

ORIGIN OF THE SO-CALLED AUTO-INTOXICATION SYMPTOMS*

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The cave man of the glacial period and the savage of today would doubtless agree that practically all disease is due to the malevolence of evil spirits. That idea constituted the first system of medicine. The next one appeared with the dawn of civilization, when men awoke to the possibility that some diseases might arise from spontaneous derangements of the bodily functions, particularly those concerned in excretion. They reasoned that if feces are foul, then the body must be in the best condition when freest from such material. This idea, which is based on what appears to be an obvious truism, has always been an attractive one, particularly to the lay mind. The ancient Egyptians purged themselves at certain times in the moon's cycle, just as many people now take calomel in the spring. For thousands of years, physicians have been in the habit of purging their patients when they have not known what else to do. We see, then, that the present day dread of stasis and "autointoxication" is nothing new. In the eighteenth century, the high priest of the cult was Johann Kämpf, who believed that all disease was due to impacted feces. Under his teaching the use of large medicated enemas became immensely popular, and the apothecaries fattened off the hypochondriacs then, just as the "internal bath" specialists do today.

The medical historian feels, therefore, that the ready acceptance of the views of Bouchard, Metchnikoff and Lane in the twentieth century must be due in large part to the fact that they fit into this great background of inherited belief. Still another factor in the rapid dissemination of these ideas has undoubtedly been the advertising campaign of those who would sell liquid petrolatum, agar, indigestible foods, sour milk, and patented syringes. One cannot blame the layman for his prompt conversion to what appears to him to be a sensible enough doctrine, but it does seem as if the scientific physician should look into the matter more carefully before he starts inoculating his patients with fear.

THE DIAGNOSIS OF "AUTOINTOXICATION"

I wish in this paper first to protest against the thoughtless way in which many of us are constantly making this diagnosis of "autointoxication." I do not deny that there may be such cases, but my experience in looking over the people who have been classified as such by other physicians makes me feel that the real article must be rare.¹ Time and again I have been put to the embarrassment of having to point out to some brother physician that his beautiful case of "auto-intoxication" was really an aortic regurgitation, a chronic nephritis, a myxedema, a high blood pressure, tuberculosis or some other well known disease. In the most recent of such cases, there was a hemoglobin of 45 per cent., a systolic blood pressure of 200 mm. of mercury and a large fibroid tumor of the uterus. The patient's physician was surprised to find that the

constipation which he thought was primary and responsible for all her symptoms was really one of the least of her troubles. It undoubtedly is true, as Taylor² says, that fashions in the "cloak for ignorance" change just as they do for other wearing apparel. When confronted by puzzling cases, we probably will always have a tendency to fall back on stock diagnoses, such as "too much uric acid," "typhoid-malaria" or "disturbances in the autonomic nervous system." Just at present the popular fancy seems to turn to "autointoxication" and "focal infections."

There are a considerable number of men, however, who do examine their patients and who still believe, after finding nephritis, hypertension, arteriosclerosis or gastric ulcer, that these diseases are due, directly or indirectly, to intestinal stasis. Some persist in this view even when it is shown that the patient has no stasis. Such men, it seems to me, are hopeless and beyond the reach of argument. The others who have demonstrated abnormal stasis in their patients may be in the right; I respect their position, but I believe it is weak. When men like Alonzo Taylor³ and Adami⁴ with their great technical knowledge tell us that there is no real evidence to support the theory of intestinal toxemia, and that the pathologic findings can be explained more easily in other ways, it seems to me that we should be slow to accept the enthusiastic claims of rough and ready surgeons who have short-circuited a few colons.

UNPROVED ASSUMPTIONS

It is not sufficient to show that toxic substances can be formed during the bacterial destruction of nitrogenous matter. It must be shown that these toxins are formed in the intestine; that they can pass through the mucous membrane; that they can escape destruction in the liver; that they can reach the general circulation in amounts sufficient to produce symptoms, and that the symptoms produced by the repeated injection of small doses of these substances into animals are similar to those observed in constipated men. Unfortunately a review of the literature on these suspected toxins shows that little has been done with most of them beyond proving that they may be formed *in vitro*. Others, such as albumoses and peptones, are known to be present in the intestine; some of them are highly toxic when injected into a vein, but they are harmless when taken by mouth. The same thing may be said about many bacterial toxins. Filtered cultures of virulent cholera vibrios that will produce severe gastroenteritis and death when absorbed from the peritoneal cavity will have no effect when injected into the bowel.⁵ We know also that antitoxins, secretin, epinephrin and other organic substances cannot be administered successfully by mouth. It is even more remarkable that such simple molecules as magnesium sulphate and lactose are practically unable to pass through the intestinal mucosa.⁶ Many such examples could be quoted,⁷ all showing how certain we must be on this point of absorption before we can ascribe the symptoms of "autointoxication" to any one substance.

Those who are impressed by the enormous numbers of bacteria found in the feces should remember that

* From the George Williams Hooper Foundation for Medical Research, University of California Medical School.

1. Clendinning (Interstate M. J. 22:1197, 1915) says, "I only know that the more carefully I examine any group of patients, the more completely do such things as chronic intestinal stasis melt out of my records."

2. Taylor: Digestion and Metabolism, Philadelphia, 1912, p. 455.

3. Taylor: Modern Medicine, Philadelphia 2:503, 1914.

4. Adami: Brit. M. J. 1:177, 1914.

5. Denys and Sluyts: La cellule 10:67, 1893. Nesbitt: J. Exper. Med. 4:6, 1899.

6. Cohnheim: Nagel's Handbuch der Physiologie, Braunschweig 2:615, 1907.

7. Woolley: Jour. Lab. and Clin. Med. 1:45, 1915.

nearly all of them are dead. Distaso⁸ and others have pointed out that they cannot multiply in constipated feces on account of the dryness and the lack of nitrogenous food. Only in the cecum can a little peptone be found. It seems clear also that there are antibacterial forces at work in the bowel, and we must be very careful in drawing conclusions from the results of experiments *in vitro*. It must be remembered, moreover, that the great number of intestinal bacteria produce no soluble toxins. Even those that do produce toxins may do little harm because, as we have seen above, these substances are often unable to pass unchanged through the mucosa.

According to Mutch,⁹ who has written one of the chapters in Lane's book and who is often quoted by those who believe in "autointoxication," the luxurious flora of the colon is a protective and useful mechanism in that it insures the rapid breaking down of amino-acids or other nitrogenous substances "into relatively innocuous bodies such as phenol, ammonia, water, carbon dioxide and hydrogen." To this list he adds later indolacetic acid, indoxyl and indol.¹⁰ Mutch realizes also that in the colon there is even less chance for absorption of toxic substances than there is in the small bowel. He admits that there is no absorption demonstrable even when short circuiting changes the colon into a blind sac full of stagnating feces. We know from researches on nutrient enemata that practically nothing can be utilized besides water, salt and a little sugar.¹¹ We know also that the feces begin to harden in the ascending colon, and thereafter they undergo practically no churning movements. They tend to go forward through the remainder of the bowel like cars on a track. This fact is brought out not only by the roentgen ray, but particularly by the study of fecal masses, in which one can often see sharp lines of cleavage between residues from two different meals. Very little absorption can be expected under such circumstances. To get absorption the feces would have to be liquid and churned actively to and fro as are the contents in the jejunum.

THE EFFECTS OF STASIS

Many of the writers on autointoxication have recognized this difficulty and have struggled to evade it. Bouchard¹² felt that colonic stasis could do little harm, and he even went so far as to say that with the dying out of the bacteria in the hard, dry feces, "constipation ought to be regarded as a protection against autointoxication." He thought the poisoning was to be observed "in chronic diarrhea, in cancer of the stomach or intestine, in chronic dyspepsia and above all, in dilatation of the stomach. Whenever he could get splash sounds in a woman's stomach he ascribed all the symptoms or pathologic findings she had to "autointoxication." Since then, of course, the roentgen ray has shown us that the stomach rarely retains its contents long enough for any fermentation or absorption of toxins.

8. Distaso: *Centralbl. f. Bakt.*, orig. 59:48, 1911; 75:507, 1915.

9. Mutch: *Brit. J. Surg.* 2:608, 1915.

10. Herter (*New York M. J.* 68:89, 116, 1898) showed that indol is comparatively harmless even when given to men in doses enormously greater than those ever encountered in health or disease.

11. Bywaters and Short: *Arch. f. exper. Path. u. Pharmakol.* 71:426, 1913. Edsall and Miller: *Tr. Coll. Physic.*, Philadelphia 24:225, 1902. Wynter: *Brit. M. J.* 2:1720, 1902. Adler: *Am. J. M. Sc.* 150:565, 1915.

12. Bouchard: *Lectures on Auto-Intoxication in Disease, or Self Poisoning of the Individual*, translated by Oliver, Philadelphia, 1894, p. 145.

Combe¹³ also admits that colonic stasis probably can have little effect on health, and that the stagnation and absorption must be looked for elsewhere in the tract. The roentgen ray has since shown us in thousands of constipated people that the colon is practically the only place in which stagnation does take place. In some cases there is a little delay of the contents in the last few inches of ileum, and in rare instances there is a little stagnation in the duodenum. I am willing to believe with Mutch and Lane that stagnation in the small intestine might give rise to the absorption of substances which ordinarily would be broken down in the colon or voided by the rectum. My experience makes me feel, however, that in nine out of ten cases the stagnation is not of sufficient duration to allow of much bacterial action. Moreover, any symptoms complained of by these people may be due to the chronic appendicitis which is so often the cause of the iliac stasis. I believe the duodenal stasis described by Jordan¹⁴ is produced artificially by his giving the barium shortly after a meal. I agree with other observers that duodenal stasis is rarely seen, and that it probably has little to do with autointoxication. Mutch takes refuge in the terminal ileum as about the only place in which toxic substances can be formed and absorbed. There alone do we find a few "selected bacteria not too numerous and not too versatile in their chemical potentialities." He found, in a few of the short pieces of ileum removed at operations by Lane, a bacillus which forms from histidin a substance, beta-aminazolyethylamin, which markedly lowers the blood pressure when injected into animals. From observations in fourteen cases he felt he had "proved definitely" that this substance is responsible for the low pressure seen in some cases of autointoxication. He claims that an ileocolostomy frees the urine from toxic substances absorbed from the terminal ileum, although we know now that that operation usually makes the ileac stasis much worse than before.

There are other things in Mutch's articles that make one uneasy about accepting his conclusions, and now further doubt has been cast by the work of Mellanby,¹⁵ who found that he could obtain beta-aminazo only with pure cultures of certain bacteria. Other organisms, when present, broke it down as fast as it was formed. It was not absorbed from the colon, but was rapidly destroyed there by relays of bacteria. He says the substance is such a powerful stimulant to smooth muscle that it must produce diarrhea and vomiting as soon as minute amounts are formed. He cannot believe that it has anything to do with constipation; nothing short of a mechanical obstruction would keep the bowel from voiding it immediately. If beta-aminazo has any clinical significance he thinks it is in the vomiting and diarrhea of children!

NEED FOR SCRUTINIZING RESEARCH REPORTS

I have gone into the subject thus at length to show how carefully we must study the reports of research workers before we quote them in support of a favorite theory. Some of my friends who believe that auto-intoxication produces high blood pressure say, "Hasn't some one found a pressor substance in the intestine?" I believe not. Dale and Dixon have suggested that three amines closely related structurally to

13. Combe: *Intestinal Autointoxication*, London, 1908, p. 111.

14. Jordan: *Arch. Roentg. Ray* 18:231, 1913. Alvarez, W. C.: *The Motor Functions of the Intestine from a New Point of View*, J. A. M. A. 65:390 (July 31) 1915, Note 41.

15. Mellanby: *Quart. J. Med.* 9:164, 1916.

epinephrin may be formed from protein during intestinal putrefaction. One of these substances, parahydroxyphenylethylamin, has much to do with the pharmacologic actions of ergot. It seems to me unlikely that these substances have anything to do with hypertension as we see it in practice. If they were responsible for the increased pressure we would expect it to drop to normal after purgation or during periods of normal intestinal activity. Such, I feel certain, is not the case. Moreover, Dale and Dixon found that these drugs when given repeatedly soon lose their effect, whereas we know that hypertension tends to become progressively worse. Mutch has suggested indolethylamin as the cause of hypertension, but Laidlaw and Ewins have found that it is destroyed in the liver before it can do any damage.¹⁶

Friends have pointed also to the work of Whipple on the proteose intoxication from closed loops of intestine. They have said, "How about that? There you have a toxin formed during stasis." If they had read the articles referred to they would have found that Whipple's work does not favor their theory. The toxin is not formed in the colon at all and very slowly in the lower ileum. Dogs with closed loops of ileum or colon may live long in perfect health. Moreover, the substance is not absorbed from the lumen of the intestine, but from the mucosa where it is formed.

The cure for all this is more reading, and particularly reading of the original articles. Many who now look up to Bouchard, Combe, Metchnikoff and Lane as great masters to be revered would be cured of their belief in "autotoxemia" if they would only read the hodgepodge books these men have written on the subject. Whenever I look into them I am reminded of the boy who had to write a composition on the horse. He began by remarking that the horse looks very much like the cow, and continued with a long description of the latter animal. Bouchard¹² rambles on about uremia, typhoid, diabetic coma, crude experiments to show the toxicity of urine, etc. Combe's carelessly written and pseudoscientific work¹³ reveals a children's specialist who has become so used to ascribing the many symptoms of his little patients to the bacterial decomposition of food in their intestines that he cannot keep from looking at adults in the same way. We must remember that, as compared with the infant's digestive tract, the adult's is very much less sensitive in every way, and the mucosa apparently much less permeable to toxins and bacteria. Moreover, the acute upsets of the infant with diarrhea, vomiting, fever and rapid wasting are very different from the chronic constipation, headache and nervousness of the adult. Many of Combe's ideas as to autointoxication in infants may be correct, but he has no right to talk about babies in one breath and adults in the next, as if there were no difference between them. One must object, moreover, to his reliance on the old worthless experiments in which urine and feces from the supposed victims of "auto-intoxication" were injected into the veins of rabbits.

We know now that Metchnikoff¹⁷ was wrong about his lactic acid bacilli, and that they do not even survive in the colon; much less do they replace other forms.¹⁸ It seems likely from recent work that the

earlier writers, with their imperfect cultural methods, fed one bacterium by mouth and recovered another closely related saprophyte from the stools.¹⁹ Most of the patients who come to me with intestinal troubles have already been thoroughly dosed with fermented milk, and I cannot see that it does them much good. Occasionally it helps because of its laxative properties, or perhaps on account of the lactose which favors the growth of a nonproteolytic flora in the bowel.

Half of the space in Lane's book on intestinal stasis²⁰ is taken up with some old articles of his on bone and joint deformities. He believes that these things throw light on the formation of bands and membranes in the abdomen; but the recent findings of anatomists and embryologists are all against him. It appears now that these bands are not due to the sagging of overloaded colons or to chronic infection, but to congenital defects in the rotation of the bowel and in the cleavage of peritoneal layers.²¹ They are just as common in fetuses and infants as in adults. We have learned that kinks are normal features of the bowel; that adhesions often do no harm, and that enteroptosis is normal and innocuous in a large proportion of men and women. Lane's operations have also been discredited. We know that an ileosigmoidostomy does more harm than good, and that the colon is not a useless organ that can easily be removed.

We see from all this that although there are many clinical facts which strongly suggest that poisons are absorbed from the digestive tract during constipation, we have as yet very little actual proof for this assumption. It is far easier to believe that toxins are absorbed in the presence of diarrhea, dysentery, typhoid or the gastro-enteritis of children. In some of these conditions, however, the toxic symptoms may be due not only to chemical substances, but also to the actual invasion of the mesenteric lymph nodes and blood by bacteria.²² Schloss²³ has just shown also that the poisoning in children with vomiting and diarrhea is often uremic in nature. Dehydration leads to imperfect excretion and also to a rise in the nonprotein nitrogen of the blood.

SYMPTOMS NOT DUE TO TOXINS

I wish now to limit the discussion sharply to a certain type of case in which I can say confidently that the symptoms are not due to the absorption of any toxin. These are the people who come in complaining of a constipation which they feel sure is undermining their health and keeping them from a full use of their faculties. I am sure there is nothing imaginary about their symptoms, which certainly can be very annoying. The principal one is often a mental haziness, a "dopiness," or a feeling of having been drugged. In addition, they may have malaise, headache, spots before their eyes, a coated tongue and a poor appetite. Now, although I have already pointed to some of the things which make me slow to accept the doctrine of "auto-intoxication," there is one fact which alone would convince me that the symptoms complained of by these

19. Ráhe: *J. Infect. Dis.* **16**:210, 1915.

20. Lane: *The Operative Treatment of Chronic Intestinal Stasis*, London, 1915.

21. Harvey: *Ann. Surg.* **67**:641 (June) 1918. Flint: *Bull. Johns Hopkins Hosp.* **23**:302, 1912. Eisendrath and Schnoor: *Ann. Surg.* **60**:622, 1914.

22. Alvarez: *Surg., Gynec. & Obst.* **26**:651 (June) 1918. Woolley: *J. Lab. & Clin. Med.* **1**:49, 1915.

23. Schloss, O. M.: *Intestinal Intoxication in Infants: The Importance of Impaired Renal Function*, *Am. J. Dis. Child.* **15**:165 (March) 1918.

16. Mutch: *Quart. J. Med.* **7**:448, 1914. Dale and Dixon: *J. Physio.* **39**:25, 1909.

17. Metchnikoff: *The Prolongation of Life*, New York, 1908.

18. Hull and Rettger: *J. Bacteriol.* **2**:47, 1917. Herter and Kendall: *J. Biol. Chem.* **5**:293, 1908. Einhorn, Wood and Züblin: *Arch. f. Verdauungsgr.* **16**:300, 1910.

people are not due to the absorption of toxins. On being questioned, they practically all admit that these symptoms are relieved instantly by a bowel movement. My attention was drawn to this point years ago by a friend who worked in an adjoining office. He would often say to me, "It's no use; my brain is in a muddle; I am dizzy and my head aches so I cannot see; I will quit for the afternoon and go home." Ten minutes later he would return, perhaps whistling cheerfully, and would remark on the fact that an unhelped for bowel movement had promptly relieved him of his discomforts. I could go on to quote scores of such cases; cases which I am sure would convince any physiologic chemist that the symptoms were not due to circulating toxins. He would know that in that case relief would not follow immediately after removal of the source of the poison but later, when sufficient excretion had taken place to lower greatly the concentration of the substance already in the blood. We know that with normal kidneys a man will take two hours to get rid of perhaps 65 per cent. of a dose of phenol-sulphonaphthalein injected into his muscles. The layman appreciates this point best when he is reminded that after eating asparagus it takes him from twelve to fifteen hours to excrete most of the aromatic substance that is noticeable in the urine. A search through the literature shows that several men have commented on this sudden relief from symptoms and have recognized the impossibility of dragging in a chemical theory to explain them.²⁴

EFFECT OF DISTENTION OF THE LOWER BOWEL

But if these symptoms are not produced by toxins, what are they due to? I feel sure that they are caused by the mechanical distention and irritation of the lower bowel by the fecal masses. Perhaps the best proof of this assumption is to be found in the observation made by my friend Dr. Saxton T. Pope that in these people the classical symptoms of "auto-intoxication" can be produced by inserting a cotton tampon into the rectum. I have since observed the same thing with masses of barium and with cacao butter suppositories. One woman experimented on was so upset by the presence of a suppository in her rectum that she dug it out with the handle of a spoon. She often had to do the same with small fecal masses, which nearly drove her crazy. Years ago, Leube²⁵ found that the pressure of his finger in the rectum was sufficient to produce typical symptoms in some of his patients. Zimmermann²⁶ found also that the rectum is exceedingly sensitive to pressure. Changes of from 2 to 3 mm. of mercury were perceived, and a rise of from 20 to 60 mm. caused distress.

The trouble with these people who complain of "auto-intoxication" is that they are unduly sensitive and keenly aware of what is going on in their bodies. I often ask such women if they could do any mental work with a flea crawling on them. They generally answer, "Certainly not. I would have to stop everything and get rid of it." Similarly, I know business men who will drop everything at the office and rush home to take an enema. It is this sensitiveness which

distinguishes these people from those who are not worried or upset when their bowels fail to move.

There should be no difficulty in accepting these views when we remember how profoundly sensory impulses from our digestive tracts can influence our emotions, our mental processes and our vasomotor balance. Thus the sleepiness and mental hebetude which worry the "auto-intoxicated" are experienced by many people after dinner. We do not ascribe that to the absorption of poisons. It may be due to the absorption of food, but some observations on a man with a jejunal fistula made me think that it may be due solely to the distention and the increased activity of the bowel. I was led to this conclusion by the fact that the man would go to sleep when the intestine was made to contract actively on a small balloon inserted through the fistula. We know too that active intestinal contractions can slow the pulse and sometimes produce sweating.²⁷ They seem also to have something to do with dreams and nightmares. Similarly, hunger with its powerful gastric contractions can put a stop to all mental work and can make the subject restless and irritable. Some people suffer from headache, dizziness and nausea which can be relieved instantly by the taking of food. Carlson has shown that these symptoms are intimately associated with the hunger contractions. When the contractions are taking place the knee-jerk is more active.²⁸ Dmitrenko²⁹ accelerated the respiration and pulse in dogs and raised their blood pressures by stimulating the stomach in various ways, as by distention with balloons.

The faintness, dizziness, pallor and cold sweats of nausea, sudden diarrhea and flatulent distention are all due to the vasomotor upsets observed by Carlson in his work. Any one who has ever given an anesthetic to a person with a full stomach must have marveled at the wonderful difference between the state of circulation and respiration before vomiting took place and afterward. I have been impressed at times by the great mental depression occasioned in some patients by the presence of a duodenal ulcer³⁰ or by a small fissure in the anus. Surgeons are well acquainted also with the tremendous respiratory reflex that follows dilatation of the anal ring.

We see, then, that particularly in sensitive people the brain is profoundly influenced by afferent impulses coming from a distended, overactive or wrongly acting bowel. The effects follow so closely on the appearance and disappearance of the stimulus that we cannot drag in a cumbersome and roundabout chemical mechanism to explain them; they must be produced directly through the nervous system.

As I have pointed out in another paper,³¹ many of the symptoms of constipation are due simply to the plugging of the lower end of the canal, which slows or stops the downward current and often produces ripples of reverse peristalsis. The food cannot go downward, so the bowel tries to refuse it admittance or sends it back again. Thus, intelligent people have told me how

27. Mathieu: Colon Reaction Syndrome, Arch. d. mal. d. l'app. digestiv 7:676, 1913.

28. Carlson: Am. J. Physiol. 31:318, 1913; 36:169, 1915; 45:144, 1918. Rogers: Ibid. 41:555, 1916. Brunemeier and Carlson: Ibid. 36:194, 1915.

29. Dmitrenko: Inaug. Diss., Odessa, 1916, p. 312, quoted from Physiol. Abstr. 2:30, 1917. Meltzer, New York M. J. 61:749, 1895. Muns: Proc. Soc. f. Exper. Biol. and Med. 12:87, 1915. Miller: Am. J. Physiol. 37:240, 1915.

30. Von Bergmann: Berl. klin. Wchnschr. 50:2374, 1913. Westphal and Katsch: Mitt. a. d. Grenzgeb. d. Med. u. Chir. 26:391, 1913.

31. Alvarez, W. C.: The Syndrome of Mild Reverse Peristalsis, J. A. M. A. 69:2018 (Dec. 15) 1917.

24. Hertz: Constipation and Allied Disorders, London, 1909, p. 164. Cabot: Differential Diagnosis, Ed. 3, 1:35, 1915. Hewlett: Functional Pathology of Internal Diseases, 1916, p. 198. Roberts, Dudley, in Discussion on Chronic Constipation, abstr. J. A. M. A. 69:1518 (Nov. 3) 1917.

25. Leube: Deutsch. Arch. f. klin. Med. 36:323, 1885.
26. Zimmermann: Mitt. a. d. Grenzgeb. d. Med. u. Chir. 20:445, 1909.

the removal of the rectal plug has often given them immediate relief from regurgitation and belching. I believe that the distended and active colon sends off ripples which run up the bowel and break into deeper waves in the upper part of the stomach and esophagus. These waves can carry more than the usual amount of bile back into the stomach and up into the mouth and give rise to the term "biliousness." They account also for the lack of appetite and the feeling of fulness after eating a few mouthfuls. It has been shown that they deposit gastric and perhaps intestinal contents on the back of the tongue, and in that way give rise to the coat on that organ, the bad taste and the bad breath. The relief obtained by taking calomel is not due to any hypothetic action on the liver, but, I believe, to a restoration of the normal downward currents.

OTHER CAUSES OF SYMPTOMS

One must always make sure in any particular case that the symptoms complained of are really due to constipation and not to cardiovascular disease, tuberculosis or something else. A careful history often shows that overwork, worry and lack of sleep give rise to the symptoms and finally to the constipation. I have in another paper³² given some of my reasons for believing that nervousness is generally the cause and not the result of constipation.

Although attacks of migraine, scintillating scotoma, dizziness, etc., may often be associated with constipation and sometimes warded off by purgation, many of my patients who have been induced to keep careful records have found that the attacks were really just as frequent when their bowels were well cleared or working normally. Many of them have discovered also that the spells are likely to come more frequently after periods of fatigue, excitement, worry and the loss of sleep. A number of these people have returned after months or years to tell me that the constipation was gone and the symptoms no better. Others remember that they had the symptoms during childhood when their bowels moved perfectly. It is significant that other members of the family often have the same symptoms without the constipation. Several years ago Franz³³ made a very careful metabolic study of a patient with migraine, and could find no change in the constituents of the blood during the attacks. He was forced to conclude that the disturbances arise in some part of the brain much as they do in epilepsy. I believe the gastro-intestinal upsets are secondary and comparable with those seen with brain tumors. In one of my patients attacks of petit mal sometimes take the place of his migrainous headaches. Some patients have been greatly helped by the removal of diseased appendixes. They still have the headaches, but these come less frequently and the gastro-intestinal symptoms are less marked.

In the worst of these cases of "auto-intoxication," the sufferers are undoubtedly psychopathic. I have learned to recognize the type at the first interview, and I no longer waste much time with them, as it is practically impossible to change their habits of thought. They are generally of neurotic or insane ancestry and often give a history of "nervous breakdowns" in the past. Nowadays they come in with a box full of roentgen-ray plates, and their estimate of the ability of the physician rises or falls with the number of

kinks which he can discover in them. These people want to do all the talking, and arguments make no impression on them. Artful questioning will often elicit the fact that they have from one to six movements a day, but these are not large enough; they are not shaped properly and their expulsion does not leave the desired feeling of comfort and rectal emptiness. After great and prolonged exhortation, they may promise to leave their bowels alone for forty-eight hours, but when they return they admit that they became worried and thought there would be no harm in their taking some castor oil the first night, a dose of salts in the morning and several enemas along the way.

Some of my confrères maintain that this mental aberration is due to long-continued poisoning, but I cannot believe that when I learn that these people were hypochondriacs before they became constipated. Why can we not forget the colon and glands of internal secretion long enough to let the brain have a few diseases and hereditary defects all its own? Those of us who are not alienists seem to have the idea that all crazy people are plainly insane, and all locked up in asylums. Nothing is farther from the truth, and the gastro-enterologist must constantly be on the watch for borderline cases.

In chatting with medical friends it is interesting also to learn that the same individuals, when they do happen to get over their colonic phobias, show up at the oculist with floating spots, queer failures of accommodation, unbalanced external muscles, etc. They go to the genito-urinary man for sexual troubles and "lost manhood," and to the orthopedist with hysterical joints and weak backs. These people are unending sources of income to the enthusiasts in all specialties, to the unscrupulous, the reckless operators, the osteopaths and the quacks. The honest physician who admits his failure to find anything physically wrong is discredited and soon discharged, often without payment for his trouble.

TREATMENT

Some may say now, "Well, you admit the reality of the symptoms, you admit that they are often caused by constipation and that they can be relieved by clearing the bowel—what difference does it make whether they are ascribed to auto-intoxication or to nervous agencies?" My answer is that it makes a tremendous difference. In the first place, as scientific physicians, we must seek the truth; if the facts of the case support the mechanical and nervous theory and not the chemical one, we must follow the facts. In the second place, the new idea is invaluable when it comes to treatment. The old theory produces hypochondriacs; the new explanation may set them free. Only by coming to believe in it can they regard their colonic functions as unconcernedly as does the normal man, and that is the first step toward a cure.

A case showing clearly the harmful effects of the old teaching and the helpful effects of the new came to my attention about two years ago, when a prominent business man, a big, athletic fellow, told me this story:

He had been perfectly healthy until six years before, when the fear of approaching baldness led him to consult a well-known dermatologist. The doctor told him that baldness was due sometimes to "auto-intoxication," and asked if he was constipated. He said he never had been, but this did not discourage the physician, who suggested that stasis might still be present and the bowel movements insufficient. This sounded plausible, so the patient began to take cathartics every day. Before long he was going from physician to physician in

32. Alvarez: California State J. M. 14:363, 1916.

33. Franz: The Physiological Study of a Case of Migraine, Am. J. Physiol. 19:14, 1907.

search of stronger purgatives. He saw a prominent internist who found what he thought were pronounced abnormalities in the colon and gave a gloomy prognosis. Later he went to a well known surgeon, who promised to cure him by removing his appendix. There never had been any symptoms referable to that organ, but the patient was now desperate and ready for anything that might put a stop to an intoxication which he had been led to believe would sooner or later undermine his mental powers. The operation brought no relief, and the surgeon explained that there were so many Lane's kinks that only a colectomy would now offer any hope. It was in regard to the advisability of this procedure that he consulted me. I found him a nearly perfect specimen of humanity with as normal a digestive tract as one could wish to see. What stasis he had was in his rectum. Sunday morning when he didn't have to rush for his train, he generally had an unaided bowel movement, which was the main event in his week. I suggested that if he would leave his bowels alone he might go back again to the normal condition from whence he had started. After several hours of argument he agreed to my proposal. His bowels moved after three days of anxious waiting, and they have been moving satisfactorily ever since. His colon no longer dominates his mental processes, but has receded into the background where it belongs. He still feels the classic symptoms at times, but they do not bother him any more, because the element of fear is gone. Now that he knows that no harm is being done to his body, he is perfectly willing to leave his colon to its own devices. Many others who have been cured in the same way tell me that it was only this fear that made them act so foolishly about their bowels.

Such cures can be obtained only with intelligent, well-balanced people who can follow an argument, stick to a course of action and, if necessary, suffer a little discomfort before attaining their end. If after a thorough trial it appears that the bowels will not move spontaneously without occasioning too much distress, the patient may use liquid petrolatum, agar or stewed fruit. Many of these people have such irritable, spastic colons that they cannot be helped at all if they continue to use bran and other coarse foods. These substances upset digestion and lead to the formation of gas. If an extra stimulus is essential, as it seems to be in some people, I am sure it is preferable, unless the patient has the digestion of an ostrich, to give a mild chemical stimulus rather than a rough mechanical one. I cannot understand why some physicians warn their patients against enemas. It seems a shame to upset 24 feet of intestine with a purgative when the material to be removed is in the rectum or sigmoid within easy reach of a little water.

These "auto-intoxicated" people are often so anxious to find a royal road to recovery that they are ready to be operated on by any surgeon who will promise a prompt and complete cure. My experience has taught me to avoid operations on such patients even when the roentgen ray shows the presence of distinct abnormalities. They are so sensitive that the surgeon can hardly leave the abdomen in such perfect condition that they cannot continue to feel something.

SUMMARY

"Auto-intoxication" is commonly diagnosed when a physical examination would show other more definite causes for the symptoms. Those who believe that intestinal stasis can account for a long list of disease conditions have little proof to offer for their views. Many of the assumptions on which they rest their case have been proved to be wrong.

The usual symptoms of the constipated disappear so promptly after a bowel movement that they cannot

be due to absorbed toxins. They must be produced mechanically by distention and irritation of the colon. They occur in nervous, sensitive people. It has been shown that various activities of the digestive tract can profoundly affect the sensorium and the vasomotor nerves. The old ideas of insidious poisoning lead to the formation of hypochondriacs: the new explanation helps to cure many of them.

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COMPARATIVE RESULTS OBTAINED IN THE TREATMENT OF PULMO- NARY TUBERCULOSIS

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I. BY GRADUATED LABOR, AS EMPLOYED AT THE BROMPTON HOSPITAL SANATORIUM AT FRIMLEY, ENGLAND

The treatment of pulmonary tuberculosis by graduated labor has been systematically carried out at Frimley, England, for a number of years, and this method of treatment has had considerable influence on a number of lung specialists in this country. Dr. Marcus Paterson was in charge of the sanatorium at Frimley during the early years of its existence, and it is largely due to his work and writings that graduated labor has been used in England and America. Of the patients treated at Frimley, a great majority first passed through the wards of the Brompton Hospital in London, whence, if found suitable after a period of observation, they were drafted on to the sanatorium. They were not chosen at random; still less was every case of pulmonary tuberculosis at Brompton passed on in turn; on the contrary, the cases were carefully selected, only those patients being chosen who were free from fever or other constitutional symptoms, who possessed considerable vitality, and who had begun to show signs of improvement. So far as possible, also, patients with signs of limited disease were preferred, although it was soon found that patients with extensive disease, but of a quiescent type, often did remarkably well.

I was struck with two prominent facts while reading Paterson's book.¹ The first was that he paid more attention to the physical condition of his patient than he did to the foci of disease. He repeatedly emphasizes the fact that the physical condition is of much greater importance than an examination of the lungs. The second fact was the great importance he placed on the auto-inoculations that were obtained from exercise and work. These two facts are absolutely opposed to my interpretation of the modern method of treating pulmonary tuberculosis. In my judgment, a physical examination of the lungs is the only sure way that one can get a knowledge as to how the foci of disease are acting. It is a common occurrence to have patients consult us who are in good muscular physical condition and at work, and yet we find a slowly progressing disease. It is impossible to know how the disease is acting without a careful physical examination of the lungs. My principal object in treatment is to treat the foci of disease, but not to neglect but also treat the general physical condition. My chief aim is to change an open into a closed tuberculosis or an active into an inactive one. I believe

1. Paterson, Marcus: *Auto-Inoculation in Pulmonary Tuberculosis*, London, James Nisbet & Co., 1911.