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IN these days of sedentary occupation, the number of patients suffering from constipation and flatulence, with their attendant train of symptoms due to auto-intoxication from the products of defective chemical changes in the alimentary canal, with which the practitioner is daily called to deal, is so great that any means for its relief must be welcomed.

Though in many cases measures directed to the increasing of the muscular activity of the bowel and the overcoming of the constipation—especially the general daily hygiene, diet, and increasing the quantity of fluid taken—will give relief by not allowing time for the colon bacilli and other intestinal bacteria to multiply unduly and cause excessive fermentation, there are many cases, of which several are quoted below, in which this alone is unsuccessful and the actual destruction of these bacteria becomes necessary.

With the symptoms of gastric indigestion we are all familiar, and these are more amenable to treatment than the intestinal cases with which I wish to deal and which are often of more importance, for here, besides the distressing pain, distension, dyspnœa, etc., we now know that there is a very real danger of remote results such as rheumatoid arthritis, neurasthenia, and arterio-sclerosis, and when we consider the enormous total superficies of the intestinal mucous membrane with its great power of absorption, we must realise that the antiseptic teachings of Lord Lister must apply quite as forcibly to this absorbing

surface (in cases where abnormal toxins are present) as to a very large superficial wound, in which case no one would think of treating it, if infected, without the use of antiseptics.

Some authorities still throw doubt on the effects of absorption of toxins from the bowel, to which Sir Andrew Clark was one of the first to call attention, and to which he gave the name of Copræmia; thus we find Professor Osler (1) says:—"All kinds of evils have been attributed to poisoning by the re-absorption of noxious matters from the retained fæces, but it is not likely that this takes place to any extent"; and yet, at the same time, while referring to this class of case, he admits that "debility, lassitude, and mental depression are frequent symptoms."

Though symptoms of both gastric and intestinal indigestion often co-exist, in the majority of patients it is easy to differentiate the one from the other, and often we see cases in which the trouble is confined, almost entirely, to either the stomach or the bowel. They demand a different treatment, and it is more particularly to the latter class of case that I wish to refer.

That fermentation changes do occur in the small intestine is shown by the presence of free hydrogen (Michael Foster), an actual estimation being carried out in the case of the dog by Planer (2), who found that when the animal was fed on meat diet the gas consisted of:—

CO_2	40·41
H	13·86
N	45·52
O	a trace only.

But on a vegetable diet the result was very different, viz.:—

CO_2	47·34
H	48 69
N	3·97

Chyme even, after removal from the intestine, continues if kept at body temperature, to produce carbon-dioxide and hydrogen in equal proportions.

In the large intestine the amount of fermentation is again largely dependent on the diet, and the relative proportions of the different gases vary very much according to diet. Ruge (3) found the gas of the large intestine when collected per anum to vary as below according to diet.

	Leguminous Diet.	Meat Diet.
CO_2	21·05	8·45
N	18·96	64·41
CH_4	55·94	26·45
H	4·03	·69
H^2S	trace	

thus showing, as was to be expected, the marked effect of variation of diet.

These patients complain of abdominal pain—often acute—and distension, sometimes epigastric and umbilical (transverse colon) but more often in the iliac fossæ, bearing no definite relation to food, unrelieved by carminatives and the usual alkaline gastric mixtures. The pain is often worse at night, keeping the patient awake, the tongue is coated but less so than in purely gastric cases, there is loss of appetite, wasting, sallow complexion and generally marked neurasthenia, and it becomes obvious that the trouble is due to defective chemical changes in the bowel, and the symptoms are caused by the absorption of toxins resulting therefrom and the pressure of an excessive quantity of gas; this may even lead on to a definite melancholia, and there is always the danger of local complications from the passage of bacilli of exalted virulence through the bowel and the infection of neighbouring organs, such as the bladder, appendix, and uterine appendages.

The judicious administration of purgatives, muscular exercises, abdominal massage and strict regulation of the diet, in an acute case only peptonised milk being allowed so that the smallest possible residue may remain, will often do wonders, but this frequently requires to be supplemented by means directed against the activity of the intestinal bacteria, and for a time we heard a great deal about the results to be obtained by adding to the "flora" of the bowel a large number of lactic acid bacilli in the form of a milk culture. This treatment was for a time very much to the

fore, but often entailed disappointment; the process of preparing the sour milk was tedious and the result unpalatable, and in some cases (see Case 1 below) the colon bacilli, though originally defeated by the lactic acid bacilli, appeared after a time to develop an immunity to their attacks, and no further good resulted.

We should have no difficulty in destroying the *Bacillus coli communis* and allied bacteria outside their usual habitat, but the difficulty of applying Lord Lister's principles to the intestine is obviously two-fold—

(*a*) The use of a germicide with a high carbolic-acid co-efficient, and yet as low a toxic co-efficient as possible.

(*b*) A means of introducing the same in to the intestine without it being absorbed or neutralised in the stomach *en route*.

With regard to this latter difficulty we can, of course, apply weak antiseptics to the sigmoid and descending colon in the form of colonic injections, but it is very doubtful if these even reach the transverse colon, and certainly they are useless for the small intestine, besides being strongly objected to by the patient. A much more useful method is the enclosing of a germicide in some substance such as keratin, which, while unaffected by gastric digestion, is dissolved in the small intestine and, setting free the germicide, allows a means of direct medication to the bowel.

When we come to the question of the antiseptics suitable for this purpose, we find a large number to choose from, but apart from mercurials, which are very useful in the case of children suffering from some forms of enteritis, they are mostly derivatives or close allies of phenol. Thus we have phenol or hydroxy-benzene C_6H_5. OH and its derivative sodium sulpho-carbolate C_6H_4 OH .SO_2 .ONa, 2 H_2O. Salol C_6H_4. OH. COO. C_6H_5 or phenyl salicylate is another close derivative useful in many cases. This is not decomposed in the stomach, and is for this reason, as pointed out by Mitchell Bruce (4) a useful intestinal disinfectant, being broken up in the intestine into salicylic acid and phenol.

Beta-naphthol $C_{10}H_7.OH$ is again a more distant connection and is useful for its antiseptic and disinfectant properties, its action being purely local on the contents of the bowel and most of the dose being recoverable from the fæces, whilst the traces which are absorbed are excreted unchanged in the urine (4).

Among the newer antiseptics suitable for this purpose is kerol, which, instead of the usual mono-phenyl nucleus, contains a di-phenyl nucleus and bears out a forecast of Sir Lauder Brunton, who suggested some years ago, that if an oxygenated compound with a di-phenyl nucleus were discovered it would have a much higher germicidal value than carbolic acid with its single phenyl nucleus and at the same time would be less toxic. Other less useful members of the mono-phenyl nucleus group are resorcin or dihydroxy-phenol $C_6H_4.(OH)_2$ and thymol $C_6H_2.OH.CH_3.C_2H_7$.

Among the solids in this list by far the most generally useful in cases of simple excessive fermentation in the bowel is beta-naphthol given in pill form and well coated with keratin, but though its toxicity is low its efficiency as a germicide is also not very great, and although I have frequently obtained good results from the administration of beta-naphthol either alone or alternating with salol, I have now largely discarded both in favour of kerol, which, besides having the advantage of being liquid and so more readily disseminated through the intestinal contents, has a carbolic acid co-efficient when tested on *B. typhosus* of 23, and is reported by Professor Hewlett (5) to be sixty times less toxic than phenol, comparing quantities of equal germicidal efficiency. Phenol itself is useful in mild cases and for short periods in doses of not more than m. ij, but its toxicity is relatively high, and some patients exhibit a marked idiosyncrasy to its use.

Whatever germicide is selected it is generally best to give it at an interval after food of from half to one hour, as then the pyloric sphincter is relaxing more frequently and the capsule will more quickly find its way into the duodenum.

The following brief notes of a few typical cases are of interest as showing how some of the above germicides will succeed where others fail.

(1) Mrs. C., *aet.* forty-eight. A widow of highly nervous temperament. Had suffered with digestive troubles for years, mainly intestinal, but getting much worse lately. Has attacks of acute abdominal pain and colic and excessive flatulence. Chronic constipation and occasional attacks of diarrhœa. No vomiting, hæmatemesis or melæna. The patient is thin and extremely neurotic, introspective and always complaining of a different pain. The tongue is moist and coated with a white fur. The abdomen showed nothing abnormal beyond hyper-resonance and distension in both iliac fossæ and a markedly tympanitic condition of the colon. The stomach was not dilated or displaced and there was no localised tenderness, a general feeling of pain and fulness being complained of in the lower abdomen.

Want of sleep, fear of taking food, and pain, had reduced the patient to a very low state. A definite assurance that there was no organic disease, measures to promote sleep, and a strict diet of peptonised milk, helped matters considerably, and beta-naphthol given in capsules three times daily relieved a great deal of the distension, aided by frequent small doses of cascara evacuant, but even by these means it was not possible to regain sufficient strength for the patient to leave her bed. A course of lactic acid treatment was then instituted, the sour milk being freshly prepared each day, and the improvement was very marked. Other light articles of diet were gradually added until we found the limit of her digestive capacity, and after another fortnight the patient left her bed and gradually got about. Relapses varying in severity recurred from time to time, and always yielded (but less readily) to the same treatment, until, finally, the lactic acid bacilli appeared to lose all power of coping with the intestinal bacteria, and some stronger measure became necessary, and kerol was given in three minim doses in keratin capsules. The capsules were given at first half-an-hour after food, three times daily and gradually reduced from twice to once daily after the principal meal; abdominal massage was ordered and tonic treatment was carried out, and, besides the relief of the pain and distension, the improvement in the nervous system from gradual cessation of the auto-intoxication from the bowel was very marked. This last attack was of about a month's duration, and in this case it has been found that a few of the above capsules taken occasionally have since sufficed to ward off another attack.

(2) Mrs. A., *aet.* seventy-eight. This case is of interest as showing how intestinal indigestion may be superadded to chronic gastric dyspepsia with hyperacidity, as an almost separate entity. This patient has suffered for ten years from gastric dyspepsia which nothing will cure, but which is kept in check and causes little or no trouble while she takes a simple mixture of magnes. carbonate, sodii

bicarb, tr. opii and ol. cajuputi, but recently I was called to her to find that in spite of her usual care in matters of diet and taking her mixture she had been confined to bed with acute pain mostly in the lower abdomen, very bad at night, preventing sleep, and complete anorexia. There was tenderness on deep pressure in both iliac fossæ more marked on the left side and some fulness. Pulse was rapid, temperature normal, and the tongue coated. There were no other abnormal physical signs, bowels being open, and no vomiting. I decided that the pain was probably due to abnormal fermentation in the colon and had the satisfaction of seeing it disappear with the use of intestinal antiseptics while stopping all gastric medication.

Here, again, the change from a worn-out, sleepless, neurotic condition to a healthful cheerfulness was very marked.

(3) Mr. E., *aet.* forty-nine, complained of very acute pain in umbilical and left lumbar regions, sufficiently bad to make him vomit and sweat. When the pain came on he could not stand. There was no hæmaturia or frequency of micturition and nothing to point to gall-stone colic. The pain had no relation to the taking of food and there were no abnormal physical signs to be made out in the abdomen, which was very fat. The patient was kept in bed on a milk diet and given a draught of ol. ricini, tr. opii, and ext. glyceriz. liq., repeated in six hours, but though a copious action followed, there was no relief of the pain. Various gastric sedatives were employed and hot applications to the abdomen, but though the pain got better for a time nothing seemed to affect it permanently. These attacks became more frequent and the patient was radiographed for calculus in two of the leading hospitals, and on the latter occasion bismuth emulsion was injected into the ureter and renal pelvis before radiography to demonstrate the absence of a calculus in the ureter. No diagnosis was made and the patient returned home.

The spasmodic nature of the pain suggested a colic, though this had appeared much more likely to be of renal origin than anything else, but arguing by a process of exclusion I determined to try the effect of eliminating some of the intestinal bacteria and ordered kerol in 3 minim doses in capsules of keratin together with free purgation. The attacks lost most of their severity at once and very soon ceased entirely, and for the last six months he has not had an attack. There has been no passage of a calculus and no vesical symtoms since and I see no reason to doubt that the pain was due to irregular spasmodic contractions of the colon caused by irritation from the products of putrefaction set up by organisms either of excessive number or virulence.

(4) Miss F., *aet.* thirty, a strong, healthy young woman, complained of the sudden onset of abdominal pain and vomiting followed after some hours by acute diarrhœa. Pulse ninety, full, strong and regular. T. 99.5. Tongue coated. Pain and deep tenderness, mostly epigastric, but later being present in the lower abdomen. There was no rigidity and the right iliac fossa was clear, though for a time a careful watch was kept on the appendix region.

Rest in bed on a milk diet and the administration of bismuth, dilute hydrocyanic acid and sp. chloroformi, relieved the vomiting, and a diagnosis of ptomaine poisoning was made. The diarhœa proved obstinate, and after thoroughly clearing the bowel with ol. ricini, astringents were given with success, so that at the end of five days all that remained was a distinct feeling of uneasiness in the abdomen with flatulent distension, the pulse and temperature soon became normal, but the appetite was still very bad and the patient disinclined to leave her bed. As the bowel evidently was still suffering from the effects of ptomaine poisoning, it was decided to give antiseptics, and salol gr. x was ordered to be taken in milk thrice daily, and capsules of kerol m. iij given to reach the lower bowel. The effect was very marked, the uneasiness and distension rapidly subsiding, the appetite returned and food was digested normally in increasing quantities. The feeling of depression which had been so marked gave way to a wish to be up and about again, which was rapidly gratified.

These few cases are typical of many with which we are daily called to deal, and the very commonness of cases of intestinal flatulence, auto-intoxication from the bowel, neurasthenia with abdominal systems, and enteritis simple, tubercular and malignant, must be my excuse for dealing with such a hackneyed subject.

References.

(1) Osler's "Principles and Practice of Medicine," p. 539.
(2) Op. Cit.
(3) "Wien. Sitzungsberichte," p. 729.
(4) Mitchell Bruce, "Materia Medica and Therapeutics."
(5) Hewlett, "Medical Times," April 20th, 1910.