is much more marked on the right side. One large right para-tracheal node at the thoracic inlet may well have produced the symptoms of respiratory obstruction by pressure on the trachea. The lymph-nodes show varying degrees of formation of a fibrous capsule. The degree of involvement of para-tracheal nodes decreases towards the upper nodes.

There is an obliteration of the septum between upper and middle lobes by dense fibrous tissue which demarcates the lower limit of local spread in the upper lobe.

In the right middle, and right lower lobe and the left lung, the parenchyma is congested and contains a few small aggregations of tubercles, which have a staphyloid appearance and are probably areas of tuberculous broncho-pneumonia.

A few small cervical (tonsillar) lymph-nodes on each side exhibit a slight red fleshy enlargement—probably an inflammatory hyperplasia. There is no notable laryngitis or tracheitis.

Head and contents.—No notable change in calvarium or cranial bones. Dura is not thickened. There is no notable increase in the quantity of C.S.F. The pia-arachnoid is normal in appearance, its blood vessels are not congested. There is no flattening or abnormal outline of the cerebral convolutions. There is no

meningitis, and no tubercles in the meninges. On section of the brain there is no hydrocephalus. In the vermis of the cerebellum slightly to the right of the middle line there is a spherical area of caseous necrosis 7 mm. in diameter, with a thin capsule. There is no macroscopical thickening of the meninges in this region. In view of the formation of a capsule and the size, the tuberculoma is not of very recent origin.

Microscopical Examination.

Upper lobe, right lung.—The large caseous area has a well-formed capsule of cellular fibrous tissue infiltrated with lymphocytes and mononuclear cells. Outside this encapsulated tuberculous area and throughout the greater part of the lobe there is a marked thickening of the interstitial tissue by a mononuclear-cell infiltration and by the formation of numerous tubercles. The tubercles vary greatly in size; they show a moderate central caseation and a giant-cell formation, and a marked follicular formation by endothelioid cells. Some of the larger tubercles have a well-formed outer zone of fibrous tissue. The thickening of interstitial lung tissue has resulted in an almost complete obliteration of the air sacs. Where the air sacs are still recognisable they are seen to be compressed and lined by a layer of cubical cells. There is occasionally an air sac filled with mononuclear cells, but no caseation of these cells. The visceral pleura exhibits a slight fibrous thickening, and some of its lymphatic channels contain tubercles.

Several of the larger areas of caseation encroach on and discharge into bronchioles.

The other areas in the lungs exhibit a few aggregations of tubercles which are usually in close relation to a small bronchus. The tubercles are of the same "hard" type as those in the right upper lobe.

The regional lymph-nodes are the seat of a fibro-caseous tuberculosis. The fibrous capsule around each node is particularly well formed and is lined by a tuberculous granulation tissue.

With selective stains it is noted that tubercle bacilli are extremely scanty in the affected areas in the lungs.

Spleen contains a large number of hard tubercles, varying greatly in size.

Liver contains a few tubercles of a similar nature. It shows no other notable change.

Kidney.—The glomeruli, tubules, and interstital tissue appear normal. There is no gross pyelitis. No further tubercles are observed microscopically in the several sections examined.

Pituitary, adrenal, pancreas, thyroid, and thymus exhibit no notable changes.

Ileum.—In some sections the lymphoid tissue of the Peyer's patches exhibits recent areas of necrosis and tuberculous ulceration. In these regions the muscular and serous coats are infiltrated with lymphocytes and larger mononuclear cells, including plasma cells. No tubercles are observed in the serous coat.

Mesenteric lymph-nodes exhibit areas of caseous necrosis and more recent small foci of necrosis which have not yet proceeded to caseation.

Myocardium shows no notable change.

Comment.

The case is a good example of the pathological process which may result from a first infection by inhalation of human tubercle bacilli, and illustrates the characteristic type of response by the body to this first infection.

Experimentally, the same mode of response may be observed in an animal, such as the guinea-pig, in which tubercle bacilli are inoculated into the skin; a local nodule forms rather slowly and proceeds to ulceration, the regional lymph-nodes become enlarged and caseous, and the tuberculous infection becomes generalised. If a similar injection is given to a guinea-pig which has previously been infected with tubercle bacilli, the type of reaction is quite different. At the site of inoculation a local nodule forms more rapidly, and quickly ulcerates, but there is no infection of the regional lymph-nodes and no widespread dissemination throughout the body. The more violent and active response at the site of inoculation in the re-infected animal is accompanied by a localisation of tubercle bacilli at the site of inoculation. This acute response can be evoked by proteins of the tubercle bacilli as well as by the living bacilli, a principle which forms the basis of clinical tests such as those of Mantoux, Von Pirquet, and others.

In the case under consideration it is probable that tubercle bacilli entered the lung in the first place by inhalation, the child's mother being the obvious source. The organisms set up a slowly progressive caseous necrosis in the right upper lobe. A good attempt at healing is evidenced by the fibrous barrier which surrounds this primary focus.

The size of the lesion and the appearance of the fibrous tissue is consistent with a duration of some weeks, and quite probably corresponds to the two months during which the child was said to have been "chesty."

This primary focus communicates freely with a medium-sized bronchus; the caseous material has retracted from the surrounding wall by discharge into the bronchus. It is quite conceivable that in a somewhat similar case a large cavity would have resulted, a cavity producing characteristic clinical signs and casting a radiological shadow. Reference is made here to such a possibility to point out that a primary pulmonary tuberculous infection may have a superficial resemblance to adult phthisis, but the resemblance is no more than superficial. The diagnosis of the adult form of pulmonary tuberculosis in childhood on such findings has no foundation in the pathological process.

The regional lymph-nodes were affected early and became enlarged and caseous. Early blood dissemination is illustrated by the metastatic sites of tuberculosis in the cerebellum, spleen, liver, and kidney.

The mode of spread is thus a parallel to the course described in experimental infection of the previously uninfected guinea-pig. It may be noted here that in this patient all the tuberculous lesions are of a character which suggest a comparatively good resistance with attempted healing and a low content of organisms.

The absence of previous infection, not the number of organisms, is the more important factor in the character of the spread of the disease in the primary tuberculous complex.

The other pulmonary lesions found at autopsy need little comment. The local spread in the interstitial lymphatics of the upper lobe and the collapse of air sacs by pressure and by blocking of air passages produced an almost solid condition of the lobe and had a clinical counterpart in the dull percussion note and the high-pitched tubular breath sounds. The moist rales suggested the presence of an exudate in small air passages which were still patent and which were observed post-mortem at the margin of the consolidated lung tissue. The symptom of respiratory obstruction was produced by a large caseous paratracheal lymph-node in the thoracic inlet.

The tuberculous ulceration of the ileum is an interesting finding in a child of seven months. The ulceration and the involvement of the regional lymph-nodes in the mesentery is almost certainly due to swallowing of infected sputum, and in this particular case may account for the history of green diarrhœa, the result of disordered and hurried peristalsis.

The tuberculoma of the cerebellum is of a considerable size and has developed slowly from a blood-borne metastatic tubercle implanted at an early stage in the disease. The size and the degree of encapsulation are reasonable evidence for this conclusion. It produced no clinical manifestations but might well have been a potential reservoir for the establishment of a tuberculous meningitis if it had later extended to involve and discharge its contents into the cerebro-spinal fluid.

A photograph of the macroscopical appearances of the lungs is appended with an explanatory diagram.

J. A. F.

WESTERN ELECTRIC INTRODUCE NEW ELECTRICAL STETHOSCOPE

BELL Telephone Laboratories, pioneers in sound transmission, announce the development of a new portable electrical stethoscope of outstanding design.

Primarily introduced for practitioners with impaired hearing, its facilities are extended to others who desire detailed and more accurate auscultation than that obtainable with the orthodox acoustic variety. This is possible, since the new stethoscope amplifies heart-sounds sufficiently to overcome an appreciable hearing deficiency, and for those with normal hearing permits these sounds to be heard at a level of twenty decibels above normal or one hundred times that usually obtained.

It is particularly helpful in the examination of thick-chested patients, where comparatively weak sounds are experienced, in diagnosis in places where noise is prevalent, and in the detection of abnormal heart conditions during their early stages.

It is apparent that numerous other useful applications of the 3A Stethoscope will present themselves to a physician during the course of its use, especially in the obstetrical and lung fields.

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a high quality receiver which reproduces them. The ordinary acoustical stethoscope ear attachment may be connected to the receiver by means of rubber tubing, so that the physician can listen to heart-sounds in the familiar manner. The microphone, which takes the form of a vibration pickup, is extremely unresponsive to extraneous sounds, and a rubber ring surrounding it reduces to a minimum noises which may be caused by handling the instrument. The frequency response ranges from 60 to 1,500 cycles per second, amply covering the band encountered in listening to heart-sounds.

An important feature of the 3A Stethoscope is its filter circuit, which isolates and accentuates murmur-sounds, so significant and yet so difficult to detect with an ordinary acoustical stethoscope. This filter circuit in the amplifier diminishes the response at both the low and high frequencies, and can be included or omitted at will by the turn of a switch. Thus the intensity of normal heart-sounds is lowered and the loudness of any murmur-sounds which may be present is accentuated.

Consultations are facilitated by provision for an additional receiver, an extremely valuable feature enabling two physicians to listen simultaneously to a patient's heart-sounds from the same body location. The amplifier has a maximum gain of sixty decibels, and is sufficiently powerful to operate the additional receiver. Volume is controlled by a potentiometer situated on the panel.

The 3A Electrical Stethoscope is completely contained in a small fabrikoid case, similar in size to a doctor's instrument bag. It measures $12\frac{1}{2}$ inches in length, $8\frac{3}{4}$ inches in height, and $4\frac{3}{4}$ inches in depth, and weighs only fourteen pounds.

Operation of the instrument is extremely simple. The physician merely attaches the tube of his acoustical stethoscope to the receiver, clips the receiver to his coat, and turns the volume control until he obtains the desired loudness. The microphone is then lightly pressed against the patient's body in the same manner as when using a conventional stethoscope. When wishing to diagnose murmur-sounds, the knob marked "filter" is turned to its "in" position.

Low-tension supply for the valve filaments is drawn from 1.5 unit cells of the flashlamp type, and the anodes are fed from a 45-volt miniature dry battery, the whole issue being neatly housed in the lower part of the case. These batteries are of the new plug type, which makes replacement simple and easy. They may be purchased anywhere.

Further particulars may be obtained from Western Electric Company Limited, Bush House, Aldwych, London, W.C.2; telephone : Temple Bar 1001.

THE ULSTER MEDICAL SOCIETY

THE eighth meeting of the Ulster Medical Society was held in the Whitla Medical Institute on Thursday, 7th April, at 8.30 p.m. The president, Professor Thomson, occupied the chair. The speaker was Professor John Glaister, M.D., D.Sc., B.L., of Glasgow, who lectured on the medical aspects of the Buck Ruxton murder case.

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Professor Glaister began by saying that the success of the investigators connected with the case was due to the co-operation not only between the police and the medical profession, but between specialist members of the profession: pathologists, hæmatologists, anatomists, and zoologists all combined to bring out, point by point, the evidence which brought the murderer to justice. For many years the subject of medical jurisprudence had been the Cinderella of the medical profession, but the Ruxton case had done much to bring it out of the kitchen, to emerge in the finale of the ballroom.

Lantern slides were shown of the scene in the ravine where the original find of human remains was made. These were found on the left bank of the stream, due to the fact that the stream flowed to the *right* of the centre of the bridge, from which Ruxton threw them. Flood, following heavy rains, carried the remains still further up the bank, and instead of their being carried to the deep river only a short distance away, they remained high and dry on the bank where they were discovered.

From the beginning it was seen that a trained medical person had been at work, for not only were the limbs and head neatly disarticulated from the trunk, but all the parts which would serve for purposes of identification had been removed. The eyes had been removed, the nose had been cut off, characteristic teeth had been extracted, and areas of skin dissected away.

Professor Glaister traced the discovery of a Sunday newspaper wrapped around the remains with a circulation localised to a relatively small area in Lancashire, and to the delivery of a copy of this paper to Ruxton's house. He traced a blouse, a pair of baby's rompers, and other articles also to Ruxton's house. Ruxton's movements were traced, step by step, and on his arrest blood-stains were found on the stairs, stair-rails, banister, the side of the bath, below the linoleum, on stair-carpets and pads, and on a suit of clothes belonging to him, and particles of human flesh were found in the drains of the house.

The reconstruction of the two bodies from the separate portions proved that they could be no other than Mrs. Ruxton and her maid, and after a trial which made history by methods employed for the first time in England, Ruxton was found guilty beyond any shadow of doubt.

Sir Robert Johnston proposed a vote of thanks to Professor Glaister for his very able lecture, which altogether lasted for an hour and a half. Professor Biggart seconded the vote, and mentioned the words of the judge at the end of the trial, in which he congratulated those responsible for the manner in which the medical evidence had been assembled and given.

ULSTER MEDICAL SOCIETY
ANNUAL GENERAL MEETING

The annual general meeting of the Society was held on Tuesday, 24th May, 1938, at 5 p.m., in the Whitla Medical Institute. The following officers for session 1938-39 were elected:—

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Sir Robert Johnston proposed a vote of thanks to Professor Glaister for his very able lecture, which altogether lasted for an hour and a half. Professor Biggart seconded the vote, and mentioned the words of the judge at the end of the trial, in which he congratulated those responsible for the manner in which the medical evidence had been assembled and given.

ULSTER MEDICAL SOCIETY
ANNUAL GENERAL MEETING

The annual general meeting of the Society was held on Tuesday, 24th May, 1938, at 5 p.m., in the Whitla Medical Institute. The following officers for session 1938-39 were elected:—

President: John M. McCloy, M.D., D.P.H.

Vice-Presidents: Robert Marshall, M.D., F.R.C.P.I.; William Dickie, M.D.

Council: C. A. Calvert, M.B., F.R.C.S.I.; Jack Crawford, M.D., B.SC.; Ian Fraser, M.D., M.CH., F.R.C.S.ENG. AND I.; F. P. Montgomery, M.C., M.B., D.M.R.E. (CANTAB.); W. R. M. Strain, M.D., B.SC.; J. R. Wheeler, M.B., D.L.O., D.O.M.S., F.R.C.S.EDIN.

Hon. Treasurer: J. S. Loughridge, M.D., B.SC., F.R.C.S.ENG.

Hon. Secretary: H. Hilton Stewart, M.D., M.R.C.P.LOND.

Hon. Librarian: James Boyd, M.A., B.SC., M.D., M.R.C.P.I., D.P.H.

Hon. Editorial Secretary: R. S. Allison, M.D., F.R.C.P.LOND.

Hon. Editor: R. H. Hunter, M.D., M.CH., PH.D., M.R.I.A.

Editorial Board: Professor H. Barcroft, M.D., M.A.; Professor P. T. Crymble, M.B., F.R.C.S.ENG.; Professor C. G. Lowry, M.D., F.R.C.S.I., F.C.O.G.; Professor W. W. D. Thomson, B.A., M.D., B.SC., D.P.H., F.R.C.P.LOND.

The report of the Council was as follows:

The Council begs to present the seventy-sixth annual report of the Society.

The roll of the Society now stands as follows:—

Hon. Fellows - - - - - -	8
Life Fellows - - - - - -	12
Life Members (Old Regulations) - - - -	2
Fellows - - - - - - -	288
Members - - - - - - -	48
Total - - - - - -	358

During the year the Society has suffered the following losses by death:—

Professor W. St. Clair Symmers, Hon. Fellow of the Society; Sir John W. Moore, Hon. Fellow of the Society; Dr. D. P. Gaussen, President 1906-7; Dr. Malcolm Brice Smyth, Fellow since 1901; Dr. J. J. Murray, Fellow since 1931; Dr. T. K. Wheeler.

The Society has had a busy year under the presidency of Professor W. W. D. Thomson. There were ten meetings held during the year, and there were quite good attendances at the meetings. The Society was honoured by visits from Dr. Leonard Colebrook of London, who delivered the Campbell Memorial Oration; Dr. Moodie, Director of the London Child Guidance Clinic; and Professor Glaister of Glasgow.

The annual dinner was held in February, and was notable for the presentation, by the president, of two magnificent portraits of Sir William Whitla and Sir Hans Sloane. The former was unveiled by Sir Thomas Houston and the latter by Sir Humphry Rolleston, Bart. Three Hon. Fellowships were also conferred at the dinner on Sir Humphry Rolleston, Bart.; Mr. A. B. Mitchell, M.P.; and Sir Robert Johnstone, M.P.

The ULSTER MEDICAL JOURNAL has had a very successful year once again under Dr. R. H. Hunter's able editorship. The Council greatly appreciate his retention

of this important work, in spite of the addition to his work in his new post as secretary to the University.

Considerable changes have been carried out at the premises of the Society during the year. A new ventilation system for the lecture hall has been installed, together with a new gas-fired boiler, and a new extraction fan, at a cost of over £200. Three new electric convector heaters have been placed in the inside hall and on the stairs to supplement the heating in this area. A new gas-fire has been bought for the council room, and the ladies' lounge has been re-floored following the discovery of dry-rot in the woodwork. The oil paintings of the Society have also been re-hung, while the portraits in the council room are being cleaned and renovated. The floors of the entrance hall and the library have been re-floored in compressed cork. The Council consider that the general condition of the building has been well maintained, and the improvements made this year should add to the general comfort of the members.

The annual laboratory meeting was again a great success, and the high standard set by Professor Young has been worthily upheld by Professor Biggart.

The annual golf competition was held at Newcastle, and was well attended. The Hanna Cup was won by Dr. J. C. Robb.

Your Council has met on ten occasions, and the following attendances were recorded :—

Professor Thomson 10, Mr. Irwin 6, Mr. Greer 4, Mr. Calvert 1, Dr. Frackelton 5, Dr. Boyd 8, Dr. Allen 3, Dr. Hunter 4, Mr. Wheeler 2, Dr. Allison 2, Hon. Secretary 10, Sir Thos. Houston 5, Dr. Stewart 8, Dr. Turkington 2, Mr. Fraser 4, Mr. Mitchell 4, Dr. J. A. Smyth 1, Dr. Lyttle 2.

B.M.A.—NORTHERN IRELAND BRANCH
NORTH-EAST ULSTER DIVISION

The Division met in the Café, Coleraine, on Monday, 7th March, 1938. Dr. David Huey read a paper describing his visit to the surgical tuberculosis clinic at Leysin. He gave an interesting account of the work of the clinic, and described the different types of cases suitable for treatment at Leysin.

Best thanks of the meeting were expressed to Dr. Huey for a most interesting paper.

Dr. Violet McFeeter kindly entertained those present to tea.

The seventh annual dinner of the Division was held at the Causeway Hotel, Bushmills, on Saturday, 23rd April, 1938, when the chairman, Dr. Bateman, presided over a company of about one hundred.

After dinner, the toast of the King was honoured. The chairman then proposed the toast of the British Medical Association. Dr. W. Porter spoke to the health of our President, Sir Robert Johnstone. He remarked that he had known Sir Robert since student days, and that he had always been an outstanding personality. The toast was then drunk with great enthusiasm. The President, who was received

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with loud applause, replied briefly, and made an appeal to medical men outside the B.M.A. to become members.

The next toast, "Our Guests," was submitted by Dr. Boylan in a most entertaining speech. Mr. T. S. S. Holmes, F.R.C.S., and Mr. Godfrey Boyle, solicitor, replied.

Dr. T. Adams then proposed the health of the chairman in an amusing speech, to which Dr. Bateman replied in similar strain. The last toast of the evening was that of the musical guests, and was proposed by Dr. W. H. Belford. Mr. Hugh Carson, Portrush, replied.

During the evening musical items were contributed by Messrs. Carson, Boyd Morrison, J. L. Baxter, Jones, and Dr. Adams, and were greatly appreciated.

At an interval the chairman presented the Divisional Golf Cup for the year to Dr. Ritchie.

The annual meeting of the Division was held in the Café, Coleraine, on Monday, 9th May, 1938.

The following office-bearers were elected for 1938-39 :—*Chairman:* Dr. J. M. Hunter; *Vice-Chairman:* Dr. H. H. McClelland; *Representative to Annual Meeting:* Dr. David Huey; *Hon. Secretary and Treasurer:* Dr. G. Bateman.

It was decided to hold the annual golf meeting at Ballycastle.

Dr. Ivan McCaw, Belfast, then read a paper on some problems in the diagnosis of common skin diseases. He dealt with the conditions frequently met with in general practice, and pointed out that even the commonest skin diseases occasionally were very puzzling in atypical cases. Dr. McCaw gave valuable hints for differentiating such cases, and mentioned several important points in treatment.

Several members raised questions for discussion, and a vote of thanks was passed to Dr. McCaw for his stimulating and instructive paper. Dr. Adams kindly entertained the members to tea.

The annual silver collection for medical charities was taken at the close.

J. M. HUNTER, *Hon. Secretary.*

Eglinton Street,
Portrush.

REVIEWS

THE TREATMENT OF NEUROSYPHILIS AND TRYPANOSOMIASIS WITH TRYPARSAMIDE. Published by May & Baker, London.

Although sent out as an advertisement, this short treatise gives a very fine summary of the uses of this very important drug.

The two diseases for which the drug is pre-eminently suited are parenchymatous neurosyphilis and trypanosomiasis, but other forms of syphilis also appear to benefit. Dosage, mode of action, and dangers are all discussed.

The great deterrent to the use of Tryparsamide has always been the fear of causing optic atrophy, and although the percentage of cases so affected is small, suggestions are put forward in this booklet as to its prevention. If followed the danger will be reduced to a minimum. A valuable chapter is included on the technique of lumbar puncture.

Any physician contempating the use on Tryparsamide will be well advised to refer to this treatise.

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THE MEDICO-LEGAL REVIEW: Published for the Medico-Legal Society by Baillière, Tindall & Cox, London. 3s. quarterly.

The arrival of the current issue of the Medico-Legal Review reminds us of the lack of a medico-legal department in Queen's University, Belfast. At present a make-shift arrangement has been provided, and excellent as the teachers undoubtedly are, they cannot, by virtue of the fact that neither of them profess to be medico-legal experts, give that personal touch to their lectures, which is so essential for good teaching. The University is not altogether to blame in this matter. Surely it is of sufficient importance for the serious consideration of the Government of Northern Ireland, for without a supply of medical men adequately trained in this subject, doubts will arise as to the medico-legal services for the community.

The present number of the Medico-Legal Review emphasises these views. It lays stress on the fact, patent to all who have considered the matter, that medico-legal problems are not confined to the muddy waters of an occasional murder, but spread over such things as proofs of food-poisoning, the diagnosis of blood and other stains, abortions, blood tests for drunkenness, blood-groups and bastardy, etc. These and other subjects are treated in the present number of the journal in a lucid manner by the Hon. Mr. Justice Humphreys, Dr. T. H. Bleuch, Dr. Julius Burnford, and other well-known authorities. In the formation of a medico-legal library, a set of this journal would form a valuable basis, and it is hoped those interested will see that when a medico-legal department is inaugurated within the University, it begins by sending a subscription to the publishers for its regular delivery.

MENTAL NURSING IN OBSERVATION WARDS. By I. M. Sclare, L.R.C.P.S.Ed. 1938. Edinburgh: E. & S. Livingstone. Pp. 259. 6s. net.

This useful little book should be in the hands of every nurse working not only in the observation wards, but in the general wards of every hospital. It contains, in a short, concise manner, a general account of most forms of mental disease, viewed from the modern standpoint, and lays much emphasis on the need of searching deeply for an organic basis of many mental states. Not the least important part of the book is the series of illustrative clinical histories. Any intelligent woman, with a background of practical nursing knowledge, will find these of great value in assisting her to a clear knowledge of how to approach a mental patient, and given that knowledge, she can play an important rôle in bringing the patient back to a normal outlook in life.

The only criticism one could make might lie in the order of study. The short, well-written chapter on the anatomy and physiology of the nervous system should precede the chapter on normal psychology, not follow it. And surely these two chapters would be better studied before the psycho-pathological states are considered? These, however, are minor criticisms in an otherwise excellent book, which many general nurses could read with profit not only to themselves but to their patients. There is a foreword by Dr. A. S. M. Maggregor, Medical Officer of Health, Glasgow.

FOOD AND PHYSICAL FITNESS. By E. W. H. Cruickshank. Foreword by Sir John B. Orr. 1938. Edinburgh: E. & S. Livingstone. Pp. 148. Price 5s. net.

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In eleven short chapters the author gives an elementary account of the most important aspects of nutrition. A useful feature is the inclusion of fifteen tables dealing with fuel values, mineral salts content, vitamin content, cost, etc., of foodstuffs. In a chapter on "vegeterianism," the author digresses a little and deals effectively with food fads and "false ideas concerning foods."

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A few inaccuracies are noted which will no doubt be corrected in the second edition. Thus we find the normal body temperature stated as 37.5°C; "osteolin" is mentioned, presumably in error for "ostelin," and "erradicate" also appears.

The difficulty of expressing scientific facts in simple language is probably responsible for such statements as—"The points to be remembered about starches as foodstuffs are that they are deficient in vitamins, proteins, fats, and mineral salts," and "When there is deficiency of iodine due to the lack in food or in water, the thyroid gland becomes enlarged, giving rise to the condition known as goitre. Where the iodine deficiency disease appears in adults, it is known as myxœdema. Both conditions are cured by iodine given as a salt (sodium or potassium iodide)."

Despite these slight imperfections, this little book, although intended for the lay public, can be thoroughly recommended as affording valuable information on many problems met with in the daily work of every general medical practitioner.

MEDICAL JURISPRUDENCE AND TOXICOLOGY. Edited by John Glaister, M.D., D.Sc., B.L. 1938. Edinburgh: E. & S. Livingstone. Sixth Edition. Pp. 748. Figs. 107, coloured plates 2. Price 42s.

Glaister's textbook on Medical Jurisprudence is now one of the few dependable books published in this country, on what has already become a highly specialised branch of medicine. The present edition, edited by the able son of the distinguished author of earlier editions, will still further enhance its reputation. It has been brought up to date with chapters on such things as the use of filtered ultra-violet light in the detection of concealed seminal stains; on the facts of finger prints and other anthropometric methods on the identification of living persons. The findings of recent cases have been carefully sifted, and where useful lessons have been learned these have been incorporated throughout the text. The findings in the now celebrated Ruxton case have formed texts for many new features, particularly in the chapter dealing with identity of the dead. These new cases, however, are given their proper perspective, and older, what might almost be called classical, cases are still used to illustrate the methods recommended.

In a book of so many excellencies it is difficult to find anything to criticise, and it seems a pity that even minor criticisms should be raised; but even the most friendly reviewer could not fail to remark on the old-fashioned description given of the eruption of teeth, or on the very unscientific account given on the sexing of long bones.

Section II of the book is devoted to Toxicology. It contains not only an account of poisons and their actions, but also a short and valuable extract of the main points of the Dangerous Drugs Acts.

SICK CHILDREN DIAGNOSIS AND TREATMENT. Third Edition (revised). By Donald Paterson, B.A., M.D. 1938. London: Cassell & Co. Pp. 604. Figs. 75. Price 12s. 6d.

This book can be thoroughly recommended to student and practitioner as an excellent work on "sick children." The fact that it has reached its third edition shows that it has been fully appreciated by the profession. This last edition has been revised, and recent advances which have found a permanent place in pædiatrics have been added.

Such diseases as the anæmias, sonne dysentry, antritis, to mention a few, have received special attention, while chemo-therapy has been included in suitable places.

A notable feature in this edition is the valuable bibliography which is found through the text, so that any one interested in certain conditions may pursue the subject further.

The chapters on infant feeding are particularly well done, and the practitioner will find an excellent catalogue of practically every patent food with its analysis.

The book is a handy size and is profusely illustrated. The only criticism that one can make is the small type used in some of the chapters. One wonders why such economy should be practised, for any gain in the size of the book is more than balanced by the unpleasantness of straining to read it. Doubtless this will be attended to in future editions, possibly at the expense of some of the more obvious illustrations.

A few inaccuracies are noted which will no doubt be corrected in the second edition. Thus we find the normal body temperature stated as 37.5°C; "osteolin" is mentioned, presumably in error for "ostelin," and "erradicate" also appears.

The difficulty of expressing scientific facts in simple language is probably responsible for such statements as—"The points to be remembered about starches as foodstuffs are that they are deficient in vitamins, proteins, fats, and mineral salts," and "When there is deficiency of iodine due to the lack in food or in water, the thyroid gland becomes enlarged, giving rise to the condition known as goitre. Where the iodine deficiency disease appears in adults, it is known as myxœdema. Both conditions are cured by iodine given as a salt (sodium or potassium iodide)."

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SICK CHILDREN DIAGNOSIS AND TREATMENT. Third Edition (revised). By Donald Paterson, B.A., M.D. 1938. London: Cassell & Co. Pp. 604. Figs. 75. Price 12s. 6d.

This book can be thoroughly recommended to student and practitioner as an excellent work on "sick children." The fact that it has reached its third edition shows that it has been fully appreciated by the profession. This last edition has been revised, and recent advances which have found a permanent place in pædiatrics have been added.

Such diseases as the anæmias, sonne dysentry, antritis, to mention a few, have received special attention, while chemo-therapy has been included in suitable places.

A notable feature in this edition is the valuable bibliography which is found through the text, so that any one interested in certain conditions may pursue the subject further.

The chapters on infant feeding are particularly well done, and the practitioner will find an excellent catalogue of practically every patent food with its analysis.

The book is a handy size and is profusely illustrated. The only criticism that one can make is the small type used in some of the chapters. One wonders why such economy should be practised, for any gain in the size of the book is more than balanced by the unpleasantness of straining to read it. Doubtless this will be attended to in future editions, possibly at the expense of some of the more obvious illustrations.

A few inaccuracies are noted which will no doubt be corrected in the second edition. Thus we find the normal body temperature stated as 37.5°C; "osteolin" is mentioned, presumably in error for "ostelin," and "erradicate" also appears.

The difficulty of expressing scientific facts in simple language is probably responsible for such statements as—"The points to be remembered about starches as foodstuffs are that they are deficient in vitamins, proteins, fats, and mineral salts," and "When there is deficiency of iodine due to the lack in food or in water, the thyroid gland becomes enlarged, giving rise to the condition known as goitre. Where the iodine deficiency disease appears in adults, it is known as myxœdema. Both conditions are cured by iodine given as a salt (sodium or potassium iodide)."

Despite these slight imperfections, this little book, although intended for the lay public, can be thoroughly recommended as affording valuable information on many problems met with in the daily work of every general medical practitioner.

MEDICAL JURISPRUDENCE AND TOXICOLOGY. Edited by John Glaister, M.D., D.Sc., B.L. 1938. Edinburgh: E. & S. Livingstone. Sixth Edition. Pp. 748. Figs. 107, coloured plates 2. Price 42s.

Glaister's textbook on Medical Jurisprudence is now one of the few dependable books published in this country, on what has already become a highly specialised branch of medicine. The present edition, edited by the able son of the distinguished author of earlier editions, will still further enhance its reputation. It has been brought up to date with chapters on such things as the use of filtered ultra-violet light in the detection of concealed seminal stains; on the facts of finger prints and other anthropometric methods on the identification of living persons. The findings of recent cases have been carefully sifted, and where useful lessons have been learned these have been incorporated throughout the text. The findings in the now celebrated Ruxton case have formed texts for many new features, particularly in the chapter dealing with identity of the dead. These new cases, however, are given their proper perspective, and older, what might almost be called classical, cases are still used to illustrate the methods recommended.

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