

Th. Section

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CHRONIC INTESTINAL STASIS

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- by -

R. GARDNER, M.B.

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CHRONIC INTESTINAL STASIS

The General Practitioner has perhaps more to do with derangements of the Alimentary Tract than with any other condition. This always has been so and it seems to be more on the increase as the pace of modern civilisation increases with all its attendant cares and worries.

In the vast majority of cases, such derangements have for their cause either excessive intake or excessive output. Indiscretions in diet have their direct results in various forms of indigestion and indirectly lead to or aggravate the other factor of much ill health - namely, the imperfect removal of the waste products from the economy. It is no use stoking if you don't remove the ashes.

If the average individual could be brought to understand the importance of having an adequate daily evacuation of the bowel, he would have a clearer head and be fitter for the strenuous race of life. Women would be saved from much ill health and dissatisfaction. Their views of life and their sense of the proportion of things would be altered for the better conducing much to the benefit of themselves and everybody with whom they come in contact. It is on account of its prevalence, of its far reaching effects and of the ignorance or want of thought displayed by the public that the subject of Chronic Constipation becomes of foremost interest to the

Practitioner. It is a subject of frequent discussion, and the medical literature on it is voluminous.

It is beyond the scope of this Thesis to deal at all fully with the subject, either medically or surgically. It is far too big and interesting and embraces so many branches that that would be impossible.

The Royal Society of Medicine in 1913 held a discussion on what they called Alimentary Toxaemia - its sources, consequences and treatment. The fascinating theories of Mitchinhoff and Sir Arbuthnot Lane, the work of Hertz and Gant of New York, have within recent years restarted the interest in the subject. I would merely in this Thesis see where some of the questions set going ⁱⁿ recent literature may lead any of us who are study-^ding it.

(As I say), ^Aall sides of the healing art are involved, and all give some new or old contributions to its field of thought. X

Constipation may be defined generally as a tendency to the accumulation of Faecal matter in the lower intestine.

The evacuation may be too small - too seldom - too dry - or too hard.

The word obstipation is used by Gant of New York for intestinal obstruction.

There is no fixed point at which the condition called constipation begins and the normal state ends.

In many people, a daily evacuation is almost a necessity,

whilst in others three or four days may elapse without their suffering any inconvenience or harm; in yet another class of persons much longer periods may elapse without their showing any deleterious effects or discomfort arising. That is admittedly true and in one's own personal experience and one is often astonished at the difference of individuals in that respect.

One expects to class oneself with the great majority of persons who, for efficient work, clear, just thinking and quick understanding, find a loaded bowel a bar. It has been proved that it is not necessary for the rectum to be emptied every day as there is room in the large intestine for the residuum of several weeks' consumption of food. Ship surgeons, especially in days when voyages were longer and ships less luxuriously equipped than they are now, relate extraordinary instances in which women who were unwilling to be seen visiting the closet, allowed the lower bowel to remain full for weeks with the result that the surgeon had finally to remove the scybala with the help of syringe and spoons. Although this is possible without a more detrimental result than the extremely unpleasant means which may ultimately be necessary to get the bowel emptied, the retention of faeces can't be a good thing and the daily emptying of the bowel is the only safe rule.

Retention of the faeces means the retention of bacilli and their toxins with their effects and possibly in successive generations increase of their virulence. Some of the bacilli

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present in healthy faeces are innocuous and no doubt of use in the economy, but they may increase in virulence and lead to inflammation of ovaries, Fallopian tubes, appendix, bladder, kidney, gall bladder, if the bowel be loaded or evacuation retarded.

Serious consequences may also follow from the presence of scybalous masses, which one often sees, and stercorous ulcers may be set up.

Constipation is not peculiar to any race or clime, occurs in all classes, in both sexes and at every period in life.

Women are more prone to suffer than men, in part owing to their different modes of life and their different avocations. Some writers assert that modesty plays its part in the case of females; others think that women take less food and drink into their alimentary canal and that that fact may be a possible reason.

In infants, an additional cause is the absence of development of the volitional element in defaecation.

Whilst constipation exists as a symptom or complication in certain definite morbid conditions, it, at the same time, is so frequent amongst otherwise healthy people that it must, in the greater proportion of cases, be regarded not as a disease but rather as a natural result of artificial conditions on the healthy body (Allbutt)² So it is more prevalent amongst civilised than amongst savage races.

Several factors may account for this:

The natural stimulus to movements of the bowel (peristalsis) is the mechanical and chemical irritation exerted by the bulk of the indigestible residue of the food. The food of the savage is coarse and ill cooked, whilst to suit the greater refinement of taste and delicacy of palate of the more civilised races, much of the indigestible ingredients have been removed in manufacture or have been softened in the process of cooking.

A free and active open air life is more conducive to bowel activity than a sedentary one or the harassing rush of modern city life.

A N A T O M Y

I do not intend to enter into a full discussion of the anatomy of all the abdominal and pelvic organs, but for the treatment of constipation some understanding of the stomach and small intestine and still more of the large intestine in its varying location construction.

Stomach.-

This organ is situated about two-thirds on the left and about one-third on the right side of the abdomen immediately below the diaphragm. It has a smaller and a greater curvature, the former looking upward and to the right and the latter downward and to the left. The entrance (oesophagus opening) to the stomach is to the left near the median line

whilst its outlet (pyloric opening) is lower down and a little to the right of this central line. After the abdomen has been opened it will be found under normal circumstances that the pancreas, spleen and most of the left kidney are completely hidden by the stomach but a further study will reveal the liver and small omentum to the right above, and the transverse colon and great omentum immediately below it.

The stomach consists of four coats. The serous, which has no significance to us much - a muscular, with its outer or longitudinal layer, its middle circular and its oblique internal layer; the sub-mucous containing the vessels and nerves; and the mucous membrane with its many irregular folds and its cardiac and pyloric glands.

The Small Intestine .-

Extends from the stomach to the caput coli from which it is separated by the ilio-caecal valve. It consists of numerous irregularly arranged convolutions, is about 20 feet in length is considerably larger at its commencement than when it joins the colon and holds about 12 pints. It is divided into three parts namely, duodenum, jejunum and ileum. The duodenum or first part is 10 inches long, the jejunum and ileum make up the remainder.

The small intestine has three coats. The serous, the muscular (longitudinal and circular fibres) the sub-mucous containing the blood vessels and nerves and lymphatics; and the

4 mucous with its goblet cells, Brunner's glands (in duodenum) crypts of Lieberkuhn, villi valvular solitary glands and Peyer's patches.

The blood supply of the small intestine is derived mainly from the superior mesenteric artery and the nerve supply principally from the inferior mesenteric plexus.

The Large Intestine.-

Is that part of the alimentary canal extending from the ilio-caecal valve to the anus. It is so called because when undistended it is considerably larger than the small intestine.

It is further differentiated from the small intestine by its nearly constant position, thicker walls, sacculated contour, its appendices epiploccal, its longitudinal bands and its greater depth of fixation. It varies between 5 and 6 feet in length and its calibre varies from $1\frac{1}{2}$ to 2 inches, being widest at the caecum from which point it gradually diminishes in size as far as the rectum; here it again increases materially and so continues until the anal canal, or narrow part of the intestine, is reached.

While it may be said that the colon normally arches round the small intestine the coils of which lie within the concavity of its curve, those segments of the bowel that are completely enveloped by peritoneum or that have a mesentery are subject to great variations in their disposition. The caecum, for example, instead of lying in the right iliac fossa may be found in the right lumbar region even as high as the under

surface of the liver or it may hang down into the pelvic cavity. The transverse colon, which normally arches across the abdomen in the upper part of the umbilical region frequently dips down as a U shaped or V shaped loop reaching sometimes to the pubes and thus increasing the sharpness of the angles at the hepatic and splenic flexures. The pelvic colon also varies considerably in length and position. It may form a short horseshoe shaped loop of not more than 6 or 8 inches, or may be two or three times as long, and be thrown into several curves assuming an S or X shape, in which case it is not always easy during an operation to recognise the direction in which a particular part is running, especially if the bowel be distended. Being provided with a well developed mesentery, it enjoys a wide range of movement and when distended it may reach any part of the abdominal cavity.

The ascending colon, the hepatic and splenic flexures and the descending and iliac portions are more constant in position as they are not completely enveloped by peritoneum and are to some extent fixed to the posterior abdominal wall by areolar tissue. The opening between the small and large intestine - the ileo-caecal orifice - is guarded by the ileo caecal valve composed of two crescentic segments enclosing a slit-like opening which, when the caecum is distended, is closed and prevents regurgitation of its contents into the small intestine. In all likelihood the circular fibres of the lowest part of the ileum form as in some animals a true muscular sphincter. A short

distance below the valve the vermiform appendix opens into the caecum.

Blood Supply.-

The caecum and appendix are supplied by the ileo-colic branch of the superior mesenteric artery, the ascending colon by the right colic and the transverse by the middle colic branch of the same trunk. The descending colon receives its blood from the left colic and the iliac and pelvic colons from the sigmoid arteries branches of the inferior mesenteric.

The veins correspond to the arteries.

Lymphatics.-

The lymphatics, after leaving the bowel, pass in the mesocolon to different groups of glands lying along the course of the branches of the superior and inferior mesenteric arteries.

Physiology of the intestine.-

The functions of the intestine are:

1. To carry on the digestive processes begun in the stomach.
2. To provide for the absorption of the products of digestion, and
3. To excrete the indigestible residue.

For the fulfilment of these functions, the intestine is endowed with secretory and motor activities, and in addition the secretions of the liver and pancreas are poured into its

lumen. The various enzymes act on the proteins, carbohydrates and fats of the food and transform them into substances that are capable of being absorbed into the lacteals and blood capillaries of the villi. The intimate mixing of the food with the digestive juices and the passage of the chyme along the alimentary canal are effected by the movements of the intestinal wall. Derangements may occur in the secretory or in the motor activities or in both.

One other factor has to be noted - the decomposition of the food stuffs by bacteria.

This occurs normally in the intestine and is probably essential for health. The processes consist in the fermentation of carbohydrates, putrefaction of proteins and conversion of fats into lower fatty acids. It has been suggested that disturbance of digestion may be associated with changes in the character of the intestinal bacteria.

The secretion of ferments is confined to the small intestine, the liver and the pancreas and in the small intestine most of the absorption takes place. At the lower end of the ileum, bacterial fermentation of carbohydrates begins. In the large intestine only small quantities of the foodstuffs are absorbed, but water is absorbed readily. The fermentative and putrefactive processes reach their maximum in the caecum and ascending colon in which also digestion still goes on, ferments being present in the chyme which passes through the iléo-cecal valve.

The intestinal contents are slowly propelled along the gut towards the colon and at the same time they are subjected to a continuous mixing process. The onward movement is affected by waves of contraction which sweep along the muscular coat of the bowel and this is called peristalsis.

The mixing of the material in the intestine is brought about by ring-like or segmentation contractions which are not progressive in character. These movements may be observed in the living animal or person by the aid of Röntgen rays after the administration of a Bismuth meal. They can also be observed directly, if the abdomen is opened in an animal immediately after it has been killed. The normal stimulus to these movements is the presence of the bolus of food in the lumen of the gut, and it is for this reason that the indigestible material of vegetable food is of value.

Observations with the aid of Röntgen rays show that the material in the small bowel tends to accumulate behind the ilio-colic sphincter and that it passes into the caecum in considerable quantity when the sphincter relaxes. This seems to take place four or five hours after each meal and the relaxation of the sphincter is brought about by a nervous reflex-gastro iliac which follows the entrance of a fresh meal into the stomach.

The material which thus passes into the large bowel, is in the form of a jelly coloured by the presence of bile pigment. It normally contains hardly any nutritive substance, the derivatives of the digestion of protein, fat and carbohydrates having been almost completely absorbed in the small intestine.

Indigestible substances contained in the food are present, especially cellular, together with cast off epithelial cells and the unabsorbed portion of the various digestive juices. The chief secretory waste products are the pigment of the bile, unabsorbed glycocholate and taurocholate of sodium and cholesterol.

In carnivorous animals the large intestine is short, and its function is limited to the absorption of water and the consequent reduction in bulk of the faeces.

In herbivora, on the other hand, the large intestine is of considerable length and not only absorbs water but serves an additional purpose. A large proportion of vegetable foodstuffs consists of cellulose which is not affected by the digestive enzymes. Cellulose is decomposed in the large intestine of the herbivora by bacterial action, being converted into fatty acids which are absorbed and utilised in the body. Further, in all the higher animals the cells lining the simple tubular glands of the large intestine are for the most part of the mucus-secreting type, and are of service in producing mucin which acts as a lubricant and facilitates the passage of the faeces along the bowel.

Water is the only substance absorbed in any quantity in the large intestine. The contents of the ascending colon contain no nutritive substances, but their bulk is fairly large owing to the amount of fluid which they contain. This is greatly reduced in the large bowel.

The faeces are the residues that reach the rectum and form a solid or semi-solid mass coloured by the pigment sterco-

bilin which is derived from bilirubin. They contain about 65% of water with organic material and inorganic salts. The organic substances are partly nitrogenous and partly of a fatty nature and soluble in ether. The nitrogenous constituents include cholic acid, dyslysin, indol and skatol, bodies, epithelial cells and dead bacteria. The lipoids are fatty acids, lecithin and coprostitcin, a body allied to cholesterol. There may be a small quantity of neutral fat. When vegetable food has been taken, the faecal matter will include undecomposed cellulose, but, for the most part, the faeces consist of substances derived from the digestive tract itself. The caecum and ascending colon are filled in the way by peristaltic contraction of the ilium and are entirely passive during the process. Later, segmentation contractions are set up and mix the contents and promote the absorption of water. The transference of the faeces from the caecum and ascending colon to the transverse and descending colon takes place at long intervals, usually three or four times in 24 hours. Scattered masses may remain in the transverse colon for a time and these are suddenly transformed to the descending colon by a peristaltic wave. The faeces remain for a time in the sigmoid flexure until usually after a meal, a certain amount passes into the rectum and gives rise to a desire for defaecation. By relaxation of the sphincter and accompanied by contraction of the walls of the sigmoid flexure and rectum assisted by contraction of the voluntary muscles of the abdominal wall and pelvic floor, the lower end of the bowel

is evacuated. The act is a reflex one, but in the adult it is under control of the higher centres. The large intestine received its nerve supply from the sympathetic system and from the pelvic visceral nerves or nervi.

The sympathetic are inhibitory and the pelvic visceral nerves are motor in function.

There are also ganglionic plexuses in the intestinal wall of which the mesenteric lying between the layers of the muscular coat is associated with the local reflex mechanism controlling the movements of the bowel.

Bacteriology of the alimentary canal.-

The condition for bacteriological growth offered by the alimentary canal are for the most part ideal. There is an equable temperature - moisture, while the supply of foodstuffs is ample and varied. Free oxygen is largely absent in the intestine except perhaps in certain diarrhoeal conditions. So the habitual tenants of the bowel are facultative anaerobis and even shut anaerobis can grow freely. It is well known that anaerobic conditions favour chemical cleavages in the medium in which bacteria are growing.

The reaction of the greater part of the alimentary canal is alkaline, and thus favourable for bacterial growth, but the local acidity of the gastric contents is not merely unfavourable but actually destructive to the new sensitive bacteria ingested.

The pneumococcus common in the mouth does not, as a rule,

reach the intestine and it is believed that normal gastric acidity is a safeguard against cholera.

The contents of the alimentary canal are always on the move in the day. As we saw above, it takes time and there are delays. In any case a bacterium can multiply a thousand million-fold during the average time occupied by its transit from mouth to anus and vast numbers must remain in the various recesses of the canal or adherent to its mucosa. Nevertheless, stasis is a futile adjurant to bacterial multiplication and hence to alimentary toxæmia whether in a dilated stomach or under the common form of constipation.

If we knew as much about the protozoan inhabitants of the alimentary canal as we do about its bacteria, we should probably find both under the same governing laws, but very little is known about the fauna.

The flora of the canal is sue genesis. Certain groups of bacteria have adapted themselves to life in the canal, and have practically abandoned other modes of existence. Such are the bacilli of the colon group, the majority of the streptococci and certain anaerobis. So characteristic are these of the alimentary canal of man and animals, that by the universal consent of bacteriologists, they are taken as indices of the faecal pollution of water, milk, earth and other substances.

They grow best at the body temperature, they are potential anaerobis and they show a high capacity for splitting up various foodstuffs, primarily for their own use, but incidentally

to the occasional detriment of their host. They can withstand considerable periods of desiccation for owing to their wholesale expulsion with the faeces, their chance of reaching a new host is thus increased.

In the secretion of the healthy buccal cavity, Gordon found bacteria to the number of 10 to 100 millions per cubic centimetres and mostly streptococci - nine-tenths of the whole. In the stomach and duodenum bacteria are very few. For in health, when the stomach empties itself properly after each meal, it is well scoured and most of them perish during digestion.

In the small intestine, bacterial multiplication recommences but so long as the contents are fluid and pass rapidly along the gut, the numbers are not very high, but they increase in passing downwards. The bile is supposed to check intestinal putrefaction but certain of the most typical intestinal bacteria have so acclimatised themselves to it that they can grow in spite of it. Bacteriologists commonly add bile or sodium taurocholate to their culture median when studying intestinal bacteria, in order to take advantage of this selective action.

The bacilli of the colon group can all grow well in presence of bile and certain of the hardier streptococci can do the same. The more delicate of the streptococci and the pneumococcus will not grow in its presence whilst such organisms as the *Bacillus protifus* are much restricted in growth.

In the caecum and colon the condition for bacterial multiplication become more favourable than anywhere in the alimentary

tract. The intestinal contents are delayed in order that the last remnants of nutriment may be absorbed and the number of the bacteria found in faeces surpass even those of the buccal cavity. Streptococci and members of the Bacilli coli very largely predominate.

In the colon too anaerobic bacilli begin in lesser degree to assume prominence while Bacillus protius and sometimes Bacillus pyocyaneus are not uncommon.

There are roughly three groups of Bacteria found in the alimentary canal:

1. Bacillus coli group.-

Of these the Bacillus coli communis, Bacillus lactis aerogenes, Bacillus acidi lactici.

Less common are Bacillus faeculis alkaligenes and numbers of the Gaertun group.

2. Streptococci

S. pyogenes, S. salivarius and S. faecalis.

3. Anaerobis group

B. aerogenes capsulatus, B. Welchii and B. enteritidis sporogenes.

In health, these organisms take advantage of the favourable conditions offered by the alimentary canal for their own good and if they do us no harm it is because the whole race of higher animals has been evolved under these necessary conditions present from the beginning so that there has been ample

time for the evolution of such protective mechanisms as are needful to neutralise the habitual effects of bacterial commu-
nalism. I refer not merely to defence against bacterial in-
vasions but to a neutralisation of their toxic products. It
has been thought that such injurious substances, absorbed from
the alimentary canal, as may escape the ~~of~~ of the liver
are neutralised by secretions of certain of the ductless glands,
for example the Thyroid. There can be no doubt, however, that
the intestinal flora is not without influence upon the body,
even in health, for the more actively metabolic bacteria carry
out protein splitting to a point beyond that which can be ex-
ercised by the ordinary defective ferments, and of the soluble
products some are known to be toxic. Retention of the intes-
tinal contents affords a fruitful field for the multiplication
of the normal bacterial flora and for the full exercise of their
fermentative activities and at the same time it gives opportunity
for the absorption of whatever toxic products may be formed.

If we define alimentary toxæmia as an absorption from
the alimentary canal of chemical poisons, of known or unknown
composition, in sufficient amount to cause clinical symptoms,
the blood having served as the channel of distribution to the
tissues which are poisoned, we are leaving out the slight in-
vasions of the blood by bacteria normally present in the ali-
mentary canal, which is constantly going on and being destroyed
by the protective mechanism which the body has been compelled
to set up in order to avert the danger. We have set up a great
armed camp with the alimentary canal and its contents practically

outside the body on the one side, and surrounding it the tissues with its blood vessels bringing aid from the outer portions of the body, all seeking to repel the constant and varying attacks of the armed force within the canal. In health there seems to be a deadlock in pathological condition - the intestinal invader temporarily wins. Treatment of the body generally must be directed to a bracing up of the tissues by all means in our power so that the enemy may be dislodged and the effects of their poisoning undone and prevented from recurring.

Everybody must admit that nothing can be too heroic in face of such odds - medical and surgical - to leave a healthy body, so that the patient may be able to live at all.

The fact that these toxins or chemical poisons or whatever they are, cannot be identified with any certainty, can not do away with the fact that many diseases depend on the absorption of poisons from the intestine either introduced with food or formed from it by the fermentative or putrefactive processes in the alimentary tract.

I have now considered shortly the alimentary tract and its contents and now, before going into the Etiology of Chronic Intestinal Stasis, I would like to refer to some of Nietchinkoff's views on the uselessness to man of a large intestine. He quotes the case of a woman who lived for 37 years although her large intestine was atrophied and inactive. In support of this he quotes another case of a woman of 62, a patient of Prof. Kaehn of Berne. She suffered from a strangulated hernia

associated with gangrene of part of the intestine and had to be operated on suddenly.

The gangrenous portion of the ilium having been removed, the healthy end was implanted on the skin so as to form an artificial aperture through which waste material from the food could pass to the exterior with ^{out} traversing the large intestine. Although the patient was old and seriously ill, the operation performed by M. Favel was quite successful. Six months later, in a new operation, the small intestine was re-joined to the large intestine so that faeces again came the natural way.

In this case then, the large intestine was thrown out of use for six months, not only without injury to the general health but with the result that the patient was completely cured. The digestive processes in the small intestine and the nutritive metabolism were studied and it was found that these were healthy and active, the absence of intestinal putrefaction that evil of the constitution being specially favourable. In six months of non-action, the part played by an organ can be satisfactorily estimated. M. Manclaise, however, has put on record a case, the history of which is much longer.

In 1902 he operated on a young woman and produced an artificial anus, there being no escape of faecal matter by the anus. Two months later he operated again and shut off a portion of the intestine. He left the artificial anus but cut across the lower end of the small intestine, and inserted it near the iliac end of the descending colon. For several days

after the operation, the faeces were passed by the normal aperture as the small intestine now communicated directly with the large intestine near the rectum. This condition, however, did not persist as the faecal matter began to flow back through the excluded portion of the large intestine, so reaching the artificial anus and causing inconvenience. Giving up the hope of this ceasing, M. Manclaise performed a third operation twenty months later. He cut across the large intestine near the point where the small intestine had been artificially let into it, so dividing the digestive tube into two parts, one of which remained in communication with the natural anus whilst the other, consisting of nearly the whole of the large intestine, communicated with the exterior by the artificial anus. In the new state of affairs, the food refuse passed directly into the terminal portion of the large intestine and thence by way of the rectum to the exterior through the normal anus without having to pass up the large intestine towards the artificial anus. In this last operation, about a yard of the small intestine and the greater part of the large intestine, the caecum and ascending, transverse and descending colon were removed from activity. This Nietchinkoff thinks proves that the large intestine is useless in man, but he says the entire suppression of the large intestine does not get rid of the intestinal flora.

Etiology of Constipation.-

We have seen that in the ordinary course, to maintain the economy in an ideally healthy state, we must have a regular passing along of the residue of the food and a regular and complete evacuation of the contents of the colon from the splenic flexure.

In considering the Etiology of Chronic Constipation, it will be best to review the various factors involved in the functions and to see how deficiency in any of them or group of them affects the process.

The factors may be divided primarily into:

1. Passenger, i.e., Faeces or contents of bowel
2. Passages i.e., Intestinal canal
3. Powers a. Intrinsic)
 b. Extrinsic) Muscles
 c. Nervous mechanism

1. Faults in the Passenger (Faeces or contents of bowel)

These may be in the nature of:

- a. Too small quantity
- b. Too great quantity
- c. Too hard and dry consistence from:
 - A. Deficiency of water
 - B. Excessive absorption of water from delay in passing.
 - C. Foreign bodies

2. Defects in the Passages may be due to:

- a. Narrowing or occlusion of the lumen of the bowel by:
 - A. Organic stricture
 - B. Pressure from without
 - C. Spasm
 - D. Knocks
- b. Excessive dilatation of a part of the bowel.

3. Defects in the Powers may be due to:

- a. Musculative
 - A. Intrinsic involuntary muscles of the abdomen
 - B. Extrinsic voluntary muscles of the abdominal wall, the diaphragm, the muscles of the pelvic floor.
- b. Nervous mechanism
 - A. Cerebral influence on reflex process
 - B. Nerves involved in the reflex are sympathetic and spinal

Faults in the Passenger.-

As we have seen already, the amount and quality of the food injected determines to a large extent the quantity and quality of the faecal contents of the colon. Thus, if a person is suffering from starvation whether this be due to his disease as for instance malignant stricture of the Oesophagus or stomach, which prevents food from being passed into his digestive tract, then, of necessity, there must be a reduction

in the bulk of the faecal residue. There would then be wanting that mechanical stimulation which is one of the ordinary requirements for the peristaltic action of the bowel. The faecal residue would be passed on more slowly and it would take longer for it to accumulate in the pelvic colon in such quantity as would create a desire for defaecation.

Again, the constituents of the food have an important bearing upon the character of the faecal residue. The more indigestible, the greater will be the residue. Thus we have seen that vegetable diet owing to its excess of cellulose is less easily dissolved than animal diet; it also increases the flow of intestinal juices and favours the development of a larger number of bacteria, in these ways also therefore increasing the bulk of the faecal remainder.

It has also been pointed out that vegetable diet tends more to develop chemical products which, together with the mechanical effect of the bulk of the residue give rise to local reflexes in the bowel which lead to peristalsis.

2. In the case of individuals who habitually bolt their food and do not masticate but swallow en masse, the stimulus to the bowel may be insufficient to move on sufficiently quickly the resulting bulk of material; similarly in children who are fed on undiluted cow's milk, it happens at times that the milk curd is so massive as to cause obstruction to its onward passage at the normal rate.

3. The stools may be too hard and dry and so resist

the driving force of the bowel. Several reasons for this may be adduced, e.g.,

- a. Deficient intake of water and fluids generally, or
- b. Excessive absorption of fluid

The function of the large intestine is mainly absorptive; whatever then may lead to diminished activity of peristalsis will tend to result in dry faeces. The contents of the small intestine as they are "squired" into the caecum contain largely fluid. The canal becomes narrower the nearer to the pelvic colon we go, therefore it gives greater opportunity for absorption and when the faecal contents arrive at the narrower part of the canal they are firmer in consistence.

4. Anything which increases the secretory functions of the kidneys, lungs and skin, will of necessity rob the intestinal contents of some of their fluid composition. Thus Diabetes, prolonged muscular exertion, hot weather, tend to result in constipation.

Defects in the passages.-

The lumen of the colon is smaller as it proceeds from the caecal to the rectal end, but this is compensated for by the greater muscular development in the wall of the bowel.

Constipation may be induced by an abnormal state of the canal in respect of its lumen. This may be in the nature of narrowing or dilatation.

Narrowing is by far the commoner condition of the two. It may be caused by alteration in the bowel wall itself or by pressure upon the bowel from without.

The commonest cause of narrowing is organic strictures. This may be malignant or innocent in character.

Malignant stricture has its commonest site in the large intestine, iliac or pelvic colon and in the rectum.

The symptom which calls attention to the condition is frequently diarrhoea and often early morning diarrhoea. In a person who has hitherto been of regular habit or with a tendency rather to constipation, this diarrhoea is apt to be intermittent.

It is a safe rule to examine the rectum and pelvic colon in every case of intermittent diarrhoea, especially if it occurs in a person over 40 years of age. The growth is usually a columnar celled carcinoma. There may or may not be blood in the stools and the stools may or may not be altered in shape. In the softer papillomatous carcinoma, which is more in the line of the bowel and not circular, the narrowing does not occur so readily and, therefore, constipation is not so marked.

Innocent stricture is very rare.

Pressure from without.— This occurs so as to affect the free action of the bowels most commonly in that portion of the gut which lies within the pelvis. Here there is an unyielding bony wall on the one hand and the fixed bowel on the other. Obstruction in this region is more common in women

because of the frequent abnormalities in their pelvic generative organs. Thus, pressure of an enlarged retroverted, pregnant or a fibroid uterus or of an ovarian cyst in the pouch of Douglas, would prove an effective cause of troublesome constipation. The pressure exerted by an abnormally placid pregnancy is sufficient to cause constipation or sluggishness in the organ above the pelvis. After a pregnancy is over, about the sixth or seventh day it is quite common for the mother's temperature to go up to 101-103° F. The urinary functions are deranged and the kidney may be felt distinctly enlarged. The *Bacillus coli communis* has affected the urinary system and reached the kidney. Attention to the bowels and symptomatic treatment brings it down again. I have seen it often in practice.

The possibility of pressure being exerted and of resulting constipation by such conditions as tumours of the kidney, cysts or others, of gall bladder liver &c., or by abscess intra peritoneal or extra peritoneal, may be borne in mind, but such cases are not by any means common and would be complicated by inflammatory infiltration of the intestinal wall and by adhesions.

Spasmodic contraction of the colon is another cause of narrowing of the lumen. This occurs in individuals of nervous temperament. It affects portions of the colon at a time - a few inches more or less. It may be brought on by worry or excitement.

Kinks or twists of the bowel. Following upon inflammatory attacks in the peritoneum or upon surgical operations,

adhesions may be formed and traction put upon the intestine.

Most commonly this occurs in the pelvic region and constipation is a frequent and troublesome sign.

Dilatation of the lumen of the bowel.-

This may occur as a congenital defect in the condition known as ~~X~~ disease or congenital idiopathic dilatation of the colon. I have lately seen two cases of this with its extreme constipation and progressive distension of the abdomen. The colon is greatly hypertrophied and diluted without any organic obstruction of the lumen. The anal canal and rectum are normal and the dilatation begins in the pelvic colon which may form an enormous loop filling the greater part of the abdomen and having a diameter equal to a man's thigh. The condition may implicate the iliac and descending colon, less frequently the transverse and still less frequently the ascending colon and caecum. There is great thickening of the wall of the colon as a result of hypertrophy of its circular muscular coat and the formation of fibrous tissue in all the coats of the bowel. When scybalous masses have formed, there may be ulceration of the mucosa.

Wilkie suggests the following explanation of the condition: "In the newly born infant, the pelvic colon and its mesentery are relatively long and lax and the meso colon has an extensive attachment to the posterior abdominal wall, so that this segment of the bowel enjoys a wide range of mobility. At birth, the lower part of the large intestine, particularly

the pelvic colon, is distended with meconium . If from any cause the muscular tone of the bowel is below normal, it is easy to understand how the distension may proceed to such an extent as to render the bowel incapable of contracting on its contents and expelling them. The retained meconium soon undergoes bacterial decomposition and gases are formed and add to the distension. From the combined weight of the contents and the gaseous distension, the mobile loop of the bowel may readily become bent or kinked even to such an extent as to fold or press upon the upper end of the rectum and so occlude it as by a valve. When the distension increases sufficiently, the pelvic colon rises into the abdomen and temporarily opens the valve and some of the contents may escape. In its effects, only partly successful, to overcome the obstruction, the bowel wall becomes hypertrophied and thickened."

The relation which the hypertrophy bears to the dilatation determines the fate of the case. When the hypertrophy fails to keep pace with the dilatation, we get early obstructive symptoms with distension and frequently death from toxæmia in infancy or early childhood. When the hypertrophy is sufficient to compensate for the dilatation, the child may reach adult life suffering only from a slightly swollen abdomen and a moderate degree of constipation. Adult life being reached, compensation does not usually fail till the degenerative changes of age set in; then from fibrous changes occurring in the hypertrophied wall, compensation fails, the bowel dilates

further, and leads to the well known symptoms."

Here we have a clinical picture of Chronic Intestinal Stasis with the battle going on between the tissues, the abdominal wall, phagocytes and so on fighting the bacterial contents of the bowel.

As the ebb and flow goes on we get the various signs and symptoms set up in the patient. Dilatation also occurs as a result of stricture of the bowel, also in rickets from accumulation of gas in the bowel.

Faults in the Powers.-

1. Musculative.

a. Atony of the intrinsic involuntary muscles of the intestinal wall.

Weakness of the intestinal musculature is part of a general manifestation. The causes giving rise to it will have been in evidence in other departments of the economy. Age, acute illness, blood disorders, starvation, the cachexias, all tend to produce constipation by interference with the general nutrition. The muscular fibres and the mucous membranes of the bowels suffer together with the other tissues, with result that they lose their tone and resiliency; they have neither the vigour nor the reflex irritability necessary to produce strong enough peristalsic waves. In like manner, in obesity the infiltration and decomposition of fat in and around the bowel interferes with its working capacity.

b. Extrinsic or voluntary muscles.

These consist of the diaphragm muscles of the abdominal wall and those of the pelvic floor. By the combined action of these, in health there is produced an increase in the intra-abdominal pressure, which assists the onward passage of the faecal contents of the bowel and gives the needed impetus during the act of defaecation. In considering the act of defaecation, mention was made of the function of these muscles.

When the desire for defaecation arises the sequence of events is as follows: A long inspiration is made followed by voluntary closure of the glottis; the diaphragm is then forced downwards; the abdominal muscles then come into action specially the internal obliques and still further lessen the intra-abdominal space, increasing thereby the pressure and in this manner the faeces are pressed into the rectum and even into the anal canal. The distension and irritation thus produced give rise to stimulation of nerve endings which communicate with the lumbar spinal centre, and as a result efficient influences pass to the colon causing peristaltic contraction of the muscular fibres and in the sphincters, which relax.

The combined action of the diaphragm, abdominal muscles, peristalsis of colon and relaxation of the sphincters result in the protrusion of the faecal mass, and its expulsion.

In emphysematous states of the lungs as in chronic bronchitis or asthma, the diaphragm may already be pushed lower down than normal and so be put; as it were, out of action, whilst

the abdominal muscles, weakened and stretched by excessive coughing, are inefficient.

The abdominal muscles may be enfeebled by old age or as a result of depressing illness or have lost their resiliency from over stretching in cases of large abdominal tumours or of accumulations of fluid as in ascites or of sub-cutaneous or peritoneal fat, or they may be insufficient from other and avoidable causes.

Systems of physical culture are apt to neglect the development of the abdominal muscles and so you get in the individual a lack of tone and a tendency to prominence of the abdomen due to the stretching of the weakly parietes by pressure of the abdominal contents.

The erect attitude in man lends itself to encourage this tendency. There is also a tendency to the deposition of fat in the abdominal wall and this also interferes with the free action of the muscles. Large abdominal tumours assists excessive accumulation of fat within the peritoneal cavity and child bearing all tend towards stretching the abdominal walls, thinning the muscles, in consequence of which their contractability is diminished. At the same time the abdominal cavity is enlarged and the increased volume of its contents necessitates a greater degree of force to obtain the increased intra-abdominal pressure required for defaecation. In addition, there may be separation of the recti muscles which allows of protrusion of the abdominal contents, very marked in "pendulous belly."

A further result of the weakening of the abdominal wall, and one which has some bearing upon the causation of constipation, is that the viscera lose part of their natural support, and, in consequence, they tend one or more, or all of them, to prolapse leading to the condition of Splanchnoptosis or Glenard's Disease. In this disease, you get a lowering of the stomach, transverse colon and right kidney. The downward displacement is probably due to a combination of causes - stretching of suspensory ligaments, atomy of the muscles of the abdominal wall and compression of the thorax and upper abdomen.

There is no correspondence between the degree of the enteroptosis and the severity of the symptoms. The chief complaints are a sense of weight and a dragging pain in the abdomen and loins aggravated by exertion and relieved by lying down. There are usually dyspeptic symptoms and, in many cases, also the numerous manifestations associated with intestinal stasis.

This tendency is accentuated in women who have been in the habit of tight lacing; in such cases the organs are actually pressed downwards.

Authorities such as Gant and Cane consider that visceroptosis is a fruitful cause of constipation as they say that the prolapse of the viscera tends to cause kinks at the various flexures of the colon with the result that the onward movement of faeces is interfered with; that as a result of the constant strain on the peritoneal attachments of the depressed viscera, there is set up a chronic inflammatory condition which is protective in so far as it tends to limit the prolapse, but at

the same time, there occurs inflammatory adhesions between the coils of the gut and neighbouring organs, thus further increasing the obstructions.

Hertz, on the other hand, says that he can get little or no evidence of delay on the onward passage of the faeces in visceroptosis; indeed, he found in perfectly normal subjects, in the erect attitude, that the angles at the splenic and hepatic flexures are as acute as in any case of visceroptosis and yet give rise to no trouble. He holds that visceroptosis and constipation in the case quoted by such authorities, are really due to and are in consequence of weak abdominal muscles.

In connection with the muscles of the pelvic floor, the main cause of default lies in the stretching and tearing with loss of tone which are the results of the second stage of labour. The levatores ani are the most important structures in this connection.

Regarding the external sphincter, it is to be remembered that the condition known as anal fissure, which consists of a crack in the mucous membrane extending down to and exposing the nerves of the sphincter, thereby causing a spasmodic contraction of the muscle is at once a result and a cause of constipation. Thus the passage of scybalous masses of faeces is apt to stretch and tear the mucous membrane or scratch it, but on the other hand, if there be present such a tear or scratch, the passage of faeces over it causes pain so exquisite that the individual so affected is in dread of the necessity of evacuating the bowel.

Nervous Mechanism.-

a. Cerebral influences on the reflex process.

The action of the bowels is largely influenced by the mental status. Thus, excitement or fear may be followed by diarrhoea and anger result in constipation. Constipation is a common concomitant of insanity and is one of the complications which has to be carefully watched.

In insanity and in the milder functional forms of mental insufficiency, such as neurasthenia and hypochondriasis, this feature is due from the associated depression of the nervous system to diminution in the response to the stimuli which normally excite intestinal activity.

Constipation may be brought about, and very commonly this is the case, through ignorance or neglect of or voluntary resistance to the call of nature.

As has been shown, the most powerful stimulus to peristalsis of the colon is the entrance of food into the stomach. After a night's repose the sensations are more acute and it, therefore, commonly happens that the call to defaecate is more distinct after a morning meal. If one voluntarily resists this, or for one reason or another, allows the opportunity to pass, then the likelihood is that the consciousness of need for defaecation becomes less persistent and a condition of constipation is set up, in the course of time.

On the other hand, one may encourage a healthy evacuation and even arrange for its daily occurrence, even timing it

to an hour, by allowing nothing to interfere with the duty on its first demand.

b. Nerves involved in the reflex are:

1. Sympathetic. In affections of the abdominal sympathetic there may be constipation.

Some people appear to have insensible terminals. This condition exists in very young infants, in whom defaecation is purely a reflex act, and results from insufficient excitability of the nerve terminals, so that the stimulation of the nerve centre is insufficient to produce the necessary reflex.

In adults, unless in the case of the aged, in whom the excitability has diminished with failing powers generally, the lack of excitability is due to neglect of regular evacuation, whereby faeces have been allowed gradually to accumulate and to be retained. The discomfort at first felt is, by degrees, overcome, until even the presence of a very large accumulation fails to cause any desire for defaecation.

ii. Spinal Nerves.— Constipation is extremely common in disease and injury of the spinal cord and is often greater than can be accounted for by the mere loss of power in the abdominal muscles.

If the volitional path in the cord is interrupted above the lumbar centre, the will no longer controls the reflex process.

If the disease of the cord also involves the sensory tracts, the patient is unaware of the action of the bowels, or

of the discomfort and constipative results. If the sensory portion is unaffected, the patient is aware of the process but cannot control it, but as voluntary action is now out of court, constipation results.

These then are some of the main causes of constipation and now we have to consider the conditions that may be set up in the patient.

The general symptoms associated with this condition depend upon the absorption of toxic material from the stagnating contents of the bowel and include a feeling of tiredness, depression and drowsiness, with a sub-normal temperature and enfeebled circulation.

Professor Chiene used to tell us not to go into an examination with a loaded bowel. "See that your rectum is clear," he used to say. Then one was able to do more justice to one's knowledge, especially in an oral.

The patient loses weight; the muscles degenerate, the skin becomes thin and wrinkled and assumes a dusky hue and there is excessive sweating. As a result of the loss of fat and of muscular tone, there is a tendency to ptosis of abdominal viscera. Changes in the joints of the nature of arthritis deformans and chronic mastitis with cystic degeneration of the breasts, like symptoms have been attributed to Intestinal Stasis, pancreatic disease, eye troubles even in every part of the eye, heart troubles &c.

The most prominent local symptoms are a feeling of abdominal distension with pain and after taking food.

As a rule the bowels act only after taking aperients, the motions are offensive and contain an excess of mucus. Diarrhoea with blood in the stools is sometimes complained of. Distended segments of the bowel may sometimes be felt or even seen. If a quantity of charcoal be given and the time noted at which it appears in the faeces, you get a rough and ready method of determining the rate at which the intestinal contents traverse the alimentary canal. Normally the time is from 20 to 30 hours. If it be delayed till 48 hours, there is some stasis present. By the use of X-Rays after a bismuth meal, it is possible to see more plainly. You may be able to see which segment of bowel is involved and the nature of the obstruction.

In answer to the question why the large intestine is so much more developed in mammals than in the other vertebrates, Nielchinkoff has formed the theory that the large intestine has been increased in mammals to make it possible for these animals to run long distances without having to stand still for defaecation. The organ thus would simply have the function of a reservoir of waste matter. This would be useful to them to enable them to catch their prey or to escape from their enemies. Such activity has become possible because of the higher development of the limbs and because the capacity of the large intestine makes possible the accumulation of waste matter for a considerable time. Mammals have to stand still and assume some particular position. Each act of this kind is a definite risk in the struggle for existence.

Principles of Treatment.-

As has been said it is difficult to give an absolute definition of constipation.

For the purposes of this Thesis, the features which in the main constitute constipation are, as to time, infrequency of action and as to character, too small or too hard faeces.

We may take it as the ideal that the bowels should act once daily, preferably in the morning.

Constipation affects both sexes, but it is far more prevalent amongst women and children. The reason for this probably lies in the larger amount of food taken and the more energetic life lived by men; delicacy of feeling in women may be a reason for delaying to attend to defaecation till a more convenient season.

Whilst we have seen that constipation may be associated with or caused by organic disease of or outside of the bowels, the great majority of cases are due to some functional derangement of the intestinal canal.

Prophylaxis.-

Constipation is a symptom, not a disease, but it is associated with evil consequences at times so clamant that it is useful to note such general principles as may, by their adoption, prevent or mitigate the condition.

There is no doubt in one's mind that much ill health and suffering could be avoided in this particular relation, were serious attention given to food exercises and general Hygiene.

1. Food. As has been already noted, the food of the present day tends to be too concentrated to be freed of the bulky and indigestible elements and the efficiency of the food residue to stimulate bowel action. Every general practitioner knows the anaemic girl in either town or country. Her food seems to be mainly pastry, tea, sweets and ice cream or some other of the many so-called luxuries. I see as many anaemic girls in farm service as anywhere else and it must be the food they eat. There is less oatmeal in the form of porridge and oat cakes and more bread which has questionable effects on the system since the War began.

The teeth of the present day are very defective, although in many of the industrial centres men and girls will cheerfully sacrifice good sound teeth for the sake of having complete sets of false ones. Oral sepsis has only of recent years become recognised as a cause of ill health. Sir James Mackenzie three or four years ago advised a friend of mine who was off work in his practice suffering from heart weakness, to have his teeth seen to and that with marked benefit. Unfortunately this improvement did not last. He died two years ago.

2. Exercise. Walking used to be the common means of getting about. Now the bicycle and motor car have taken its place and not necessarily to the benefit of the race. Walking, climbing over uneven ground or hilly country are the very best exercises. Out-of-door sports, rowing, football, golf, swimming &c., are to be highly recommended to those who can do them, not

only on account of their beneficial effect generally, but also on account of their stimulating effect on bowel action directly or indirectly.

Gymnastics and more especially Swedish drill are greatly to be advocated. All of us have seen marked benefit by carefully graduated exercises of this sort on pronounced neurasthenias with obstinate constipation

Breathing exercises which tend to develop the abdominal muscles as well as send the air into all the nooks of the lungs. The right exercises done in the right way produce a massage of the abdominal organs, especially the liver and stomach and bowels. By bracing up the abdominal muscles, we can prevent to a large extent the tendency to visceroptosis. In this connection, it were well if girls did not wear corsets too early, if at all, as these are only, at the best, artificial supports and do away with the active vital support of the abdominal wall.

3. The formation and maintenance of a regular habit of evacuation.

From the earliest infancy the child should be trained to evacuate the bowels by being regularly held over a receiver. It is remarkable how easy it is to teach an infant and how quickly a habit is formed by this plan.

It would be well were parents to continue to impress the importance of habit in this function upon the minds of their growing children and to explain the dangers which they run through its neglect.

By habit, the act could become to some extent in health a rhythmic process occurring at a fixed time each twenty hours.

Amongst the poor, lack of proper sanitary accommodations is a factor of no small importance and one which has to be reckoned with.

With regard to the most suitable position in which to defaecate, it is to be noted that the modern seat is too high. It should be arranged at such a level that it will allow of flexion of the thighs upon the abdomen. In this position, there is support given to the muscular walls by the apposition of the thighs and the effect of expulsion is arrested thereby.

The natural attitude such as is assumed by uncivilised races is one of crouching with the knees bent up towards the chin. It is an approximation to this position which should be aimed at.

Prof. Chiene exhibited some years ago at a meeting of the Edinburgh Branch of the British Medical Association, a model of his own devising which he called a "Kata-physical closet." This, by reason of its being low set and having the sides well raised, caused the occupant to assume, approximately, the attitude to which we allude.

In some persons the bowels act at night, but in the majority the tendency is for evacuation to occur in the morning. Every encouragement should be given to ensure the morning action by going at a fixed hour. Nothing should be allowed to interfere or to cause it to be put off. If no stool should be passed at the time, a second visit should be paid later. Even when there is no desire, it were well to endeavour to create one by visiting the closet every morning at the same hour.

In all cases and in particular in women, it is important when one asks as to the state of the bowels not to be put off with the reply so often given "quite regular." It is necessary to ask how and when. How often they act, what its consistence appearance and quality, and whether it is natural or the result of medicine. In spite of all they tell us, how often their motion is only the discharge of a full bowel as may be proved by washing out the bowel after it. The amount of the excreta is not equivalent to the residue of the food taken, but leaves a portion to which has been added the waste of succeeding meals, this going on day after day tends to an increasing column of faecal matter, which, by its long residence in the colon, becomes dried up and hard and leads to various discomforts and trouble. This condition has been called "Fragmentary Constipation."

In other cases, patients complain that they have diarrhoea and on examination it is found that this is secondary to the impaction of constipated matter which by causing hyperaemia, increases secretions, liquifaction of faeces, an abnormal production of gas and an accentuation of peristalsis. The secretions from the bowel with some liquid faeces pass over, without disturbing the scybalous masses, give rise to diarrhoea and mark the true state of affairs.

In considering the treatment of each case in which constipation is a salient symptom, one's first duty is to endeavour to diagnose the primary cause, for in this way only can one diagnose whether the patient requires local or general treatment. Just as there are many causes of constipation, so the line of

action in the treatment of the condition varies. Careful enquiry into the history of the complaint is necessary in order to eliminate the possibility of the existence of serious disease in other systems which might be the primary cause of the condition. That the nervous system exerts a powerful influence over the intestinal motility is already shown by the frequency of chronic constipation in psychic disorders, e.g., melancholia, neurasthenia, as well as many diseases of the brain and spinal cord, e.g., meningitis, epilipsy, tabes. The effects of poisons such as morphia and lead are also manifested in part by constipation, so also in acute specific fevers.

It is sometimes of value to find out what delay, if any, there is in the passage of the food residue. As we have seen, delay does not usually occur until the chyme reaches the great intestine and chiefly there in the pelvic portion.

Hertz classifies constipation into:

1. Retention of faeces above the pelvic colon, i.e., descending colon below the crest of the ilium, including the sigmoid flexure.

2. Retention in the pelvic colon where expulsion is difficult or impossible, owing to weakness of the defaecation or to impairment of the defaecative reflexes. To this class of constipation he has given the name of "Dyschezia."

In order to ascertain what delay there is and where it occurs, a series of X-ray examinations must be made. It is,

however, first necessary to determine whether large doses of Bismuth salts interfere with the normal activity of the bowel; for it has been rightly pointed out that they are among the best drugs for combating certain forms of diarrhoea.

Hertz got two of his assistants to take charcoal on a number of occasions at different hours of the day, their bowels being regularly opened in the morning at about 9 a.m. By this means they found the shortest time required for the charcoal to appear in the thin faeces.

On repeating their investigations with 2 oz. of Bismuth oxychloride added to the charcoal, they found that the time was unaltered. He believes that bismuth salts only influence those cases of diarrhoea in which excess of sulphuretted hydrogen has developed as a result of abnormal putrefaction; this gas is a powerful stimulant to the intestinal movements, but is rendered inert by combining with bismuth.

It has been often urged that to give bismuth meals to study the condition of the stomach and bowel, e.g., in iliac kink, is to displace or to affect the motility of them and so get wrong impressions. To meet this natural and obvious objection, many observers use barium sulphate instead of bismuth oxychloride and find that as compared with the bismuth salt, (1) it does not combine with sulphuretted hydrogen; (2) under no circumstances does it affect the motility of the stomach and intestines; (3) it is equally non-poisonous; (4) the shadow it throws is almost as dense as that of bismuth salts and (5) its cost is only one twentieth.

Except in very fat individuals, 2 ounces are ample for all practical purposes. Above this you get a distinct error. Hertz found that even with small doses the weight of the food combined with the bismuth or barium salts, produces a slight degree of distortion of the stomach which is greatly increased in cases of atonic dilatation; it also tends to drag the caecum and the end of the ilium downwards. So of course the smaller the dose the more accurate will be the results obtained by the X-rays.

The normal limits must be fairly wide but it would be clearly incorrect to say that stasis was present in an individual in whom the barium salt had not reached beyond the hepatic flexure after seven hours.

In the stomach it has been found that a meal consisting of half a pint of porridge or bread and milk mixed with 2% of barium sulphate is completely evacuated by that organ in four hours. If no food is taken in the meantime and a barium shadow is got six hours after, then there is gastric stasis. The kind of meal is important as it is necessary to approach the normal meal in taste and consistence as nausea may be set up.

When all precautions are taken, it is found that no connection of any sort exists between gastric and intestinal stasis. In organic pyloric stenosis which always gives rise to gastric stasis, the chyme which passes through the pylorus abnormally slowly, often traverses the intestines at the normal rate. The constipation, which is almost invariably present, is due solely

to the small quantity of faeces formed owing to the deficiency of chyme reaching the intestine; too little faeces, therefore, reach the pelvic colon to give rise on entering the rectum to a daily call to defaecation. This view is confirmed by the fact that gastro arteriostomy at once relieves the constipation by allowing an adequate quantity of faeces to form.

Hertz is of opinion that Intestinal Stasis does not lead to duodenal kinking, dilatation or ulceration, and duodenal ulcers are associated with an unusually rapid passage of chyme out of the stomach and through the whole of the small intestine.

Iliac stasis is a normal phenomenon and results from the action of the ileo-caecal sphincter. Iliac kinks are comparatively rare and do not directly increase the normal iliac stasis. The normal iliac stasis may be increased by spasm or absence of relaxation of the ileo-caecal sphincter as a result of disease in the neighbourhood of the caecum including perhaps iliac kinks.

In normal individuals examined with X-rays, the hepatic and splenic flexures almost invariably appear to be acutely kinked. This again is the result of the shadow being cast in a single place, as the limbs of the flexures belonging to the transverse colon are in front of those of the ascending and descending colon respectively, the flexures consequently appear to be acute, although they form a wide angle when looked at from the side. It is almost always possible to determine when adhesions are present between the limbs of the hepatic and splenic flexures by seeing whether they can be separated by palpation during the X-ray examination. They can usually be separated sufficiently

to make it obvious that no great mechanical hindrance to the passage of the faeces can be present.

When constipation is associated with visceroptosis, the former is generally due to dyschezia which results from inefficient defaecation owing to weakness of the abdominal and pelvic muscles, this weakness being also the cause of the visceroptosis. All examinations of the bowel by X-rays should be preceded by first thoroughly evacuating the bowel and by so doing it is possible to find out which parts of the bowel are affected and then these parts, rectum or perhaps pelvic colon it may be can be treated by regular habits, exercises for the abdominal and pelvic muscles and graduated enemata. In some cases Pelvic adhesions may cause it and so on.

Mr. George Herschell, of London, suggests a simple method whereby the general practitioner who is beyond the reach of radiography may diagnose the case. He gives a test renal in conjunction with a dose of carmine. If this is found in the stool the next morning, the time of transit is normal. If stool passes with no carmine, delay is in the upper colon; if no stool is passed, a small injection is given, sufficient only to empty the pelvic colon. If this brings away the carmine coloured stools, the delay is in the pelvic colon. Here again the bowels must be well emptied beforehand.

Having cleared up the position so far, it is well to ascertain the habits as regards the kind and quality of food and drink of the patient. Treatment may be divided into:

1. Educational and Prophylactic.
2. Dietetic
3. Mechanical
4. Medicinal
5. Surgical

Enough has been said about the first of these.

2. Dietetic.

A careful selection of the daily dietary, with a few directions as to proper exercise and as to the formation of a regular habit suffice to cure many cases of constipation. In others such measures must be combined, for a time at least, with further treatment such as mild purgatives, massage, electricity. Other cases again require some surgical interference to bring about cure.

In those cases which are due to the slow passage of food residue along the large intestine owing to deficiency of bulk or of fluid, diatetic treatment is of the greatest value.

Delay may be due to a too great absorption of food materials, in which cases an increase in the less digestible constituents is indicated, in the form of vegetable cellulose. A diet of plenty of fruit and vegetables will relieve a great many patients. I have found this my best form of diet. I learnt it abroad and have always stuck to it with benefit.

On the Continent, vegetables are very largely cooked with butter. Many authorities on physical culture advise the daily

use of some oil - nut oil.

Agar-agar - a gelatinous substance obtained from certain seaweeds has been used in such cases. It has the property of absorbing water readily and retaining it. It passes practically unaltered into the intestine where it adds to the bulk of the faeces and by keeping them uniformly moist, prevents the formation of scybalous masses. It also arrests peristalsis. It may be given in mashed potatoes, porridge or with cream. Sugar and salt may be added according to taste.

This can be given unknown to the patient as for example dementia, where you often have constipation combined with a hatred or distaste of drugs.

Certain foodstuffs have a beneficial effect on chronic constipation by a judicious varying and combination of them. Great benefit accrues in many cases. Such articles of diet are oatmeal, brown bread, honey, treacle, many jams, marmalade, also fats - butter. So also have fruits, as apples, pears, oranges, figs and prunes. Vegetables such as cabbage, potatoes, spinach, onions and brussel sprouts.

White bread is contra-indicated as so much of the gritty substance of the wheat has been removed in the process of manufacture of the flour; so also tea unless China weak and freshly made. Ceylon and India teas contain a greater proportion of astringents.

Sweet milk is a constipating food as is seen in bottle-bred babies, but if there be added in correct proportion some cream, the bowels can be regulated, as a rule quite well.

Quite good results have been obtained in some cases of constipation with excessive flatulance, intestinal, from the use of soured milk containing an active culture of lactic and bacilli devised by Nietchinkoff such as is obtainable from Messrs Le Fennent of Paris in the form of tablets or powder, of Lacto bacilline. In some cases this milk gives rise to stomach irritation but such persons could not take milk in any form without discomfort. I have seen whole families like that.

When there is dyspepsia coincident with constipation, it is necessary to treat the former by a diet suitable and if need be to relieve constipation by drugs in the meantime. It may be that with the cure of the dyspepsia the constipation will be relieved. A plentiful supply of good, not too hard water should be allowed to children and adults alike. This, to a large extent, is absorbed in the course of the digestive canal and is used up in the formation of the various secretions of the body including the digestive juices.

If the fluid taken is hardly sufficient for the needs of the tissues, it is likely to be absorbed very completely from the intestines, hence the material in the colon becomes hard and dry, and is passed on with difficulty.

Fluid taken into an empty stomach is passed rapidly on to the small intestine and if it is empty as is usually the case in the early morning, it is probable that some of it reaches the colon with little delay and this may account for the easy evacuation which is so often found to follow an hour or so after sipping

a tumbler of water on rising. It is likewise advantageous to make a practice of sipping a tumbler of hot water - preferably warm - before retiring.

The constipation which follows severe and prolonged exercise may be ascribed to deficiency of body fluid owing to free perspiration as well as to fatigue.

3. Mechanical.-

Sedentary occupations conduce to a constipated habit. Those whose avocations entail physical activity, as for instance agricultural labourers, shepherds, suffer very little from constipation.

Exercise, by stimulating the circulation, encourages the elimination of waste products by the various channels of excretion - skin, lungs and kidneys - increases the secretory functions generally and in particular those of the digestive tract and improves the tone of the musculature, skeletal and intestinal. The balance of functions of the body can only be kept in full swing by use and work. It is less than no use to try to develop one part of our mechanism whilst another is in abeyance. All must act in one harmonious whole. Nature abhors a drone in the nest. All parts working harmoniously in the economy of the body is Health. Exercise induces deep breathing and thereby causes a freer action of the diaphragm with, in consequence, a certain amount of massage-like effect on the liver and transverse colon. The whole being is re-created and body and mind are stimulated.

To be thus, beneficial exercise should be methodical and regular. It should be well balanced, no one part being developed

at the expense or to the neglect of another. It should be taken away from meals and should never be conducted to the extent of producing over fatigue. Competitive exercise is not so desirable as it is apt to lead to overstraining.

In the list of what may be termed General Exercises may be included walking - the best of all - climbing, horse exercise, swimming, tennis, football, golf and such like. These act through their mechanical effect directly upon the alimentary tract and indirectly through the improvement in the blood circulation which is manifested in all parts of the body.

While out of door exercise may not be immediately available to many city dwellers, it is within the power of all to institute in their own homes, systematic physical training; this has proved a boon to many of us in every way.

Specially to be commended is the adoption of what may be called Medical Gymnastics, of which there are many well accredited systems. These are specially valuable if pursued before the morning bath and again, if possible, in the evening before retiring.

They consist in various movements such as trunk twisting, trunk bending, lying in supine positions, raising the limbs and flexing the thighs on the abdomen; keeping trunk erect, standing on tip toe, hands on hips and squatting with knees outspread, &c. Throughout, careful attention must be paid to deep breathing.

The effect of such exercises is to develop and tone up the abdominal walls and so give support, which, in such conditions as ptosis of the viscera is so desirable and helpful, at the same time by their mechanical effect, they produce an alternating

pressure on the abdominal organs, increasing the intra abdominal pressure and so by a massaging influence stimulate peristalsis. Similarly, systematic breathing exercises increase the range of diaphragmatic action, thereby lessening the intra abdominal space and increasing the pressure on the contained viscera.

The operation of a skilled masseur or masseuse are of the utmost value in many cases of atonic constipation. The movements thus are directed to and in the line of the colon - beginning over the caecum, continuing along ascending, transverse and ascending colon. They should be of a kneading character. By such means peristalsis is stimulated and accumulations of faeces which otherwise resist the feeble attempts of the muscular contractions of the unaided bowel are caused to be displaced and are moved onwards.

Massage of a firmer character may be directed towards the strengthening of the abdominal walls. Auto massage may be practised with a rubber ball, filled with No. 8 shot to the weight of 4 lbs. for an adult, half that weight for a child. This is used by the individual whilst in the recumbent position; the ball is rolled over the course of the large intestine, from caecum to descending colon. Ten minutes of this night and morning is sometimes quite efficacious.

4. Medicinal.-

Indiscriminate use of drugs for the purpose of producing evacuations of the bowels is to be severely deprecated. As we have seen, very many cases can be cured by attention to the hygiene of the bowel - varying the diet, or by systematic exercises of an active or passive kind.

Any one or any combination of these three primary lines of treatment will be satisfactory in a large proportion of cases.

There are, however, without doubt classes of constipative individuals who require help of some kind beyond these. For example, in the constipation which occurs in cases of inoperable cancer - one of which said cases I have watched and endeavoured to treat for some time and the case that really drew my attention to this class of case - as a concomitant of incurable disease of the kidneys, in chronic heart disease or in diabetes, drugs have a varying necessary and useful place in one's armamentarium. Similarly, in the constipation of old age, some form of laxative is necessary.

It is to be regretted that in practice, when chronic constipation is of such common occurrence and one is so frequently called upon to advise, it is so difficult to follow up results. Patients are given the directions or the remedy which is considered most suitable to their respective type of constipation, the results may be satisfactory for the time being and with that they are satisfied. There is apt to be so few opportunities for really estimating results from the standpoint of conclusivity as there may be no further consultation till the condition recurs, which it probably will do owing to the neglect or lack of intelligent interest, so at least is it amongst the working classes.

There are, too, so many and so various remedies on the market which are easy of access and which are lavishly commended to the public fancy, through the medium of advertisement, that

the physician may find himself only the dernier resort in cases which have by intelligent drugging complicated the condition for which relief is requested.

It is to be remembered that the rapid passage through the whole alimentary canal must result in a considerable loss of nutritive material. It is, therefore, necessary to order the smallest dose of an aperient which will give daily formed motions, and to instruct the patient to diminish the quantity used as improvement in the condition of the bowels occurs.

Constipation may be due to very varying causes and the choice of the drug, the dose and the duration of it depend largely upon the cause. In habitual constipation each case must be treated on its own merits and individual idiosyncracies carefully studied. "Though the symptom is a simple one, its treatment needs not this drug nor that drug, but any drug or many drugs, or no drugs combined with systematic measures for gradually restoring the healthy functions of the digestive tract that culminate in normal defaecation." (Practitioner)

Thus, if spasm or obstruction be the cause, purgatives which increase spasm or peristalsis are out of court; in such cases, sedatives are indicated in the first instance.

It would be manifestly unwise to prescribe a strong purgative medicine, at all events at once, if it were found that the patient suffered from marked impaction of the faeces or a strangulatory hernia. Similarly persons suffering from chronic constipation complicated by some painful condition of the anus, should

take such a laxative, both on rising and on retiring, as will promote soft, small motions and avoid the pain incidental to one large, hard motion.

It is thus necessary to ascertain whether the case to be treated is one of the (1) chronic habitual or of the (2) spastic variety or of the nature of what Hertz calls the (3) Dyschezia.

In the treatment of chronic atonic constipation, it is wise to avoid severe measures. What has to be aimed at is a tonic and stimulating effect upon the whole body structure, and with this, an increase of the activity of the intestinal musculature and gland elements.

Of drugs which act favourably in these directions and particularly on the large intestine, we mention a few as of special value and in common use:

Cascara Sagrada is probably the most commonly prescribed laxative. It is best administered in small and repeated doses. It has a definite and tonic action on the striped muscle and glands of the intestine and is slightly stimulating to the liver. Good samples have the advantage that the dose is small, and that, though taken over long periods, there is in many cases no need to increase the dose; on the other hand it is frequently possible to gradually decrease the dose, a healthy habit of action having been established. It causes little or no griping or discomfort. There are many patients in one's practice who have taken Cascara Sagrada for years without having to increase the dose very much. Its only objection is its unpleasant taste, but this may be

overcome to a large extent, by admixture with flavouring agents as in the combination known as Cascara Lamant. It is also popularly combined with Belladonna, Nux Vomica and Ext. Glycyrrhyae Liq. and other flavouring agents.

Castor oil, in small doses, is a safe and mild remedy. Encapsulated in whiskey or in orange juice its nauseous taste is not observed. It passes the stomach unchanged and is split up and saponified by the biliary and pancreatic juices; a part of it escapes unchanged to the large intestine and acts as a lubricant. It is very useful in regular doses night and morning to the constipation of old age and in large doses for the removal of faecal masses.

Senna is a favourite remedy of most practitioners and patients, in the form of a watery extract of the pods. Six to twelve pods are covered with water, and allowed to steep over night; the liquid is drunk in the morning and the bowels are moved in about four hours. It has practically no taste.

Aloes, and its principle, aloin, are amongst the most commonly prescribed remedies, most usually in pill form. They act exclusively on the large bowel. They are contra indicated in haemorrhoids because of the hyperaemia of the rectum which results.

Podophyllin is useful as a cholagogue cathartic. It should be given in small doses as otherwise it is apt to purge too severely. It is also ten to twelve hours in action. On account of the griping tendency, it is best combined with

carminatives such as Hyoscyamus, Belladonna or Cannabis Indica in pill.

Sulphur precipitated or sublimed or combined with cream of tartar to form the officinal confection, is a very favourite remedy in cases of haemorrhoids and anal forms. In such cases sulphur renders the motions of soft consistence which pass over the tender area without causing unnecessary pain.

Drugs such as the following are frequently combined with laxatives. Strychnine for its general and tonic effect. Belladonna and Hyoscyamus to combat spasms and to prevent griping. Capsicum to stimulate gastric secretion; Assafoetida, Myrrh and Oils such as Peppermint and Cajeput to relieve flatulence.

Saline purgatives furnish ready means of increasing the liquidity of the motions and their frequency. Hertz says that contrary to the generally accepted belief, their action would appear to be an indirect one. He experimented by giving a saline purgative in water along with Bismuth Oxychloride before breakfast. Skiagraphic examination showed that the salt only reached the caecum in four hours along with the Bismuth, although a watery motion had already been passed $2\frac{1}{2}$ hours before. He happened to have two patients with fistulae in the end of the ileum. He used these as controls examining the stools as passed through the stools. Analysis of the watery stool did not show any increase of the salt and, of the second action, though there was excess of the salt, yet there was no tendency to its being watery. He found that one half of the salt was excreted by the kidney

within eight hours of being swallowed, and that the greater part of the remainder was present next day in the stool which was solid. He concluded that the salt is absorbed by the small intestine and cuts through the blood stream in the muco muscular mechanism of the colon producing increase of motor and secretory action.

Magnesia and Soda, in the form of sulphates are present singly or together in the numerous natural aperient waters. Those waters with a preponderance of salts or sulphate of soda over magnesia such as Marienbad or Carlsbad are probably the best to prescribe in most irritable cases as being less irritating to the mucous membrane.

Salines are best given in the morning before breakfast and with a good volume of water. They have the advantage of not hastening the contents of the stomach and small intestine, and thus do not interfere with their proper digestion. They are indicated in cases of artero-sclerosis, in constipation occurring in the obese and in the numerous individuals who suffer from toxaemia, from absorption from the bowel such as occurs in gout and rheumatism.

A useful method of presenting such a saline as Carlsbad is to give the following directions. Stew one dozen prunes, put in a tumbler and add as much water as may be necessary to fill it. Add one third to one half teaspoonful of the salt; allow to stand for twenty four hours and drink early in the morning. The prunes should be eaten also. This method has the advantage that a smaller dose of the saline is required.

The remedy that I have found most useful in the distressing

case of malignant disease above referred to is Liquid Paraffin. For a long time, a year or more, the patient has taken one to two tablespoonfuls every night and it has been her stand-by. She has often had to have her bowel washed out for weeks on end once a day but between the two I have always managed to get her bowel moved once a day.

Constipation is a symptom associated with muco-membranous colitis. This disease occurs in persons of highly nervous temperament. It is accompanied by pain most commonly in the left iliac region but often spreading over the abdomen also. The stools are small and piecemeal and are coated with mucus, while there are frequently present large shreds or coats of spissated mucus. Tenesmus is common and frequently there is an unsatisfied desire to defaecate. There may or may not be ulceration of the intestinal mucosa.

The pain is due to the spasmodic contraction of the bowel, caused by irritation by faeces of the tender and inflamed, it may be ulcerated, mucous membrane, or it may be by traction of adhesions between the bowel and neighbouring organs.

It probably occurs more frequently in women than in men and in the former it has practically always been associated in one's experience with some morbid condition of the sexual organs, such as a tender enlarged ovary or definite adhesions between ovary and bowel. What relation the ovary really has to the condition, or how exactly the adhesions produce such effects, it is hard to say. In the milder degrees of this condition, treatment

consists in the avoidance of purgatives, the administration of Belladonna or small doses of morphia. The careful regulation of diet and attention to the surroundings and hygiene, abundance of open air and a mild sunny climate. The bowels are moved by enemata of sterilized water or normal saline; local application of warmth in the form of poultices such as linseed or anti-phlogistine. I am at present treating a boy who came to me to be treated for Epilepsy. He had and still has at ever decreasing intervals marked colitis. More severe cases have to be treated surgically.

As "Dyschezia" Hertz describes a group of cases in which, while there is no delay in the passage of the faeces along the intestine the act of defaecation fails to expel completely the contents of the bowel beyond the splenic flexure. He explains that it differs from other forms of constipation in that more or less considerable quantities of faeces are found in the rectum whenever an examination is made even though immediately after defaecation. It is due, he says, to:

A. Inefficient defaecation from:

- a. Habitual disregard to the call to defaecate leading to loss of the defaecation reflex and atony and paresis of the musculature of the rectum and pelvic colon.
- b. Inefficiency of the voluntary muscles of defaecation, e.g., in splanchnoptosis
- c. Unsuitable posture during the act.

B. Some obstacle to efficient defaecation such as spasm of the sphincter ani in anal fissure or painful haemorrhoids; stricture of rectum or anus, commonly malignant; pressure on rectum from without, of tumours, such as ovarian cysts, fibroids, pregnant uterus. In such cases as these, drugs are contra indicated at least until the accumulations of faeces which have become hard and dry have first been removed. The best way to accomplish this is by enemata.

Enemata may be divided into two classes:

1. High
2. Low

according as the fluid injected is carried into the descending colon and beyond or only into the rectum and pelvic colon.

In order to administer a high enema, one passes a long rubber tube beyond the pelvic colon. This is done by taking a short grip of the tube and insinuating it with a screwing movement. Considerable care and experience is required in order to ensure the passage through the sigmoid flexure. Indeed in some cases, it is not possible even with a stiff gum elastic hollow stem. Two to three pints may be injected; this should be done slowly by means of a funnel or douche can set at a height of not more than three feet.

Low enemata are given by Higginson's syringe and need not consist of more than from a pint to a pint and a half as, should there be any hard faeces lodging in the pelvic colon or

rectum, little if any of the water would reach beyond the rectum. The temperature of the liquid injected is usually a little above blood heat, but in cases in which a tonic action on the rectal mucous membrane is desired, as in haemorrhoids, the fluid may by preference, be cold.

Various fluids may be used of which sterilised water is the most common, alone or with soapsuds or a normal saline solution.

Irrigations of the colon with sterile water or with normal saline are soothing and very valuable in the treatment of mucous membranous colitis, in spasmodic constipation with or without ulceration.

Distension of the bowel is a powerful stimulant to peristalsis and enemata accomplish this, while at the same time they tend to soften the faeces.

Soap added to the water causes stimulation of the mucous membrane. Oil may be injected prior to the soap and water. It has the effect of lubricating the mucous surfaces and softening the surface of the faeces as well as of separating in this way the scybala which may be clinging to the bowel wall.

Oatmeal gruel enemata are very useful.

Where a more powerful stimulation of the defaecation reflex and rapid effect is desired, glycerine as a suppository or in fluid form, alone or incorporated with the oil and soapsuds enema may be used. Glycerine acts through the dehydrating power it has. It is useful in *Dyschezia* due to loss of defaecation reflex.

A very useful formula is well known. It consists of Henny's solution $1\frac{1}{2}$ oz. Glycerine, $\frac{1}{2}$ oz., water 2 oz. This has the advantage of being small in bulk and powerfully stimulating. As a rule there is a stool within a few minutes of injection. This formula is particularly useful after abdominal operations such as Appendectomy. Glycerine is too irritating for use in fissure in ano or in the treatment of constipation caused by or accompanied by haemorrhoids. Metchinkoff in Prolongation of Life, page 156, line 7, says:

"Is it possible without operative interference to take direct action against the intestinal flora by the use of antiseptics? Consideration of this is already ancient history. When the theory that the intestine was a source of auto-intoxication was propounded, M. Bouchard made the attempt to cure such cases by disinfecting the digestive tubes with B.Naphthol. He found, however, that the antiseptic, like many others, not only did not completely disinfect the intestine but sometimes had a harmful effect on the body.

M. Stern has shown, in an elaborate manner, that such antiseptics as calomel, salol, B.Naphthol, Naphthaline and camphor when administered in quantities compatible with health do not disinfect the digestive tube at all. More recently M. Strasburger has shown that when Naphthalene has been given in quantities sufficient to impart its odour to the faeces, the intestinal microbes, so far from being diminished, are even increased in number. On the other hand, after meals consisting of milk to which there has

been added an antiseptic in the proportion of a quarter of a grain to the litre, the intestinal microbes are really reduced in number. Strasburger obtained his best results with tannoeol.

He concluded that the attempt to destroy the intestinal microbes by the use of chemical agents has little chance of success.

It cannot be denied that under special circumstances it is possible to decrease the number of microbes especially in the small intestine. But this result is small and may be followed by the contrary effect, for the natural means of defence of the intestine against the microbes are weakened, and the intestine itself may be harmed more than the microbes.

Strasboenger thinks that the most favourable results can be obtained by aiding the intestine in the discharge of its normal functions. If it can be brought to digest the food more completely, there is the less pabulum left for the microbes. A similar result can be reached by lowering the amount of food taken and to this course the beneficial effects of starvation in acute diseases of the intestine may be attributed.

The general conclusion reached after many experiments on the disinfection of the intestine is unfavourable. Very little is to be expected from the method. None the less he is unable to regard the matter as settled.

Colmody has investigated the effect on the intestinal flora of thymol which was administered in several cases with the object of destroying parasites.—From nine to twelve grammes

of thymol were administered to each patient in the space of three days and there was a notable antiseptic effect. Colmody believed that the quantity of microbes had been reduced to a thirteenth.

Such facts prove only that the antiseptic treatment is available up to a certain point. To attain the results, however, such large quantities must be used that the treatment can only be applied in certain cases and at long intervals. More use can be made of simple purgatives which do not kill the microbes, but eliminate them by the normal channel. It has been urged repeatedly that calomel, which is often used as a purgative, acts as an intestinal antiseptic; but it is probable that its influence in reducing the intestinal flora is merely mechanical. It has been shown that calomel, like some other purgatives, lessens intestinal putrefaction, the evidence being the decrease in the sulpho-conjugate ethers in the urine. But although the diarrhoea induced by purgatives generally, has such a result, spontaneous diarrhoeas such as typhoid fever and of intestinal tuberculosis are associated with increased putrefaction.

It is clear, however, these matters may be settled, that regular activity of the bowels, increased by the occasional use of purgatives, must diminish the formation of intestinal poisons and therefore also the damage done by these to the higher elements of the body.

"There is a close association between sclerosis of the arteries and the functions of the digestive tube." These then are some of the means that are used to treat this seriously common condition.

When these have failed or not been persevered with, can the surgeon help us? Many surgeons say they can and do, and now we have to consider some of the possibilities in the various conditions set up. We have seen that stasis can affect most of the organs of the body so that it is surely well worth consideration.

Surgical Treatment.-

Sir Arbuthnot Lane believes that the chief cause of this condition to be the erect position, with the consequent formation of suspensory ligaments and membranes, which later cause kinking of the intestine. He thinks the results disastrous to health chiefly from the absorption of toxins causing widespread degeneration and disease. He attributes such common diseases as Appendicitis, gastric and duodenal ulceration, cholelithiasis and many others to one common primary cause - chronic intestinal stasis. Should his fascinating speculations prove correct, he will have made another great contribution to surgery, even greater than his original and enduring work on the operative treatment of fractures, which at its inception was met with much opposition.

This line of treatment, that he recommends, has been and is much criticised and that rightly so. The operations are extensive, formidable and dangerous. In his magic hands they are not very risky, but in those less expert, they can easily prove so.

Many of his patients are miserable subjects of extreme constipation and many are much better after operation. In some,

the improvement is not maintained and some suffer from serious complications afterwards. Most authorities maintain that the same improvement can be obtained by painstaking and rather tedious but safe medical treatment as already states. When this has been thoroughly tried in vain, an exploration is advisable and will probably reveal a definite mechanical cause.

Although Sir Arbuthnot Lane's views do not seem to be supported by adequate proofs according to many authorities, or to find much favour as yet in this country, they are certainly worth consideration. Time will prove whether they are right or not. He has modified some of his methods and probably will go on doing so in the light of his fuller experience. One man's work does not make for complete acceptance of all his theories or methods. They must be confirmed by others working for the same end - the benefit of mankind.

Metchinkoff started the ball rolling in that direction and Lane boldly extended his theories much as has been done in Metchinkoff's theory of Phagocytosis.

It is pointed out that the erect posture is the cause of a dropping of the viscera, it may be into the true pelvis. In the prone position, they fall upwards and forwards away from it. This displacement of organs has to be compensated for.

The drainage system or gastro-intestinal tract, is the structure that is primarily affected.

The Large Intestine they call the cesspool of the body, and they deny it any use or function. As it retains its contents for a long time and its contents being mostly solid, their weight must tend to pull the bowel downwards early in life.

In the erect posture, the caecum and ascending colon become filled with more or less fluid contents, and, by hydraulic pressure, this tends to tire out the muscular wall and the cavity dilates. Thus the dilated caecum is displaced downwards into the true pelvis, where its pressure is detrimental to the true comfort and function of the viscera which are naturally contained there.

This tendency to displacement of the caecum in a downward and inward direction may be regarded as acting along the resultant of a parallelogram of faeces, and to oppose this tendency, resistances develop which correspond in position and action to the sides of the parallelogram. These "lines of resistance" are crystallised first as bands and later as distinct membranes, which, as the outer limbs of the parallelogram connect the peritoneum lining the abdominal wall to the outer surface of the colon in its immediate vicinity. This goes on increasing - larger and larger areas of colon and peritoneum are involved until bands are formed supporting the colon from the outside. As these bands and membranes develop, blood vessels form in them, correspond in position and action to the sides of the parallelogram.

This particular resistance, when fully developed into a membrane, has recently been termed "Jackson's Membrane" and the manner in which it should be dealt with has afforded surgeons an excuse for doing many operations whose object is not very apparent, and which suggests ignorance of the factors determining its development as well as of its function.

These "crystallised resistances" of peritoneum are not limited to the caecum, but may extend up along the outer aspect of the ascending colon, even to the hepatic flexure.

At this flexure a number of new bands are formed overlying the normal peritoneum and attaching, which may later be so large as to require ligaturing when divided.

These bands as they develop, drag the flexure upwards and may produce a distinct obstruction. The right kidney is in close relationship with them here and so we may get symptoms ascribed to the kidney - stone, for example, and may lead to error in diagnosis and it may be enormously cut down upon and no stone found but the cutting of the bands relieves the urgent symptoms for a time.

The bands or membranes may constrict the ascending colon usually at the level of the crest of the ileum. The inner level of the parallelogram of faeces is at an early period represented by opaque streaks on the under surface of the mesentery attaching the last few inches of the ileum and commencing at its base at a point most distant from the bowel. This thickening on the under surface of the mesentery goes on growing until it develops into a membrane. This membrane secures the under surface of the ileum and creeps round it till it reaches the point opposite the attachment of the membrane. As it creeps round the ileum, it contracts so that it twists the ileum on itself along the longitudinal axis.

At first this acquired ligament or mesentery is useful,

but later when it contracts and kinks the lumen of the ilium, it is deleterious. Some surgeons have stated that this band has arisen from inflammation that started spontaneously in the appendix, but Lane says that they start at the reflection of the peritoneum at the point furthest away from the intestine, gradually approach and secure the bowel.

They also exist only on the surface of peritoneum, on which strain is exerted and correspond to the lines of force.

This gradual growth can be studied in every degree of development in the mesentery of the iliac colon. If the supine and especially the prone position be assumed, the strain exerted on the kinked bowel is reduced sufficiently to allow of the passage of the contents of the bowel to some degree. This is what happens in the case of ilial kink if the patient lies in bed.

The appendix is a firm structure attached to the summit of the caecum and offers an irresistible attraction to these bands.

It may be gripped by one of them forming the outer limb of the parallelogram, when the portion which intervenes between the point of attachment by the band and the caecum is made to form the function of a ligament.

If the appendix be gripped in its length, it is liable to be kinked, when the part distal to the second point readily becomes obstructed. Appendicitis may result.

Should the appendix form part of the outer limb of the

parallelogram of forces, it is caught up at a point in its length and secured by an acquired band or ligament to the under surface of the mesentery. It must pass up behind the termination of the ileum. In these circumstances the inner limb of the parallelogram of forces is found by a portion of the proximal appendix stretched to its utmost, and contained in the lower layer of the mesentery, into a thick, dense, fibrous and peritoneal band, which has developed in order to secure it in its position.

If the appendix is strong and the ligament or membrane on the under surface of the mesentery has a secure, efficient grip, the band to the termination of the ileum does not form.

If the grip is not secure and effective in restraining the caecum, you may get an acquired mesentery and ilial kink will result.

When they co-exist, the band fixing the appendix may become continuous with the band kinking the ileum.

This had led observers to consider that the membrane producing the ilial kink is also formed by an inflammation of the appendix.

The appendix, then, fixed to the mesentery, presses on the end of the ileum, when the caecum falls into the pelvis and the ileum becomes dilated and distended behind the control which is exerted by the unyielding and practically rigid band formed by the proximal portion of the appendix and the ligament which secured it.

The part of the appendix distal to the grip is, as we saw, liable to be obstructed beyond its kink and an appendicitis is set up.

So we have in this case an obstruction of the bowel and an appendicitis with all its symptoms.

Some surgeons tell us that they cure Duodenal Ulcer, &c., by removing an appendix. It has even been suggested that Duodenal Ulcer &c., is caused by an infection by organisms that grow in the appendix. The removal of the appendix with the new formed band, removed the obstruction to the bowel and the results thereof. Duodenal ulcer and allied conditions are the results of that obstruction. This condition is very important and frequent.

Coming again to the large bowel, the transverse colon tends to drop. Part of its weight is transmitted to the convexity of the stomach through the great omentum and part through an acquired mesentery which develops between the convexity and the ascending and descending colon.

This mesentery is the "crystallisation of resistance" to downward displacement of the transverse colon. As usual it is at first useful and serves to relieve the stomach of stasis. Later it contracts and renders the hepatic and splenic flexures more acute, and so hinders the passage of faeces.

Much of the weight of the transverse colon is transmitted through the posterior layer of the transverse meso-colon, which shows distinct acquired thickening and it may be independent membranes along the line of greatest strain. The splenic

flexure is, normally, much higher than the hepatic and in cases of stasis it is still further elevated by the formation of membranes which contract and increase the angle and so the durability of this flexure.

It is at these flexures and especially at the splenic flexure that inflammatory, and later, cancerous changes take place in consequence of this blocking. The descending colon is affected in much the same way as the ascending colon.

These adhesions in time contract and constrict the bowel and you get symptoms of obstruction. This occasionally exists in the large bowel on the right side at the level of the iliac crest where the abrupt change from the firm bony wall to that of the flaccid muscular wall renders the production of a kink more easy.

The sigmoid has a good long mesentery and so is further away from the abdominal wall than the caecum and ascending colon. Adhesions form on the outer surface of the mesentery and they contract till the wall of the iliac colon itself becomes secured to the floor of the fossa. Along with this fixation, the lumen of the bowel diminishes as also its length so that it becomes a short straight constricted tube attached to the abdominal wall by a considerable area of its circumference quite devoid of any mesentery.

Its muscular coat wastes as it becomes fixed. This interferes with the passage of faeces here and so it is hard to operate on the sigmoid and you are very apt to get inflammation and cancer. Dr. W.T. Mayo has described the inflammatory

condition in several papers under the title of Diverticulitis.

These acquired adhesions may not grip the whole length of the sigmoid and leave intervals between the gripped portions. Here the bowel distends. The anchored gripped parts form kinks or obstructions. Rotations of the loop may easily occur forming a volvulus.

Sir Arbuthnot Lane does not believe that acute volvulus can occur in a perfectly normal sigmoid. The last kink or obstruction in the drainage scheme affects the large bowel where it crosses the brim of the true pelvis on the left side. It develops early in life and appears before the erect posture is assumed. The band develops to resist the tendency to downward displacement of the large bowel into the true pelvis and is continuous with those that secure the iliac colon. As it contracts on the posterior aspect of the normal mesentery, it opposes the backward passage of faeces from the pelvic colon upwards into the large bowel.

There is very great divergence of opinion about the origin of these bands - inflammatory or evolutionary - and even as regards their effects. They are said not always to produce the symptoms ascribed to them. That they do exist is proved by anatomists and very many cases have been operated upon with very great benefit to the patients themselves. Some undoubtedly have, unfortunately, not benefited by operation and some have had distinct harm.

Indications for Operation.-

Accurate diagnosis of the cause and site of delay should be aimed at in every case and suitable medical treatment should be patiently tried. If this fails and the patient's health is deteriorating, the abdomen should be explored, and if a mechanical obstruction is discovered, this should be treated by a suitable operation.

In many cases it is sufficient to divide adhesions, remove an appendix or gall bladder. In some cases a short circuit is necessary, especially a gastro-jejuno-stomy for pyloric or duodenal stenosis. When there is an immovable obstruction anywhere, the short circuit should be as near as possible to the obstruction, provided that healthy parts can be joined without tension.

Surgical treatment should only be recommended for chronic constipation if prolonged medical treatment has failed to give relief - not drugs alone. If a patient can by medical means have his bowels moved every morning, he should be content. If an operation is decided upon, it should be chosen to suit the particular case. There is no routine operation for any case.

The question to be answered is "are the dangers and possible unpleasant sequels of the operation worth risking as compared with the severity of the symptoms for which it is proposed to operate?"

Appendicostomy is apparently quite free from danger to life but in rare cases unpleasant local complications have

arisen. All the other operations recommended for constipation have a slight but definite danger. The mortality of simple short-circuiting operations is very small, but if adhesions are divided at the same time, it is greatly increased. The mortality of partial, and, to a still greater extent, that of complete colectomy, is high even in the most experienced hands.

They should not be lightly recommended, and should only be done for symptoms which are really severe enough to interfere considerably with the enjoyment of life or with the performance of the professional or other duties of the patient. Treatment from surgeon's point of view in chronic intestinal stasis consists in facilitating the passage of the faecal material along the gastro-intestinal tract. In the greater number of cases such substances as pure paraffin preceding the passage of food, application of some spring support to the lower abdomen which tends to keep the viscera up, and to control the delay of material in the small intestines and caecum, and the avoidance of the use of such proteid food as poison the tissues if retained for an abnormally long time in the intestine, are sufficient.

If that fail, operation is the only thing and the object of that operation is usually to send on the effluent from the ileum and so to remove at once from the area of the drainage scheme, from which toxins are chiefly absorbed, the filth which supplied them.

What is to be done depends on the nature of the mechanical conditions which produce the stasis and also on the state of

the patient at the time. If it is an appendix hitched up behind the termination of the small bowel, the removal of the constricting band frees the lumen of the small intestine and restores it to its normal function. Then if there are present marked rheumatoidal changes or tubercular infection, as Lane so often finds, the emptying of the contents of the altered and dilated small intestine into the caecum may not result in such an effectual clearing of the small intestine as will afford the sufferer sufficient spare energy to destroy the disease. Then the only thing to do, he says, is to divide the small bowel and introduce its extremity into the pelvic colon.

In ilial kink you have a much more serious condition than that brought about by the appendix, as it is so apt to recur, no matter what you do. This can't occur in the case of the appendix. The free division of these bands for some reason is very apt to bring about peritonitis and that may cause serious anxiety and so short circuiting is much more commonly done, especially in the female subject.

Lane prefers to short circuit rather than merely to divide the constricting bands. He believes that in many cases the risks of short circuiting are less than those of division, while the possibility of recurrence by the reformation of these bands is permanently removed. The necessity of following the same occupation which determined the obstruction originally in the case of the man makes such a procedure all the more advisable. The convalescence after the short circuit is much more satisfactory in his opinion.

Then again, if tubercle, rheumatoid arthritis, or any advanced condition of auto-intoxication be present, short circuiting is better.

It consists in the introduction of the ileum directly into the upper part of the pelvic colon and it is essential, in Lane's opinion, to close in the interval between the mesentery of the ileum and that of the pelvic colon, and not to be satisfied with establishing the anastomosis alone. The intestines fall down behind the junction till the termination of the ileum has done so also. This has resulted in a permanent or recurring torsion of the end of the ileum on its own axis, producing a varying degree of obstruction of its lumen and consequent pain and diarrhoea, thus being due to incontinence caused by over-distension of the bowel behind the obstruction. The chief disadvantage of short circuiting is the occasional tendency of the material passing from the ileum into the pelvic colon, if not evacuated very shortly, to ascend into the iliac colon.

By fixing the colon to the posterior abdominal wall at the pelvic brim by exaggerating the last kink, as described above, if this kink be not efficient. In a certain proportion of cases it is advisable to remove the large bowel also. This may be required after the above ileo-colostomy where the faecal matter ascends or where the colon is much dilated and especially if its mucous membrane has been chronically inflamed. This is the case in Herschprung's disease as already described.

Lane does not lay down any sharp line between cases in which short circuiting only is done and those in which he deems it proper to remove the large bowel as well. If the patient is wasted and the abdominal wall is loose and flaccid, especially if tubercle or rheumatoid arthritis or other results of stasis are present, he removes the large bowel at the same time as he short circuits, but if by doing the operation in two stages, he can save the patient any risk whatever he does it. Adhesions are the bugbear of short-circuiting and there is apparently no way of preventing them doing so. Silk cloths soaked in paraffin have been tried by Lane but he doubts if it is any good when applied to the intestine. The rule in all abdominal operations to avoid all unnecessary exposure of or damage to the intestines in the requisite manifestations, and to be most careful in the aseptic precautions, obtains most fully here.

Adhesions seem to imply sepsis.

Suppuration in the incisions can be met by hot compresses frequently applied.

Lane has done a very large number of operations in these cases suffering from Chronic Intestinal Stasis. In many of them the results have proved to be very satisfactory. In others there has been little or no improvement and in a few the operation has been fatal. In a number of instances faecal material has collected in the blind end of the colon and given rise to unpleasant symptoms; Hertz thinks this must have been

due to the accumulation of the secretion of the large intestine, which normally forms a large proportion of the faeces, but is insufficient in bulk and in irritating constituents to stimulate the caecum and colon to empty themselves without the aid of the contents of the ileum. Probably also the overflow of fluid material arriving in the pelvic colon from the ileum and Dr. Case recently stated the opinion that in some cases antiperistalsis carries the contents of the pelvic colon into the more proximal parts as the descending colon and sometimes the transverse colon and sometimes the transverse colon may become visible after a bismuth meal. Thus Lane excises the caecum and ascending colon and more recently the whole colon, as a secondary, or in some cases, as a primary operation.

Mausell Moullin recommends a simple ileo-sigmoidostomy in these cases, without division of the ileum. Although Lane believes there is a risk of the stoma closing, or the simultaneous performance of an ileo-sigmoidostomy and an appendicostomy, which would ~~make~~ it possible to keep the proximal part of the colon empty by lavage through the appendix.

In a large majority of cases only part of the colon is affected in constipation as Hertz has pointed out and he says that in nearly half of the severe cases he has examined by X-rays and other means, the rectum, or less commonly the pelvic colon, was affected alone. In none of these, he says, would an ileo-sigmoidostomy have been the least use, as a normal colon would have been short-circuited and the abnormal pelvic colon and rectum left inactivated.

In cases of dyschezia due to obstruction at the pelvic-rectal flexure an anastomosis between the pelvic colon and the first part of the rectum has been established by Gant with success when medical treatment and division of adhesions with "Sigmoidopexy" had failed to give relief.

In other cases the caecum and ascending colon are alone affected; as soon as the faeces get into the transverse colon, their passage to the rectum is normal in rate. Medicine and diet with massage applied regularly over long periods usually succeed more or less. If these fail, anastomosis between the ileum and transverse colon, with or without the removal of the caecum and the transverse colon seems more rational and less dangerous than ileo-sigmoidostomy which may have to be followed by complete colectomy. Sometimes the passage of faeces as far as the splenic flexure is normal in rate, but considerable difficulty is experienced in getting beyond this point. This may be due to severe ptosis of the transverse colon, the splenic flexure remaining fixed, sometimes it may be due to unexplained muscular weakness of the distal part of the transverse colon, and sometimes to adhesions in the neighbourhood. Enemata very often help these cases and if ptosis be present, abdominal supports are useful. When these fail, an operation to bring about anastomosis between the lowest part of the transverse colon and the pelvic colon in the first case, and where ptosis has taken place between the limbs of the splenic flexure has given relief.

When all the bowel is involved, again we try diet, drugs and massage as before and if they fail - ileo-sigmoidostomy is the treatment.

Colectomy is Mitchinkoff's hope for the realisation of his dream of a "natural death" at one hundred and forty years.

This is the operation that follows ileo-sigmoidostomy if that be not successful in Lane's hands. At first the caecum and ascending colon were sometimes removed alone but now a complete excision down to the pelvic colon is always performed. A large number of cases have had this operation performed on them, some with benefit, some with less benefit, and some fatal.

Too short a period has elapsed since the publication of these cases and the War has intervened. Up to now the subject is sub judice. It is conceivable that an individual can go on without his colon for a time but not for ever.

In Herschspung's disease it is distinctly indicated after all else has failed. If this occurs, as it has done, in later life it requires similar treatment. In volvulus also, it may have to be done.

Appendicostomy, as stated above, is done along with ileo-sigmoidostomy so that the colon can be washed with two or three pints of water or normal saline solution every morning.

If the constipation is complicated with colitis, an astringent can be added, and if infective in origin, antiseptic irrigations can be also used. In muco-membranous colitis no astringent or antiseptic should be used.

Appendicostomy is very safe and the opening is small and no faeces, mucus or flatus escapes from it and does not need any special covering. When improvement has occurred, the irrigations should go on on alternate days only and then twice and

once a week for three months, after which the opening is allowed to close spontaneously. In severe cases the irrigations may have to go on indefinitely.

Appendicostomy is specially indicated where the stasis is confined to the caecum, and ascending colon, as these parts can certainly be more effectively washed out from above by water introduced through the appendix than from below by water introduced by rectum.

When the stasis is at a point beyond the splenic flexure and especially in dyschezia, it is less effective than enemata combined with other forms of medical treatment.

When there is any mechanical cause for the stasis, it is not likely that appendicostomy alone will do any good. Ileosigmoidostomy or other form of short-circuiting will have to be done.

Ileo-colostomy (short circuiting)

The following is Arbuthnot Lane's method of doing this operation and colectomy as given for the first time in Rowland's and Turner's Operative Surgery, 6 Edition 1915.

The bowels of the patient are emptied by large doses of castor oil ii or iii and enemata.

The diet of fluids for 48 hours before the operation is limited.

Saline infusion into both axillae is begun with the anaesthetic and is continued through the operation usually from four to six pints being administered. A vertical incision,

from five to six inches long, is made, three quarters of an inch to the left of the mid-line, through the anterior layer of the rectus sheath. The rectus muscle is displaced outwards and the posterior layer of the sheath is divided. The peritoneal cavity is now opened and its contents explored.

Lane's kink is looked for if present, and examination is made as to whether the ilial effluent is controlled by an appendix anchored to the mesentery.

The degree of gastric and duodenal obstruction and distension and the position and size of the band forming the "last kink" is made out.

If ileo-colostomy is decided on, a mobile portion of the ileum at a distance of about six to ten inches from its termination is chosen, crushed by a pair of forceps applied at right angles to its long axis, and ligatured in the groove thus formed with stout linen thread. A pair of forceps is then placed on the ileum immediately proximal to the ligature and somewhat obliquely so that a larger lumen is obtained than by transverse section. The bowel between the ligature and the forceps is then divided with the cautery, its two ends are secured and the ligatured distal stump is carefully invaginated and sewn over with fine silk.

No mesenteric vessel of any size need be injured in this procedure, and the mesentery need only be divided for about an inch.

A portion of the pelvic colon below the "last kink" is

selected and one blade of a pair of curved stomach clamps is placed on it parallel to its long axis, and free of its mesenteric border.

The anatomy of the colon will be found to vary greatly in these patients, but the portion of colon to be chosen as the site of the anastomosis will usually correspond to the convexity of the loop of the pelvic colon should a loop be present. Otherwise if the pelvic colon is fixed, it should be clamped at any point accessible. In these circumstances, however, the operation may be one of very great difficulty.

The ileum, its lumen having been controlled by a light-bladed forceps placed at some distance from its divided end, is now brought across, and arranged in a suitable position for an end to end anastomosis with the pelvic colon, the compression forceps, which occlude its cut end lying beside the clamp on the colon, so that the mesenteric border of the ileum is directed upwards and its free border downwards. A suture of fine silk now unites the peritoneum of the two portions of gut, being inserted in the colon along the inner limits of bowel covered directly by peritoneum, and in the ileum about a quarter of an inch from the cut end. Its insertion in the ileum is facilitated by giving a half turn to the forceps holding the cut end of the gut; thus bringing its under surface within easy reach. The colon is now opened by a longitudinal incision for a distance equal to the lumen of the section of the ileum. —The forceps are removed from the

end of the ileum, and the adjacent margins of the ileum and colon are united by a through-and-through buttonhole stitch so as to avoid any constriction of the orifice. The adjacent margins of ileum and colon having been accurately united, the outer margin of the colonic aperture is sutured in a similar manner to the outer margin of the ileum. A second row of sutures is employed to secure more absolutely the closure of the two outer margins and the junction is completed by an anterior continuous peritoneal suture. Silk or linen thread is used for all layers, and especial care is necessary at the angle where the mesentery is attached to the ileum.

Lateral anastomosis, formerly practised by Sir Arbuthnot Lane, has been long abandoned by him in favour of an end-to-side union, on account of the pouching of the blind end of the ileum which was apt to occur, and which frequently caused the patient a deal of pain and discomfort.

The anastomosis being completed, in order to withdraw the intestine from the pelvis which they enter through the interval between the mesenteries of the ileum and pelvic colon, the patient is placed in the Trendelenburg position. The gap which will be found between the mesentery of the ileum and that of the colon at the point of junction is now accurately closed by a continuous buttonhole suture of silk or thread. Neglect to close this space, may lead to serious trouble for the reason that the passage of the small intestine through the opening results in a torsion of the end of the ileum in its long axis and the consequent partial or complete obstruction of its lumen.

An obstructive diarrhoea, which varies largely in severity, results from this condition, and this has brought discredit on the operation.

The degree of development of the band forming the "last kink" is next investigated, and if poorly represented, it is exaggerated by means of a stitch which passes round half the circumference of the bowel and then through the peritoneum lining the iliac fossa external to it. This tends to obviate the regurgitation of material back along the descending colon.

An assistant now dilates the sphincter ani, and passes an aoesophageal tube (size 18) up the rectum, the operator manipulating the tube from the abdomen so that it passes through the anastomotis opening into the small bowel for a distance of about twelve inches.

The passage of this tube is facilitated by injecting several ounces of liquid paraffin up it by means of a Higginson's syringe.

The abdomen is closed and the rectal tube is fixed in position by a stitch at the anus, being left in position for five days during which time it is allowed to drain into a receptacle at the side of the bed.

This tube prevents and relieves any distension of the small bowel, takes all strain off the anastomosis and adds very greatly to the post-operative comfort of the patient.

All shock is obviated by the use of the sub-cutaneous saline infusion, which also prevents post-operative vomiting.

These facts probably depend on the maintenance of a high and level arterial blood pressure throughout the operation.

As to whether the ileo-colostomy alone is performed, or whether the colon is removed as well, depends on the mobility of the colon. Experience has shown that if the colon is fixed ileo-colostomy is very rarely followed by regurgitation.

If, on the other hand, it is very loose, regurgitation is not infrequently an annoying result necessitating a subsequent colectomy.

The same preparation of the patient is necessary for colectomy as for short-circuiting and saline axillary infusion should be carried out throughout the operation.

The operation may be performed in one or two stages. If a two-stage operation is decided on, ileo-colostomy is performed as above and the colon removed subsequently.

It is, however, Sir Arbuthnot Lane's usual practice to perform the whole operation at one sitting, and, in his hands, this procedure is attended with practically no risk. The incision is the same as above but somewhat more extensive and the ileum, proximal to Lane's kink, is divided as described above. The caecum, appendix and the terminal blind portion of the ileum are held up by an assistant, and the evolutionary adhesions which will be found on their outer side are divided, any vessels which are found being tied.

The mesentery of the terminal ileum, caecum and ascending colon is now transfixed at several points, close to the gut and

tightly ligatured with stout linen thread; pressure forceps are applied between the ligatures and the gut wall, and the mesentery is divided. Great care is necessary when approaching the hepatic flexure to avoid injury to the duodenum or its blood supply, which however will not occur if the ligatures are applied close to the bowel wall.

The transverse colon is next drawn firmly forward by an assistant.

In the neighbourhood of the hepatic flexure, the gastro-colic omentum and the transverse meso-colon can usually be dealt with together, being transfixed fairly close to the bowel wall and ligatured in several places. It is advisable to crush the tissue with forceps and to tie very firmly in the groove so formed since the vessels have a great tendency to retract and you may get troublesome bleeding. Towards the middle of the transverse colon, however, the gastro-colic omentum and the transverse meso-colon must be tied in several places separately. Care must be taken to apply the ligature close to the bowel wall, in order to avoid injury to the greater curvature of the stomach or its blood supply.

The splenic flexure, which must next be freed, usually is the most difficult part of the operation. It will be found to be firmly bound down on its outer side by evolutionary adhesions which must be carefully separated from the mesentery, the finger being passed upwards between them. Any vessels encountered must be tied in the process.

These acquired bands having been divided, the splenic flexure moves freely on its mesentery, which is then readily ligatured. The greatest care is necessary in carrying out this separation of the acquired bands from the mesentery of this part of the bowel, as otherwise the firm attachment of the gut at a great depth, the size of the vessels in this region, and their great tendency to retract, render it a most difficult procedure should it be attempted to ligature the mesentery and the acquired bands together. The vessels must be tied tightly and a double thickness of stout linen thread should be used for all ligatures. If not tightly tied, the vessel retracts and you get large blood escapes in the sub-peritoneal tissues.

The descending colon is dealt with the same way, first freeing the evolutionary bands then transfixing the mesentery, tying and dividing between the ligatures and the bowel wall.

A suitable portion of pelvic colon is then grasped in one blade of a pair of curved stomach clamps, the proximal end of the divided ileum is brought across, and an end-to-side anastomosis is established as described under ileo-colostomy. The anastomosis being complete, the colon is freed to within about two inches of the junction, seized with a pair of crushing forceps placed at right angles to its long axis and tightly tied in the groove so formed. The bowel just proximal to the ligature is controlled with a pair of forceps and it is divided with the cautery between the ligature and the forceps. The colon, which is now quite free, is removed, and its ligatured distal stump is

invaginated several times with a suture of silk or thread till the outer limit of the junction is reached. This invagination must be carefully and thoroughly performed in order to avoid any tendency to pouching.

The posterior abdominal wall is next inspected and any bare areas along the beds of the ascending and descending colons are covered by drawing the peritoneum together over them. The oesophageal tube is passed as described under ileo-colostomy and the abdomen is closed.

Recently Sir Arbuthnot Lane has adopted end-to-end anastomosis instead of end-to-side union between the ileum and the pelvic colon. This shortens the operation and avoids the formation of a colic pouch.

These are the methods that the pioneer surgeon in this field recommends and some of the modifications that other surgeons have suggested and practised. All lay stress on the fact that diet, medicine and massage and exercises if feasible in the case must first be tried in any given case. All recognise the severity of the procedures but in so many of these cases they are driven to do something to alleviate the circumstances of the patients. A large intestine may not be of much use now-a-days, but it is just possible that it is not the intestine that is to blame so much as the possibility that the task set it by modern food is too difficult for it. At any rate it is a very difficult thing to remedy the condition of Chronic Intestinal Stasis if it gets out of the control of diet, drugs and massage.

Constipation in Infants and Children

Both in breast fed and in hand fed infants, constipation is a very common trouble and is often very difficult to remedy. The most common causes of this condition may be grouped under three heads:

1. Diet
2. Conditions giving rise to muscular atomy
3. Congenital defects
4. Certain cerebral defects

1. Diet.— The stool may lack volume from deficiency in fat or proteids. In older children this may be due to lack of vegetables or fruits, or it may be too great in bulk, as frequently happens in hand fed children from excess of casein in cow's milk or from imperfect digestion owing to the milk having been boiled; the process of boiling renders the casein less digestible. In the former cases the lack of volume results in deficient stimulation of the weakly intestinal muscle, in the latter there will be such an accumulation that the feebly developed muscle of the intestine is unable to propel the faeces along. In the rare condition of congenital Idiopathic stenosis of the Pylorus, the constipation, which is one of the associated symptoms, is due to the lack of food residue, the major part of the nourishment being lost in the vomiting which is so characteristic.

Muscular atomy is apt to be an important factor in the

onset of constipation. In infancy and childhood, the muscles have not yet acquired their strength or their habit; both of which come largely by education.

There may be also congenital weakness of peristalsis apart from the constipation which results from acute illness and which is due to consequent general weakness. We note that in Rickets we have constipation as a well marked accompaniment. This is due to muscular atomy, at once associated with and caused by flatulent distension of the intestines and stretching of the abdominal muscles as a direct result, as well as to imperfect and unsuitable feeding.

3. Certain congenital conditions

Kinking of the colon at the pelvi-rectal junction. The pelvic colon in infants is relatively much longer than in the adult and should it be abnormally long, kinking may readily take place. The accumulation of faeces in the pelvic colon as a consequence will necessarily aggravate the condition.

Hirschspung's disease - congenital idiopathic dilatation - of the colon has been referred to before.

Congenital defects such as stenosis of or imperforate anus would be obvious causes of constipation.

4. Cerebral disease such as purulent and Tubercular Meningitis have constipation as a predominant symptom.

Treatment may be divided into:

Prophylactic
Dietetic
Mechanical
Medicinal
Surgical

Prophylactic is the same as in adults.

In earliest infancy, defaecation is a purely reflex act, but in infants of a few weeks old, education may be begun in this selection.

The habit of regular evacuation may be induced by suggestion, by holding the infant over a suitable receiver at regular stated intervals; even though at first there may be no result, yet perseverance will be rewarded. It is best to make the first such suggestion immediately after the first or second feed of the day, and the second about twelve hours after.

It is of equal importance that the child should receive nourishment at strictly regular intervals, It is clearly the duty of the parent to instil into the minds of older children the importance of the function and the absolute necessity for intelligently attending to its performance.

All that has been already said in connection with prophylaxis in the adult, applies equally here, to the cases of young and growing children.

Dietetic.-

If the mother's milk is at fault as very frequently is the case, the deficiency is most frequently in the quantity of

fat. Thorough attention must in such circumstances be directed to the dieting of the mother. It should be liberal, with abundance of milk and cream and milky foods; fat may be added also in the form of cod liver or olive oil. Careful attention should be given to the state of the mother's functions generally and her health promoted in every way possible. In the cases of hand fed infants, the fault will usually be found in the unsuitability of the proportion of casein and of fat as contained in cow's milk. If, in addition, it is found that the milk has been boiled, a further course of difficulty has arisen, as boiling diminishes the digestibility of casein.

By careful dilution of cow's milk with water or barley or meal water, to reduce the excess of proteids, the addition of cream when fat is deficient and of sugar of milk, to make up for the shortage of soluble carbohydrates, we may arrive at such a modification as will satisfactorily take the place of human milk, and at the same time be free from the objections of milk taken direct from the cow.

The milk should, by preference, be sterilised.

Extract of malt or a little orange juice two or three times a day will often help in these cases.

In older children assistance will be given by an increase in the starchy foods and of fruit juices.

Growing children should be encouraged to eat freely of the coarse foods, such as oatmeal in oat cakes or porridge, of brown bread and of fresh vegetables and fruit.

Medicinal.-

It is highly indiscreet to attack the condition of chronic constipation by means of drugs, in the first instance in the adult, and it is much more so in the case of infants and children. Such remedies should only be used when other means have had fair trial and failed. It must be admitted that this may appear to be but a counsel of perfection when one is dealing with the poorer and less intelligent mothers; yet it is quite practicable when one has the assistance of a capable nurse or mother, who will take pains.

Of drugs, the most useful in young infants one usually finds is manna, and the most reliable. Sulphate of magnesium in small doses, repeated two or three times a day, is very effective. For older children, senna as an infusion, cascara as the "Evacuant" and Phenophthalein are valuable.

In rickets, when there is atomy of the muscles, general treatment consisting of massage and a well considered dietary, should be combined with such remedies as Nux Vomica and general blood tissues.

The constipation of Meningitis must be treated by Castor Oil or salines or by enemata.

Enemata in children should be of small quantity - 2 to 4 ounces - so as to avoid the possibility of distension of the bowel, which would only defeat one's purpose. The technique of their administration and their composition have already been detailed in speaking of the adult.

Cold water injections are preferable as they are not so locally enervating as are warm fluids.

A common and homely method of stimulating the defaecation reflex is the use of a suppository or cone composed of Castile, or if that be not available, of ordinary yellow soap. This is more to be recommended than glycerine which is too irritating to the sensitive mucous membrane. The soap lubricates the canal and, at the same time, stimulates the nerve endings in the Rectum.

Surgical.-

In cases of imperforate anus, operative treatment may in suitable cases by division of the septum relieve the condition.

Congenital stenosis of the anus may be treated by careful stretching, with the finger or bougie after, if need be, incision of the structure.

It is not necessary to deal here with the various other types of congenital abnormalities in the rectum and anus, as they are comparatively rare.

Conclusions.-

This is a very brief and partial consideration of this wide subject. From any such consideration of what is known about it and remembering the imperfect state of what is definitely known of it, one must include -

1. That the congenital state is extremely common and of widespread occurrence.

2. That while it is not strictly speaking a disease but rather a symptom consequent on some morbid condition in some one or other of the systems of the body, yet its effects may be so very far reaching and pernicious as to be more serious than those of the primary causal condition.

At the same time, there is a danger, in certain cases, of treating Chronic Constipation per se and of overlooking the primary cause, which may be, though less apparent, of a very vital nature.

There are two dangers of treating such a frequent symptom as chronic constipation without making every effort to ascertain the cause:

1. Constipation may be the only symptom of a disease which, if diagnosis were made early, might be radically dealt with.
2. There are many and often the most severe cases of constipation in which a routine treatment of symptoms by purgatives and bulky diet may aggravate instead of cure the trouble.
3. That it is to a very large extent preventible whether in young children or in those of more mature years.

Much can be done by the training and education of infants and of young infants at home, of scholars in the seminary and of young men and women by literature and by lecture..

That parents and teachers are responsible for much suffering and ill health if, for reasons of delicacy or dalliance, they neglect to insist on the importance of the Primae Viae.

That the treatment of Chronic Constipation should not be undertaken till a full review of the case has been made.

Enquiries should be directed to the symptoms, heredity, habits and mode of life, particularly with reference to exercises food and environment. In many cases a diagnosis may be assisted materially by a rectal and abdominal examination. That each case must be treated on its own merits and that the three degrees of treatment - diet and exercises, drugs, surgery, must be apportioned only after a full consideration of each case.

That the object of treatment should be to recreate a natural desire and habit by the mildest means at one's disposal, and to continue the remedy for as short a time as is consonant with cure.

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