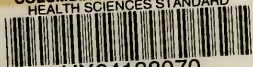


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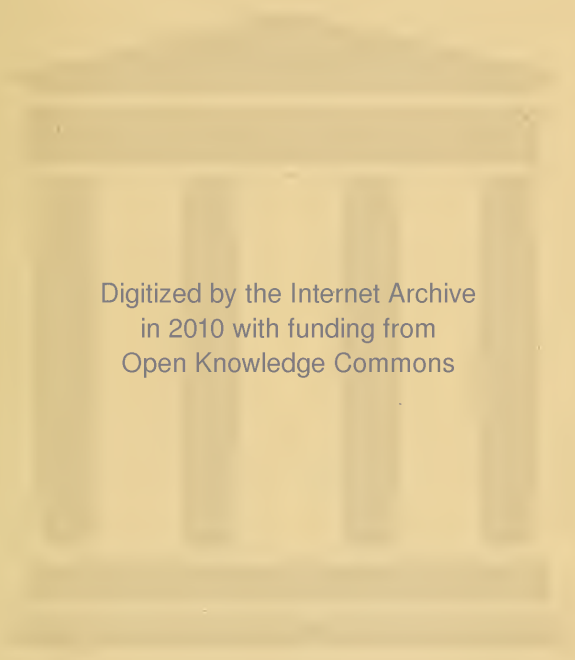
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## Colon Hygiene





# Colon Hygiene

Comprising New and Important Facts Concerning the Physiology of the Colon and an Account of Practical and Successful Methods of Combating Intestinal Inactivity and Toxemia

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*Superintendent of the Battle Creek Sanitarium; Author of "Neurasthenia, Its Causes and Cure," "Rational Hydrotherapy," "The Art of Massage," "Light Therapeutics," etc.*

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Twenty-eighth Thousand

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## Preface

That most despised and neglected portion of the body, the colon, has in recent years been made the subject of much scientific study and research, with the result that a lively controversy has been stirred up over the question as to whether this organ should be permitted to remain a part of the "human form divine," or whether it should be cast out as worse than useless and unworthy of a place in the anatomy of the modern *genus homo*.

Anatomists have declared the colon to be a useless appendage, a vestigial remnant left over from a prehistoric state. Bacteriologists have charged it with being an incubating chamber of poison-forming germs, a hold of unclean and hateful parasites, a veritable Pandora's box of disease and degeneracy. Surgeons have removed the offending organ, and thus proved that it may be dispensed with, and have claimed wonderful advantages from this abbreviation of the *primæ viæ*.

Barclay Smith, the great English anatomist, first suggested the uselessness of the colon. Metchnikoff proved that animals that possess the longest colons have the shortest lives, and announced that the colon bacillus is the germ of old age. Sir William Arbuthnot Lane, the eminent London surgeon, cites a long list of grave maladies, ranging

from tuberculosis to rheumatism, cured by removal of this offending organ.

The war still wages. There are pro-colon partisans as well as anti-colon enthusiasts. One thing is certain, however, the colon can no longer be ignored. That this organ, or rather the morbid conditions that develop in it, plays a dominant role in the causation of a long list of the gravest and most common disorders, can no longer be denied.

In the treatment of every chronic disease, and most acute maladies, the colon must be reckoned with. That the average colon, in civilized communities, is in a desperately depraved and dangerous condition, can no longer be doubted. The colon must either be removed or reformed. From the beginning of the colon controversy and for many years before, the writer has been a very earnest student of the questions involved, and has formed very definite opinions, the validity of which he, together with his colleagues of the faculty of the Battle Creek Sanitarium, has had opportunity to test in the treatment of many thousands of sufferers from colon and colon-caused maladies. The writer believes that methods have been worked out by means of which the colon may be reformed and made to do its work efficiently, not only in ordinary cases, but in by far the great majority of those cases which are thought by enthusiastic colon surgeons to be suitable subjects for surgical treatment.

Until very recent years almost nothing has been known of the physiology of the colon. This part of the body has been almost a *terra incognita*. The physiology of digestion stopped at the ileocecal valve. How the colon dealt with its contents, how the very necessary act of defecation was performed, nobody knew. The discovery of the X-ray enabled Cannon and, later, Hertz to study the colon while in action in animals and man. Elliot, Keith, and other anatomists studied the intestine in dogs, and finally Case, by perfecting the X-ray technic of colon examinations, completed the physiologic study of this previously neglected organ. The combined result of the extensive labors of these investigators has been a great flood of light upon some of the most obscure questions in physiology. These new facts, not yet known to the general public, have rendered the greatest service in the development of rational methods of dealing with that most common and most destructive disease of civilized peoples—constipation. The chief purpose of this work is to present in a popular way these new facts and the practical results to which they have led.

Forty years' experience and observation in dealing with chronic invalids, and careful study of the results of the modern X-ray investigations of the colon, together with observations made at the operating table in many hundreds of cases, has convinced the writer—

1. That constipation with its consequences is the result of the unnatural habits in relation to diet and colon hygiene which prevail among civilized people.

2. That patients are not constipated on general principles, but that there exists in every case of constipation some particular condition which is the immediate cause of the delayed intestinal movement, and which must be removed before definite relief can be obtained, and that in the great majority of cases this cause is mechanical in character, a fold, a kink, a redundancy, a contraction—in short, some real and tangible obstruction.

3. That practically every case of constipation is curable, and in all but exceptional cases without the aid of surgery. It must be added, however, that by cure is not meant the working of such a miracle that the colon will perform its function normally without attention to diet or other means which encourage colon activity, but rather that by observing certain rules and the faithful and continuous use of safe and simple means, the colon may be made to perform its functions in a regular and efficient manner, without the use of irritating laxative drugs.

If some of our recommendations at first impress the reader unfavorably, we ask only that judgment be suspended until the suggestion has been given a fair test in actual experiment. Every measure presented has been tested in the crucible

of actual experience in hundreds of cases, and is the result of a long series of practical tests made for the purpose of determining the actual value of individual remedies and perfecting practical methods of relief.

If the reader misses the usual list of laxative drugs, old and new, the reason is simply that the writer regards all medicinal agents that force bowel action by irritation (wrongly termed "stimulation") as pernicious and, without exception, harmful, and to be used only as temporary or emergency measures. In the words of the eminent Professor Von Noorden, "Nothing is so bad as the chronic use of laxative drugs."

The reader is asked especially to note that no panacea is offered for colon miseries; there is no "cure all" for constipation. The way out of the slough of intestinal toxemia with its "biliousness," headaches, neurasthenias, and multitudinous maladies, is to be found only through living biologically, and making use of the "safe and sane" helps which recent scientific progress has provided.

In attempting to put into semi-popular form the scientific facts pertaining to the hygiene of the colon, the writer does not desire to convey the impression that the sufferer from severe constipation can safely undertake to act as his own physician. The purpose is rather to enable the patient who may read this work to cooperate intelligently with the wise up-to-date physician.

The reader's attention is especially called to the chapter on "The Bowel Habits of Uncivilized Man," which contains a fund of original information obtained at the cost of much effort, which is both highly interesting and instructive. The author desires here to acknowledge his obligations to some hundreds of medical colleagues who have devoted their lives to the noble work of carrying to heathen lands the blessings of modern scientific medicine and Christian civilization, and who have found time in the midst of their arduous labors to answer the questionnaire and thus furnished the unique information presented in this chapter.

## PREFACE TO FOURTH EDITION

### REVISED AND ENLARGED

The writer has made a few important additions in this edition of "Colon Hygiene." The author also desires to express his gratitude for the very kindly reception which the book has received and the hope that the revisions made in this fourth edition will render the volume still more useful and acceptable to those of the great army of sufferers from chronic ailments into whose hands the work may fall.



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## The Colon

Ignoring technical anatomical details the food canal may be described as a muscular tube about ten times the length of the body, measuring the trunk from the top of the head to the end of the spinal column. The chief part is coiled up in the lower cavity of the trunk, below the diaphragm. The upper end of the canal is controlled by the circular muscle of the lips, which is brought strongly into play in whistling. The lower end is controlled by the anus, also a voluntary circular muscle. At other points along the canal, circular muscles are placed to regulate the movements of the foodstuffs during the process of digestion. Both in health and disease these "food gates," as they may be called, have a most important relation to digestion that has not been fully appreciated until very recent times.

The upper end of the food tube is provided with a special apparatus, the mouth and teeth, for taking in food and preparing it to undergo the various processes which are carried on in the deeper parts. At the lower end of the canal is found a mechanism that is wonderfully designed to receive and discharge from the body the unused remnants of the food and other waste materials—the pelvic colon. Of this we shall learn more later. v

### The Structure of the Food Tube

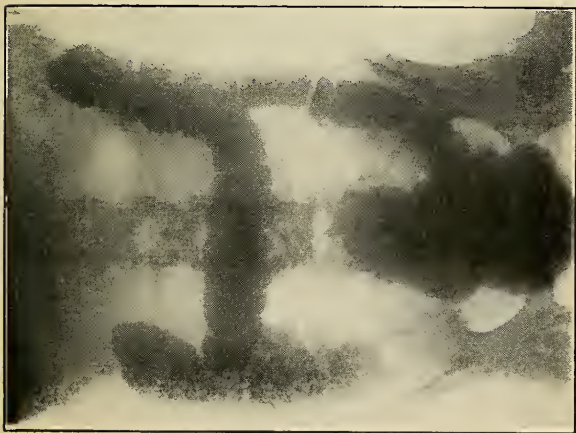
In structure, the food tube consists chiefly of muscle and gland tissue. There are two sets of muscle fibres. One set, the outer, runs lengthwise of the canal; an inner, circular muscle structure, surrounds the canal throughout its entire length.

Between the muscle layers is a layer of nerve cells and fibres. These are connected with the central nervous system, the brain and spinal cord, but are capable of acting independently.

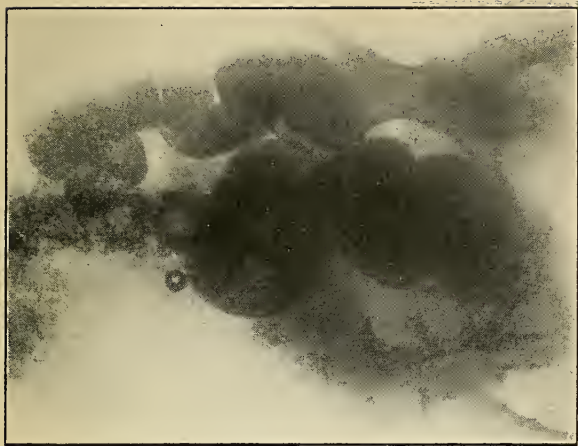
The food canal is lined with mucous membrane, which presents at various points special groups of glands that produce some of the various digestive juices which act upon the food. The canal is covered through most of its course with a delicate membrane, the peritoneum.

The food tube is roughly divided into six parts—the mouth, œsophagus, stomach, small intestine, colon and rectum. The intestine is attached to the spine by a membrane, the mesentery, in which pass the nerves and blood vessels which supply the canal.

The colon may roughly be described as a muscular reservoir about five feet in length and an inch and a half to three inches in diameter. This reservoir is divided into four secondary reservoirs, the cecum, the transverse colon, the pelvic colon, and the rectum. The feces, in their preparation for discharge from the body, are passed successively from one to the other of these reservoirs, pausing

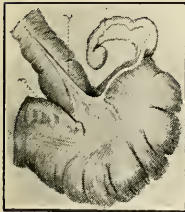


A Normal Colon

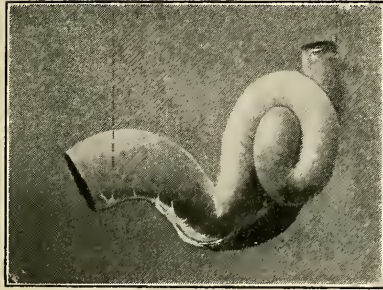


Radiogram Showing Removal of First Half of Colon

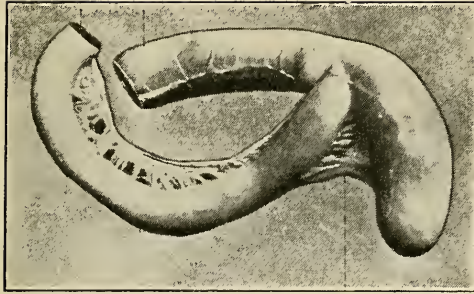




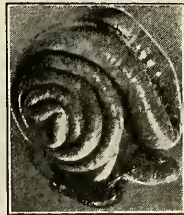
Cecum and Appendix of  
a Chimpanzee



Cecum of a Dog



Cecum of an Opossum



Colon of a Japanese  
Deer





for a definite interval in each, with the exception of the last.

### Normal Position of the Colon

When in its normal position, the colon begins at the lower right hand section of the abdominal cavity; its head, a pouch much broader than the rest of the colon, lies in the hollow of the right iliac bone. This is the cecum. The small intestine joins the cecum about an inch and a half above its lower part, leaving a pocket, at the bottom of which is attached the appendix.

From the cecum the intestine ascends along the right side of the abdomen to the liver. This portion is the ascending colon. At the liver a rather sharp turn is made toward the left, the hepatic flexure.

From this point the colon passes across the body above the umbilicus, sloping upward toward the left side, where it lies in close contact with the spleen. This section is the transverse colon.

At the spleen the intestine makes a short turn, the splenic flexure, then passes downward along the left border of the abdominal cavity to the hip bone (crest of the ileum). This is the descending colon.

Passing obliquely across the hollow surface of the left iliac bone, the large intestine, here called the iliac colon, reaches the upper border of the pelvic cavity. Here it forms a loop, the pelvic

colon, which has an average length of a foot and a half, but which varies in length from six inches to nearly three feet (in conditions of disease). The pelvic colon and iliac colon together form the sigmoid. The lower end of the pelvic colon joins the terminal portion of the intestine, the rectum, opposite the middle of the sacrum. The pelvic colon varies in position according as it is empty or filled. When empty, it falls over backward into the pelvis, and lies upon the upper part of the rectum. When it is in this position, a very pronounced fold is formed at the junction with the rectum, the pelvi-rectal fold, a factor in controlling bowel movements. When the pelvic loop is full, it rises and thus gradually obliterates the fold and so opens the passage to the rectum.

The rectum extends from the pelvi-rectal fold to the internal anal sphincter, being about six inches in length. In its upper part are two or three projecting folds of membrane known as Houston's valves.

The thicker muscular walls of the rectum are ordinarily contracted so that no cavity exists in the upper part, although some gas and often (in cases of disease) a considerable amount of fecal matter may be found in the lower part.

The distance between the internal and external sphincter is about one inch. This is the anal canal, which is always tightly closed except during defecation.



Ileocecal Valve of a Conger Eel.  
A. Ileum; B. ileocecal Valve; C. Colon.



Just above the internal anal sphincter is found a series of raised points or papillæ, first described by Horner of Philadelphia many years ago. These papillæ are the terminal points of special nerves which when excited cause powerful contraction of the colon and the abdominal muscles and diaphragm, and at the same time a complete relaxation of the anal sphincter.

Here are also a number of shallow pockets in the mucous membrane, the follicles of Horner, whose function is to secrete a lubricating mucus. Both follicles and papillæ sometimes become inflamed and a source of pain.

Behind the rectum are located two muscles which act an important part in defecation, the levator ani muscles. In contracting, these muscles pull the anus upward and compress the rectum, and so squeeze out the last particles of fecal matter, leaving the rectum completely empty.

The small intestine is a smooth tube of uniform size, but the large intestine is sacculated. By a thickening of its muscular structures at intervals shallow pouches are formed in its sides. Along the outer surface of the colon run thick bands of muscle tissue which act in defecation like gathering strings. In contracting, these bands draw the lateral pouches together, so as to empty them of their contents. These sacs or pouches are well shown in the accompanying stereoradiogram, a rare view of the colon.

All parts of the large intestine, including the rectum, are supplied with two sets of nerves, one of which stimulates its muscles to contract, while the other exercises an opposite influence.

In the accompanying plates will be seen representations of the colons of different animals. It is especially interesting to note the close relation between the form of the colon and the character of the food in various classes of animals. In flesh-eating animals the colon is always short; in vegetable eaters it is long as compared with the body length.

## The Physiology of the Colon

The function of the colon is largely that of a receptacle for unusable and waste matters, a sort of human garbage box. On this account, perhaps, this part of the food tube has been habitually neglected. It has been regarded as of little consequence. But modern studies of this part of the intestine have shown that by neglect this temporary reservoir of wastes may become a veritable breeding place of miseries and maladies almost too numerous to mention. So many and so serious are the disorders of mind and body which are now traceable to this part of the food tube, that not a few eminent surgeons have advocated and practiced the actual removal of the colon in cases of chronic disease of various sorts, and in many instances with surprisingly good results.

Professor Metchnikoff, of the Pasteur Institute, Paris, Dr. Arbuthnot Lane, head surgeon of Guy's Hospital, London, Dr. Barclay Smith, and numerous other scientific men, eminent bacteriologists, physiologists, anatomists and surgeons, have even announced the belief that the colon is a useless and often dangerous structure and that it may be advantageously dispensed with.

The writer does not accept this view, but holds with Professor Keith, the eminent English anatomist, that the evils attributed to the colon are really

due to the adoption by man of a dietary unsuited to his anatomy. All vegetable-eating animals have long colons, as has man. The presumption is that a vegetable diet requires a long colon. Meat-eating animals, as the dog, have short colons. The frog while in the tadpole state is a vegetable feeder and has a very long colon. The adult frog feeds upon flesh and has a very short colon.

### **The Wrong Use to Which We Put the Colon**

The trouble with the civilized colon is not that it is too long, but that it is put to a wrong use. Civilized man has adopted the dog's diet while having the colon of the chimpanzee. It may be admitted that if a man is to feed on the diet of the dog he ought to have his colon abbreviated. This is, in fact, the only way in which he could avoid a dangerous biologic misfit.

It is hardly to be supposed, however, that Nature has made so grave an error as to give to man an organ which is not only a useless appendage, but at the same time a prolific source of mischief. It seems more rational to believe that if the colon, an organ useful under normal conditions of life, is found to be so great a source of mischief in our civilized life, it is because of abnormal and pernicious habits or other influences connected with the life of the average civilized man.

The remedy is to be sought then, not in the



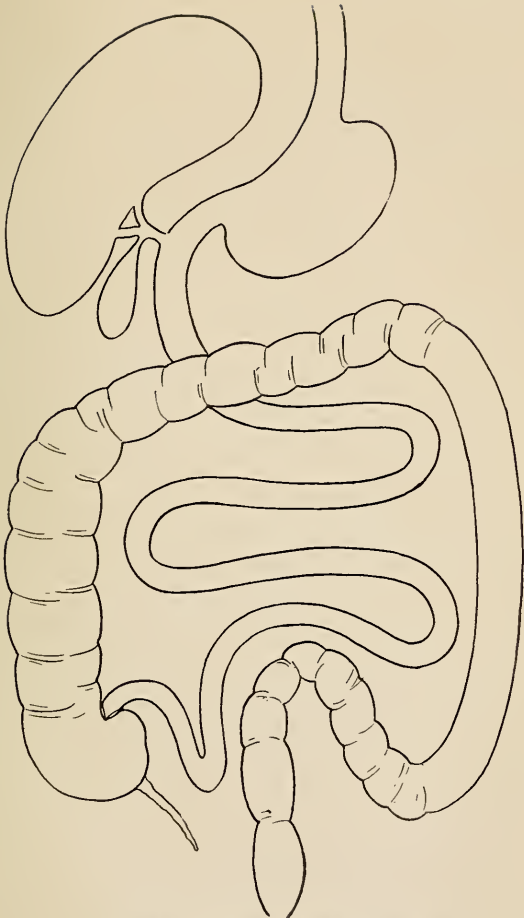


Diagram Showing Normal Colon and  
Ileocecal Valve



extirpation of a portion of the body, but in a correction of those habits of life in which there has been a departure from the condition normal to the human species, and a return to practices and conditions which are physiologically and biologically correct for the *genus homo*.

### The First Function of the Colon

One important function of the colon is to receive and to discharge from the body the unusable residue of foodstuffs. If these foodstuffs are of such a nature that they readily undergo putrefaction, as do meats of all sorts, the colon contents will become highly putrescent, offensive and poisonous, while still in the body. A non-putrefying vegetable diet on the other hand furnishes a residue which cannot putrefy, but ferments, forming harmless acids which aid bowel action. Hence the colon is not out-of-date, as its critics have suggested, but is only made to appear as a misfit by the adoption of a diet which belongs to short-colon animals. This view maintained for many years by all advocates of the biologic diet is so eminently reasonable that it cannot fail to be accorded due recognition since it is now supported by so eminent an authority as the world-famous anatomist, Professor Keith, of England.

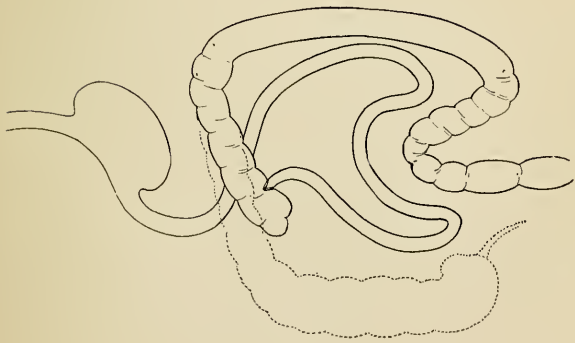
Another important function of the alimentary canal, one which is quite distinct from its function

as a digestive apparatus, is its excretory function. The intestine is the outlet of the bile, from fifteen to twenty ounces being poured into the upper end of the small intestine every twenty-four hours. The bile is the most poisonous of all the bodily secretions, being, according to Bouchard, six times as poisonous as urine. It is through the bile that the body rids itself of alkaline wastes, some of which are highly poisonous in character.

Another fact of very great importance is that the intestine is itself an excretory organ. Certain poisons are excreted by the stomach, others find their way out of the blood through the walls of the gall-bladder and the small intestines.

The colon forms a receptacle for all these waste and excretory substances, together with the unusable or undigested residues of the food. But the collection of these waste matters is only an incidental function of the colon, its really important function being to conduct these waste and unusable matters out of the body.

The food normally enters the first part of the colon, or the cecum, in a nearly fluid state, its composition being ninety per cent water, and only one-tenth solid matter. During the passage of the foodstuffs through the twenty-two feet of small intestine, the digestible starches, fats, and proteins are rendered soluble by the digestive fluids, and are practically completely absorbed. The solid parts left consist almost entirely of indigestible remnants



Half of Colon Removed

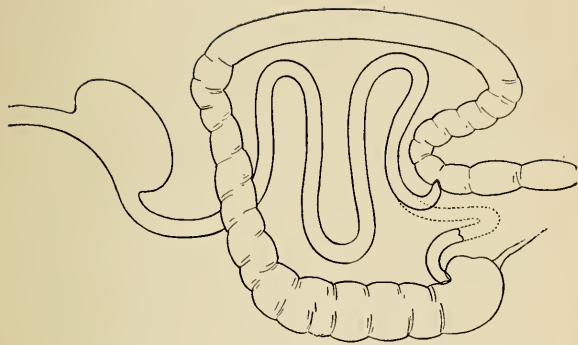


Diagram of "Short-Circuiting" Operation



of foods, waste products excreted by the liver and the intestinal mucous membrane and microbes which are produced in great numbers in the lower part of the small intestine as well as in the colon. The small intestine is not only the seat of the principal digestive processes, but is also the principal organ of absorption of the digested foodstuffs. The colon normally absorbs only about one-sixth of the water which remains in the material received from the small intestine, the amount of which is estimated at about half a pint, and practically none of the foodstuffs. The small intestine absorbs daily five or six quarts of liquids and all the products of digestion. It is, in fact, the one great avenue for the intake of nutrients, both solid and liquid.

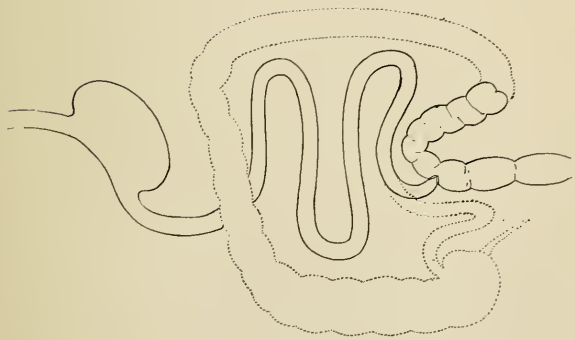
About four hours after a meal, bubbling and squirting sounds may be distinctly heard when the ear is placed over the right lower abdomen, and an hour or two later it is easy to produce splashing and gurgling sounds by intermittent pressure over the colon low down in the right side of the abdomen, showing that a considerable amount of fluid has passed from the small intestine into the cecum. It should be remembered that this is not a mere mechanical process. The fluid food does not pass by gravity from the small bowel into the large intestine as water might trickle from a pipe into a reservoir. The opening of the small intestine into the colon is controlled by a sphincter, the ileocecal valve. This circular muscle holds the food in check in the lower

part of the small intestine long enough to make sure that digestion is complete and the absorption of digested foodstuffs practically finished. In other words, the ileocecal valve is a sort of second pylorus, and serves much the same purpose.

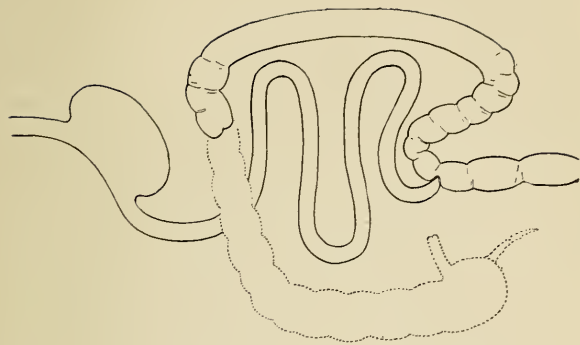
The pylorus and ileocecal gates hold back solid and imperfectly digested foodstuffs, permitting the fluid portion to pass on. In the cecum and ascending colon the food is detained by a special process, so that its fluid portion may be absorbed, thus increasing the consistency of the bowel contents. Gradually a portion of the water is taken up by the absorbents, which are very numerous in this part of the colon, and at the same time the more solid portions are pushed along toward the upper end of the ascending colon, the fluid part dropping back into the cecal pouch for absorption.

Keith, the eminent English anatomist, has recently pointed out new facts of great interest in relation to the control of the movements of the alimentary canal. Keith has shown that the muscular structures of the intestine have the same property of rhythmic action as is possessed by the muscle fibres of the heart. This tendency to rhythmic movement of the individual fibres is an organized, orderly action of certain centers or nodes which are designated as pace makers. These nodes have been shown to exist at the following points along the alimentary canal—the upper or cardiac orifice of the stomach, the pylorus, the duodenum, the ileo-





Short-Circuit with Colon Removed



Short-Circuit with Half of Colon Removed



cecal valve, the transverse colon, the junction of the pelvic colon, the rectum and the internal anal sphincter.

### Movements of the Colon

Like the stomach, the colon has movements peculiar to itself,—four very distinct modes of contraction. These are:

1. *Molding movements*, by which the contents are slowly compressed and molded. These movements are almost too slow to be noticed by the eye in X-Ray examinations except by observations made at intervals of a half hour or more.

2. *Propulsive movements*, by which the colon contents are passed along so rapidly that the eye cannot follow the movement. Movements of this sort occur regularly when the bowels are evacuated and also at other times.

3. *Snake-like movements*. Roeder, of Germany, has recently described movements in which the transverse or free part of the colon moves about in a manner closely resembling the contortions of a serpent. From this he concludes that the position of the transverse colon, unless it is held fast by adhesions, is not a definite one and is not a matter of much importance.

4. *Reverse Peristalsis*. Anti-peristalsis, that is, a reverse movement of the intestine, was first observed by Jacobi, more than twenty years ago, and has more recently been studied in cats by Can-

non. These movements occur systematically while the contents of the cecum are fluid in character, and serve both to prevent the sudden and frequent discharge of the bowel contents, as in diarrhœa, and also to churn the contents of the cecum, thus bringing every portion in contact with the walls of the gut, so that absorption may be assisted.

As studied in animals, by Cannon, and in human beings by Case, the rhythmical reverse movements which occur in the colon, never in the small intestine, are interrupted at regular intervals by a downward peristalsis. These downward movements occur at intervals of about fifteen seconds.

The tight closure of the ileocecal valve alone prevents the contents of the cecum from being forced by these powerful anti-peristaltic waves backward into the small intestine. At intervals the anti-peristaltic waves cease momentarily, while the ileocecal valve relaxes, and small portions of material are passed into the cecum from the small intestine; then the anti-peristaltic waves again begin, churning the liquid material, spreading it over the surface of the cecum and ascending colon, thus encouraging absorption, while at the same time exerting a pumping action upon the venous and lymphatic vessels, so that the contents of the cecum are rapidly dried down to the proper consistency.

It is very probable that the common practice of resisting the "call" of Nature for evacuation, may have produced abnormal conditions of the colon,

by which its normal functions are obscured to a very considerable degree. The theory of anti-peristalsis, first suggested by O'Bierne, accords well with the facts of clinical experience, and may now be recognized as a fully established fact, especially since anti-peristalsis has been actually observed in man by Case on numerous occasions, in the X-ray department of the Battle Creek Sanitarium.

### The Pelvic Colon

The pelvic loop of the colon, which, with the iliac colon forms what was formerly known as the sigmoid flexure, constitutes the motive part of the mechanism by means of which the feces are discharged from the body. This loop of intestine, when empty, lies low down in the pelvis, the lower end of the loop where it joins the rectum being closed by a sharp fold. There may be a sphincter at this point, although not in a state of constant contraction. The loop fills from below as fecal matters gradually and slowly enter it from above. As it fills, the loop gradually rises, finally reaching a point at which the valve opens, so that the feces can enter the rectum. As the rectum walls become distended by the accumulation of feces, the defecating center is stimulated; and powerful nerve impulses are sent out, which cause the pelvic loop to contract, thus compressing its contents just as one compresses the contents of a rubber bulb by squeezing it with the hand. The contraction of the pelvic

loop is normally so vigorous and complete that it is fully emptied of its contents. The contraction of the descending colon at the same time is normally sufficiently strong to carry the contents of the descending and iliac colon into and through the pelvic loop, so that the left half of the colon, from the splenic flexure to the anus is emptied in normal defecation. At the end of the contraction, the pelvic loop, or at least the mucous lining of the loop at its lower end, may be pushed down into the rectum like a piston, thus ensuring complete emptying of the rectum. The action of the pelvic colon thus resembles that of a bulb and piston combined, the upper part acting like a compressing bulb, while the lower part serves as a piston, thus forming a surprisingly effective mechanism for discharging the body wastes.

Careful and long-continued observations of the time required for the passage of food through the different sections of the alimentary canal, have secured very definite and exact information upon this very important subject, on which are based the figures given below.

The following table shows, according to Rosenheim, the time required for the food to reach the more important of the stations along the alimentary tube, reckoning from the time the food is eaten, since it is known that food begins to pass out of the pylorus very soon after the beginning of a meal:

**The Digestive Time Table**

Cecum .....	4 hrs.
Hepatic flexure .....	6 hrs.
Splenic flexure .....	8 hrs.
Iliac colon .....	9 hrs.
Pelvic colon .....	10 hrs.
Rectum .....	16 hrs.
Discharge of residues.....	18 hrs.

The X-ray shows that food often reaches the ileocecal valve within half an hour after it is taken into the mouth. It does not pass into the colon at once, however, but accumulates in the lowest coils of the ileum, which finally becomes distended to such a degree that segmentation is set up, and by this means the food is pushed forward into the cecum.

The last of the food taken into the stomach does not reach the colon until the end of about nine hours from the time it is eaten. Thus, the entire meal should reach the pelvic colon, according to Rosenheim, at the end of about fourteen hours.

The delay of six hours in the pelvic colon seems wholly unreasonable and unnecessary. If the food can pass from the splenic flexure to the pelvic colon in two hours (Rosenheim) it would seem that it ought to be able to traverse the short pelvic loop in the same length of time, or less. The processes of digestion and absorption of digested products is completed before the splenic flexure is reached. The

descending colon, iliac and pelvic colon, and the rectum, contain few absorbent vessels. The feces are ready for discharge from the body; what possible benefit can result from their longer retention? Putrefaction processes are actively at work producing ptomaines and other toxins in quantity. By absorption, these may become a source of enormous and irreparable mischief. Why should not the unusable food remnants, the wastes and microbes which constitute the fecal mass, be gotten rid of as soon as possible when prepared for exit? Is it not more than probable that the lower part of the human intestine, which is most subject to the influence of voluntary interference, has been so long abused, discouraged and hindered that it has become abnormally slow and dilatory?

### Evacuation of the Colon

The evacuation of the bowels is accomplished by means of seven distinct actions, three of which are voluntary and four automatic. Arranged in the order of natural sequence, the following are the several acts which together constitute normal bowel movement.

1. Descent of the diaphragm and compression of the bowels, accomplished by taking a deep breath.
2. Voluntary contraction of the abdominal muscles, increasing the compression.



3. Pressure of the thighs against the abdominal wall (natural position in moving the bowels is not the upright sitting position, but a crouching or squatting position universally employed by savages and in some pioneer rural communities).

The result of these three voluntary efforts is to force a portion of the contents of the pelvic colon into the rectum, the distention of which gives rise to stimulation of the defecation center of the sympathetic nervous system by means of which the four automatic movements in defecation are brought into action, consisting of the following:

4. Reflex contraction of the abdominal muscles, reinforcing the voluntary contraction.

5. Contraction of the colon; the descending and pelvic colons are chiefly active, though sometimes the whole colon contracts.

6. Reflex relaxation of the anal sphincter, in obedience to the general law which holds throughout the entire digestive tube, by virtue of which a wave of contraction passing along any portion of the canal is immediately preceded by a wave of relaxation.

7. Contraction of the levator ani, a structure which surrounds the rectum and contracts at the end of defecation for the purpose of forcing out the last remnants of fecal matter, so that the rectum may remain empty until another movement occurs.

There are really eight steps in the defecation process, if we include the preliminary filling of the pelvic colon with fecal matter. A disturbance of any one of these eight factors in the process of defecation may result in constipation. If the diaphragm contracts insufficiently because of weakness, tight lacing, adhesions or any other cause, or if the abdominal muscles are weak, as is generally the case among civilized people, and if the position assumed in evacuating the bowels is such that the abdominal walls are not compressed by the thighs, the result may be that the rectum is not filled sufficiently to stimulate the defecation center, and so the reflex necessary to set in operation the automatic movements which empty the bowel, will not be produced.

To be effective, the distention of the rectum must be complete, and must be accomplished quickly. If the rectum is allowed to fill gradually, stimulation may not occur. If, on the other hand, distention of the rectum, as evidenced by a desire to move the bowels, is not relieved by going to stool, the desire for movement gradually disappears through the loss of sensibility of the rectal nerves, and the reflex is lost. The nerves which preside over reflex activities are easily exhausted by continued stimulation. Human physiology affords many examples of this principle.

## The Ileocecal Valve and Its Function

This is an extremely interesting and important anatomical structure, which, though known to science for three hundred and fifty years, has received almost no attention until very recently. The ileocecal valve was discovered by Servius in 1563, A. D. It has been described by numerous anatomists, but was until recently regarded rather as an anatomical curiosity with no very important function.

The ileocecal valve consists of two parts — a sphincter muscle and a two-lipped check valve. The sphincter is formed by a thickening of the circular muscular fibres of the small intestine at its junction with the colon. The check valve is formed by an invagination of the small intestine into the colon. Something of an idea of the structure of the valve may be formed from the illustration opposite page 142.

### Action of the Ileocecal Sphincter

\*“Recent observations of Cannon have clearly demonstrated that the ileocecal sphincter acts in a manner very similar to the pylorus, retaining the foodstuffs in the small intestine until the digestive

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\*The paragraphs in quotation marks are extracts from a paper by the author entitled, “Incompetency of the Ileocecal valve.”

work of the mid-gut is complete and the digested foodstuffs have been absorbed.

“Within the last few years Holzkecht, Schwartz, Groedel, Case, and numerous other roentgenologists have clearly demonstrated the functional activity of the ileocecal valve in controlling the movements of foodstuffs from the small intestine into the colon. These observations establish the necessity of the ileocecal valve for the following purposes:

“1. To hold back the digesting material in the small intestine until the digested portion has been transformed by the several digestive juices, and absorbed.

“2. To pass the mixture of unusable food residues, mucous, bile, and other excretions from the small intestine into the colon in small successive doses, so as to give the colon, the chief function of which is the absorption of water and the discharge of unusable food residues and excreta, an opportunity to deal with the successive portions of material brought to it without being over-loaded.

“3. To prevent a reflux of material from the colon into the small intestine, which is accomplished by co-operation of the muscular sphincter of the proximal side, and the mechanical action of the membranous folds on the distal side of the ileocolic junction. The importance of this function of the ileocecal valve is greatly emphasized by the demonstration, by Cannon, Schwartz, Case, and others, of

the existence of an anti-peristaltic action in the proximal half of the colon. Cannon gives a most graphic description of very powerful anti-peristaltic waves (as seen in the cat) beginning at about the middle of the transverse colon and passing rapidly backward along the colon to the cecum, compressing the liquid contents of the cecum so strongly as to cause a backward rush through the advancing ring of constriction. Case has confirmed these observations in the human subject in many cases."

## Normal Bowel Action

There is perhaps no important bodily function so much neglected, and with such damaging results, as defecation or bowel movement. This function is too often looked upon as a humiliating act that must be secreted and avoided whenever possible, and that may properly be postponed to suit the exigencies of business or pleasure. The "call" of Nature for evacuation of the bowels is habitually ignored or resisted by children and adults alike, until it can no longer be suppressed, or until it disappears.

This wrong attitude toward one of the most important functions of the body is in large part responsible for the almost universal existence of constipation among civilized people, and of widespread and most appalling evil consequences, as we shall make clear in a subsequent chapter.

Ignorance of physiology, and especially of the physiology of digestion and nutrition, is doubtless the cause of this widespread evil. It is the duty of every physician and every trained nurse to do all possible toward the enlightenment of the chronically sick with whom they come in contact in relation to the absolute necessity for frequent and complete bowel action.

This is a subject which is too commonly tabooed, by a false modesty that is entirely out of place.

Mothers and school teachers especially should give the matter special consideration. They should make sure that each child under their supervision has formed and maintains correct and regular habits in relation to evacuation of the bowels.

### The Mechanism of Defecation

Until very recent times the process by which the colon discharges its contents was one of the most obscure in physiology. The discovery of the X-ray and of a method of examination by which the contents of the stomach and intestines could be made to cast a shadow on the fluorescent screen or upon a photographic plate, has thrown a flood of light upon this extremely interesting and practical question.

As already remarked, the process of defecation involves seven distinct acts. Three of these are under voluntary control, the other four being controlled by a special center known as the "center of defecation," located at the extreme lower end of the spinal cord.

The act of defecation is called forth by a sensation of fulness in the lower part of the colon. In a state of health we ordinarily perceive sensation only near the extremities of the alimentary canal. At the upper end of the food tube, guarding the entrance to the esophagus, there is located a reflex that controls the intake of food and liquids.

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There are nerves in the mucous membrane at the back of the throat that, when stimulated by the contact of foods or liquids, give rise to the swallowing movement in which the esophagus opens and food or liquid present in the throat is drawn in by a strong suction movement. The act of swallowing is impossible without the contact of something that may be swallowed.

At the other end of the food tube, within a few inches of the anus—that is, at the upper part of the rectum—are found nerves that, when stimulated by the contact of fecal matters, give rise to a peculiar sensation recognized as a warning that the bowel contents should be discharged from the body.

### The “Call”

Natural bowel movement is preceded by sensations which clearly indicate the necessity for evacuation of the bowels. The mechanism of this instinctive notification of the necessity for giving attention to the needs of the body is very interesting. We have already learned that the colon is subdivided into four separate compartments and that the feces are dealt with by each of these in succession. In the cecum the consistency of the feces is increased to such a degree that the mass can be handled by the muscular wall of the bowel. The ascending colon pushes the feces through the hepatic flexure into the transverse colon. In this horizon-



tal portion of the canal the feces rest for a time for further extraction of water. From the transverse colon the feces are pushed up the incline to the splenic flexure, and through this narrow gateway into the descending colon, along which, in the course of an hour or two, it finds its way to the capacious loop of the pelvic colon, through which it passes quickly to the lower end. Here its further progress is arrested by the tightly folded canal, just as a current of water through a rubber tube may be controlled by a sharp bend in the tube.

The pelvic loop gradually fills, and in filling is raised until the bowel is unfolded and thus opened. Now, unless the feces have been so long retained that they have become hard and dry, the bowel contents are pushed on into the rectum.

Up to this point the progress of the food material after leaving the mouth, during its passage through the long food canal, has been unattended by any sensation whatever. The process has been wholly automatic, and, though controlled in a way showing marvelous intelligence, wholly independent of the consciousness. But now there is felt an unpleasant sense of weight in the region of the rectum. This sensation increases as the rectum becomes fuller, and there is a more or less urgent desire to evacuate the bowels.

This is the "call" of Nature for bowel movement, evoked by the contact of the feces with the nerves of the rectum and distention of its walls.

The fuller the rectum becomes, the more pressing is the desire for evacuation. The "call" appears only when the feces have reached the rectum.

It will now be easily seen how the "call" and the bowel movement may be directly influenced by numerous factors. Let us briefly notice some of the most important of these, which will be discussed more fully in a later chapter.

If the food taken is insufficient in bulk, the pelvic loop will be only partly filled, and hence will not rise high enough to permit the feces to pass into the rectum, and hence there will be no "call" and no movement. It is evident, also, that if the amount of food taken is small, the pelvic loop may be so long a time in filling that the feces which first entered, will become so dry and compact that they may form a mechanical obstruction, and thus the onward movement necessary to reach the rectum will be prevented, even though the bowel may rise, and the gate which guards the entrance to the rectum may be open. In starvation, no "call" appears because there is nothing with which to fill the loop and open the rectal gate.

Bodily movement has a certain amount of influence upon the position of the loop and the entrance of feces into the rectum, especially deep breathing exercises, and bodily exercises which produce deep breathing. In deep breathing, the diaphragm is pushed down upon the abdominal viscera, compressing the colon as well as other parts against the ab-

dominal wall. By this means the feces in the loop may be pushed through the fold into the rectum, thus evoking a "call."

The increased depth of breathing and the compression of the abdomen resulting from movement when one first awakens in the morning are no doubt the reasons why many persons experience a "call" almost immediately upon awakening after a full night's rest. During sleep the pelvic loop has been quietly filling and rising, but the pressure has not been quite sufficient to cause the feces to pass into the rectum. A push from the diaphragm and the abdominal muscles gives the little extra help needed and the "call" comes.

By straining movements, such as accompany bowel evacuation, sufficient fecal matter may be pushed over into the rectum to create an effective "call," when not previously felt. Hence the importance of going regularly to stool even though no "call" is experienced.

A cold morning bath helps in the same direction, both by causing deep respiratory movements, which increase the intra-abdominal pressure, and by causing a reflex contraction of the colon.

These facts are mentioned here in order to bring the explanation of the "call" within the range of common every-day experience, and to show its very important bearing upon the practical management of cases of constipation.

The act of swallowing a glass of water, espec-

ially the drinking of cold water, and above all other things the taking of food, by setting up peristaltic movements may produce a "call," provided there is at the time a quantity of feces in the pelvic loop. If the loop is empty, food taking or anything else which sets up intestinal peristalsis will serve to help the feces along toward the pelvic colon, thus leading to a "call" a little later. The immediate effect of any such stimuli will of course depend upon the position of the fecal mass in the colon. If, for example, there is slight delay at the hepatic flexure, perhaps as the result of neglect of usual exercise or spending a day in bed, the use of measures to promote intestinal action may seem to produce no effect, whereas a bowel movement the next morning may be the result of the impulse given to the fecal mass by means of which the stagnation in the ascending colon was overcome.

### The Lost "Call"

The "call" to bowel movement is like the call of the alarm clock set to awaken one in the morning. If not responded to, it soon ceases to be heard. It is like the voice of conscience, which may be wholly stifled by continued disregard. This is only the operation of a general biologic law. A continuous sensation which is ignored, by and by fades out of the consciousness. For example, the clothing gives rise to no sensation unless adjusted in

some unusual fashion, although in contact with almost the entire cutaneous surface. We are unconscious of gloves or shoes, although our hands or feet may be tightly compressed. So, if the "call" evoked by the pressure of feces upon the nerves of the rectum is not responded to, after the lapse of a certain time the "call" is no longer heard. A mass of feces may lie in the rectum, but it produces no sensation. The writer has many times found large fecal masses in the rectum of which the patient was wholly unconscious, although in some instances there was evidence that they had been present in the lower bowel for days or even weeks.

The first time a "call" is disregarded it will return again when additional fecal matter is pushed down from the pelvic colon by the stimulus of the next meal, or as the result of some other influence which excites intestinal action or increases intra-abdominal tension. After having been disregarded or resisted many times, however, the "call" becomes less and less distinct, and by and by ceases entirely. The rectal nerves have lost their normal sensibility. They do not respond to the irritation produced by the contact of fecal matters, but have acquired a tolerance for such contact, just as the nerves of taste may become accustomed to contact with hot spices, so that they no longer cause any disagreeable sensation, or the skin may cease to react to a mustard plaster, so that a stronger irritant, as croton oil or a hot iron, must be required to produce a blister.

This condition of lost sensibility is one of the most common causes of constipation, and a condition which is sometimes very difficult to remove, although always conquerable by persevering effort, thanks to the great light thrown upon these cases by modern medical research.

To lose one's "call" is almost as bad as to lose a fortune; indeed such a loss has more than once led to loss of fortune, and to worse results. A "call" that has been lost must be most assiduously sought for until recovered, and put into efficient operation. The methods for accomplishing this will be described at length in a later chapter.

### **Why Do the Bowels Move Periodically?**

There are two factors which are chiefly active in producing bowel movements in normal individuals. The first is the practice of taking food only at stated intervals, regular meal hours. The second is regularity in the hours of sleep and morning rising. The omission of a meal, or a change in the hours of meals or of sleep will at once change or destroy the rhythm of bowel movements. Animals that eat continuously, as monkeys and barnyard fowls, have bowel movement many times a day.

The taking of food is the most active of all natural excitants of bowel action. When food is taken into the stomach, it produces powerful peristaltic waves which traverse the whole length of the

intestine and carry the intestinal contents forward at a rate several times faster than the ordinary rate of progression; the larger the meal, and the more it is relished, the more pronounced is this effect. This explains the almost universal experience that the bowels move most freely and regularly soon after the morning meal.

On rising in the morning after a full night's sleep, so long a time has elapsed since the last bowel movement that the feces have accumulated in the pelvic loop and the descending colon, and it is only necessary that sufficient stimulus should be applied to cause feces to enter the rectum, and a "call" and bowel movement will follow. The act of rising, sometimes the mere awakening and the accompanying turning and stretching movements, are often sufficient to accomplish this. During sleep, the intestinal movements are slowed. The progress of the intestinal contents along the canal is at a much slower rate than during the waking hours. This is easily shown by X-ray observations after a bismuth meal. At the moment of awakening, all the bodily movements are quickened. The heart beats faster, the force of the breathing is increased, and the whole vital machine feels the impulse of quickened energies. If the pelvic colon has been slowly filling during the night, the various influences which are brought into play at the moment of awakening will be likely to cause the passage of a sufficient quantity of feces from the pelvic loop

into the colon to produce a "call" and an evacuation.

Regularity of bowel movement is of the utmost importance. It is a function which should be assiduously cultivated. As we have seen, the periodicity of alvine evacuation is not the result of any mysterious influence, but is a product of forces which are largely in our own control and are easily understood.



## The Feces

The composition of the colon contents, the feces, is very complicated and highly variable, depending very largely upon the character of the food. The bowel discharges of the nursing infant consist of fragments of undigested curds, fat, bile and a small amount of mucus. The odor of a healthy infant's stool is slightly acid, and yellowish in color. The stool of an adult who subsists upon an ordinary mixed diet contains a considerable amount of food residues, seeds and skins of fruit, cellulose from vegetables, and such whole-grain cereals as oat-meal and cracked wheat, and also contains one or two per cent of starch, about the same amount of fat, and three or four per cent of protein. Sugar is not present. The color is usually dark brown, often black, and the odor putrid. The form varies to a marked degree.

The stools of a person who subsists on a natural non-flesh diet closely resemble those of a healthy infant. The odor is not putrid, but may be slightly sour.

Strassburger has shown that about half the solids of fecal matter is made up of bacteria. When the stools are putrid it is because of the dominance of the special bacteria which give rise to putrefaction. In sour smelling stools, however, the bacteria present are chiefly those of the sort which cause

fermentation and give rise to acid. The sour odor is due to the presence of acetic acid, which is more or less volatile at low temperatures. Lactic acid is also present. As it is non-volatile, its presence is shown only by chemical tests, not by the odor.

The general belief that the feces or stools consist chiefly of the unusable remains of foodstuffs is entirely erroneous. As a matter of fact, even under the most unfavorable conditions, the feces contain really very little food material.

### **Composition of the Feces**

The chief constituents of the feces are as follows: Bile, remains of digestive juices, especially of the pancreatic juice, mucus, excretory substances thrown off by the intestinal mucous membrane, microbes and various poisons produced by microbes, such as indol, skatol, pyrrol, and numerous other poisons, together with some small amounts of the various food principles, and water.

The composition of the stool varies greatly according as the diet contains much or little of vegetables. On a vegetable diet the feces contain much cellulose, and with the cellulose are increased quantities of undigested protein and starch. The amount of fat does not vary much, and sugar is never present.

### Quantity

The weight of feces varies very much with the diet, increasing with a vegetable diet, and diminishing with a diet composed chiefly of animal substances. Food which contains much cellulose passes through the intestine much more quickly than does animal food, and hence contains more water and undigested food principles. The total weight of the feces for twenty-four hours with a mixed diet is about five ounces, of which three-fourths is water. With a vegetable diet the weight is double, the proportion of solid matter being slightly greater.

### The Microbes of the Intestine

The reaction of the feces is neutral or slightly acid on a vegetable diet, and strongly alkaline on a flesh or mixed diet. This difference in reaction is due to the difference in the flora or species of bacteria which are present. Feces that are rich in protein, the result of a mixed or flesh diet, contain enormous quantities of putrefactive bacteria, which produce alkaline substances in decomposing the proteins—ammonia, ptomaines, and various toxins. When considerable quantities of starch are present, as with a vegetable diet, with very little protein, acid-forming bacteria are dominant, and hence the feces have an acid or neutral reaction.

This difference in reaction is one of the most important of all the various characteristics of the

feces, since it suggests at once the general character of the flora, and thus points to the toxic or non-toxic character of the stool.

Roger calls attention to more than one hundred and sixty different species of bacteria which have been found in the feces. Of these, more than one-third were found to possess pathogenic or disease-producing properties. Distaso points out more than twenty species of putrefactive bacteria which are found in the stools of flesh eaters, all of which produce very highly toxic products. One of the most common and abundant of these is the *Bacillus of Welch*, which produces enormous quantities of offensive gas and highly active poisons. This microbe, as well as the other putrefactive organisms which are found in the feces, is found in an active growing condition in butcher's meat and fresh flesh foods of all sorts, as well as salted and dried fish. This is doubtless the chief source of the dangerous bacteria which carry on in the body the same putrefactive processes to which they give rise outside of the body.

The number of these microbes in the feces is something prodigious. They often constitute from one-third to one-half the total weight of dried feces. Strassburger estimates the weight of the microbes produced in the intestines in a single day at not less than one-quarter of an ounce, and the number more than one hundred trillions, of which a large proportion may be poison-forming organisms. Only a small

share of the bacteria are found alive in the feces (one per cent, according to Strassburger), but all have been alive and have each produced its portion of poisonous substances in breaking up the protein upon which it feeds.

The study of these bacteria is one of the most important fields of research at present before the bacteriologist, for it has been clearly shown that the condition of the flora of the intestine is one of the most important of all factors in determining health or disease, long or short life. Of this subject we shall learn more in a subsequent chapter.

### **Excretory Products**

Not the least important constituents of the feces are the waste products which they contain, a fact quite too often overlooked. The mucous membrane of the intestine, like the skin, is an excretory organ. Although the extent of the intestinal mucus covering is only seven square feet, about one-third of that of the skin, there is reason for believing that its importance as an outlet is fully as great as that of the skin, and probably much greater. This fact has only recently been made known. By the researches of Roger and others, it has been shown that the mucous membrane removes from the body some of the most deadly poisons which are produced in our tissues, or which may be introduced from without. If, for example, a quarter of a grain of

morphia is injected underneath the skin of a person, a large part of the poison will be found in the stomach and intestine within a half hour. This excretion of poisons appears in the light of these new researches to be one of the important offices of the stomach.

Lime salts which are no longer needed in the body are excreted through the intestine.

The bile poured into the intestine contains some of the most deadly poisons produced in the body. Bouchard found the bile to be six times as toxic as the urine.

### **Examination of the Stools**

When a doctor is called to see a sick infant, he first of all inquires as to the bowel passages, and the experienced nurse or mother always preserves the infant's napkins to show to the doctor when he comes. If the bowel passages have the usual consistency and yellowish color and a slightly acid odor, the doctor knows that there is no serious disturbance of digestion; but if the stools are dark or brownish in color and have a foul or putrid odor, this fact alone is sufficient to show to the physician or experienced nurse that the infant is sick. Any physician who would omit to examine the stools of an infant when called in consultation, would be regarded either as ignorant or as quite remiss in his duty.

It is very strange indeed that until quite recently almost no attention has been given to the stools of adults, and even at the present time physicians quite rarely take the trouble to make anything like a thorough investigation of bowel passages. The doctor usually contents himself by inquiring if the bowels move regularly. When questioned concerning the character of their stools, most patients are unable to give any information. Something can be learned from the general appearance of the stools, but for really useful information it is necessary to submit a specimen to a thorough laboratory investigation at the hands of an expert in this particular line of research.

It is not going too far to say that a thorough examination of the stools should be made in every case of chronic disease. This practice has already been instituted in a few medical institutions where a high degree of medical work is done, and the time cannot be far distant when such an examination will be a routine practice with all physicians who attempt to keep abreast with the advance of medical science.

## Influences Which Excite Movements of the Colon

The food tube is controlled by two sets of nerves. One, the motor, excites contractions of the intestine, while the other opposes this action, causing cessation of movement and relaxation of the intestine. The motor nerves are derived from the brain and spinal cord; those of the second class, known as splanchnic nerves, from the sympathetic.

A very remarkable and interesting fact relating to the action of these nerves should be mentioned here as an aid to a full understanding of their action. When the motor nerves of the intestine are stimulated, they cause powerful contraction of both the intestine and the abdominal walls, but relaxation of both the internal and external anal sphincters. When the sympathetic or splanchnic nerves of the intestine are stimulated, they cause relaxation of the intestines, with cessation of movement, and at the same time strong contraction of the ileocecal sphincter. These two facts explain many important phenomena in relation to bowel movement and constipation.

The relaxation of the anal sphincters when the colon and abdominal muscles contract, is necessary to facilitate the discharge of feces from the bowels. This fact wholly agrees with the interesting obser-



vations of Bayliss and Starling, that mechanical excitation of the intestine causes contraction at and above the point of irritation, and relaxation below, a most beneficent and wonderful adaptation of means to ends.

One more important fact is especially worthy of note in this connection, *viz.*, that the intestine is supplied with nerve ganglia of its own, located within its walls, between its two layers of muscles, so that it may act even when all cerebro-spinal and sympathetic nerves are cut in experiment or paralyzed in disease. A small bit of stomach or intestine removed from a living animal, when stimulated by electricity does not contract in continuous spasm as do ordinary muscles, but contracts rhythmically, as does the heart and other involuntary muscles. This is true, however, only when the nerve ganglia are removed with the muscle tissue.

### The Bile

The bile is a normal stimulant to the colon, but for some curious reason does not act upon the small intestine. This seems unfortunate, for there is an increasing volume of evidence that in some of the most obstinate forms of constipation the chief cause of trouble is located in the small intestine. Possibly the biliary secretion of the degenerate modern civilized man has lost something of its original value as a laxative. The best proof of the laxative property

of the bile is found in the remarkable colon-stimulating properties of "bilen," an extract prepared from the bile, which when introduced into the rectum often produces active peristalsis within a few minutes, with vigorous bowel movement.

A recent discovery has shown that the spleen also produces a substance which powerfully stimulates the intestinal peristalsis. This substance, however, acts upon both the small and the large intestine.

Another remarkable substance, pituita, produced by a small gland in the brain, the pituitary body, is a most powerful stimulant to the entire intestinal tract.

It seems hardly necessary to devote space to emphasizing the importance of so guarding the interests of the liver and spleen as to receive constantly the full benefit of the powerful aid these organs are capable of giving to the muscular movements of the alimentary canal.

The intestine has two special senses, the muscular sense, which it possesses in a very high degree, and a fine tactile sense located in its mucous lining. The muscular sense is excited by distension of the intestine, which causes tension of its muscular walls.

### **The Influence of Bulk**

In operations upon the stomach and intestines, the influence of mechanical stimulation is often seen. Slight pressure upon the wall of the stomach or of

the intestine is sufficient to set up a contraction which follows in a few seconds. Contraction of the intestine, as shown by Bayliss and Starling, is accompanied by dilatation of the intestine lower down, so that room may be made for the material that is being pushed along. Contact of the food with the interior of the intestine produces like effects. The greater the bulk of the food, the greater the effect. As shown by Cannon, segmentation, a most effective means of food propulsion, becomes really active only when the bowel is distended.

All foods which are completely digested and absorbed by the intestine, leaving little or no residue, discourage peristalsis. This is the reason why rice, boiled milk, and fine flour bread have become generally known as constipating foods. These foods are not actively constipating; they simply do not leave sufficient indigestible residue to afford the necessary mechanical stimulation of the intestine.

In general, all animal foods encourage constipation, for the reason that they are completely soluble in the digestive fluids. Hair, feathers and bones are almost the only animal tissues not capable of complete solution in the digestive juices. It is in part for this reason that carnivorous animals usually eat bones with the flesh on which they feed; the bones are of course necessary also for the lime which they contain, and which is almost wholly lacking in the soft tissues of animals. Most carnivorous animals also eat more or less vegetable food.

Cats and dogs often nibble grass, and special weeds, of which they appear to be extremely fond. Fowls swallow feathers and sand. Horses sicken when fed on corn alone. They must have a liberal supply of coarser material. A Maine ship captain saved a cargo of mules, when the supply of hay was swept overboard, by feeding them shavings made by the ship carpenters. A number of horses in the cargo refused to eat the shavings and died. In England, when the price of grain is high, the farmers feed their stock on treacle, which is exceedingly cheap, combined with wood sawdust, and with good results. The animals readily fatten on this diet, and remain in good health.

Most primitive people recognize the need of bulk to maintain healthy action of the alimentary canal. The Japanese and Chinese make large use of various seaweeds. One of these under the name of agar-agar has come to be well known in this country.

Agar-agar is prepared from a sea-weed that grows on the coast of Japan and Ceylon. It is sometimes known in commerce as Ceylon moss. It is also known as Japanese isinglass or vegetable gelatine. It does not, however, have the composition of gelatine. Its composition is practically identical with cellulose. It is almost wholly indigestible in the human alimentary canal. The commercial product is prepared by cooking the seaweed with much water in large kettles, then cooling the solution, and passing it through colanders by which it is formed

into long strings. These are dried in the sun, and then bleached in the sun and dew for several weeks. This material is brought to the United States in large bales. In its commercial form, as it is obtainable at many drug stores, agar-agar is hardly fit to be placed in the stomach. It needs to be thoroughly washed and disinfected by peroxide of hydrogen or some other efficient means. It is also very tough and inedible.

Mr. George Kennan, the celebrated Siberian traveler, stated to the writer that the Eskimos eat half digested reindeer moss as a remedy for and preventive of constipation. The moss is obtained by killing the reindeer at a certain time after feeding, removing the moss from the stomach, and submitting it to a very slight and simple preparation.

The natives of Japan and China eat quantities of dried raw turnip, bamboo sprouts, lily flowers and roots and other vegetables with the rice which forms the staple food of these people.

The Alaska Indians gather and dry a seaweed, which they eat at all seasons as a laxative.

A missionary nurse working among the Alaska Indians, sent us a few years ago a sample of the seaweed which is used in its native state by these people to prevent the constipation which would naturally result from the nearly exclusive fish diet on which these Indians are compelled to subsist at certain seasons of the year. The sea-weed is simply gathered and dried in the sun and pressed into large

flat cakes between flat stones. The material thus prepared is very black in color but is crisp and not unpleasant in flavor.

The Hopi Indian makes a good laxative food by grinding up in a stone mortar the whole nut of the pinon, including the shell.

The Highland Scotchman escapes the constipation which would otherwise result from his diet of buttermilk, oatmeal and potatoes, by eating his brose (oatmeal) in a half raw state.

The wild Arab supplements his diet of camel's milk and dates with wheat ground in a stone mill, which supplies all the cellulose of the bran, with the addition of a certain amount of pulverized stone.

The Orinoco Indians and the poor whites of the Tennessee Mountains combat constipation by eating considerable quantities of clay, as do horses and other animals when fed on a too concentrated diet.

The desire for bulky green things, which afford much bulk with little nourishment, that almost every one experiences in the early spring time, when the oncoming heat reduces the bulk of the food by lessening the appetite, is an instinctive prompting which cannot be disregarded without injury.

A western pioneer, who was shut up in the mountains of the Coast Range by an early fall of snow, and confined for three months with several companions and a number of mules with no food but corn meal, escaped without injury, although his associates all suffered extremely from scurvy, by fol-

lowing the example of the mules, who dug tunnels in the fifteen-foot snow drifts and ate the grass hidden underneath.

A diet consisting largely of meat, eggs, milk, cane sugar and fine flour bread, leaves little or no residue to act as a stimulus to the intestinal muscles. The free use of greens and salads of lettuce, cabbage and other uncooked foods fresh from the garden is essential to healthy intestinal activity.

### The Sugars

Other elements of the food besides bulk, exert a marked influence upon the activity of the digestive organs. All the sugars stimulate intestinal activity. Roger thinks this action is confined to the small intestine, but in this he is in error, for every abdominal surgeon knows the remarkable laxative effects of an enema consisting of a half pint of molasses with an equal amount of hot water.

Cane sugar is undesirable, however, because of its irritating effects. The sugars of fruits—levulose and dextrose—are wholesome and efficient. The malt sugar produced by the action of the saliva upon starch is of great service as a stimulant of gastric and intestinal activity. Many mothers know of the laxative effect of milk sugar added to the infant's food. Malt sugar is better, because free from germs, and more native to the body than the sugar of cow's milk.

Malt sugar, as shown by recent experiments, is absorbed in one-fourth the time required for milk sugar.

### **Fruit and Vegetable Acids**

The acids of fruits and vegetables—citric, malic, and tartaric,—are excellent laxatives. This is, in part at least, the explanation of the good effects of an orange taken at night or before breakfast. All acid fruits are laxative. The tomato, a vegetable fruit, is a most excellent stimulant of intestinal action, chiefly through its citric acid. When possible, the tomato as well as other acid fruits should be eaten raw, to obtain the best effects.

Lactic and acetic acids, developed in the intestines by the growth of harmless acid-forming bacteria, are a powerful stimulant of intestinal action. A. Schmidt of Halle, Germany, has demonstrated that these acids are the normal stimulants of the colon. When they are present in sufficient amount, bowel activity is normal. Putrefaction produces an alkaline condition in the colon which has a paralyzing effect upon the intestinal movements. Sour milk and buttermilk produce a decided laxative effect in many persons, especially in children.

### **Fats**

Oils and fats stimulate intestinal action. Not only fats themselves, but the glycerine and soaps



which are formed by the digestion or decomposition of fats in the intestine, are very active stimulants of intestinal movements.

Mineral oil—white Russian paraffin oil—being indigestible and unabsorbable, is a very powerful stimulant of intestinal activity. It adds to the bulk of the food, lubricates the food canal, hinders the excessive absorption of water, and keeps the bowel contents moist.

### Gases

The carbonic acid gas and other gases formed in the intestine by the fermentation of starch, cellulose, and other foodstuffs are powerful stimulants to the muscular activity of the bowel. When present in excess, gases cause spasm of the circular muscles of the intestine, with sharp colic pains.

### Eating

The taking of food into the stomach is by far the most powerful of all the natural stimulants of the intestine. Very soon after food enters the mouth, peristaltic movements begin in the stomach, and quickly extend the whole length of the food canal. This is the reason for the desire to evacuate the bowels which most people experience soon after eating breakfast. The peristaltic waves set up carry the feces down into the rectum, and this produces the sensation which indicates the necessity for evacuation.

It has been shown that even the smell of agreeable food is sufficient to cause increased intestinal activity. The act of swallowing also excites intestinal activity.

X-ray examinations show that the intestinal contents move four times as fast during a meal as during the interval between meals.

It is the opinion of the writer that bowel movements should occur after each of the principal meals of the day. This question is discussed further in a later chapter.

### **Psychic Influences**

Pleasurable emotions and excitement have been known to produce intense activity of the intestines, and even diarrhœa, while depressing emotions have the opposite effect. This has been clearly demonstrated experimentally, in animals as well as clinically in human beings.

### **Electricity**

This powerful agent may be applied in such a way as greatly to stimulate intestinal activity. The most effective method is the application of the sinusoidal current to the rectum and abdominal muscles, or to the rectum and the central portion of the back. Another very effective method, perhaps the most efficient of all methods, is the application of a

bi-polar electrode to the inner surface of the pelvic colon, which is the point of greatest delay in the majority of constipated persons.

### **Mechanical Vibration**

Powerful mechanical impulses may be communicated to the intestines and the nerve ganglia which control them, by suitable apparatus. The writer has in numerous instances seen strong intestinal movements set up by this form of stimulation.

### **Massage**

This is another valuable means of stimulating the bowel to increased activity. Kneading with the hands or with a suitable mechanical appliance has been shown to be capable of quickening the movements of the intestine, if applied with sufficient thoroughness.

Stroking, or reflex titillation of the skin, stimulates the bowel in much the same way that tickling the soles of the feet may give rise to powerful contractions of the muscles of the legs. To be effective, massage intended to influence the intestinal movements must be given by an expert.

### **Abdominal Compression**

This method acts upon the intestine by increasing the intra-abdominal pressure. It is most effective

when applied in cases in which the abdominal muscles are weak and relaxed.

The compression may be made continuous by the application of a tight abdominal bandage; or intermittent pressure may be applied, if desired, by means of an inflated rubber bag. These measures will be explained more fully elsewhere.

### **Exercise**

Bodily activity is another way of mechanically stimulating the intestine. Vigorous exercise sets the diaphragm and abdominal muscles at work in such a way that the intestines are, between the two, vigorously kneaded and squeezed and thus stimulated to action.

Every farmer knows the constipating effect of idleness upon his horses and cattle. Most observing persons have noted in their own experience the advantage of taking a brisk walk before or after breakfast.

The sedentary man or woman not only loses the immediate benefit which results from the increased activity of the diaphragm and abdominal muscles, but his abdominal muscles become permanently weakened, relaxed, lacking in tone, and incapable of supporting the intestines in their proper place, thus adding a number of other factors which contribute very materially to the lessening of intestinal activity.

## Posture

A stooped or relaxed posture in sitting or standing tends strongly to induce constipation by weakening the abdominal muscles and causing congestion of the liver and all other abdominal organs. The viscera, over-filled with blood, and lacking the support of the abdominal muscles, become prolapsed. The colon falls with the rest; kinks are formed; the intestinal contents stagnate; the bowel becomes distended; the ileocecal valve becomes incompetent, infection travels up the small intestine, and a long list of ills result. The check valve action of the ileocecal valve is essential to the onward movement of the food residues, and therefore the crippling of this valve naturally leads to constipation.

An erect posture secures proper exercise of the muscles of the trunk, correct breathing, normal circulation of blood in the viscera, and promotes in a high degree normal bowel movement.

## Hot and Cold Applications

Cold applications, and even extremely hot applications, act as powerful stimulants to the intestinal muscles. To be effective, the applications must be short and intense. The cold spinal and abdominal douche, and the cold douche to the feet and legs, are the most effective external procedures.

The application of cold water to the bowel by means of the enema at a temperature of 75° to 40°

F. produces almost instant contraction of the bowel. The action is so intense that great pain may be produced, especially if a very low temperature is employed.

## Influences Which Lessen Intestinal Movements

There are certain foods and other agents and influences that exercise a decided deterring influence upon intestinal movements, either directly, or indirectly through the suppression of the normal stimuli.

### Liquid Foods

Such foods as soups, gruels, porridges, and purees contain so little solid matter that the bulk, considerable though it may be when the food is eaten, is soon reduced to a very small volume. On this account liquid foods are almost always constipating. The only exceptions are those liquid foods which contain much sugar, acids, or fats.

Pasty cereals such as oatmeal mush, are decidedly constipating in their influence, because of their pasty consistency and the little mastication which they receive. New bread, hot biscuits, "noodles," and doughy foods of all sorts are likewise objectionable.

### Concentrated Foods

Foods which contain little or no waste or indigestible material are so completely digested and absorbed that the bulk left in the intestine is in-

sufficient to stimulate segmentation or peristalsis. In feeding the sick, the mistake is not infrequently made of feeding exclusively fluid or concentrated foods, with the idea that such foods tax the digestive organs least. In a sense this is true, but the importance of maintaining proper bowel action is so great that this must be considered in the dietary, and with rare exceptions the patient will perfectly well tolerate simple salads, stewed fruit of some sort, whole wheat preparations, especially wheat flakes, in which the whole grain is represented.

The conventional "tea and toast" is about the worst diet that could be offered a sick person. The panadas, puddings, and "slops" of various sort are little better.

### **The Properties of Fruit Juices**

Fruit juices of all sorts are, on the other hand, most suitable for almost all forms of sickness. They contain choice nutriment in a form needing no digestion, ready for immediate absorption and assimilation.

Orange juice or freshly expressed juice of apples, grapes, or other sweet or sub-acid fruit, is ideal nourishment for the sick. In the absence of these fruits, dried fruit, soaked long in water may furnish a very fair substitute. Canned fruit juices come next in value. To these rice, or some other cereal food, may be added in proper amount, with malt sugar in some form.



### **Fasting**

In a state of absolute fasting the intestine is in a state of complete inactivity. The normal stimulus of food is lacking, and there is nothing to call forth the rhythmical activities which accompany normal digestion. In another chapter we shall discuss at some length the question of fasting as a curative means, a method which has almost assumed the character of a fad in certain sections.

### **Pain**

Pain in almost any part of the body may arrest intestinal action by causing a reflex interference. Pain or inflammation in any part of the abdomen, especially such painful affections as rectal ulcer or fistula, inflamed hemorrhoids, chronic appendicitis, inflammation of the bladder, prostate, uterus, ovaries, and other pelvic organs, all give rise to inaction of the intestine, not only by inhibiting or preventing peristalsis, but also by causing obstruction through contraction of the ileocecal sphincter. The pain and irritation of an ulcer or fistula, or inflamed hemorrhoids, may induce constipation by causing spasms of the anal muscle, and so preventing the normal relaxation in the act of defecation.

### **Miscellaneous Causes**

*Depressing emotions*, such as anger, fear, or despondency, all suppress the normal movements of the

intestine, and thus form a vicious circle which continually aggravates both the malady and its cause.

*Heat* lowers muscular tone, and hence checks the intestinal movements. This is well seen in the relief obtained by the application of a fomentation to the abdomen, or the administration of a hot bath or a hot enema in a case of intestinal colic or diarrhoea.

*Hot drinks*, as well as hot baths, tend to slow intestinal movements, and the habitual use of warm enemata certainly aggravates the condition for which the treatment is given.

*Sweating*, if very profuse, encourages intestinal inactivity by removing large quantities of water through the skin, and thus producing excessive dryness of the intestinal contents.

Elevated body temperature, whether caused by fever or by a hot bath of some sort, slows the intestinal movements.

*Sleep* and inactivity slow the intestinal movements by lessening the activity of the diaphragm and the abdominal muscles. The first voluntary movements made on awakening in the morning often start up peristalsis, and often provoke a desire for evacuation of the bowels. Persons who lead inactive lives almost always suffer from constipation, though often unaware that this is the case, for reasons which we shall present later.

*Prolonged cold sitz baths* cause intestinal inactivity by inducing a spasm of certain of the food gates, probably the ileocecal sphincter. This result

occurs if the bath is continued for more than seven or eight minutes. When for any reason the use of the prolonged sitz bath becomes necessary, special precautions in diet and otherwise must be taken to prevent producing this undesirable effect.

A diet largely made up of meat necessarily favors intestinal inactivity, first because the complete digestion of the meat leaves too little residue to stimulate peristalsis, and second because an excess of protein encourages putrefactive processes in the intestine, which establish an alkaline condition of the intestinal contents, and thus prevent normal intestinal activity. The stools of flesh eaters usually have a very strong ammoniacal odor, and when tested by the chemist are found to be strongly alkaline. Alkalies paralyze the colon, while acids stimulate it.

## The Causes of Constipation

The causes of a disease so universal in civilized communities must be very numerous to produce this condition in so great a number of people living under many different conditions, and with different habits of life. In general it may be said that the causes of constipation are abnormal habits or conditions of life, the result of what we call civilization. Savages rarely suffer from constipation, which is also true of the more primitive of so-called civilized nations. Chronic intestinal inactivity is much less frequent among country people than among those living in the city. It is manifestly a morbid condition peculiar to a state of high civilization; and modern medical researches tend to show that this condition and its results may justly be looked upon as among the fundamental causes of the race degeneracy which is becoming every year more apparent in all highly civilized communities.

We may therefore expect to find adults suffering from constipation much more than children, although this malady often begins early in life. Women are more subject than men to intestinal inactivity and all the terrible consequences which result from this condition. Westphalen asserts that four-fifths of all women suffer from constipation from their youth onward, a statement that is corroborated by Foges, the eminent specialist of Vienna,

and that few experienced practitioners will deny. Adults have been longer exposed to the degenerative influences of civilized life than have children, and the life of civilized women is to a considerable degree more highly artificial and unnatural than that of men.

Professor Virchow more than half a century ago called attention to the fact that post-mortem examinations show evidences of disease of the intestines in almost every case of many hundreds examined, irrespective of the cause of death. Indeed, he declared it to be almost impossible to find an adult person whose intestines did not show adhesions and other evidences of chronic disease. At that time the origin and significance of these inflammatory conditions was not understood. We now know that infections of the interior of the intestine, by causing inflammation of the intestinal walls, readily extend to the outside, giving rise to inflammatory changes and adhesions. In these adhesions, located in various parts of the intestine, but particularly at special points noted by Professor Virchow, and more recently by Dr. Arbuthnot Lane, we have both a consequence and a cause of constipation.

### **The Rationale of Constipation**

To fully comprehend the influence of various habits and conditions in developing constipation, it is necessary to have in mind the mechanism of

defecation and the conditions essential to the normal colon action. The several acts by which the colon is emptied of its contents may be briefly summarized as follows:

1. Contraction of the diaphragm — a deep breath.
2. Contraction of the abdominal muscles.
3. Pressure of the thighs against the abdomen as in the squatting position assumed by the savage.
4. Reflex contraction of the abdominal muscles.
5. Contraction of the colon.
6. Relaxation of the anus.
7. Contraction of the levator-ani muscles.

Any influence which interferes with a single one of these seven steps in the normal process of defecation may give rise to constipation, and when the disturbing influence is of such character as to interfere with several factors, the result is certain to be an extremely obstinate form of colon inactivity.

The causes of constipation may become operative either before or during the action of defecation. In order that normal defecation should occur, it is necessary that fecal matters should reach the pelvic colon in condition to be expelled from the body, and that the pelvic colon should be free to rise out of the pelvis, so that it may discharge a part of its contents into the rectum; and it is then essential that there should be no interference with any of the several factors which enter into the normal act of defecation.

Among the causes that may operate to prevent the proper preparation of the bowel for the act of defecation through the accumulation of the bowel contents in the pelvic colon, are the following:

1. Deficient bulk of intestinal contents. If the amount of the intestinal contents is too small to distend the pelvic colon, the bowel will not be stimulated to action. This condition naturally results during fasting, and may also result from the use of a concentrated diet. A diet largely made up of animal foods; that is, fish, flesh, fowl, eggs and milk, is always a concentrated diet, since these materials are almost entirely digested and absorbed, leaving no residue. On the other hand, vegetable foods, with a few exceptions,—such as the banana, potato, fine flour bread, and polished rice,—contain a considerable amount of cellulose, which in human beings is indigestible.

2. A spastic or contracted condition of the bowel in the transverse, descending, or iliac colon may hold back the intestinal contents, preventing them from reaching the pelvic colon, and so may interfere with normal bowel action. This condition exists in nearly all persons suffering from colitis, the most common seat of which is the descending colon. The effect may be almost the same as that due to organic change, as from ulcer or adhesions.

3. Adhesions, by interfering with the normal contraction movements of the colon, may seriously cripple its function. These adhesions may be the

result of peritonitis due to chronic infection of the mucous membrane extending through the wall of the bowel to its peritoneal surface. Such adhesions may occur between any part of the colon and the abdominal wall, but are most likely to occur in the lower part of the colon. Adhesions of this part of the colon are in the writer's experience very likely to be found present in cases of extremely obstinate constipation.

4. Redundancy of the colon is another frequent cause of constipation. The overloaded colon is gradually stretched, until it may acquire nearly double its normal length. The redundant colon often becomes folded upon itself, and adhesions form, giving rise to kinks which produce mechanical obstacles to the forward movement of the intestinal contents.

5. Incompetency of the ileocecal valve, by preventing the forward movement of the intestinal contents, hinders the normal filling of the pelvic colon, and so leads to constipation.

6. Ordinarily, the whole bowel is not emptied in the act of defecation. The length of the colon is such that the residue from two or more meals may be present in different parts of the intestine at the same time. For example, the supper residue may be passing into the cecum while the dinner residue occupies the transverse colon and the breakfast residue is in the pelvic colon ready to be dismissed.

The descending colon is normally found in an



empty state. When the intestinal contents are pushed from the transverse colon over into the descending colon, they are not long retained, as in other parts of the colon, but pass rapidly down to the pelvic colon, which seems to be intended by nature for a sort of discharging reservoir, in which the fecal matter accumulates until a sufficient degree of distention of the bowel has been induced to stimulate peristaltic action.

A lack of this distending stimulus, which is essential to bowel activity, is a cause of constipation in a large number of persons whose pelvic colons have been over-distended. In such persons an extremely bulky diet is necessary to fill the pelvic colon to such a degree as to bring about the reflex movements which induce normal bowel action.

In persons who are chronically constipated the descending colon is often constantly filled. The long contact of the poisonous fecal matters with the mucous membrane gives rise to infection. This is colitis. Colitis causes contraction of the bowel, thus becoming a new and most potent cause of constipation. The contraction produced by colitis not only obstructs the bowel, but also sets up anti-peristaltic movements, thus reversing the action of the bowel and carrying material back to the ascending colon and cecum. Normally, the anti-peristaltic contractions start at the middle of the transverse colon and do not involve the lower half of the colon. But when colitis and spasm are present,

the reverse movement extends even to the pelvic colon. This fact, discovered by Case, explains the peculiarly irregular and erratic bowel movements characteristic of colitis.

7. By compression of the waist, such as results from the wearing of corsets and tight dresses, the action of the diaphragm is greatly crippled. This may be one reason why women in general suffer from constipation more than do men. The feeble condition of the diaphragm and other breathing muscles, which is the natural result of neglect of exercise, produces a similar effect in both men and women.

8. A feeble and relaxed condition of the abdominal muscles, the result of a sedentary life, and especially of a stooped and relaxed posture of the body in sitting or standing, will necessarily interfere with both voluntary and reflex contraction of these important muscles, which is an essential factor in normal defecation. When the colon has been long over-distended by neglect, and relaxed by the long-continued use of the warm enema, its power to contract is necessarily greatly diminished. This condition of the bowel not only prevents inefficient normal defecation, but the efficiency of the bowel may be still further interfered with by adhesions and kinks.

9. Hemorrhoids, fissures, ulcers, fistulæ, and simple irritation of the mucous membrane in the anal region, may cause spasm or abnormal tightness of the anal muscle, so that the ordinary reflex is

insufficient to cause relaxation of the muscle, and it thus becomes a mechanical obstacle to bowel movement.

10. The levator-ani muscle frequently becomes so weakened by continuous over-stretching, as the result of accumulation of hard fecal matters in the rectum, that it loses its power to contract. This condition may also be induced by proctitis, a common result of constipation.

When the rectum walls are thus weakened and paralyzed, the rectum, instead of being always empty except during defecation, always contains more or less fecal matter, the constant contact of which with the mucous membrane produces loss of sensibility and chronic catarrh or proctitis, and often gives rise to hemorrhoids, anal ulcer, abscesses, fistula and local affections.

It is thus apparent that in all cases of constipation there is a definite reason for intestinal inactivity. In every case of really serious constipation—that is, cases which are not relieved by regulation of diet—careful inquiry must be made for the purpose of ascertaining the exact conditions which are interfering with normal intestinal movement, including both the exciting and the predisposing causes of these conditions, which will be considered at length in succeeding pages.

In discussing the causes of constipation, we will consider first of all the influence of habits of life upon the function of defecation, and will then notice

various morbid conditions in different parts of the alimentary canal, which may give rise to constipation.





Lower Jaw of a Malakos Indian

## Habits Which Give Rise to Constipation

In considering the habits of life common among civilized people which give rise to constipation, we shall not undertake to arrange the subject matter in the order of relative importance, but rather speak first of those which are most common.

### Hasty Eating

Insufficient mastication is a fault peculiar to civilized men. The savage, as well as the monkey and all lower animals that are provided with teeth for grinding food, masticates his food with the greatest thoroughness. The accompanying cut made from the lower jaw of a skull in the writer's possession, shows the teeth of an ancient mound builder, a Malkelkos Indian. The well-worn appearance of the teeth affords sufficient evidence of the thoroughness with which they were used in grinding the nuts and cereal food which formed the dietary of these aborigines.

Hasty eating leads to constipation in a variety of ways, but most directly, perhaps, by the rapid introduction into the intestine of a large amount of imperfectly masticated food material, which being slowly digested, undergoes putrefaction and other changes, by which the functions of every part of the

digestive canal to the colon are more or less disturbed. As has been mentioned, the food is normally held back for three or four hours at the ileocecal valve, to permit the completion of intestinal digestion and absorption. When the food has been imperfectly chewed, it may be too long delayed at this point.

As the result of the long delay in the small intestine, the food mass contains too little water when finally passed through into the colon, and is moved along with great difficulty, and by delay tends to dilatation of the colon. Under normal conditions the food does not remain in the body more than twenty-four hours, but under the conditions just described it may be retained for forty-eight hours or more, in the meantime undergoing putrefactive changes, which not only render the normal contents of the bowel alkaline, and thus deprive the bowel of a normal stimulus, but in time produce infection of the mucous membrane, which manifests itself ultimately as chronic colitis, or chronic appendicitis.

Hasty eating is a fault almost universal with the American people. The fifteen minutes' stop for refreshments at the lunch counter or eating house, and the general spirit of hurry which is everywhere manifest in our bustling communities, constantly encourage, almost enforce, wrong habits in eating. If time is limited, it would be far better to eat a smaller quantity and chew it well, than to swallow the whole amount half masticated.



### Excessive Mastication

Excessive chewing of the food, to which the term "bradyphagia" has been applied, has been charged with being a cause of constipation, and the charge may be true. A person who follows the recommendation made by some writers, to swallow nothing which cannot be reduced to liquid in the mouth, is sure to suffer from constipation as a consequence of insufficient bulk. Some have not only carried the practice of chewing to a great extreme, but have reduced the quantity and bulk of food to so low a limit that chronic constipation has been the natural result. Constipation is indeed so common a result that it has been by some commended as one of the advantages of thorough mastication, a "food economy" that should be cultivated. This is certainly an error, and a most dangerous one. We have been consulted by a number of persons who have found themselves suffering from severe constipation and resulting autointoxication, in consequence of so greatly reducing the amount of food eaten, and especially of the amount of insoluble residue, that there was too little left to evoke the necessary intestinal movements. The human alimentary canal is adapted to somewhat bulky and moderately coarse food-stuffs, and does not work well when such food materials are excluded from the bill of fare. Bulk is almost as necessary as nutriment.

Food should be chewed sufficiently, that is, until the tongue no longer discovers coarse particles.

### Insufficient Bulk

The alimentary canal of man, while not so long in proportion to his size as that of the herbivorous animals, is much larger and longer than in animals which are intended to feed upon a flesh diet. The human intestine is approximately ten times the length of the body, that is, of the trunk, which is approximately half the height. The colon is sacculated like the colon of herbivorous animals, and like that of the higher ape, indicating the adaptation of the intestines to bulky food. Fresh vegetables of all wholesome sorts are highly essential to give the food the necessary bulk required to stimulate the intestines to activity. A diet of bread and meat leaves almost no residue at all in the intestine.

Fruits and fresh uncooked vegetables are used far less than they should be by the majority of people, especially by the poor. The Russian peasant keeps his bowels regular by the use of sauer-kraut, which serves him the same purpose as the products of the "silo" do the farmer's cattle.

Vegetables, especially such vegetables as carrots, turnips, beets, parsnips, lettuce, cabbage and spinach, contain a large amount of cellulose, which is not readily digestible by the human digestive organs. This cellulose is highly important to make the nutritive elements of the food less concentrated and to furnish to the intestines the necessary stimulus to cause them to move the food and food residues along at a proper rate.

Nearly all fruits and most vegetables, especially that curious vegetable-fruit, the tomato, contain organic acids,—citric, malic and tartaric. The free use of foods containing these acids is as wholesome for man as for other frugivorous animals. Their laxative effect is essential to maintain a healthy colon.

### Meat Eating

Carnivorous animals have a short alimentary canal and a smooth colon. The movement of food stuffs along this short, smooth passage is rapid. This is necessary for the preservation of the life of the animal, as undigested remnants of meat long retained in the body necessarily undergo putrefactive changes with the production of ptomaines and poisons of a dangerous character. The digestion of meat leaves little residue, hence an animal that lives chiefly on meat has but little bulk to stimulate the bowels to activity, a condition which favors the putrefaction of undigested remnants, and this by creating an alkaline condition of the intestines soon develops constipation.

A diet of fine-flour bread and meat, with the usual concomitants of the ordinary bill of fare, would be an excellent prescription for the production of constipation. Within the last century there has been an enormous increase in the use of flesh foods in all civilized countries; and the use of modern milling processes has become almost uni-

versal. Fine flour bread and meat form a combination that is productive of prodigious harm, not only in causing constipation, but also in depriving the bones of the lime salts which are essential for their development and maintenance. From the lack of lime salts comes decay of the teeth, and loss of the teeth leads to imperfect mastication of food.

The increased consumption of flesh, and the substitution of fine-flour bread for the wheatmeal of our ancestors, are two calamities, the evil results of which upon the health of the men and women of the present generation are incalculably great.

### Milk

Within the last few years much evidence has accumulated to the effect that cow's milk is by no means the specially wholesome human nutriment that it was once supposed to be. Bunge, a great physiologist, and perhaps one of the world's greatest authorities on foods, goes so far, indeed, as to assert that many thousands of children are annually killed by feeding on cow's milk; and many persons have learned from their own observation that milk does not agree with them. Cow's milk is excellent food for calves, to which it is naturally adapted, but for many human adults it appears to behave almost as a poison. The probable cause is the very common inability to digest the casein of cow's milk. Personal observations in a very large number of

cases have convinced the writer that at least one-third, and probably more than one-half, of the persons suffering from chronic disease cannot use cow's milk freely without more or less serious injury. One of the prominent symptoms arising from the use of cow's milk is the production of a condition commonly known as "biliousness". The tongue becomes coated, there is a bad taste in the mouth, the breath is foul, the bowels are inactive, and an examination of the stools shows the presence of considerable quantities of undigested casein undergoing putrefaction.

The free use of milk is unknown among savages. The writer has no doubt that the extensive use of milk, under the mistaken notion that it is a specially valuable food for adults as well as for infants, is one of the active causes of the steady increase of constipation amongst civilized people. Putrefaction of undigested casein in the colon produces an alkaline condition which paralyzes the bowel and encourages conditions by which the defecating mechanism is in various ways more or less irreparably damaged.

### **A Bland or Monotonous Diet**

Pawlow has shown the importance of taste as an element in digestion. According to his experiments, the activity of the stomach begins almost immediately after food is taken into the mouth. The intensity of the gastric activity depends upon the

degree of stimulation of the gustatory nerves. Cash has shown by experiments on dogs that even the smell of food produces peristaltic activity. If the food is not relished, the stomach does not produce "appetite juice", and the vigorous peristaltic movements that are essential for sound digestion, and that are equally necessary to stimulate movement of the intestinal contents all along the line, are not initiated. It must be remembered, as has been shown in a previous chapter, that the taking of food, although it has for its primary object the introduction of nutritive material into the body, is incidentally necessary as a means of setting up the strong peristaltic waves that push forward the fecal matters that have accumulated in the colon, causing them to pass through the sphincter which guards the upper entrance of the rectum, and to set up the series of automatic movements by which this waste and unusable material may be removed from the body.

In order, then, that these two prime purposes of eating—namely, the nourishment of the body, and the evacuation of poisonous material—should be efficiently accomplished, it is necessary that the food should be so inviting and stimulating to the senses which participate in the enjoyment of food that the digestive activity will be prompt and vigorous. A meal taken without relish and eaten as a mere matter of routine and duty does not accomplish this. A person who eats without appetite is always

constipated. Even if the bowels move regularly, the discharged materials should have been got rid of twenty-four or forty-eight hours before; there is a latent constipation, the evil results of which do not materially differ in the main from those of other forms of constipation, although likely to escape attention. The bill of fare should be so varied from day to day and from meal to meal, and the food should be of such a character, that each meal will be taken with keen relish. This is especially important for persons whose lives are sedentary, and who on this account are more likely to suffer from loss of appetite, and the constipation which is both a cause and a consequence of this difficulty.

### **The Exclusive Use of Cooked Food**

While it is true that the cooking of food in general increases digestibility, experience in the feeding of both infants and adults has clearly shown that a diet consisting exclusively of cooked food is detrimental both to digestion and to general health, and may lead to the most serious results. It has, indeed, been shown that in children a cooked diet, such as sterilized milk, for example, may lead to the development of rickets and general mal-nutrition. Combe, one of the world's greatest authorities on infant feeding, asserts that the symptoms and injury from such a dietary make their appearance within two or three weeks. The writer's observations

have fully convinced him that adults as well as infants suffer from this cause. It has long been known that salt is not the exclusive cause of scurvy in sailors, as was once supposed; it is rather the lack of certain elements—enzymes and vitamins found in raw foods, many of which are destroyed by the heat of cooking, and which are essential to good nutrition.

Another objection to the exclusive use of a cooked diet has a special relation to the subject in hand—the fact that it renders the cellulose of the food too readily digestible by the intestinal bacteria, so that the amount remaining is insufficient to give to the intestine the needed stimulus to movement.

The same objection also applies in relation to starch. Raw starch is to a degree digestible in the intestine, but cooked starch is much more readily digestible. For good bowel action, it is necessary that a certain amount of undigestible starch should find its way into the colon. Cooked starch is quickly converted into sugar, and is completely absorbed in the small intestine. When no starch reaches the colon, the acid-forming bacteria which feed upon starch and convert it into lactic and other acids, are not able to grow; acids are not formed, the intestinal contents become alkaline, with the formation of ammonia and the putrefaction of protein. This condition results in a semi-paralysis of the colon, so that the feces are too long retained, and putrefaction proceeds still farther.



Foods containing starch or cellulose should be taken every day, or preferably at every meal. Among foods of this kind to be specially recommended are green corn fresh from the garden (uncooked), lettuce, cabbage, and fresh fruits of all sorts, turnips of the best varieties, and even radishes, if care be taken to remove the acrid rind. Young carrots are also relished by some prepared raw. As a salad Cucumbers and raw tomatoes are excellent.

These raw foods must be thoroughly chewed, as otherwise they may cause too long delay in the stomach or in the small intestine. The universal relish for fresh vegetables, and the intense craving for them, is an evidence of their value. These food stuffs, while supplying very little active nutriment, nevertheless furnish the body with quantities of certain elements which modern research shows to be essential, while at the same time they supply necessary bulk and a sufficient amount of undigested carbohydrates to establish in the colon conditions essential for a normal activity.

### **Hot Foods and Drinks**

Heat relaxes and paralyzes, while cold stimulates. For a muscle in a state of cramp or violent contraction, the application of heat is the most efficient remedy. When food is taken into the stomach active muscular movements at once begin. As we have seen, these movements are essential, not only

for churning the food and passing it onward along the digestive tube, but also to move forward the contents of the colon to the sensitive point in the rectum, at which are set up the automatic actions by which the bowels are moved. Heat, whether taken into the stomach by food or drink, or applied externally, has the effect of weakening these movements. It does this by exciting the sympathetic nerves which hinder or inhibit the movements of the stomach or intestine, and so check peristalsis. The practice of eating food as hot as it can be swallowed, and especially of taking hot drinks at meals, is unquestionably a very active cause of constipation. If the food is held in the mouth for a sufficient length of time to permit thorough mastication and the proper admixture of saliva, no harm will result from serving it hot when necessary, as it will be cooled in the mouth to body temperature before swallowing.

Priessnitz, the sagacious peasant doctor of water cure fame, noted the unwholesome effects of hot foods more than a century ago. By experiments upon pigs he demonstrated that hot food produced an unhealthy state of the intestine. He accordingly recommended his patients to take their food at the natural temperature of the air, and the thousands coming from every part of the civilized world who annually ate at his table in the little village of Graefenberg, hidden among the forests of Austrian Silesia, testified to his success in the treatment of

chronic constipation and numerous other ills which were at that time acknowledged incurable even by the best physicians.

Hot foods and drinks produce a sensation of comfort in the stomach directly after they are swallowed. In certain forms of indigestion this effect of heat is particularly noticeable. In these cases, however, temporary comfort is obtained only at the expense of the later serious disadvantages of the constipating effect of such a diet.

### **A Meager or Low Diet**

Many persons suffer from constipation because they do not eat enough. They are in constant fear of overloading the stomach and bowels, and the consequence is that these organs lack sufficient work to stimulate them to proper activity. The writer has many times surprised such patients by the prescription of a meal two or three times as large as was being taken. The patient has usually found that he suffers no harm from his large meal, and is able to digest it without difficulty, and has also experienced a notable improvement in bowel action. The peristaltic waves which move the food along in the stomach and small intestine and the feces in the colon, are set up by reflex action excited by the food itself; that is, contact of the food with the mucous membrane of the stomach and intestine excites certain nerves by which the muscles are stimu-

lated to activity. This action may be likened to the ringing of a bell in response to the touch of an electric button, or the starting of an electric fan by the moving of a switch. When taken into the stomach, food by its contact with the mucous membrane sets in operation the food motor that operates in the upper part of the digestive canal to carry the food stuffs along from one part of the digestive tube to another and in the lower part to transport rubbish and refuse to the place of exit.

The degree of this movement depends upon the amount of stimulation, while the amount of stimulation depends largely upon the bulk of food taken. This stimulating effect is produced not only in the stomach, but in the small intestine.

It is evident, then, that for vigorous stimulation of the intestine, such as is needed to bring about the evacuation of the colon, a full meal must be more effective than a meagre one. This is one important reason why the taking of food at regular and not too frequent intervals is favorable to regular bowel action. A small amount of food taken at frequent intervals may not at any time set up a sufficient degree of stimulus to give the bowel the impulse required.

People who "diet" do themselves great injury often by too great restriction of the bill of fare, both in quantity and variety of food. A food that the patient imagines to be constipating or otherwise harmful is generally found to have the expected

result. Thus, item after item the food is discarded, until the bill of fare is reduced to a few articles which are usually taken without relish and with more or less apprehension of injury. Such patients might far better pay no attention to diet whatever; they would run far less risk of injury by taking whatever the appetite craved.

In this connection it should be noted, however, that in increasing the amount of the food intake, the increase should usually be in bulk rather than in food value. The added bulk should consist of such foodstuffs as lettuce, celery, turnips, tomatoes, greens, fresh fruits and other articles which give large bulk with little nourishment.

### **Constipating Diets**

Nurses, and perhaps physicians also, sometimes unwittingly do their patients great harm by restricting the diet to bland or liquid foods, which are often taken without relish, and which on this account, as well as by lack of bulk, tend in the highest degree to promote intestinal inactivity and obstinate constipation. A diet like this naturally necessitates the use of artificial means for moving the bowels. Many a patient owes the beginning of his constipation to such a course of dieting during temporary illness. Milk, which has been so much relied upon as a sick-room diet, is particularly objectionable in a very large number of cases, for reasons which have already been given. Buttermilk is pre-

ferable, because of the lactic acid it contains, while its value is greatly increased by the addition of malt sugar or milk sugar, and wheatmeal porridge, or a porridge of corn meal or oatmeal made with an addition of wheat bran. Fruit juices are extremely useful. There are very few cases in which such fresh things as lettuce and scraped apple and other raw fruits may not be taken with great advantage as well as vegetable purees. The danger of the use of solid food in these cases is purely imaginary, if care is taken to exclude meat, fried foods, and indigestible combinations. Thorough chewing of the food is of course essential.

The dietaries generally prescribed in certain forms of chronic disease, and considered to be essential, are often highly constipating. This is particularly true in the meat treatment for diabetes. Constipation is nearly always found present in persons suffering from this malady. It will always be found, indeed, that constipation existed before the appearance of sugar in the urine. The writer has no doubt that chronic constipation is one of the most prolific causes of the rapid increase of diabetes in all civilized communities. The statistics gathered in the United States Census Bureau, show a death rate from this source nearly ten times as great as twenty years ago. As has been pointed out already, meat, which is usually the staple article prescribed for diabetic patients, leaves little residue, while at the same time promoting putrefaction in the colon, thus establish-

ing conditions which of necessity favor constipation. This difficulty may be entirely overcome by the free use of green vegetables, bran, and vegetable protein or pure gluten.

In the dietetic treatment of hyper-acidity, and especially of ulcer of the stomach and the duodenum, the usual prescription is of such a character as to cause constipation, which in turn leads to intestinal toxemia and to a relapse later on. The withholding of bulk-forming food is by no means so essential in these cases as has been supposed; the essential thing is to avoid the stimulation of the gastric secretion by flesh foods and the extractives of meat that are found in bouillon, broths and meat extracts. These substances powerfully stimulate the gastric secretion, and thus aggravate and perpetuate the ulceration. They also produce auto-intoxication, which encourages hyper-acidity and tends to the formation of ulcer. Carefully prepared vegetable purees may usually be given in these cases at least after the first few days, not only without injury, but even with much benefit, thus preventing the constipation which is certain to result from the bland, liquid diet.

### **Fasting**

Fasting, which is sometimes prescribed as a remedial measure, necessarily leads to constipation, unless some preventive method is adopted. The use of the enema is not sufficient. Washing out of the colon can do nothing more than remove materials which

have been deposited in it from the small intestine; and in fasting, the small intestine as well as the stomach is in a state of complete inactivity. Bile, mucus and other secretions, as well as poisonous excretions from the blood, are accumulating from day to day, but there is no peristaltic movement to carry them onward, because no food is taken into the stomach. From these facts it is evident that absolute fasting, except when made necessary by some intestinal trouble or other equally imperative exigency, is rarely likely to prove beneficial. As a general measure for purifying the blood, removing uric acid, or producing tissue renovation, it is never required. The prodigious claims that have been made for fasting as a means of physical regeneration, are in the highest degree misleading. Not a few people have done themselves irreparable damage by a prolonged fast. The benefit derived from fasting, except when made necessary by a surgical operation, hemorrhage from the stomach or bowels or some other emergency, is due to the withholding of protein and fats, so that the body has an opportunity to clear itself of "cinders" and other waste and toxic matters derived from foods rich in protein, especially meat and eggs. All these benefits may be obtained by the exclusive use of juicy fruits for a limited period, or better still, by the use of fruit of some kind with bran and some green vegetable, such as lettuce. By this means the food tube is supplied with the bulk necessary to maintain its



rhythmical action. The acids and sugars of fruits are active in the same direction, while at the same time furnishing the body with the necessary fuel to maintain animal heat, and support its activities, so that it is not compelled to feed upon itself, as certain animals when starving bite and tear their own flesh, and suck their own blood.

The injury to which persons subject themselves by a long fast is similar to that resulting from a long fever; the conditions are really very similar. The appetite of the fasting person disappears on the third or fourth day, just as does that of the fever patient, and from the same cause, namely, the saturation of the tissues with toxins. In the case of a fasting person, the result of the absorption of poisons from the putrefying materials stored up in the inactive colon—foul breath and coated tongue—is evidence of this autointoxication, and not of a process of body purification. The foul breath and coated tongue are the result of a growth of bacteria in the mouth and the intestines, which is encouraged by the lowered vital resistance resulting from abstinence. The clearing of the tongue that occurs in many cases in from two to four weeks, is likewise comparable to the clearing of the tongue in typhoid fever, in about the same time, which results from the development of immunity against the bacteria and bacterial poisons to which the body is exposed. In the case of the fasting person, clearing of the tongue may be induced by the taking of food.

The coated tongue does not occur in a "protein" fast, such as has been above described.

### **Obesity**

In the treatment of obesity not due to disease of the glands of internal secretion, restriction of the quantity of food is essential; unless care is taken, this naturally leads to constipation—a very common result of dieting to reduce flesh. This effect of reduced diet is aggravated by the sweating which results from the hot baths administered, as well as from the vigorous exercise required. Constipation may be avoided in these cases by not diminishing the bulk of the food intake while reducing its food value. Indeed, it is an advantage to increase the bulk. The free use of green vegetables is especially indicated in obesity, as a means of preventing constipation.

### **Condiments**

Mustard, pepper, pepper sauce, cayenne, capsicum, horseradish, and the whole list of hot, irritating substances which are frequently added to food as seasoning, having no food value in themselves, are active causes of constipation. These substances produce, at first irritation, and later on catarrh of the stomach and intestines, leading to gastritis enteritis, and colitis, and ultimately to degeneration of the gastric glands. The consequence is loss of

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the normal reflex activity, to which the peristaltic movements are due. But the worst effects of condiments are to be seen in the lower part of the small intestine and in the colon. Condiments being indigestible, become more and more concentrated as the food substances with which they are eaten are absorbed, and hence their effects are seen in a very pronounced degree at the extreme lower end of the small intestine, and in the colon where the food residues accumulate before passing on to the cecum through the ileocecal valve. When the irritating mass is pushed through the ileocecal valve, each successive portion falls at once upon the floor of the cecum, so that this small area, to which is attached the appendix, receives, so to speak, the concentrated fire of these enemies of good digestion. The resulting irritation in the meantime results in infection, upon which follows colitis, and not infrequently acute and chronic appendicitis, affections which are both a consequence of chronic constipation.

The concentrated residues of the food stuffs, including the indigestible particles of mustard, pepper, or other condiment taken with the food, brought in contact with the rectum cause chronic catarrh; hemorrhoids develop together with ulcers, fissures, and abscesses, followed by fistulae, and the way is prepared for tuberculosis and cancer.

In India, especially in Ceylon, and also in Mexico, countries in which curries and hot, peppery



saucers are used, gastric catarrh, constipation and hemorrhoids are almost universal among those addicted to the use of these pernicious food-poisons..

### **Irregular Meals**

When the meals are not taken regularly, the rhythmic peristaltic impulse by which the feces are pushed forward from the colon into the rectum is lacking. If for example, a person's habit is to move the bowels immediately after breakfast, and the breakfast is not taken, the bowels will not move, or if a movement occurs, it will be incomplete; instead of complete emptying of the colon below the splenic flexure, which occurs in a normal movement of the bowels, only the pelvic loop will be emptied; and fecal matters remain in other sections of the colon. After the next meal, the stimulus may be sufficient to empty the colon completely; but if the irregularity is frequently repeated the normal rhythm of the bowels will be interrupted. The forward movement of food stuffs in the small intestine is continuous while digestion is going on; but the movement in the large intestine is more or less intermittent. If a meal is taken when the pelvic colon is loaded, the stimulus of the meal will cause the pelvic colon to contract and push forward a portion of its contents into the rectum. The feces in the rectum will excite the defecating center, and thus set up the automatic

action by which a movement of the bowel is effected.

If a meal is taken at a time when the feces have not reached the pelvic colon, manifestly no movement of the bowels can occur, and a general contraction of the colon by which its contents are discharged does not take place. If, on the other hand, no meal is taken at a time when the pelvic colon is filled, the movement must be delayed until the next meal is taken, or perhaps until some unusual straining movement or exercise serves to crowd out some of the fecal matter from the colon into the rectum. If the fecal matters retained in the pelvic colon become too dry to be readily moved by normal stimuli, a laxative or an enema becomes necessary. In many cases, this is the beginning of chronic constipation; a few repetitions may be sufficient to create a latent constipation in which the bowel movements are always twenty-four or forty-eight hours behind time.

Since bowel movement depends so largely upon the stimulus derived from eating, it is evident that regularity of bowel movement depends upon regularity of eating.

If a full meal cannot be taken, some fresh fruit, as an apple or two, or a couple of oranges, may serve the purpose to maintain the normal rhythm. When strong stimulation of the colon is needed a bran biscuit may be added with advantage, together with a dose of paraffin.

### Tea and Coffee

Tea and coffee contain two substances the poisonous effects of which are well known, viz: caffein, a nerve poison practically identical with uric acid, and tannin, an astringent well known as one of the constituents of oak bark and many other vegetable substances. A cup of "good" coffee contains four grains of caffein and two of tannin. There is, in fact, nearly three times as much uric acid in a cup of coffee, in the form of caffein, as in an equal quantity of urine. The effect of tannin upon animal tissues is well shown in the process of tanning, by which animal skins are converted into leather. Tannin is an active poison to the mucous membrane of the stomach and intestines; it not only interferes with the digestive processes, but it produces changes in the mucous membrane by which its power to respond to the delicate impressions made by the food is lessened. The result is diminished intestinal movement and constipation.

Everyone is familiar with the use of astringent or tannin-containing remedies in diarrhea. However beneficial tannin may be in cases in which the bowels are abnormally active, certainly its effects are nothing but pernicious when habitually used. The average civilized man requires stimulation of his food tube rather than the use of substances which produce a paralyzing effect.

### Insufficient Fluid

Most persons who suffer from constipation habitually drink too little water. Women drink less than men. It is difficult to account for this scanty use of a necessary of life, which costs little and is of such inestimable value to the body. Water is far more immediately necessary for the support of life than is food. A man may live six weeks or two months without tasting food in any form, but a few days at the most is the limit of human life without water. The consequence of a scanty use of water is abnormal dryness of the feces, which delays their passage through the lower colon, and often causes an actual stoppage in the pelvic colon or the rectum.

Persons who sweat much, either as the result of hot weather, vigorous exercise, or hot baths, are likely to suffer from constipation, unless special care is taken to supply the body with water sufficient to make good the loss. The skin ordinarily throws off as perspiration an ounce and a half of water each hour, or more than a quart in twenty-four hours. By active exercise or sweating baths, this amount may be increased to thirty or forty ounces in an hour. The kidneys excrete two to three pints daily. It is evident, then, that care must be exercised to replace the water that is lost through the skin and kidneys.

In diabetes there is a great loss of water through

the kidneys. This also must be made up by drinking. If these losses are not made good, the thirsty tissues will absorb as much water as possible from the feces, thus causing hardening and retention in the lower bowel.

Scanty and highly colored urine is an evidence that the tissues are in need of water. Dryness of the skin often testifies to the same need.

Water should be taken in proper quantity irrespective of thirst. It may be made palatable by the addition of fresh fruit juices.

For the average person a good plan is to take a couple of glasses of water on rising, and the same amount before retiring at night. A glassful should be taken half an hour before dinner and supper, and an equal amount two hours after eating. The free use of oranges or orange juice, and of other juicy fruits, serves the same purpose as water drinking, to the extent of the liquid which they supply.

Persons suffering from obesity or diabetes are sometimes restricted in the drinking of water, with the result that constipation is produced, if this condition does not already exist. This should never be done.

In all cases in which there is a tendency to dryness of the stools, water should be taken in increased quantity. It is important in such cases also to diminish the amount of salt eaten. The addition of salt to the food creates thirst for water to dissolve



it and to aid in its elimination through the skin and the kidneys.

Children as well as adults need much more water than they are usually given. Meat eaters and those who use salt freely require a much larger amount of water than do those who adhere to a low protein dietary and who use little salt.

### **Irregular Sleep**

The resumption of bodily activity on rising in the morning is one of the important means by which the bowels are made to act with regularity, by stimulating the colon to empty a portion of its contents into the rectum. When the hours of sleep are irregular, and especially when insufficient time is devoted to sleep, this physiological stimulus is lacking, and constipation may be one of the evil consequences resulting. Loss of sleep causes loss of tone in the intestinal muscles, as well as of general muscular tone, and also lack of appetite, thus diminishing the normal stimuli to bowel movement, and so easily leading to constipation. Even when the bowels do not move soon after rising, the stimulus of rising after a good night's rest at least aids in the filling of the pelvic loop, which then only requires the stimulus of breakfast to cause a normal bowel action. Regularity of sleep is almost or quite as necessary for regular bowel movement as is regularity of meals.

### **Incorrect Breathing**

A child does not have to be taught to breathe. It breathes instinctively and hence correctly, for all instinctive movements are physiologically and hence correctly performed. But the breathing muscles are voluntary muscles, and hence may be controlled by the will. This fact permits modifications of the act of breathing, which may or may not be physiological. Unfortunately, the conditions of civilized life are such as lead to serious perversions of the breathing process. Normally, when air is inhaled the whole chest is enlarged, but the chief movement is at the lower sides of the chest. This broadening of the chest at its lowest part stretches the diaphragm and thus gives it an opportunity to exert its greatest force. Its form being arched, this is highly important. If its ends are held in place, the top of the arch can descend only a little, and while breathing is ineffective, the lungs being imperfectly expanded, the compression of the abdominal organs is equally inefficient. The diaphragm, it must be remembered, is a double acting pump. It creates a suction in the chest, while at the same time it produces pressure in the abdomen. If its work is imperfectly done in one direction, it fails equally in the other.

The compressing movements produced by the diaphragm at each inspiration are, when efficient, of great service in assisting the movements of the

food along the alimentary tube. Acting upon the stomach, which lies just beneath it, the diaphragm churns the food and aids in pushing it along into the intestine. Acting upon the colon, which on the left side lies in contact with it, the diaphragm renders great assistance in helping to push the food along toward the rectum.

But it is especially in the act of defecation that the action of the diaphragm is important. The very first step in the process of unloading the bowel is in the sinking of the colon by a very deep breath. If the sides of the chest are compressed by belts or a corset, so that they cannot expand, the diaphragm cannot descend more than a short distance, and its action is inefficient. As a result, the fecal matters stored up in the descending and pelvic colon are not pushed onward to the rectum, and the bowel is only partially emptied. Thorough natural bowel movement is not possible without free and vigorous movement of the diaphragm.

So, too, if the diaphragm is weak because of habitual shallow breathing, the result of a bad position in sitting at work or study, the same result follows. A position which hampers the movements of the chest thus leads to constipation.

The ordinary house chair, especially the rocking chair and easy chairs in general, train the body in unhealthy attitudes and compel shallow breathing. When the chest is depressed, as when sitting in a hollow-backed chair, the abdominal muscles

are relaxed, and the diaphragm cannot act well. There can be no compression of the abdominal viscera without a tense condition of the abdominal muscles. In most constipated persons these muscles are so relaxed and flabby that they render little service. The colon in such cases is compressed so feebly in defecation that it is never properly emptied except when the stools are made fluid by a laxative or by an enema.

When, on the other hand, the chest is raised, as shown in the accompanying cut, the abdominal muscles are stretched, they are thus made tense, and the colon is kept under constant pressure, by which its contents are moved along at the proper rate; and when defecation occurs, these tense, well-developed muscles are ready to do their necessary part of the work

Probably the majority of sedentary men and most civilized women spend the greater part of their lives under conditions which induce imperfect breathing and lead to weakness of the abdominal muscles, and so to constipation.

When we consider how universal among civilized women is the practice of compressing the waist by corsets or bands, we find a ready explanation of the fact that four-fifths of them suffer all their lives from constipation, while a large proportion suffer more or less from disorders peculiar to their sex which are by many supposed to be a necessary burden laid upon them, and an inevitable consequence

of femininity but are really due to causes which might be easily avoided.

### **Deficient Exercise**

The relation between exercise and breathing and the necessity for vigorous and untrammelled action of the diaphragm have been already referred to in the preceding paragraphs. Exercise promotes bowel action, not only by aiding respiration and inducing vigorous movements of the diaphragm, but by calling into strong action the muscles of the abdomen, and by raising the general muscular tone of the body.

The excellent effects that walking has upon bowel activity are well known. Riding is also of great advantage in the same way. These exercises, as well as many others, mechanically stimulate the colon as well as all parts of the intestinal tract, by communicating to it a continued series of slight shocks, by which reflex movements are excited. The active play of children is as necessary to maintain proper bowel action as for muscular development. The movements of skipping, hopping, jumping, are especially useful, because they induce sudden vigorous contractions of the abdominal muscles, and vigorous diaphragm movements by which the colon is compressed and stimulated. The folk dancing of the middle ages, which has been revived in recent years, is for the

above reasons to be highly commended as a health measure. It is important, however, to make a clear distinction between the varied and vigorous movements of the folk dance, in simple dress and under wholesome conditions, and the monotonous and restrained movements of the social dance, in full dress and under conditions always physically, and not infrequently morally, unwholesome.

Those whose occupations are such as to give them plenty of exercise are fortunate in being able to lead lives which in large measure conform to natural requirements. Such persons never need suffer from constipation if they eat proper food, drink an abundance of water—at least three to five pints daily—and take care to give the bowels an opportunity for movement after each meal, and promptly whenever there is a “call” for evacuation.

Those who are compelled to lead sedentary lives, and especially women, whose lives are nearly always more or less sedentary in character, must take daily and regular exercise of a sort calculated to benefit the bowels if they would escape the evils of constipation and its secondary results. Some of the special exercises which have been shown by experience to be of greatest service in combating constipation will be described in a subsequent chapter. The exercises of greatest value are those which strengthen the abdominal muscles. A spring abdominal supporter will usually render great service (page 298).

### Resisting the "Call"

The practice of resisting the "call" of Nature to discharge from the body accumulated wastes and rubbish is almost universal among civilized people, as the result of refinement of manners and modesty which lead to the concealment of certain animal functions as much as possible. That this is the result of what is commonly called false modesty cannot be denied, and yet there are few who would desire that this so-called false modesty should be altogether laid aside. It is important, however, that every person, children as well as adults, and at a very early age, should be fully instructed respecting the evil results of resisting and thus thwarting one of the most important of the bodily functions.

The "call" signifies that the pelvic colon is full of feces, and that a sufficient amount of fecal matter has been pushed down into the rectum to arouse the center of defecation and cause it to set in operation the automatic processes concerned in bowel movement. The colon is contracting, and there is a tendency for the anus to relax, which must be forcibly resisted to prevent immediate discharge of feces. The feces are normally stored in the pelvic colon, the portion which lies just above the rectum. So long as they remain here, there is no desire for movement, but when a portion of fecal matter has been pushed down into the rectum, the time

for evacuation has come, and the fact is indicated by a more or less urgent "call." When the feces are fluid, they reach the lowest part of the rectum at once, and the "call" is a very urgent one; but if they are of normal consistency, they are at first retained in the upper part of the rectum, and the "call" is less imperative, and may be suppressed by strong resistance.

If, for any reason, the bowels are not permitted to move at once, the "call" usually disappears after a few minutes, and may not reappear until after the next meal or even the next day. In the meantime, the feces which have entered the rectum lie there, and through the absorption of water by the intestines become each hour drier and harder, so that when the "call" comes again as the result of more feces being forced into the rectum and further distention produced, evacuation may be difficult or impossible without mechanical aid.

It is possible, also, that the fecal matters which have been carried down to the lower part of the colon may be returned. It is not probable that this occurs to any great extent, however, for new installments of feces are continually coming down from the upper part of the intestine, and hence the feces simply accumulate, first in the pelvic colon, then in the iliac and ascending colon, and finally in the transverse colon, and even in the cecum and ascending colon.

Although the bowels may be permitted to move



when the next "call" occurs, the colon may not be fully emptied. The colon contents may by this time have become so dry and hard that the colon cannot be emptied by an ordinary effort. Thus there is left a residue in the pelvic and descending colon, which is likely to increase from day to day, or at least as often as there is failure promptly to answer the "call" to evacuation.

As the necessary result of this gradual accumulation, the pelvic loop of colon becomes distended more and more. This fact accounts for the variation in the size of this part of the colon which is far greater than in any other part. The late Dr. Byron Robinson of Chicago found in two hundred carefully measured pelvic colons a variation in length from five inches to thirty-three inches. The writer has several times encountered at the operating table cases in which the pelvic colon was between two and three feet in length.

This stretching may extend to other parts, affecting chiefly, of course, the movable parts of the colon. The transverse colon often becomes loaded with delayed and dried feces, which in thin persons may be felt as hard irregular masses lying in the region of the umbilicus.

The cecum is also often found greatly distended as the result of this hoarding of feces by resisting the "call". It is very probable that the fecal matters are sometimes forced back into the transverse colon and the cecum by the strong contractions of

the colon in attempts at defecation. When a "call" is experienced, there are at once set up colon contractions which would expel the feces if permitted to do so; but as the anus is held closed by voluntary contractions, the feces cannot be forced downward after the pelvic colon is filled, and the natural result is a slipping back of fecal matters into the first half of the colon, some portion even reaching the cecum.

By resisting and ignoring the kindly hint of Nature, that the body requires an opportunity to dispose of its poisonous wastes and refuse, thousands, perhaps we should say millions, of men and women have brought upon themselves untold miseries, and have shortened their lives and have greatly impaired their efficiency and usefulness. Not a few persons are almost at once conscious of injury. A dull headache appears. There is less appetite than usual for the next meal. Sleep is less sound and refreshing. The urine has a stronger odor, and the breath is offensive. These are simply the evidences of poisoning by absorption of toxins. The absorbent process which dries out and hardens the feces, carries with the water that is taken up and poured into the blood, quantities of poisons which it holds in solution. These poisons overwhelm the liver with unnecessary labor, tax the kidneys, irritate or stupefy the brain and nerves, and disturb every bodily function.

The prompt evacuation of the bowels in response

to Nature's "call" is a sacred obligation which no person can neglect without serious injury. Ignorance of this fact is one of the chief causes of the prevalence of constipation, a condition in which the body becomes a storehouse of the most disgusting and offensive material, which saturates the tissues with its horrible effluvium and its virulent poisons and taints the very springs of life.

This fault is perhaps more common in America than in any other part of the world, especially in the cities. In English, German, French and Austrian cities places are abundantly provided, where well kept toilet conveniences are offered at a very small cost. One sees often in Vienna such notices as the following: "Urinal free. Seats, one 'heller' (a farthing or half cent)." The toilet arrangements at railway stations are sanitary and well cared for. There is room for great improvement in this particular in this country. Mothers should give more attention to the habits of their children in this respect. School teachers, at least in the primary grades, should instruct their pupils concerning the importance of giving prompt heed to the "call" of the bowels for attention. Among savages this function receives much attention. A missionary physician tells of an Arab who declined to live in Aden because the city regulations required that the bowels should be evacuated only in certain places, as in all civilized communities, rather than anywhere at any time the "call" demanded.

The worst results of these habits of postponing attention to the bowels to a convenient time, is the fact that the "call" after a time ceases. It is no longer made; or, if made, is so faint that it is not recognized. The continued pressure of the mass of hardened feces upon the nerves of the rectum destroys their sensibility, so that the "reflex" is no longer in operation. The defecatory center is not notified that evacuation is necessary, and the accumulation of feces continues with no remonstrance. Quite a large proportion of chronic sufferers from constipation reach this condition before they really begin to give serious attention and study to the matter.

There are thousands of persons who never experience a desire for evacuation of the bowels except after taking a laxative. The cure of cases of this sort is one of the most difficult problems connected with this class of disorders, but with the thorough co-operation of the patient the normal "call" may be restored by patient application of the proper measures. No victim of this condition should rest contented until this has been accomplished. For the body to be deaf to the needs of its sewage system, by which its most poisonous waste matters are removed, is a far more dangerous and serious condition than for it to be deprived of the sense of hearing. Fortunately this condition, serious as it is, may usually be relieved by the use of simple means.

### Hurried Defecation

The act of defecation normally occupies but a few seconds. The colon acts with so much celerity that when watched under the penetrating X-rays its movements can scarcely be followed by the eye. There is a vigorous surging which passes in waves from one end of the colon within a few seconds, and then the colon is at rest; but it is easily seen that the contents have either disappeared or have been moved forward. After a normal movement, the colon is empty from the splenic flexure down, and there is seen to have been a forward movement of feces in other parts of the colon.

There are, however, so many persons who are not quite normal, even though apparently healthy, that perfectly natural bowel movements are probably the exception rather than the rule among civilized adults. It often happens, at least after the first portion of feces has been expelled, that a second or even a third installment is brought down, and a second or third action of the colon occurs. The pelvic loop of the colon has in most people been so much abused by resisting the "call" and so compelling an accumulation here, that it is often so much dilated or so much folded upon itself that two or even three efforts are necessary for its complete evacuation. To accomplish this requires a little patience, and sometimes a great deal of persevering effort. The first partial movement empties

the rectum and the lower part of the distended pelvic colon. By straining, that is, by strong contractions of the diaphragm, aided perhaps by pressure with the hands upon the lower abdomen on the left side, an additional portion of feces may be forced down into the rectum. This excites the center of defecation just as touching the back of the throat excites the vomiting center, causes the colon to contract, the anus to open, and reinforcement of the contraction of the abdominal muscles with a second bowel movement results. In like manner, a third or even a fourth movement may be secured.

But this requires time, perhaps five, ten or even fifteen or twenty minutes. The bustling or worried business man, the hurried clerk, the student who has barely time to reach his school before roll call, the housekeeper who is perhaps superintending some important culinary operation, these and a thousand other busy individuals believe that they have not time to devote to a function looked upon as grossly animal and repulsive, and so it is cut short at the earliest moment possible.

Ignorance of the consequences does not, however, prevent the evil effects which certainly follow such neglect. The feces left behind in the half-emptied pelvic colon become so dry and hard before another opportunity for evacuation occurs that the difficulty is greater than before, and so a considerable quantity, often an increasing amount,

of feces is held back, and cumulative constipation is established.

Undue haste in bowel movement is also encouraged by unsuitable toilet arrangements. In many places, especially in country districts, the insufferable "privy" still exists, and is a most prolific source of misery. The use of such a place for evacuation of the bowels is at all times more or less inconvenient and offensive, and on this account is avoided as much as possible, leading to neglect of the "call", and when necessity compels the use of the offensive place, the visit is made as brief as possible.

In cold weather, the danger of injury from exposure of the unprotected body to a low temperature, sometimes even zero weather, is very great, especially in the case of feeble or delicate persons. Extreme cold also tends to prevent effective defecation, by contracting the anal muscles so strongly as to negative the effect of the automatic reflex by which the outlet is normally opened.

The toilet should be conveniently placed, and should be made as warm and comfortable as a bathroom. It should be kept in so neat and sanitary a condition as to be in no way offensive.

The time devoted to defecation should be sufficient for complete emptying of the descending and pelvic colon. All fullness and weight in this region, as well as the sense of fullness in the rectum, which commonly prompts to bowel movement, should

disappear after defecation. If necessary to occupy the mind by glancing over a morning paper, this will do no harm provided that it is not allowed to interfere with the muscular efforts which may be necessary to force down into the rectum from the pelvic colon a sufficient amount of feces to induce an expulsive action of the bowels.

### **Unnatural Posture in Defecation**

The natural position in defecation is squatting or crouching. All savages assume this attitude in moving the bowels. The reason for this, as has been fully explained in a preceding chapter, is that in the natural position the abdomen is compressed by the thighs, and thus the feces are forced into the rectum, and so the automatic process of bowel movement is set going.

The ordinary water closet is so constructed that natural bowel movement is impossible in its use. By bending strongly forward, some compression of the thighs may be effected, but it is only in the squatting position that the pressure can be as great as is possible and often necessary. By placing a low platform in front of the closet so as to raise the feet eight or ten inches, this objection may be very largely overcome. Some closets are now made with this idea in view, and are a great improvement over the old style. The same thing may be accomplished by the use of a chamber.



Many surgeons have learned the importance of the squatting position to secure complete evacuation of the bowels and bladder, and forbid the use of the bed pan in any except the feeblest cases, requiring the patient to be supported as may be necessary while using the chamber.

Although this matter is one of very great importance, it is more than likely that half a century will pass before manufacturers and plumbers, upon whom we are dependent for these necessary conveniences, recognize to any appreciable extent the need of a change in closet construction.

### **The Use of Tobacco**

Numerous laboratory experiments have shown that the use of tobacco in any form has a paralyzing effect upon the splanchnic nerves. Without the aid of the sympathetic nerves, normal, rhythmical bowel movements are impossible. The fact that some persons observe an apparently favorable influence from smoking, is accepted as evidence that the effects of the weed are favorable to the bowels. These cases are exceptional. They happen to be cases in which there is an excessive action of the sympathetic nerves, so that the paralyzing influence of tobacco seems to be helpful. In general, and in the long run, however, the use of tobacco is highly injurious. Kreuznach, of Vienna, has recently shown that nicotine produces arteriosclerosis of the

splanchnic vessels. That is, it produces hardening and degeneracy of the vessels which supply the colon and other abdominal organs. This change in the blood vessels gives rise to general degeneracy and atony, and hence to constipation, by which it is always accompanied.

### **Alcohol and Other Narcotic Drugs**

Alcoholic beverages of all sorts tend to produce constipation, by causing chronic and intestinal catarrh, ulcer of stomach, and paralysis of the sympathetic nerves.

Opium in all forms produces a specific effect in paralyzing the bowels. In former times it was customary to administer opium in sufficient doses in certain cases to cause complete inactivity of the bowels for a week or more. In such cases the constipation induced was often the beginning of chronic constipation of a most obstinate character.

The very common use of opium for the relief of pain is a prolific cause of constipation, especially among women. The fact that a laxative drug is given to overcome the constipating tendency, does not prevent the evil that results, but only adds another.

Bromides and sleep-producing or hypnotic drugs of all sort tend to produce constipation, although some of them are less harmful than opium. Fortunately, the use of these drugs may easily be dis-

pensed with when the resources of hydrotherapy and other physiologic means are made use of.

### The Use of Purgatives

One of the best evidences of the universal prevalence of constipation is afforded by the enormous use of laxative or purgative drugs. The quantity of this class of drugs used annually far exceeds that of any other class. Besides drugs proper, there is sold a prodigious quantity of laxative mineral waters. It would be difficult in the average community to find a household in which there is not kept on hand a supply of some favorite laxative. The columns of the newspapers are filled with advertisements of drugs which act upon the bowels. Many housekeepers lay in supplies of bowel medicines as regularly as the stock of groceries and other necessaries, and medical advice is sought no more in relation to one than the other. Laxative drugs have come to be regarded as staple commodities which stand, next to food and drink, as necessities.

Unquestionably, an inestimable amount of injury is done by the use of these intestinal irritants, most of which are nostrums of the worst sort, providing temporary relief only at the expense of permanent injury.

It is not too much to say that all laxative drugs

are harmful. There is no such thing as a harmless laxative medicine.

Laxative drugs act in different ways, and some are more harmful than others. "Salines" impose heavy burdens upon the kidneys, besides irritating the bowels. When long used, they produce an obstinate intestinal catarrh, which aggravates the constipation. Almost without exception, laxative drugs increase the condition which they are supposed to cure. The most difficult cases to cure are those which have long made use of laxative drugs.

Not the least of the damage done by laxatives is the injury to the stomach. The drug is administered by the mouth for the purpose of relieving a difficulty at the other end of the digestive tract, than which it would seem nothing could be more irrational. In a large number of cases of constipation, the whole trouble is a loss of the rectal reflex. The feces accumulate in the rectum or the pelvic colon because of failure of the discharging mechanism. What could be more really absurd and irrational than to irritate and worry the stomach and the whole twenty-five feet of small intestine, besides the cecum and the greater part of the colon, just for the purpose of exciting to action the last six inches of the intestinal tube, the rectum.

As we shall see in the further study of this subject, constipation is not a disease, but only a symptom. The morbid condition upon which the

symptom depends may be any one of a score or more of things, or several in combination. For the most part, these conditions, as we shall presently see, are such as are certain to be greatly aggravated by the use of laxatives or irritants of any sort.

The use of laxatives as a routine measure, a practice which is almost universally in vogue with the profession as well as with the laity, is most illogical, and is productive of a prodigious amount of injury.

The use of laxative drugs to cure constipation must be regarded as one of the most certain and prolific causes of this condition, and a person who has once formed the habit of using laxatives must as a rule continue the practice as long as he lives, unless he is so fortunate as to find some one wise enough to show him the way out of his troubles.

The systematic use of purgatives for "cleansing the system," irrespective of the state of the bowels, is a very old custom still in vogue in various places. Nothing could more effectively operate to produce the most obstinate sort of constipation. An excellent illustration of this baneful practice and its results came under the writer's observation a number of years ago. A man past middle life sought relief from a constipation which he declared responded to no drug in any dose. He had taken half a pound of "salts" without effect. The history which he gave revealed the cause of his unfortunate condition. The patient stated that when a child

at home it was the practice of his mother to give to each child every Friday night a dose of "salts" as a sort of house-cleaning process to prepare the family for the proper observation of Sunday—whatever that may have meant. The result was that after a few years the weekly dose was quite insufficient, and daily doses of increased size became necessary. The dose increased from year to year, and new remedies were adopted as one after another ceased to be effective, until the whole list of laxatives had been exhausted.

In another case, a patient who had taken at first small doses of licorice root and other simples, had become so constipated that even croton oil no longer produced laxative effects. The only remedy that remained at all efficient was a tablespoonful of unground mustard seed taken before breakfast. Many more lamentable examples of addiction to harmful and disease-producing laxatives might be cited, but such cases are familiar to every trained nurse as well as all physicians.

## Disorders of the Digestive Tube Associated with and Caus- ing Constipation

The disorders of the alimentary canal, which give rise to constipation, are very numerous. Some are purely functional in character, others are organic or structural affections. All are of a nature which cannot possibly be relieved by laxative drugs, at least, more than temporarily, and most are likely to be made worse by their use, a fact which shows the folly of depending upon them for the relief of this condition, which unfortunately is rarely treated in any other way.

First let us study some of the functional disturbances of the digestive tract, which may give rise to inaction of the bowels.

*Lack of Appetite.*—Lack of desire for food is a common result of constipation, and may also be a cause of this condition, when it is the result of some other cause, as lack of exercise, excessive heat, etc. With loss of appetite there is absence of relish for food, and hence a failure of the meal to awaken those lively peristaltic movements which are essential to propel forward in the colon the hardening masses of fecal matter which are stored up in its lower segments waiting to be discharged. Those who eat without appetite are always consti-

pated, and while the lack of relish for the food encourages the constipation, the latter still further lessens the appetite, and so the difficulty continually becomes more and more aggravated.

In this condition there is usually found a coated tongue and foul breath, which point unmistakably to a state of low vital resistance and malnutrition. With the removal of these conditions by the application of the proper measures, the appetite will improve and the bowels, if not organically crippled, will assume their normal rhythm.

Atony or weakness of the muscular walls of the colon itself, is no doubt sometimes a cause of very obstinate constipation. This condition sometimes appears to be hereditary. It occurs in families as a family characteristic. It is possible that in these cases the condition is only the result of improper care in infancy. No doubt a great number of cases of chronic dyspepsia and chronic constipation have their origin in the very earliest period of infancy. Prolonged indigestion in an infant may so damage its stomach and colon as to cripple these organs for life. The delicate structures of an infant's colon are easily stretched to such a degree as to be damaged permanently and to become a source of trouble during the whole after life. Cases of constipation which have existed for a life time are not infrequently encountered. Fortunately even these cases are often curable by the use of rational means.



Atony of the colon is especially likely to be encountered in persons long past middle age; but it is not at all rare to meet cases, especially women, in which the colon shows all the signs of senility at forty years, or even earlier. The age of the colon, like that of the arteries, is not to be reckoned in years, but is to be judged by the existing degree of tissue change. A colon which has been continually distended with putrefying feces or poisonous gases during twenty years or so is a senile colon, no matter what the reputed age of the possessor. An eminent French physiologist has said, "A man is as old as his arteries;" and it might be said with almost equal truth, "A man is as old as his colon."

In fever the colon as well as other parts of the intestine is in a state of semi-paralysis. The elevated temperature of the blood paralyzes the sympathetic nerves, and so interferes with rhythmical movements and causes constipation. Very hot weather and exposure to high artificial temperatures produce a like effect.

In cases of extreme obesity, in which there are abnormal fat accumulations and fatty changes in various parts of the body, the intestine suffers with other tissues, even undergoing fatty changes which render it less effective in transporting its contents and resulting in stasis and constipation.

*Painful Affections of the Abdomen.*—Pain in almost any part of the abdomen may cause consti-

pation, through reflex arrest of peristaltic movement, and spasm of the ileocecal or pelvi-rectal valve. Chronic appendicitis is a common cause of this form of colon inactivity, sometimes called *reflex constipation*. The discovery of the fact that there is a sphincter at the ileocecal valve explains the relief from constipation, which often follows an operation for appendicitis. Painful affections of the uterus, ovaries and uterine appendages, inflammation of the prostate gland, painful hemorrhoids, rectal ulcer, and possibly ulcer of the stomach and duodenum may, through reflex disturbance of the sympathetic centers cause spasm of the ileocecal sphincter, and obstinate constipation.

The most common cause of spasm of the ileocecal valve, however, is inflammation of the appendix, an affection which is even more common than is generally supposed. The infection of the colon commonly known as colitis readily extends into the appendix, which often becomes adherent to the lower end of the small intestine and interferes with the action of the ileocecal valve, both by causing spasm of the ileocecal sphincter and by preventing proper closure of the lips of the valve, so as to prevent the reflux of fecal matters from the colon. Interference with the closure of the valve is also prevented by adhesions of the appendix to the cecum, a very common condition. Delay of the intestinal contents in the lower part of the small intestine, either by spasm of the valve or incompetency (failure to close), is one



A Spastic Colon. Darkest Portion Shows Dilatation—Arrows Indicate Spastic Condition



of the most pernicious forms of constipation. The delay occurs at a point where putrefaction is most active and absorption is also greatest. Cases of this sort usually present very active symptoms of intestinal toxemia. Such persons are often victims of attacks of violent headache. They show much indican in the urine, are likely to have high blood-pressure, and sooner or later develop chronic Bright's disease of the kidneys.

Painful affections of the abdominal organs, such as chronic appendicitis, colitis, adhesions following an abdominal operation, pelvic or bladder disease, may cause constipation, not only by producing reflex spasm of the ileocecal valve, but by restraining the patient from making the necessary effort to expel the colon contents. Such efforts naturally increase the pain, and so are dreaded and avoided. In such cases the application of a hot fomentation over the seat of pain before ordering the effort to move the bowels will often render very great service. A hot sitz bath may be taken instead. A hot water bag placed against the abdomen may be found useful both by lessening pain and as a mechanical aid to defecation.

*Depressing Emotions.* — Fear, disappointment, anger, or any depressing emotion, may, through the sympathetic nerves, cause reflex constipation. Prof. Anderson, an eminent Danish physiologist who has made an exhaustive study of the influence of the emotions, found that depressing emo-

tions powerfully excite the sympathetic. Some persons are unable to move their bowels because they are in a state of fear that they cannot. All persons are more or less at the mercy of the sympathetic nervous system, but some much more than others. A curious example of the effect of mental influence is the case of a woman mentioned by Hertz whose bowels were obstinately constipated but who had a good movement of the bowels whenever she gave one of her children a dose of castor oil, although the oil produced no effect when she took it herself.

*Obstructions.*—Probably half the cases of chronic constipation are really due to some form of obstruction at some point along the food canal. It matters little, apparently, where the obstruction is; the effect is delay, and this results in constipation from absorption of water and the resulting excessive dryness of the feces.

*Contracted Colon.*—In cases of reflex spasm of the colon, or spasm due to colitis, the intestine can often be felt under the fingers, to which it gives the sensation of a rubber tube. When the contraction is due to colitis, the intestine is not only hard and contracted but is also tender to pressure, sometimes extremely so. In such cases there are likely to be present various reflex pains such as headache, or pains in the legs, which in women suggest ovarian inflammation or some other pelvic disease.

This condition of the colon is most often found

on the left side, at the site of the iliac colon, sometimes extending upward, and may occasionally be felt in the pelvic colon also. The cecum and the ascending colon are not infrequently affected, and more rarely the transverse colon, which may be felt as a hard round cord passing across the abdomen just above or below the umbilicus.

These spastic contractions are not permanent; they come and go, sometimes disappearing while under the examining finger; but they cause great delay in the progress of the feces along the bowel, and thus lead to excessive dryness and constipation.

Organic or permanent contraction of the colon is a much more serious condition than simple spastic contraction, because usually incurable, except by surgery. It may be the result of peritonitis or of colitis followed by pericolicitis and adhesions.

### **Incompetency of the Ileocecal Valve**

One of the consequences of chronic constipation is incompetency of the ileocecal valve. By overdistention the intestine becomes so widely dilated that the lips of the valve no longer come in contact and so its check valve action is prevented, and the putrefying contents of the colon readily pass backward into the small intestine. The infection thus induced may travel backward the entire length of the small intestine, to the stomach, liver, gall-bladder, pancreas and duodenum, giving rise to ulcer

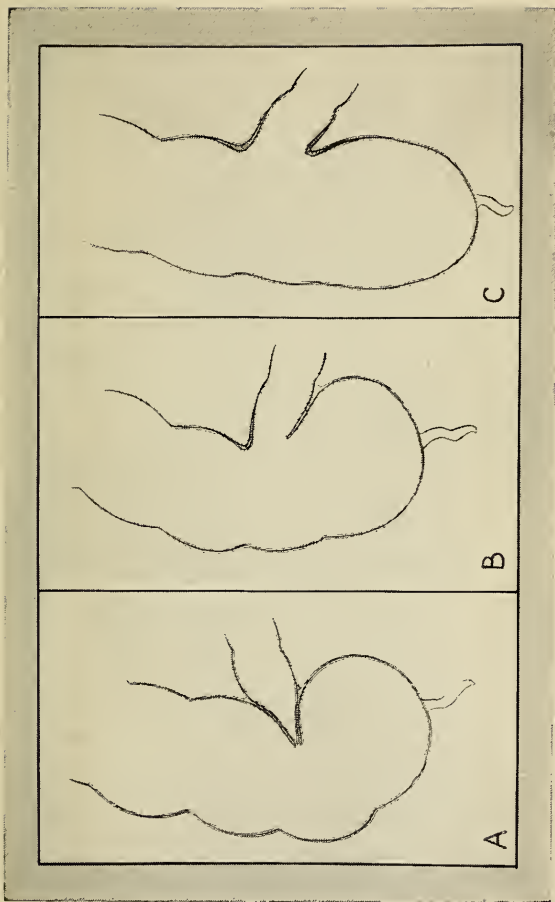
of the stomach, duodenal ulcer, gall-stones, inflammation of the gall-bladder, infections of the liver and jaundice resulting from these conditions, and pancreatitis, a still more serious condition. It is probable also that the worst effects attributed to alimentary toxemia or intestinal intoxication are seen in cases in which through incompetency of the ileocecal valve, the putrefying materials of the colon find ready entrance to the small intestine, and are thus rapidly absorbed.

When the ileocecal valve is incompetent, it is of course incompetent to gases as well as liquids. There is evidence that the valve sometimes becomes incompetent to gases while it still may be competent to liquids. Patients whose ileocecal valves are incompetent suffer from great discomfort because of inability to expel gas from the intestine. When an expulsive effort is made gas passes in both directions, that is, out of the body and back up into the small intestine.

There is reason to believe that the failure of short-circuiting operations either with or without removal of the colon or a part of it, is often due to loss of the function of the ileocecal valve, which is of course removed with the colon. Recent advances in the department of surgery make it possible to remedy this defect by constructing an artificial ileocecal valve.

In like manner incompetency of the ileocecal check valve interferes with the complete and proper





A. Normal Ileocecal Valve. B. Partially Incompetent Ileocecal Valve.  
C. Wholly Incompetent Ileocecal Valve.



emptying of the colon and thus becomes a cause as well as a consequence of constipation.

The worst evils resulting from incompetency of the ileocecal valve may be corrected in the majority of cases by removing the cause, namely, relieving the constipation to which it is due. While in a majority of cases, this may be accomplished by the employment of the thoroughgoing measures suggested in this volume, a few cases remain in which an operation is required for breaking up adhesions of the pelvic colon and removing the other obstructions which have been the cause of the overloading and the distention of the cecum, which produced the incompetency of the valve. Fortunately such cases may be relieved by surgical operation, and it is even possible to repair the valve so as to enable it to resume its function.

### **“Greedy Colon”**

Goodhard, Schmidt, and others hold that abnormal dryness of the feces may be produced by excessive digestion and absorption, leaving so little residue that the bulk of the intestinal contents is too small to stimulate peristaltic action. It is possible that cases of this sort may exist, but it seems more probable that the fault is a too concentrated diet or deficient gastric or intestinal secretion, at least in most of the cases in which this diagnosis has been made. It is much easier to see how the intestine can

fail to do its work completely than to understand a condition of excessive activity of digestion.

### **Excessive Dryness of the Feces**

Persons who sweat profusely, even if their habits are active, often suffer from constipation, because of dryness of the stool. This condition may also result from sweating baths and from the drinking of an insufficient amount of fluid, as we have already seen.

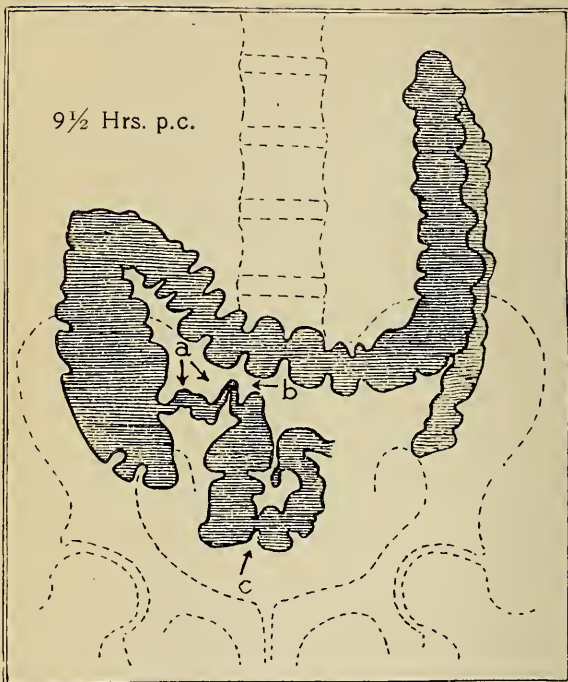
Excessive activity of the kidneys, as in *diabetes mellitus* or *diabetes insipidus*, may produce the same result, by depriving the feces of water.

A deficiency of fat in the food leads to constipation in like manner. The presence in the feces of a certain amount of unabsorbed fat is useful not only to prevent excessive dryness, but to prevent too great adhesiveness of the feces and thus to facilitate movement along the colon.

### **Contraction of the Ileocecal Valve**

Various causes, as we have already seen, may cause delay at the ileocecal valve, such as reflex spasm set up by pain in neighboring organs, and the irritation of condiments or imperfectly digested foodstuffs. Colitis may cause thickening of the valve and partial obstruction. Recent observations have shown that the valve is sometimes too small at birth, causing congenital constipation. This





Marked ileac stasis. Roentgenogram made nine and a half hours after barium meal. Arrows a, b and c point to several coils of the terminal ileum still filled at this hour. The remainder of the barium is in the colon, where it all should have been before the ninth hour. (Case.)

form of incompetency of the valve is fortunately very rare, and like others may be remedied.

Incompetency is both a consequence and a cause of constipation. The valve is often rendered incompetent by over-stretching of the bowel, usually the result of obstruction in the descending or pelvic colon. When once the valve is crippled, the constipation is made worse by the loss of the check-valve action which aids the forward movement of the bowel contents, so that the food residues oscillate back and forth between the large and the small bowel, until the water content is so much reduced that a pasty mass is formed, which is pushed forward only with great difficulty by the bowel, which at this point is adapted to dealing with thin liquids rather than semi-solid adhesive materials.

The stagnation resulting from this condition readily leads to infection of the cecum and appendicitis, and to more remote affections, through extension of the infection backward along the small intestine to the duodenum, stomach, gall-bladder, liver and pancreas, causing inflammation of the gall ducts and gall-bladder, gall-stones, pancreatitis and possibly diabetes, duodenal and gastric ulcers, and various other allied affections.

### **Delay at the Hepatic Flexure**

The cecum is a rather thin walled pouch, intended only for holding a small amount of liquid for a comparatively short time. When the bowels

are restrained from normal action, by resisting the "call" for evacuation, the cecum becomes filled by the backing up of semi-solid feces, which cause it to sag down, and in time dilate and displace it. The over-filled and heavy cecum drags heavily upon the hepatic flexure, and so narrows the passage along the colon at this point as to produce partial obstruction and delay in the movement of feces from the cecum over into the transverse colon. The observations of Virchow, Lane and others have shown that adhesions are often found at this point, which narrow the bowel and produce more or less obstruction and delay.

### **Delay at the Splenic Flexure**

At the splenic flexure the bowel forms a very acute angle, so that the colon is narrower at this point than at any other. The overloading of the transverse colon, which results from gross neglect to attend promptly to the "call" of Nature, drags heavily upon the splenic flexure, and causes such narrowing of the bowel as to result in very considerable obstruction and delay.

As the feces are banked up in the transverse colon, this segment of the intestines sags more and more until it may be stretched to the very bottom of the pelvis. This process of prolapse is, of course, greatly favored by weakness of the abdominal muscles.



### **Delay at the Pelvi-rectal Junction**

The passage from the colon to the rectum, which is closed and opened by the falling and rising of the pelvic loop of the colon, is sometimes obstructed by thickening due to inflammation or ulceration. Sometimes the pelvic colon becomes adherent to the pelvic floor so that it cannot rise, and there is more or less obstruction to the passage of feces into the rectum. In such a case, there must of necessity be an accumulation of feces in the lower bowel above the rectum, and as a consequence cumulative constipation will be found present.

The inflammatory process by which adhesions and thickenings are produced is easily set up by the colitis and other infections which are the natural consequence of retention of feces in the bowel for an undue length of time, such as results from postponing the evacuation of the bowels, or from excessive dryness of the stool from any cause. Stasis, that is, delay of fecal matters at any point in their journey through the colon, is likely to be followed by inflammation not only within the bowel but in the whole thickness of the bowel wall and on its outer surface, thus leading to adhesions and loss of contractile power. An inflamed and thickened bowel is always crippled and incapable of contracting upon the bowel contents in a normal way.

### **Thickening of Houston's Valves**

It is believed by some surgeons that these membranous valves sometimes become so thickened as to form an obstruction to the passage of feces. The writer has seen no cases of this sort, although he has carefully looked for them in hundreds of cases.

### **Delay at the Outlet**

Failure of the anus to relax when the colon contracts interferes seriously with defecation, and may prevent movement of the bowels. This may result from various causes, as a weak stimulus from the defecation center, or unduly contracted anal muscles. This point will be considered further in another connection.

### **Kinks**

Virchow was the first to observe the conditions to which Mr. Lane, an eminent London surgeon, first applied the term "kinks," but his observations received little attention until within recent years. Mr. Lane has shown the important relation which they bear to the functions of the colon and to general conditions of the body arising from auto-intoxication.

The narrowing which occurs from folding of the bowel or compression by bands, is usually the result of adhesions. The obstruction thus pro-

duced causes stasis, or stagnation, and increase of putrefactive changes in the foodstuffs, with infections of the intestine, from which come still further thickening and narrowing of the bowel, and so continual increase of delay and of constipation.

The pelvic loop sometimes becomes so much elongated that when it is emptied and falls over backward into the pelvis it makes several folds upon itself. If adhesions form an extension of infection through the wall to the outer surface, as they sometimes do from pericolicitis, "kinks" are developed which may require surgical means of relief.

### **"Lane's Kink"**

Within the last dozen years there has been much discussion in medical circles about a "kink" located at the lower end of the small intestine within a few inches of the ileocecal valve. Lane, of London, has attributed to these adhesions of the terminal ileum stasis or stagnation of materials in the ileum, and most of the disease conditions which develop in the stomach, liver, duodenum, gall-bladder and pancreas.

Recent observations made at the operating table by the writer and others, clearly show, however, that "Lane's Kink" is practically always associated with incompetency of the ileocecal valve. It seems most probable that adhesions of the lower end of the ileum are the result of inflammation caused by the

backing up of fecal matters into the small intestine through the open valve. It has also been observed that these "ileal kinks," first mentioned by Lane, are seldom obstructive, the real cause of the delay in the small intestine associated with "kinks" being incompetency of the ileocecal valve, which also is the cause of the "kink."

### **Mechanical Effects of Constipation**

Fecal accumulations in the rectum, and in some cases possibly also accumulations in the pelvic colon and in the cæcum, may give rise to various reflex pains on account of pressure. Pain in the buttocks and the back of the thigh, and a dull pain in the region of the sacrum is often due to the pressure of fecal matters in the rectum. Neuralgia of the testicles and of the ovaries, and dysmenorrhea in young women, is often traceable to this cause. Abnormal sexual excitability, especially during sleep, is also sometimes traceable to accumulations in the rectum. Itching about the anus, is often caused by the pressure of a small amount of fecal matter in the anal canal, disappearing at once when the feces are removed. Hemorrhoids may be caused by the pressure of fecal matters upon the hemorrhoidal veins; and varicocele, if not produced, is certainly aggravated by accumulations of fecal matters in the iliac colon.

Headache and sometimes vertigo and a sensation

of exhaustion and depression are symptoms commonly experienced by persons suffering from cumulative constipation. These symptoms may be the result of reflex action, which seems most probable, or they may be in whole or in part the result of chronic poisoning due to the absorption of long retained fecal matters. The fact that the symptoms disappear almost immediately when the bowel is emptied by an enema, does not necessarily indicate that the act is reflex. Effects due to autointoxication are the result of over-saturation of the blood with poisons derived from the bowel contents. When, by removal of the source of the poisons, the intake ceases, the liver and kidneys quickly clear the blood of the subtle intoxicants, and the nerve disturbance ceases.

### **The Bad Effects of Straining**

The violent straining occasioned by the presence of dry and hard feces in the rectum and lower colon is not merely an inconvenience, but often results in serious and sometimes fatal injury.

One of the most common results of straining at stool, especially when prolonged or repeated several times daily, is hemorrhoids, or piles. These are excrescences which form just in the anus, or at its lower edge. The accumulation of fecal matters in the rectum obstructs the flow of blood in the veins which have their origin at this point, and in straining these veins become greatly distended with blood;

their walls become thickened, forming irregular masses which are usually forced out when the bowels move. As the result of the straining, and often as the result of the use of rough toilet paper, the delicate mucous membrane becomes abraded or cracked, infection occurs, and the hemorrhoids become inflamed and swollen causing still further thickening. Thus the hemorrhoids gradually increase in size, until they may become so large that the anal sphincters are over-stretched and become relaxed, and in time the rectum may be pushed outside whenever the bowels move. Prolapse of the rectum is most likely to occur in children and emaciated adults.

In persons suffering from arteriosclerosis or degeneration of the blood-vessels, especially aged persons, straining at stool may cause rupture of a blood vessel and sudden death. In angina pectoris a spasm may result from straining at stool, sudden death having been known to occur in cases in which the heart was very feeble.

### Stricture

The bowel may be narrowed by the contraction of the scar left behind by a healed ulcer due to tuberculosis, typhoid fever or other cause. When such strictures are present, the peristaltic movements of the intestine are often so strong as to be visible in a thin patient through the abdominal walls. Such cases require operation.

### **Cancers and Tumors**

Cancer of the colon is not infrequent, constituting about nine per cent of all cancers. Cancer occurs most frequently in the cecum or ascending colon, and next most frequently in the rectum or pelvic colon, points at which the greatest delay of the feces occurs.

Cancer of the colon is not infrequently secondary to cancer in some other location. When cancer exists or has existed in the breast, stomach, or elsewhere, obstinate constipation should lead to a careful physical examination including an X-ray examination of the colon with special reference to the presence of organic obstruction.

### **Intussusception**

Acute obstruction due to "telescoping" of the intestine requires immediate surgical attention.

Chronic constipation is held to be sometimes due to such a telescoping of the pelvic colon into the rectum. This condition is probably quite rare, but it possibly may be more frequent than has been hitherto supposed. Such cases require surgical attention.

### **Disturbance of the Discharging Mechanism**

The feces are formed by the gradual absorption of the digested foodstuffs, and the drying out of

the mass of debris left through the absorption of water. When thus formed, the feces are slowly moved along the colon toward the lowermost part of the colon proper, the pelvic colon, where they are deposited, the pelvic loop filling from below upward. The filling begins at the bottom of the loop, the junction of the colon with the rectum.

At this point a new mechanism is provided to deal with the feces. They have become so dried and hardened by the absorption of their liquid part that they are no longer suited for transportation by the feeble peristaltic waves which continually course from one end of the intestinal tract to the other. They must be dealt with by a more powerful mechanism. This may be termed the discharging mechanism or device, and it is certainly a most remarkable apparatus. We need not repeat here the description of the process of defecation, which has been given in detail elsewhere. Briefly summarized, it consists of three voluntary and four involuntary acts.

1. Voluntary acts in defecation: (a) Contraction of the diaphragm. (b) Contraction of the abdominal muscles. (c) Compression of the abdomen by the thighs.

2. Involuntary acts in defecation: (a) Contraction of the colon. (b) Relaxation of opening of the anus. (c) Reinforced contraction of the abdominal muscles. (d) Strong contraction of the levator ani muscles lying behind the rectum.



When each of these several distinct voluntary and involuntary acts is promptly and efficiently performed, defecation is complete, and at least the lower half of the colon is completely emptied. Failure at any point results in incomplete defecation, and fecal matters are left behind, producing cumulative constipation. Let us note the different ways in which these several acts may be interfered with.

### **Weak Contraction of the Diaphragm**

If the diaphragm is weak from disuse or general feebleness, if its movements are obstructed by corsets or waist bands, if it is tied fast by adhesions from pleurisy or crippled by hernia, it cannot act efficiently, and the amount of feces pushed down into the rectum may not be sufficient to call forth a vigorous act of defecation. The result will be that the colon will be only partially emptied, and cumulative constipation will result, though the rectum may be fully emptied and no sense of discomfort be felt. The pelvic colon will be gradually stretched by the accumulating contents until it becomes enormously enlarged and forms a reservoir of putrefying feces, by which the body is continually poisoned, and a great variety of diseased conditions produced. This condition is very common as the natural result of sedentary habits and corset-wearing.

### **Feeble Contraction of the Abdominal Muscles**

When the abdominal muscles are weak, relaxed, separated, or otherwise inefficient, the results are the same as when the diaphragm fails to do its duty, for the two sets of muscles must work in co-operation.

The ordinary water-closet seat renders complete efficiency of the abdominal muscles and diaphragm practically impossible, since it does not permit of pressure by the thighs, an essential voluntary act in defecation.

### **Deficient Contraction of the Colon**

A feeble, dilated, inflamed, thickened, elongated, adherent, overloaded, obstructed colon, cannot possibly contract with sufficient vigor to empty itself of its unclean contents. Yet such is the chronic condition of the colon in a very large proportion of cases as the result of the operation of some one or more of the causes which have been enumerated in the foregoing paragraphs.

Nervousness, apprehension or fear may prevent the normal reflex from acting. Hysteria or melancholia may paralyze a patient's colon as well as an arm or a leg.

### **Injured Levator Ani Muscles**

When these muscles are crippled so that they cannot contract properly, the rectum is not emptied

but remains relaxed and filled with feces, which give rise to much annoyance, and may become a cause of rectal ulceration and hemorrhoids. The levator ani muscles are often damaged by lacerations at childbirth, or by the prolonged contact with hardened feces, which gives rise to atrophic changes. Laceration of the perineum permits the pelvic floor and anus to bulge forward, stretching the rectum and thus creating a wide reservoir for feces.

### Anal Disease

Pain arising from ulcer, fissure, fistula or inflamed hemorrhoids may cause so strong a contraction of the anal sphincters that they fail to relax at the command of the defecation center, so that the bowel must force the feces down through the rectum in opposition to these muscles. This condition exists more frequently than was formerly supposed. Many cases of obstinate constipation have been cured by an operation for removal of painful hemorrhoids or relief of a painful ulcer or fistula.

Pregnancy, extreme retroversion of the uterus, an enlarged and painful prostate, malignant or other growths in or about the rectum, and in women, rectocele, from laceration of the perineum, are causes of interference with the proper action of the defecating mechanism.

The usual result of this defective action is to

leave a quantity of feces in the rectum or the pelvic colon or in both cavities. The retained feces become dry and hard, sometimes to a surprising degree, and form a mechanical obstruction which results in a damming back of the feces which are left to accumulate in sections of the colon higher up.

### **Loss of Rectal Reflex**

The key to the automatic or involuntary act of defecation is the rectal reflex, which is discharged by contact of the feces with the walls of the rectum. The long retention of feces in contact with the rectal nerves destroys their sensibility and so the reflex is lost. This is one of the worst results of the disturbances in the defecating mechanism, which have been above enumerated. Patients suffering with this form of constipation often report that they have felt no desire for evacuation of the bowels for years. The loss of hearing, or even of the sense of sight, would really be less of a calamity in many cases than the permanent loss of this useful reflex, which is one of the most important protective mechanisms with which the body is provided. Fortunately, however, the reflex generally may be restored.

Disease of the spinal cord may permanently destroy the defecatory center. Constipation is sometimes a most troublesome symptom in locomotor ataxia.

## Alimentary Toxemia or Intestinal Autointoxication

Bouchard, an eminent French physician, was first to coin the word autointoxication, and to point out the various ways in which the disease may be produced by poisons generated in the body. He called special attention to the fact that the intestine, and especially the colon, is a prolific source of poisons. Some of these poisons are excreted by the liver. The bile, as shown by Bouchard, is six times as poisonous as the urine, producing poison enough within ten hours to cause death. The mucous membrane of the intestine has been shown to be another source of highly active poisons, which are separated from the blood by the mucous membrane and thrown into the cavity of the intestine to be removed from the body.

Still another source of intestinal poisons is the putrefaction of that portion of the protein of the food which fails to undergo absorption.

The bile, mucous, and other secretions of the intestine and the adjacent glands also undergo putrefaction when conditions are favorable.

This putrefactive process is, as shown by Pasteur, the result of the growth of certain forms of bacteria. These putrefactive bacteria are found everywhere. They are present in great num-

bers wherever putrefaction is taking place. The flesh of every dead animal is filled with teeming millions of these poison-forming microbes within a few hours after death. A piece of flesh taken from an animal just killed, and placed in a tightly sealed glass jar, will be found in a few days in an advanced state of putrefaction. Experiments of this kind were made by Professor Tissier of the famous Pasteur Institute of Paris. He found it impossible to obtain meat so fresh that it did not contain bacteria of different species sufficient to produce complete putrefaction. As ordinarily eaten, the flesh of animals is always in a state of more or less advanced putrefaction, and hundreds of millions of living bacteria are found in every morsel. This is true even when the flesh has been cooked; ordinary cooking does not destroy the putrefactive bacteria.

Commercial cow's milk also abounds with bacteria, some of which are of putrefactive sort. Street dust consists very largely of putrefactive bacteria derived from animal feces which have been dropped in the street and ground into dust by passing vehicles. It is evident then, that the human intestine is very greatly exposed to infection by putrefactive bacteria; and it needs no argument to show that any delay of food residues capable of putrefaction, together with the bile, mucus, and other constituents of the feces, must result in the production of a large amount of intestinal poison.

In view of these facts, it is safe to say that the worst effects of constipation are those which arise from intestinal autointoxication. Not only Bouchard, but Tissier, Combe, Bourget, Lane of London, and a great number of able medical experts in all parts of the world have within the last few years recognized the great and far-reaching destructive effects of the absorption of bacterial poisons from the intestinal tract.

It is entirely possible for a person to suffer from intestinal toxemia without constipation, as in cholera morbus, cholera infantum and summer diarrhœas of infancy; but it is impossible to have constipation without intestinal autointoxication. The fact that the symptoms of toxemia do not occur in every case is no evidence that they are not present. The body must be unduly exposed to toxic influences, even though it may possess to such an extraordinary degree the power to defend itself against these intestinal poisons that immediate visible effects do not appear.

When the intestinal mucous membrane is intact, it is able to exclude most of the intestinal poisons, acting like a filter, which permits only the useful substances to enter the blood. The liver, the largest gland in the body, possesses the power to destroy poison to a considerable degree. There are various other organs of the body, such as the glands of internal secretion, of which the thyroid

gland is a conspicuous example, which aid in the destruction of poisons. The kidneys both destroy and eliminate poisons, and the skin and the lungs also share in this protective work.

So long as the defensive powers of the body remain intact, enormous quantities of poisons may be produced in the intestine without apparently evil results. This is the reason why many constipated persons seem to suffer no ill effects from intestinal inactivity.

In every case, however, the time comes sooner or later when the intestinal filter no longer acts sufficiently in excluding poisonous matters—when the liver is no longer able to destroy all the poisons brought to the blood; when the thyroid and other glands have become worn out with over-activity; when the kidneys have ceased to be able to maintain the normal degree of blood purity by the excretion of poisons.

When the symptoms of toxemia appear, the fact shows that the poison-destroying mechanism of the body is broken down; the great margin of safety which Nature provides against emergencies, has been used up; the defenses against autotoxins have been swept away, and the tissues are flooded with these subtle and mysterious disease-producing elements.

The simple and latent forms of constipation are those in which the symptoms of toxemia are specially prominent, for the reason that in these forms of



constipation the delay occurs in those portions of the digestive canal in which the intestinal contents are still fluid, a condition in the highest degree favorable to the growth of putrefactive bacteria. Besides being fluid, the contents of the small intestine and first part of the colon contain a varying amount of protein, the food element on which putrefactive bacteria thrive, and from which alone they are able to produce their deadly toxins.

In cumulative constipation, the protein is almost wholly absorbed before the lower colon is reached, and the amount of water is reduced to such an extent that putrefaction is necessarily limited, and the resulting autointoxication is proportionately less.

In latent constipation, especially, the conditions are in a high degree favorable for the development of intestinal autointoxication. The stasis or stagnation above the ileocecal valve affords conditions the most favorable for putrefaction and absorption of putrefactive products. It is evident, then, that the study of constipation cannot be complete without a thorough study of intestinal toxemia. This is especially true as regards the treatment of this condition both with reference to the causes of the constipation and its consequences.

### **Bacteria of the Intestine**

Roger, the eminent successor of Bouchard, described no less than one hundred sixty different spec-

ies of bacteria which have been found in the alimentary canal. Many of these produce no poisons. Others produce simple organic acids which are under ordinary circumstances harmless; still others produce alcohol, formic acid, butyric acid, and other substances which are unquestionably toxic, although not appreciably so in the extremely minute quantities in which they are produced in the intestine under strictly normal conditions. Still other microbes, of which some scores of species are found in the intestine, produce subtle poisons which are capable of causing deadly effects, even in very minute quantities. Everyone is familiar with the unpleasant effects of the volatile substances which emanate from a mass of putrefying flesh. Headache, nausea, and other symptoms may result from the odors alone which arise from putrescent substances. These volatile substances are poisonous, but other non-volatile poisons present are much more active. Some are almost as powerful as the venoms of snakes, which they resemble in chemical composition. The South American Indian poisons the points of his deadly arrows by dipping them into putrid flesh. Butchers as well as undertakers sometimes die as the result of a small cut made with a knife soiled by contact with a dead body. The same poisons are produced when putrefaction takes place in the intestine.

None of the intestinal microbes are essential for life or health. Pasteur supposed that all life was

dependent upon microbes. One of his pupils, Roux, showed this idea to be erroneous, at least as regards vegetables, by causing beans to grow in sterile soil and sterile water. Pasteur admitted his error in regard to vegetable organism, but still maintained that animals could not live without the aid of intestinal bacteria. Nuttall and Thierfelder, by experiments with guinea pigs, showed that these animals could be brought into the world free from germs, and made to grow on food which contained no trace of bacteria. When the animals were killed, no bacteria were found in their intestines. Recent experiments made by Roux showed that chickens hatched and grown under sterile conditions thrived better than chickens hatched under ordinary conditions.

Numerous other experiments have confirmed this fact, but most important of all were the observations of Levin at Spitzbergen, in the Arctic region. This observer made careful examination of scores of Arctic animals, and found that in the majority of cases no bacteria were present in the intestine. This fact will be easily understood when the additional fact is known that the air, and even sea-water, are in these cold regions practically free from bacteria.

The fact that bacteria are present in the human intestine is therefore no evidence that they supply any human need. The presence of these minute parasites is, instead, an unfortunate incident of our

existence. Metchnikoff has shown that colon germs in no way contribute to our well-being, but on the contrary, are an undoubted cause of premature senility, and the unnatural abbreviation of human life, the sad lot of the average man.

### **Acid-Forming Bacteria**

Professor Tissier, of Paris, well known as one of the leading savants of the renowned Pasteur Institute, many years ago made a profound study of the bacteria of the intestine and established the fact, which had been previously observed by Escherich and others, that the intestine of a new born babe is absolutely free from bacteria. Tissier made an extended research of the manner of the invasion of the intestine of the young child by bacteria. He found that within about seven hours in summer time, and twenty hours in winter time, when bacteria are less abundant in the air, the intestine of the recently born child is found to be swarming with bacteria, many of which are of the putrefactive sort. Within a few days, however, the putrefactive bacteria disappear, and a peculiarly shaped acid-forming microbe, to which Professor Tissier gave the name *Bacillus bifidus*, takes their place.

This observation was of the greatest importance. It reveals the beneficent plan of Nature, by which the young infant is protected from the deadly effects of putrefactive organisms. So long as the *Bacillus*

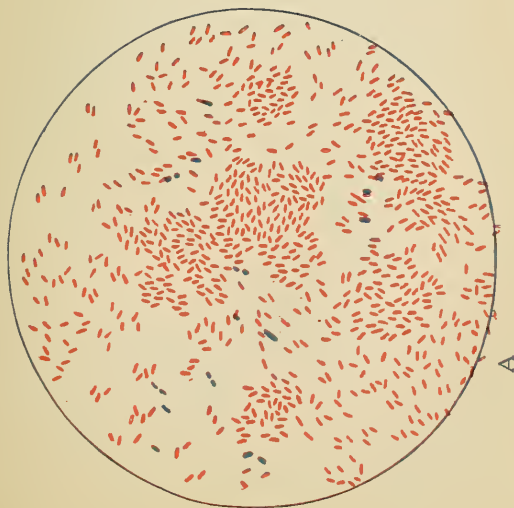
bifidus continues to hold its place as the dominant microbe of the child's intestine, the stools are slightly acid and the little one enjoys perfect health. The child's intestine may be compared to a flower garden which is so completely occupied by flowers that there is no room for the growth of noxious weeds.

As the child becomes older, and is fed upon cow's milk, meat, and other foodstuffs which contain putrefactive organisms, and is no longer nursed at the breast, the *Bacillus bifidus* becomes less prominent in the stools, putrefactive bacteria make their appearance, the child becomes subject to constipation and diarrhœas, and the troubles of life begin. The stools, instead of being acid, acquire a foul odor. In many instances, such symptoms of chronic autointoxication, as rickets, scurvy, arrested growth, emaciation, decay of the teeth, nasal catarrh, and other evidences of physical weakness make their appearance.

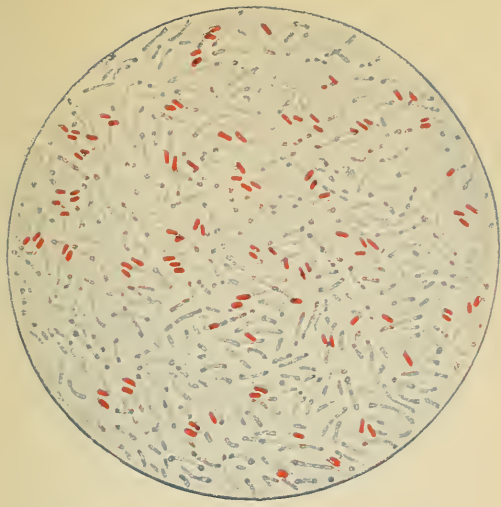
Infantile convulsions, night terrors, grinding the teeth during sleep, fitfulness, feverishness, and numerous other symptoms of nervous disturbance in infants, are directly due to poisoning as the result of constipation, with intestinal putrefaction. So long as the stool remains normally acid, constipation does not occur, but when putrefaction and foul-smelling feces occur then constipation appears with a great variety of nervous and other symptoms which are a natural consequence.

A few years ago Massol, of Geneva, in studying certain Bulgarian milk preparations discovered a new lactic-acid-forming ferment. In testing its properties he discovered that it possessed the faculty of producing lactic acid in far greater quantities than any other known ferment. The eminent Professor Metchnikoff, of the Pasteur Institute, at once recognized the value of this new discovery, and after a careful study of the ferment, did not hesitate to recommend it as a most important means of combating many of the gravest forms of chronic disease, and especially that most inveterate of all human maladies, old age.

Professor Metchnikoff has long held the theory that old age, as well as many common chronic disorders, is due to poisons absorbed from the intestines. These poisons are formed by certain germs known as anærobes. Some of these germs are found in such great quantities in butcher's meat that Herter has given to them the name "meat bacteria." By the use of meat these germs are introduced into the intestine in great numbers. The poisons formed by these germs are extremely virulent, and when taken into the body, gradually break down the liver, kidneys, and other defensive organs, and so give rise to a large number of very common and very serious diseases. This chronic poisoning first makes its appearance in acute attacks, such as sick headache, nervous headache, loss of appetite, coated tongue, bilious attacks, irregular action of the



A



B

### Colon Bacteria

The red color indicates species which produce putrefaction and give rise to toxins; the blue color, acid-forming organisms which are friendly. A. Stool from a child suffering from intestinal toxemia. B. Same case ten days later after flora was changed by a change of diet and other measures.





bowels, diarrhea, appendicitis, febrile attacks resembling malaria, and insomnia.

As the system becomes more and more saturated with these poisons through the gradual failure of the liver and kidneys and the constant multiplication of the bacteria, other more chronic symptoms appear, such as constant headache, mental confusion, neurasthenia, nervous exhaustion, gall-stones, hemorrhoids, emaciation, browning of the skin, particularly about the eyes, various skin diseases, especially acne, eczema, psoriasis and urticaria, neuralgia, pain and stiffness of the joints. After a time still worse conditions make their appearance, such as Bright's disease, sclerosis or hardening of the liver, dropsy, chronic rheumatism, and rheumatic gout.

Chronic autointoxication is unquestionably a factor in nearly all chronic disorders, and lays the foundation for tuberculosis, cancer of the stomach, ulcer of the stomach, and other gastric disorders. Many women supposed to be suffering from disorders peculiar to their sex, are really suffering only from autointoxication, which is the natural result of prolapse of the viscera, colitis, and inattention to the hygiene of the bowels.

It has long been known that the conditions above mentioned may be greatly relieved by the use of buttermilk and kumyss, but these remedies have never gained very great confidence for the reason that, while they have seemed to succeed remarkably in certain cases, in the majority of cases the

relief obtained has been very temporary, and often their use has been attended by complete failure. The reason for this was the fact that the lactic ferment of kumyss and buttermilk is not able to live in the large intestine. This is the particular part of the alimentary canal in which the poison-forming anærobes are found in largest numbers, especially in the cecum.

Tissier's experiments showed that the Bulgarian lactic ferment has such great vitality that it is able to live in the colon. Its great activity in the formation of acids enables it to kill off the anærobes which can live only in an alkaline medium. Fortunately the new ferment is harmless, so that a person who is suffering from autointoxication may, by introducing into his alimentary canal a sufficient amount of the lactic ferment, drive out the poison-forming germs, or at least reduce their numbers to a very great extent. The importance of doing this will be realized when it is known that the poisons which they form are among the most highly toxic known. This is the reason that constipation produces headache, and that diarrhea is accompanied by such great exhaustion. The headache and the prostration are simply results of the poisons which are absorbed from the infected intestines.

This ferment has been known for ages in Bulgaria and the Orient generally. In Egypt it is known as leben. In these countries a milk preparation containing the ferment is prepared by steriliz-

ing the milk and adding the ferment to it. It possesses the particular advantage that it does not produce alcohol as does the kumyss ferment, and when properly cultivated, it does not produce disagreeable flavors by decomposing the caseins and fats of the milk.

The use of the ferment has extended rapidly in France and Switzerland, and has lately been introduced into this country. For those who like milk and are able to digest it readily, the milk preparation is very satisfactory, although the preparation of the milk requires considerable care and pains to prevent contamination. There are many, however, with whom milk does not agree. Such persons have been termed by Combe "casein dyspeptics." For the benefit of such cases concentrated preparations of the ferment have been devised. Pure cultures of the ferment are made in a bacteriological laboratory and in concentrated form are made into tablets. Three or four of these tablets taken after or at meals in connection with a proper dietary,—especially with the free use of farinaceous foods, and maltose in the form of malt extracts or meltose—develop rapidly, and by driving out the invading anærobæ, stop the formation of poisons and give the body an opportunity to clear itself from the accumulated toxins, and thus establish conditions which render recovery possible. Those who like milk, but do not like it sour, may take it in its ordinary form, adding the tablets.

It is, of course, evident that a person adopting this method should discontinue the use of meat entirely, and should not use eggs freely.

Ancient Latin authors mention the use of sour milk preparations by the primitive tribes which occupied the country now inhabited by the Bulgarians and other Balkan people by whom the Bulgarian ferment is widely used.

The natives of Mesopotamia, living about Mount Ararat make large use of the same ferment, which they declare was preserved for them by the antediluvian Noah; and it is certain that this ferment and buttermilk prepared from it was well known to Abraham and the other Hebrew patriarchs whose use of it is mentioned in the Scriptures.

Natives of northern India make large use of a sour milk preparation called dahi. An examination of a sample of this preparation, sent to us from a friend living in Darjeeling, India, showed that it contained an acid-forming organism identical with the *Bacillus Bulgaricus*. A few years ago a medical friend whom the author met in Edinburgh, Dr. Matthieason, of Iceland, described to him a sour milk preparation used in that country, known as "skyr," which is made by first adding to the milk a "starter," to which rennin is then added to curdle it. The curd is separated from the whey and packed in casks or barrels. Melted paraffin is poured over the surface to preserve it. In this way it is kept for many months, and is a valuable source of food in the win-

ter season when milk is scarce. Doctor Matthieason states that this product is found a highly efficient remedy in relieving acute gastric and intestinal disorders due to excessive meat-eating which is very common in Iceland. A bacteriological study of skyr made in the laboratory of the Battle Creek Sanitarium showed that it contains an acid-forming organism resembling the *Bacillus Bulgaricus* which grows very vigorously and produces large quantities of lactic acid.

It thus appears that the use of lactic acid ferments is a practice known to widely scattered nations and from the most ancient times. The great care which is taken by the most primitive people to preserve the purity of the particular ferment which they employ, and the high value which they place upon it in the treatment of many diseases, leads one to wonder that civilized people should have been so slow to avail themselves of this valuable means of combatting some of the most dangerous and insidious of the foes of human life.

### **Alimentary Toxemia**

The condition known as intestinal autointoxication, intestinal toxemia, and more recently termed alimentary toxemia, is one of the natural and most far-reaching consequences of constipation and intestinal stasis. All foodstuffs are capable of undergoing destructive change as the result of the action

blood vessels and cause first contraction, then hardening and degeneration, or arteriosclerosis. The brain and nerves show evidences of depression or irritation, according to the nature of the dominating poisons. Headaches, neuralgia, neuritis, paralysis, mental dullness, neurasthenia, even insanity, are the results. Diseases of the liver, thyroid gland and spleen develop. Skin diseases of various kinds, and every sort of bodily derangement, are seen.

## Important Discussion of Alimentary Toxemia Before the Royal Society of Medicine of Great Britain

About two years ago the subject of alimentary toxemia was discussed in London before the Royal Society of Medicine, by fifty-seven of the leading physicians of Great Britain. Among the speakers were eminent surgeons, physicians, and specialists in the various branches of medicine.

### **Poisons of Alimentary Intestinal Toxemia**

The following is a list of the various poisons noted by the several speakers: Indol, skatol, phenol, cresol, indican, sulphuretted hydrogen, ammonia, histidine, urobilin, methylmercaptan, tetramethylendiamin, pentamethylendiamine, putrescin, cadaverin, lecithin, neurin, cholin, muscarine, butyric acid, beta-imidazolethylamine, methylgadinine, ptomatropine, botulin, mytilotoxin, mytilo-congestine, oxybetaine, tyramine, agmatine, tryptophane, sepsin, indolethylamine, sulphemoglobine.

Of the thirty-six poisons mentioned above, several are highly active, producing most profound effects, and in very small quantities. In cases of alimentary toxemia some one or several of these poisons is

constantly bathing the delicate body cells, and setting up changes which finally result in grave disease.

### **Symptoms and Diseases Due to Alimentary Toxemia**

It should be understood that these findings are not mere theories, but are the results of demonstration in actual practice by eminent physicians. Of course it is not claimed that alimentary toxemia is the only cause of all the symptoms and diseases named: Although of many it may be the sole or principal cause, some of them are due to other causes as well.

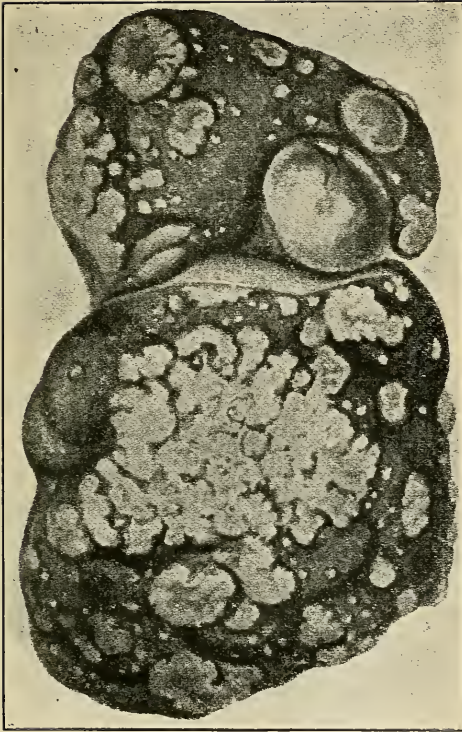
In the following summary the various symptoms and disorders mentioned in the discussion in London, to which reference has been made above, are grouped and classified.

#### **The Digestive Organs**

Duodenal ulcer causing partial or complete obstruction of the duodenum; pyloric spasm; pyloric obstruction; distension and dilatation of the stomach; gastric ulcer; cancer of the stomach; adhesions of the omentum to the stomach and liver; inflammation of the liver; cancer of the liver.

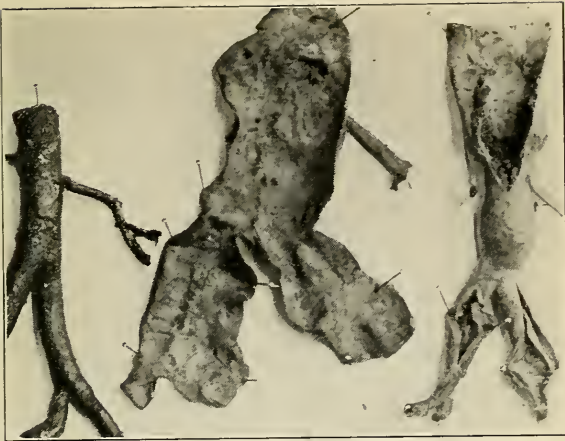
The muscular wall of the intestine as well as other muscles, atrophies, so that the passage of their contents is hindered. The abdominal viscera lose



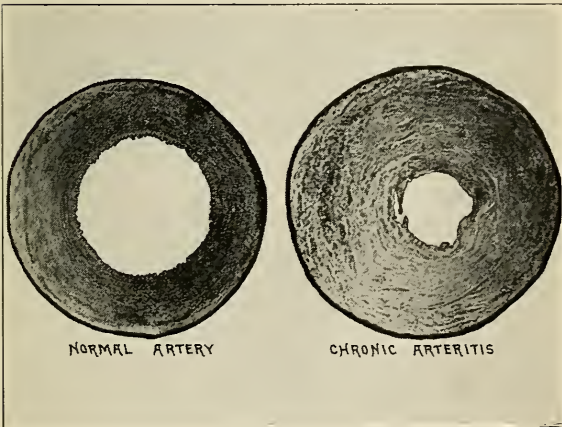


Cancer of the Liver





Healthy and Hardened Arteries



Sectional View of a Healthy Artery and Arteriosclerosis



their normal relationship to the spine and to each other, on account of weakening of the abdominal muscles; these displacements are much more marked and serious in women. Other conditions are: Catarrh of the intestines; foul gases and foul-smelling stools; colitis; acute enteritis; appendicitis, acute and chronic; adhesions and "kinks" of the intestine; visceroptosis; enlargement of spleen; distended abdomen; tenderness of the abdomen; summer diarrhoea of children; inflammation of pancreas; chronic dragging abdominal pains; gastritis; cancer of pancreas; inflammatory changes of gall-bladder; cancer of gall-bladder; gallstones; degeneration of liver; cirrhosis of liver; infection of the gums, and decay of the teeth; ulcers in the mouth and pharynx.

### **Heart and Blood-Vessels**

Wasting and weakening of the heart muscle; microbic cyanosis from breaking up of blood cells; fatty degeneration of the heart; endocarditis; myocarditis; subnormal blood pressure; enlargement of the heart; the dilatation of the aorta; high blood pressure; arteriosclerosis; permanent dilatation of arteries.

Dr. W. Bezley says: "There are a few phases of cardiovascular trouble (disease of heart and blood vessels) with which disorder of some part of the alimentary tract is not causatively associated."

### The Nervous System

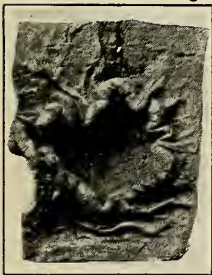
Headaches of various kinds—frontal, occipital, temporal, dull or intense, hemicrania; headache of a character to lead to a mistaken diagnosis of brain tumor. Dr. Lane tells of a case where a surgeon had proposed an operation for the removal of a tumor from the frontal lobe of the brain; the difficulty was wholly removed by the exclusion of the colon. Acute neuralgia pains in the legs; neuritis; twitching of the eyes and of muscles of face, arms, legs, etc. Lassitude; irritability; disturbances of nervous system, varying from simple headaches to absolute collapse; mental and physical depression. "A medical man with neurasthenic symptoms and a belief that he was ruined, recovered after he left off taking an egg for breakfast." Insomnia; troubled sleep, unpleasant dreams; unrefreshing sleep, the patient awakening tired; excessive sleepiness, patient falling asleep in the daytime; shivery sensations across lower spinal region; burning sensations in face, hands, etc; epileptiform tic; typhoid state; paralysis; chronic fatigue; horror of noises; morbid introspection; perverted moral feelings; melancholia, mania, loss of memory; difficulty of mental concentration; imbecility; insanity; delirium, coma.

### The Eyes

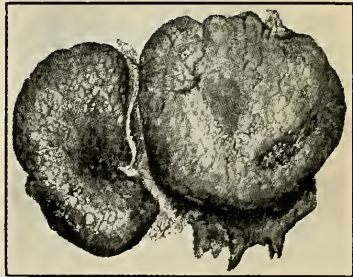
Degenerative changes in the eye; inflammation of the lens; inflammation of the optic nerve; hard-



Gall Stones



Ulcer of the Stomach



Cirrhosis of the Liver





ening of the lens; sclerotitis, sclerokeratitis; iritis; iridocyclitis; cataract; recurrent hemorrhage in the retina; eyes dull and heavy. W. Long says: "As an ophthalmic surgeon, I can look forward full of hope to a future when those serious eye affections will cease to occur, because the physician has taught mothers how to feed children properly, and the dental surgeon has impressed upon the population at large the importance of proper mastication and the hygiene of the mouth."

### **The Skin**

Formation of wrinkles; thin, inelastic, starchy skin; pigmentation of the skin—yellow, brown, slate-black, blue; muddy complexion; offensive secretion from skin of flexures; thickening of the skin of the back of the upper arm; irritability of the skin; sweating of the palms of the hands and the soles of the feet; eruptions of the skin—sores and boils; pemphigus; pruritus; herpes; eczema; dermatitis; lupus erythematosus; acne rosacea; cold, clammy extremities; dark circles under the eyes; seborrhœa; psoriasis; pityriasis; alopecia; lichen; planus; jaundice; "An infinitesimal amount of poison may suffice to cause skin eruption."

### **Muscles and Joints**

Degeneration of the muscles; "Muscles waste and become soft and in advanced cases tear easily."

"In young life the muscular debility produces the deformities which are called dorsal excurvation, or round shoulders, lateral curvature, flat-foot, and knock-knee." "Weakness of abdominal muscles causes accumulation of feces in the pelvic colon, which renders evacuation of contents more and more difficult." Prominence of bones; rheumatic pains simulating sciatica and lumbago; various muscular pains; muscular rheumatism; arthritis deformans; synovitis; rickets; arthritis, acute and chronic. Tubercle, and rheumatoid arthritis are the direct result of intestinal intoxication. Dr. Lane says: "I do not believe it is possible for either of these diseases to obtain a foothold except in the presence of stasis."

### **Genito-Urinary and Reproductive Organs**

Various displacements, distortions and diseases of the uterus; change in the whole form and contour of woman; fibrosis of breast; wasting of breasts; induration of breasts; sub-acute and chronic mastitis; cancer of breast; metritis and endometritis; infection of bladder especially in women; frequent urination; albumosuria; acute nephritis, movable kidney; floating kidney. Dr. Lane goes so far as to say: "Auto-intoxication plays so large a part in the development of diseases of the female genito-urinary apparatus, that they may be regarded by the gynecologist as a product of intestinal stasis."

## General Disorders and Disturbances of Nutrition

Degeneration of the organs of elimination, especially the liver, kidneys (Bright's disease) and spleen; pernicious anemia; lowered resistance to infection of all kinds; premature senile decay; retardation of growth in children, accompanied by mental irritability and muscular fatigue; adenoids; enlarged tonsils; scurvy; enlarged thyroid (goitre); various tumors of thyroid; Raynaud's disease.

In those who apparently suffer no harm from constipation during a long series of years there is perhaps, as suggested by Hertz, a partial immunity established. The writer has long believed that such an immunity is sometimes established in the very obstinate constipation which accompanies absolute fasting, because of the cleansing of the tongue and reappearance of appetite which often occurs at the end of the second or third week of the fast, a phenomenon very like that which appears in typhoid fever and other continued fevers. It must not be supposed, however, that even the establishment of so-called immunity insures the body against all injury. The labor of eliminating an enormous amount of virulent toxins, which falls upon the kidneys, damages the renal tissues and produces premature failure of these essential organs. Any process which develops toxins within the body is a menace to the life of the tissues and should be

suppressed as far as possible, and as quickly as possible.

The fact that symptoms of poisoning resulting from constipation do not appear at once is no evidence that injury is not done. Dr. Wm. Hunter in the course of the London discussion remarked that the fact that chronic constipation "might exist in certain individuals as an almost permanent condition without apparently causing ill-health is due solely to the power and protective action of the liver. It is not any evidence of the comparative harmlessness of constipation *per se*, but only an evidence that some individuals possess the cecum and the colon of an ox, with the liver of a pig, capable of doing any amount of distoxication."

In the face of such an array of evidence backed up by authority of nearly sixty eminent English physicians—and many hundreds of other English, German, and French physicians whose names might be added—it is no longer possible to ignore the importance of alimentary toxemia or autointoxication as a factor in the production of disease. To no other single cause is it possible to attribute one-tenth as many various and widely diverse disorders. It may be said that almost every chronic disease known is directly or indirectly due to the influence of bacterial poisons absorbed from the intestine. The colon may be justly looked upon as a veritable Pandora's box, out of which come more human misery and suffering mental and moral as well as physical than from any other known source.

The successful treatment of alimentary toxemia often taxes to the utmost the resources of the best equipped physician. Sometimes it is necessary to call in the services of the surgeon.

It may be fairly said, however, that at least nine-tenths of the possible benefits to be derived from treatment is to be secured by combating intestinal stagnation. By such regulation of diet and habits as to secure a thorough evacuation of the bowels at least three times a day, or after each meal, and by excluding from the diet flesh meats and other putrescible substances, more can be accomplished toward eliminating from the intestine pernicious parasitic organisms and the multitudinous poisons which they produce than all other means.

The sources of the poison-forming bacteria which grow in the human intestine are numerous. It is probable, however, that butcher's meat, fish, oysters and other shellfish are the chief sources, for Tissier found that when he obtained flesh from the slaughterhouse in as fresh a condition as possible, it contained all the bacteria necessary to produce active putrefaction, which was made evident to the sense of smell within twenty-four hours, and became more and more pronounced from day to day.

Bacteriologists have shown that the mouth always contains putrefactive bacteria. The normal stomach is sterile during digestion, because the gastric juice is a powerful germicide and destroys

them; but in stomachs which do not produce a sufficient amount of gastric juice, and in normal stomachs when empty of food, great numbers of these dangerous microbes may be found.

Below the stomach the number of bacteria increase. At the lower end of the small intestine, and in the caecum, the number of living bacteria is the greatest.

The reason for this is the presence of food residues and body wastes of character suitable to encourage the growth of putrefactive bacteria, while starch and sugar which are needed for the growth of acid-forming organisms are absent, having been digested and absorbed in the small intestine.

### **Changing the Intestinal Flora**

Many people seek by change of climate, often at great expense and inconvenience, to secure relief from ailments which only require a change of the character of the bacteria growing in their intestines and are to no appreciable extent affected by the climatic influences. If sometimes relief is found by such persons in a change of climate it is because an incidental change of their intestinal bacterial growth happens to occur at the same time. "Bilious" climates do not exist. "Biliousness," an unscientific but significant and useful word, signifies conditions that can be remedied only by in some way getting rid of putrefactive

bacteria and putrefaction processes that are active in the intestines.

Dr. Tissier, of the Pasteur Institute, was the first to point the way to methods of changing the flora of the intestine. His plan was to displace "wild," noxious, poison-forming bacteria which have taken possession of most adult intestines through wrong habits of life, especially in diet, by harmless, acid-forming species, such as Nature plants in the intestines of the young infant within a few days after birth.

There are various ways in which the intestinal flora may be changed. Three things are essential:

1. The diet must be such as to encourage the growth of friendly germs, the acid-formers, and discourage the growth of unfriendly and undesirable ones, the poison-formers. This requires a fleshless diet and in some cases a diet free from animal protein, that is, a diet which excludes eggs and milk as well as meats of all kinds.

2. The bowels must be made to move three times a day or more frequently so as to hasten the displacement of the undesirable bacteria and to dislodge them from their hiding places.

3. The introduction of friendly, acid-forming bacteria in such large numbers as to enable them to take possession of the intestine and establish themselves in the colon where their services in combating putrefactive processes is needed.

The change of diet may be effected by adopting

the "milk regimen" for a limited period. The "fruit regimen"—fresh fruit and such green vegetables as lettuce, celery, and cucumbers answers the same purpose. The "whey cure," "kumyss cure," and "milk cure" are other dietetic methods of changing the flora.

Fasting will not change the flora for reasons given elsewhere, (see pages 103-106).

In general, the antitoxic diet elsewhere described (see pages 221-240) is the most practical solution of the diet problem in relation to bacterial change in the intestine. In cases in which it is desirable to secure a gain in flesh in connection with a change of the intestinal flora, a milk diet may be successfully employed.

### **The "Milk Regimen"**

Cow's milk is not a natural food for grown-ups, either human or bovine. Milk is deficient in iron, and contains an excess of protein, and lime. Cow's milk disagrees with many persons, children as well as adults. It is certainly by no means an ideal food. Yet many persons are benefited by its temporary use when proper precautions are taken. The first essential is that the milk shall be taken in large amount, so large as greatly to exceed the needs of the body, and thus fill the alimentary canal with material which will promote the growth of friendly bacteria, or sour milk germs, for which milk supplies the very best medium.



A second essential is that the milk shall be taken often. A half pint every half hour or every forty minutes is the usual plan. This is necessary to make it possible to take into the stomach the five or six quarts of fluid required for one day's milk ration. It is also important to maintain a constant stream of fresh material passing along the alimentary canal, so that a considerable portion may reach the colon undigested and unabsorbed. It is especially important that a sufficient amount of milk sugar should reach the colon unabsorbed to maintain in the colon a state of acid fermentation thereby preventing putrefaction and changing the intestinal flora. This is, indeed, in many cases, the chief benefit derived from the milk diet. To encourage this change it is well to give at each alternate feeding yogurt buttermilk in place of sweet milk; or equal parts of sweet milk and milk soured by the Bulgarian ferment may be taken at each feeding.

Feeding begins at 7:00 a. m. and ends at 7:00 p. m.—twenty-five feedings in all. At 10:00 a. m. and 4:00 p. m. the milk is omitted and a meal of fruit is taken instead. The purpose of this is to encourage bowel activity, since very free and frequent bowel movement is essential to success. The disappointing results often encountered in the use of the milk diet are chiefly due to the constipation which is likely to be produced in many persons, the natural result of which is intestinal toxemia

and an aggravation of the very symptoms relief from which is sought.

An ounce of wheat bran or agar-agar should be taken daily in half ounce doses, preferably at 8:00, 10:00, 12:00, and 4:00 o'clock feedings. In cases in which the colon is badly crippled, the use of the Russian paraffin oil in doses of one tablespoonful three or four times a day is necessary to secure the active bowels required for a rapid and efficient change of the flora.

When the period of exclusive milk feeding is ended, the milk should be at once discarded and a strict antitoxic diet adopted; milk, meat, fish, fowl, eggs and all kinds of animal protein must be discarded. Milk is unwholesome for most invalids and often even in very small amounts. This is especially true of persons suffering from colitis. It is most likely to produce unpleasant effects when taken in small amounts with other foods. It is generally tolerated when taken as an exclusive diet and in large amount because of the special conditions established whereby a change of the intestinal flora is accomplished.

It should be remembered that the chief advantage of the milk diet as a means of changing the intestinal flora lie—(1) in the large amount of milk sugar which by this means is carried into the colon and there, fermenting, produces lactic acid and so prevents the growth of the putrefactive bacteria; (2) in the frequent bowel actions induced by the large

surplus of food ingested. The soft curds, undigested and unabsorbed by their bulk as well as by their acidity stimulate peristalsis to such a degree as to cause several bowel movements daily. In certain cases, however, in which mechanical obstacles to bowel action exist, such as either spasm or incompetency of the ileocecal valve, or adhesions of the pelvic colon, constipation may continue in spite of the largest quantities of milk that can be taken. In such cases the sugar of milk is wholly absorbed, leaving the curds to putrefy in the lower colon, and the most intense toxemia may result. The writer has met a number of cases of this sort. This is the cause of the disastrous failure of the "milk cure" in certain cases.

### The "Fruit Regimen"

To meet the needs of certain patients who have an idiosyncrasy against milk, especially cases of colitis, the writer has conducted a large number of experiments for the purpose of discovering a diet for changing the intestinal flora suitable for general use and especially in cases in which milk is not tolerated. The result of many experiments was the selection of a diet consisting chiefly of wheat bran and fruit; lettuce, cucumbers, tomatoes and any other uncooked product of the garden may be added, but the chief part of the diet must be bran and fruit. Such a dietary practically eliminates protein and fats. Food may be taken either three or four

times a day. Two or three tablespoonfuls of sterilized wheat bran should be taken at each meal. A convenient way to take the bran is in the form of a soup or porridge made with stewed tomatoes or some fruit. A spoonful of oatmeal or cornmeal may be added if desired.

All sorts of fruit may be eaten freely. Dates are especially valuable because of the sugar which they contain.

In addition, a paraffin tablet or a tablespoonful of white Russian paraffin oil should be taken at each meal.

The result will be three or four free bowel movements daily, and at the end of three or four days the stools will become odorless or nearly so. A slight acidity is a good indication, showing that the flora is completely changed, the putrefactive and poison-forming germs having been displaced by the beneficent acid-formers.

After the flora has been thus changed by a bran and fruit diet closely adhered to for a few days, a careful antitoxic diet should be closely followed as a permanent regimen. It is a great error to suppose that the intestinal flora can be definitely and permanently changed by a brief course of treatment or by any plan which does not include the complete and permanent exclusion of "toxic" foods. Meats of all sorts must be wholly discarded. Eggs must be used sparingly if at all. In not a few cases milk must be carefully avoided even as an ingredient of

soups and other dishes. Some persons may recoil at the idea of so great a limitation of the dietary; but a person who has suffered from such distressing effects of chronic intestinal toxemia as a severe eczema, frequent "sick headaches," Bright's disease or arteriosclerosis will be quite willing to undergo almost any sort or degree of gustatory discipline if assured that the sacrifice will secure the desired result. Fortunately, this assurance may usually be given with the greatest confidence that the results will not be disappointing.

The free use of bran and paraffin must be continued indefinitely, and care must be taken not to omit their use at a single meal. If thorough evacuation of the bowels does not occur three or four times daily the amount of paraffin or quantity of bran, or both, should be increased. Agar-agar in some form may be used in place of bran, or in connection with it. There need be no fear of injuring the intestine by producing irritation. The writer does not hesitate to make this statement after having carefully watched the effects of the measures above recommended in hundreds of cases. If the measures suggested are employed with sufficient thoroughness, and continued for a sufficient length of time, the effort will not fail of success. It is necessary in many cases, to supplement the regimen recommended by means of treatment which will thoroughly cleanse the colon, introduce a normal flora, and reform the wild bacteria with which the

colon is infected. For a detailed description of these measures the reader is referred to the directions given elsewhere in this work for the treatment of colitis. (See page 330). If an ammoniacal or putrescent odor appears in the feces at any time the fruit regimen must be resumed for a few days until the odor disappears. The diet should be carefully studied and modified as necessary until the stools become regular, frequent, and practically free from odor, or at least free from putrescence.

## Forms of Constipation

### Classification

Constipation, although a symptom rather than a disease, itself becomes a cause of various and often most serious vital disturbances. Every bodily function and every structure may suffer damage through the failure of the body to be relieved of the highly poisonous refuse which it is the duty of the colon to discharge.

The symptoms by which the presence of constipation may be known differ according to the form of constipation which is present. Although many different forms of constipation have been described, practically all phases of this disorder may be included under three heads, namely:

1. Simple constipation.
2. Cumulative constipation.
3. Latent constipation.

### **The Symptoms of Simple Constipation**

When fecal matters remain in the intestines more than twenty-four hours, constipation exists. Some authorities place the limit at forty-eight hours, while others assert that every individual is a law unto himself, and that a bowel movement once in two or three days is as normal for some persons as a daily or twice-daily movement is for others. The

writer feels certain that these authorities are in error. Their conclusions have been drawn from observations made upon unhealthy rather than normal individuals. For reasons stated elsewhere in this work, the writer is fully persuaded that the normal rhythm of the intestine is a movement after each meal, or at least after each full meal. Certainly, when the bowels do not move regularly at least once a day, constipation may be said to exist.

In simple constipation the evacuation of the bowel content is not complete. A normal desire for evacuation occurs when the feces enter the rectum, but normal bowel movements occur only every other day, or perhaps at somewhat longer intervals, or at irregular periods. There is simply a slowing of the rate at which the food moves along the alimentary canal, due to some one or more of the many causes which have been mentioned in the preceding pages; but there is no disturbance of the defecating mechanism.

Most cases of chronic constipation begin with the simple form. The cause is most commonly a concentrated diet, irregular meals, sedentary habits, or neglect to attend promptly to the "call" for evacuation of the bowels.

### **Symptoms of Cumulative Constipation**

In cumulative constipation, which is perhaps the most common form, the difficulty is almost wholly



confined to the lower part of the colon. Cumulative constipation is for the most part a disorder of the defecating mechanism. The food and the feces move along the small intestine and the upper part of the large intestine at the proper rate; but after the feces have reached the pelvic colon, they are retained either in the colon itself or in the rectum, instead of being promptly discharged. The special characteristics of cumulative constipation are dry hard stools, loss of the rectal reflex, caused by the retention of fecal matters in the rectum and distension of the rectal walls, and in pronounced cases, complete loss of the "call" for evacuation of the bowels. In cumulative constipation, the difficulty exists in the lower half of the colon, or below the splenic flexure.

In well pronounced cases of cumulative constipation, a considerable quantity of feces will always be found present in the rectum, although in a certain number of cases the accumulation occurs only in the pelvic colon. The latter cases are sometimes the most difficult of relief, because of the existence of obstruction at the pelvi-rectal valve, or of adhesions of the pelvic loop to the floor of the pelvis. Sometimes the pelvic colon has become so large by overstretching that, when filled, it is so heavy that it cannot rise, but becomes impacted in the hollow of the sacrum, folded upon itself and incapable of emptying itself. In such cases, as in most cases of cumulative constipation, bowel movements occur

only as the result of pressure from accumulation of feces in the colon, a process which necessarily involves great distension of the colon and resulting injury to its walls, and to the ileocecal valve, which is often rendered by this means wholly incompetent.

When in cases of cumulative constipation the bowels are made to move by violent straining efforts, the rectum is not emptied. A few masses of hard, dry feces, sometimes a single mass covered with mucous, may be extruded, but a thorough emptying of the bowel never occurs. In cases in which the rectum only has lost its sensibility, the sense of weight and pressure often lead the patient to make repeated efforts during the day to relieve the bowels, with the result of securing perhaps each time a small movement. This has been termed "fragmentary constipation" by Boas, the eminent Berlin specialist, but it is only a form of cumulative constipation.

### **Symptoms of Latent Constipation**

In latent constipation the bowels move regularly, or at least daily. In most cases the patient has no idea that he is suffering from constipation. An examination, however, by means of suitable tests shows that there is delay at one or more points along the food tube. There is no disturbance of the mechanism of defecation. The "call" for bowel movement occurs, and often with inconvenient fre-

quency, and the lower colon is emptied of its contents. There is no accumulation of feces in the rectum, but if a portion of charcoal or carmine is given with a meal, forty-eight hours or even a longer time may elapse before the colored matter makes its appearance, and a longer time before it is all discharged.

The exact point at which the delay occurs may be ascertained by administering a bismuth test meal and watching its progress along the food tube by the aid of a powerful X-ray apparatus. An examination of this sort is highly important in cases of latent constipation, affording the only means by which the real nature and location of the disturbance can be ascertained.

The feces in latent constipation are generally very dark in color, ragged and foul smelling, the result of the advanced putrefaction induced by their long retention.

The reflex contraction of the ileocecal valve produced by the pain of chronic appendicitis and other painful affections of the pelvis and lower abdomen, may be the cause of latent constipation, which, when due to this cause, is sometimes called "reflex" constipation, for the reason that it is generally relieved by measures which lessen the activities of the sympathetic nerve and so relax the ileocecal sphincter. Latent constipation is also very commonly associated with colitis, on account of the spastic condition of the intestine often present in this disease,

which may be a consequence as well as a cause of latent constipation.

Incompetency of the ileocecal valve is probably a very frequent cause of latent constipation.

A marked symptom of latent constipation when associated with incompetency of the ileocecal valve is the great amount of intestinal gas from which it is impossible to get entire relief. This is due to the fact that the gas generated in the colon escapes into the small intestine and cannot be wholly expelled because the colon discharged its contents internally, into the small intestine, as well as externally.

### Mixed Forms of Constipation

The majority of cases of constipation may be clearly assigned to one of the above-defined classes. Not infrequently, however, cases are encountered which present most of the symptoms of the several classes of constipation. Colitis with spastic constipation is often observed in cases in which there is also a failure of the defecating mechanism to perform its work properly, and cumulative constipation.

# The Treatment of Constipation

## Hygiene

The first point of importance in the treatment of constipation is hygiene. A person must by every means in his power endeavor to improve his general health. Chronic ill health always involves, either primarily or secondarily, a lowering of the vital status, and is in most cases not a result of a single error in habits of life, but of numerous infractions of the rules of healthy or biologic living. So many different factors are involved in the function of bowel movements, that it is highly essential that a person who is suffering from chronic constipation should seek by every available means to improve his general health, and thus increase the vigor of all his bodily functions.

If one's habits have been sedentary, he must make a radical change in his mode of life. When possible, a change from an indoor employment to an active occupation out-of-doors is most desirable. This in itself will in many cases be found quite sufficient to secure regular bowel movements.

If the circumstances of life have been such as to give rise to worry or nervous depression, some change should be effected by which the causes of irritation and depression may be gotten rid of, or the individual should, by the cultivation of optim-

ism, endeavor to rise above the influence of his surroundings.

Constipation is in most cases simply one of the unhappy results of the artificial conditions imposed upon us by modern civilized life. The only escape from this terrible handicap of all useful human activities is to be found in a rational return to Nature, in the adoption, so far as is necessary to secure the physiological conditions, of natural and primitive habits, particularly in reference to diet, sleep, exercise, and out-of-door life.

Before proceeding further the reader who is making a serious study of this subject is asked to re-read carefully two of the preceding chapters, entitled, "Influences Which Normally Excite the Movements of the Colon" and "Influences Which Discourage or Lessen Intestinal Movements," bearing always in mind the fact that for the successful treatment of constipation every possible factor which aids bowel activity must be utilized, and that every factor which has a discouraging influence must be most carefully avoided.

### **General Habits**

Many of the causes of constipation, and many of the influences connected with every-day life which tend to produce this condition, have been already discussed with some detail, and need not be reconsidered here. The bearing of each one of these

causes should be considered in each individual case, and not one unfavorable influence should be permitted to remain.

### **Clothing**

This has a very much more direct bearing upon the functions of the colon than might at first be supposed. Corsets and belts, as has already been shown, tend directly to produce constipation by hampering the movements of the diaphragm, preventing proper development and activity of the abdominal muscles, and causing displacement of the colon and other viscera into the lower portion of the abdomen. Excess of clothing tends in the same direction by overheating the body and producing excessive perspiration and relaxation of the muscular structures of the abdomen, and perhaps also of the intestines.

Finally, as regards hygiene, every person who is suffering from constipation and really desires to be delivered from the miseries attendant upon this condition should be careful to avoid all habits and influences which tend to retard or discourage bowel action and will most assiduously cultivate every influence and habit which tends to encourage intestinal activity.

### **Constipation Always Curable**

Every person who undertakes to combat constipation should know at the start that his efforts if

thoroughgoing and persistent may be expected to win. There are many thousands of sufferers who have become utterly discouraged through unsuccessful efforts and have become convinced that the malady is incurable, and that nothing more can be done than to mitigate the evils of the malady as much as possible by laxative drugs and the use of the enema, withstanding their well-known evil effects. There are many thousands of others who depend wholly upon the use of laxative drugs or mineral waters for bowel movements and who are unaware of the harmful effects which inevitably result from the long continued use of drugs which force bowel movement by creating an artificial irritation. The majority of such persons are always looking for some new laxative drug to take the place of one which has lost its effects, fully believing that there is no other way of doing. There is apparently a widespread belief that constipation is incurable. This hopeless view, quite generally held by physicians as well as the laity, is the very natural result of the wrong methods which are generally employed, and the great ignorance concerning the intimate nature and causes of constipation. This ignorance has been quite excusable, however, because of the lack of scientific knowledge respecting the physiology of bowel action. But now that the light of new discovery has illuminated this dark corner of human physiology, the treatment of constipation is no longer necessarily a hopeless groping in the



dark but may be made a regular organized campaign against an enemy whose nature and favorite haunts are known and against which recent medical science has provided efficient weapons.

And a veritable campaign the effort must be if success is to be attained in really grave cases. But victory may be attained in every case. It must be understood, however, that there is no panacea for constipation. There is no one simple means by which all cases may be cured, and some cases require the simultaneous employment of almost every known rational remedy. A very few cases require the aid of surgery; and even surgery seldom succeeds when made the sole reliance. Fortunately surgery is very rarely needed when all other means are efficiently used.

### **What Is a Cure of Constipation?**

When a child has measles or scarlatina or when a person suffers an attack of typhoid fever, the usual result under modern management is such a recovery that no traces of the disease or its effects are discoverable. The individual is apparently as well in every respect as before the illness. Modern medical research has taught us, however, that this completeness in recovery is more apparent than real. Besides the permanent injuries to eyes and ears, which are often left after measles and scarlet fever, there are not infrequently far more serious

injuries to heart, lungs, or kidneys. And statistics show that whenever typhoid fever and small-pox are prevalent, pulmonary tuberculosis increases. Thus we know that recovery does not really mean, even in acute disease, absolutely complete restoration to former soundness.

In chronic disease this is still more evident. An attack of acute disease is like a sudden outburst of flame in a dwelling from the upsetting of a lamp or from some similar accident. The fire is usually quickly extinguished and the house itself is little injured. A chronic malady is often like a fire which has begun in the basement of the house and has gradually worked its way up in the inner walls until it has reached the top and burst out in flame through the roof. Acute disease we may say is analagous to a fire *in* a house while chronic disease is a fire *of* a house. In lung tuberculosis a cure means an arrest of the disease process and a healing of ulcerated surfaces in the lung; but lung tissue which has been destroyed is not restored; and the consumptive who has been cured by the out-of-door life and other means must continue to employ the essentials of the curative treatment in order to keep well. No consumptive can expect to remain well if he returns to the old conditions of life under which he became ill. He must make a radical change in his habits of life and the change must be permanent. In case of an injury to a leg, the patient may recover, but with the loss of a leg.

By the aid of an artificial leg he will be able to walk very well, but not so well as with a natural limb.

The situation is exactly the same in constipation. In very chronic cases, much irreparable damage has been done. The colon has been permanently crippled. The art of treatment is to find out the exact nature of the injury and to find means for supplying the needed aid, much as an artificial leg in a large measure supplies the place of a missing limb. These measures must be such as render aid in a physiologic way, and must be harmless in character. When once the necessary means have been found and adapted to the individual case they must be perseveringly employed not for a few days or weeks or months; their use must become a life habit. In general it is possible to secure a considerable degree of improvement so that a few and simple means will afford all the aid required though at first the concerted use of many measures was required.

If, for example, it is found that the addition to the food of a liberal quantity of sterilized wheat bran will secure three normal bowel movements daily, this simple means must be faithfully used, not only daily, but at every meal. If it is found that the bowels are ready for evacuation at a certain hour, a natural "call" being experienced at that time, this hour must be religiously set aside for this duty. Nothing may be allowed to interfere with this duty. Whatever plan or program is found to

secure efficient bowel action, this program must be carried out every day with greatest circumspection. Nature must not be discouraged or thwarted in her efforts. Every pains must be taken to foster every symptom of returning normality in bowel functions. When a "call" occurs, it must be answered at once. The delay of a few minutes only may extinguish the effort Nature is making to reestablish the normal rhythm. It takes considerable will and character to conquer constipation as well as knowledge and perseverance. But the gain in clearness of mind, zest for work, endurance of mind and body, and general efficiency, to say nothing of such gains as keenness of appetite, sweetness of breath, clearness of skin, sound sleep and sense of joy in being alive, are ample compensation for the effort required. If it is a life-long battle to conquer constipation, it may be a winning battle and one which lengthens one's days and wonderfully increases capacity for useful activity and enjoyment of life.

### **When Is Surgery Needed?**

It will not be possible to review in a brief paragraph the various opinions which have been expressed by eminent medical authorities respecting the indications for surgical relief in cases of obstinate constipation, nor to offer the reasons for or against the various surgical procedures which have been

proposed. It must suffice simply to enumerate the principal conditions concerning which the concensus of authoritative surgical opinion is settled and clearly defined.

Constipation due to organic obstruction resulting from tuberculosis, cancer, or other morbid growths, necessarily requires surgical interference, and an abdominal surgeon should be consulted at once, one experienced in intestinal surgery. This is important, for in surgery of this character results depend almost wholly upon exactness and perfection of technic, such as can be gained only by long and extensive practice.

Chronic as well as acute appendicitis is an indication which may open the way for relief of constipation by removal of an active cause. This is especially true in cases in which an X-ray examination shows many adhesions about the inflamed appendix, which fix the cecum so that it cannot empty itself or perhaps cause obstruction of the lower end of the small intestine. The necessity for operation may exist in cases of this sort, even when little pain is felt in the region of the appendix. Not every case in which such adhesions exist, however, requires operation. By far the great majority may be substantially relieved by non-surgical measures.

Adhesions of the ascending or descending colon, and especially adhesions which compress the pelvic colon and limit its movements, may be relieved by appropriate surgical procedures when other means

fail. These cases seldom require removal of the colon or any portion of it, or even the so-called short-circuiting operation which often affords only temporary relief unless care is taken to restore the ileocecal check valve. When adhesions of the pelvic colon are broken up the pelvic loop must be suspended in such a way as to prevent the reproduction of the restricting adhesions which will almost certainly occur unless some efficient means of prevention is adopted.

A very definite indication for operation in certain cases in which other means fail is incompetency of the ileocecal valve accompanied by very pronounced stasis or stagnation in the small intestine. This condition is sometimes accompanied by the most incorrigible constipation and by most pronounced intestinal toxemia as shown by enormous quantities of indican and other putrefactive products in the urine and by intractable headaches. An operation has within a few years been devised by which the incompetent valve may be repaired so as to effect a radical cure of the incompetency of the valve and, fortunately without any considerable degree of risk. This operation has been now performed in a sufficient number of cases to demonstrate its value in cases which do not yield to other measures.

Diverticulitis (see page 348) sometimes requires operation but probably much less often than has been thought if thorough-going non-surgical meas-

ures of treatment are instituted. Anal hemorrhoids, fissures, fistula, spasm due to local irritation, rectocele in women and prolapse of the rectum are other measures which may be readily cured by surgical procedures which are not attended by risk nor even, when skillfully done, by much pain or inconvenience.

### **Regularity of Meals Necessary**

The bowels do not move without a reason for moving. The pelvic colon is an ejecting apparatus for expelling fecal residues, which works only when brought into action by the reflex nervous mechanism which comprises the nerves of the rectum, the defecating center, and the connecting nerve trunks. The entrance of food into the rectum is like the closing of a switch which controls the starting and stopping of a motor. When the rectum is distended, the nerves are stimulated, and in turn excite the defecating center where they originate. From this center are sent out impulses which cause the pelvic colon to contract strongly and empty itself. In doing this it is assisted by strong contractions of the abdominal muscles and of the rest of the colon.

This process, it must be remembered, is set in operation only when there is a sufficient movement of feces from the pelvic colon, where the feces are stored, into the rectum, to produce the necessary amount of stimulation. As we have already seen, this is accomplished, normally, by peristaltic move-

ments set up by taking into the stomach relishable food. In constipation, these stimulating reflexes are often weak, and must be reinforced by every means possible. Hence the diet must be so managed as to secure the maximum amount of stimulating influence upon the lower bowel. Eternal vigilance is necessary; every meal must be taken with reference to the bowel action. A single omission of a meal, or a meal of unsuitable food, may be sufficient to produce an undue accumulation of feces in the colon and rectum, and unless this is immediately corrected, the most serious results may follow. The taking of food, then, serves a double purpose, it supplies the body with needed nourishment and at the same time furnishes the impulse needed to enable the body to get rid of the unusable residues of a previous meal and of a portion of its constantly accumulating intestinal excretions. So if regularity of bowel movement is to be expected, care to take the food at regular intervals becomes a matter of absolute importance. With the savage, regularity of bowel movement is not a matter of so great importance, for the reason that he is rarely so situated that he cannot respond quickly to the "call" for evacuation. But civilized human beings by their systematic and, in general, their closely occupied life, must often find themselves in circumstances which compel a considerable delay in answering the "call" without being seriously incommoded. Rather than interrupt the normal rhythm, even on



a single occasion, it would be better to incur a very considerable degree of inconvenience, a fact which the constipated must take to heart and carry in mind; but it is better to observe such an order of life and such regularity of habits as will cause the bowels to move at a time at which they may without haste or inconvenience receive the leisurely and thorough attention which the importance of this function demands.

Every meal must contain foods which will leave a sufficient amount of residue to prevent stagnation. To neglect this fact on a single occasion may in the case of a constipated person, who by careful attention to regimen has established regular bowel habits, cause the beginning of a return of all the old conditions.

Too much emphasis cannot be laid upon the absolute and unfailing faithfulness required to maintain the improved condition which may have been attained. The majority of cases of constipation relapse sooner or later, but chiefly because patients return to their old irregular and careless habits. Drugs are resorted to because by their use the difficulty is temporarily overcome with so much less trouble and self-control than is needed for the complete regulation of one's habits of life, especially in relation to eating. Sufficient care in the matter of diet will be followed by success in nearly all cases of simple constipation. It is necessary, however, that the proper regimen should be strictly and uninterruptedly followed.

### Supplementary Bowel Movements

The act of defecation must be made as complete as possible. The rectum and lower bowel are often filled with dry feces which are an obstacle, the removal of which by patient and continued effort may be followed by a full and natural movement.

Sometimes a partial movement will be followed by another, within a half hour or less. Many persons evacuate their bowels in the morning by two movements, one on rising and the other soon after breakfast. Whatever may be the vagaries of the individual colon, if it can be persuaded to act at all, other things must be accommodated to its needs. In many cases, always when the movement seems less complete than usual, it is wise to give the bowels a second opportunity for movement a few minutes or half hour later. If a second "call" is experienced, the matter should not be ignored, but should receive instant attention. The moving of the bowels is a matter of equal importance with the taking of meals, and should be given the same consideration. A crippled colon must be humored and coddled, so to speak, and in many cases apparently hopeless the result may be in time that the colon may be trained back to habits of normal activity and regularity.

### Sleep

The important relation of sleep to constipation is shown by the fact that loss of sleep, or a change of

sleeping hours from night to day, very quickly upsets the bowel rhythm when it is nicely balanced in a person of sedentary habits. Cannon showed that the bowel contents advance very slowly during sleep, but very rapidly during and directly after eating. Evidently sleeping after eating must tend to constipation by interfering with the normal advance of the colon contents toward the exit.

Loss of sleep does not, however, increase bowel activity, but rather has an opposite effect, doubtless because of its general depressing effects. This is shown in the lack of appetite and in the coating of the tongue which result from loss of sleep. Relish for food is one of the normal stimuli of the intestines.

### **Posture During Sleep**

This is by no means a matter of no importance. Gravity exerts a decided influence upon the contents of the stomach and intestines in states of disease, although the influence of this force is of little moment in conditions of health. In health the food is grasped by the digestive tube as soon as it reaches the back of the throat, and this vital grip is maintained until the residue of the food is cast out at the anus.

In disease, the situation may be greatly changed. The walls of the stomach, instead of contracting upon the food and kneading it, are relaxed and hang

loosely separated like the sides of a bag. The stomach no longer grips the food, and so gravitation controls it to a large degree. Under these circumstances it is best for the patient to lie upon the right side in case a meal has been eaten within two or three hours before going to bed, or if there is evidence of the presence of food or liquid in the stomach on retiring.

When the cecum is known to be dilated and the seat of stagnation, it is well to sleep upon the left side, so as to facilitate the movement of food along the relaxed colon.

In cases in which the abdominal muscles are much relaxed and the whole colon dilated, so that intra-abdominal pressure is much reduced, it is well to lie upon the face, so that the weight of the body may by constant pressure upon the abdominal contents aid the progress of the feces along the crippled colon. Thin persons may often adopt with advantage the practice of sleeping on the face with a pillow beneath the abdomen. Backache, and various discomforts in the abdomen, especially in cases of colitis, may be relieved by this simple procedure. Persons whose stomach and intestines are much relaxed and sluggish in consequence are much benefited by lying upon the face for half an hour or an hour after each meal. This not only aids the passage of liquids from the stomach, but helps the colon, and prevents the excessive congestion of the viscera, which naturally results from the excitement

of digestion when the intra-abdominal pressure is very low. The nervousness from which many dyspeptic and constipated persons suffer after eating may be relieved and prevented by half an hour's rest lying upon the face after meals. It should be observed that it is not well to sleep at this time.

## Diet in Constipation

The writer once asked a celebrated Vienna professor, "What do you do for constipation?" The reply was, simply, "Diet." "But, professor, what do you do for cases in which diet and all other means have failed?" The reply was still, "Diet, only diet."

Proper regulation of diet is certainly the most important of all measures to be adopted in the treatment of constipation although there are other measures which are too valuable to be neglected. A practical cure may in many cases be effected by this means alone, provided, of course, that proper attention is given to ordinary bowel hygiene. No attempt should ever be made to treat a case of constipation without proper regulation of diet. Such a course, no matter how gratifying may be the results for the time being, must end in disaster; for a physiologic diet is of all things most essential as the means of securing normal activity of the intestines.

First of all, the fact should be recognized that food is Nature's laxative. Natural food taken in the proper manner and at proper intervals gives to the alimentary canal just the kind and amount of stimulation that is required to maintain the normal procession of nutrient material along the digestive tract, and to effect the prompt discharge of un-

usable residues and poisonous wastes from the body. As has been pointed out in preceding chapters, one of the effects of eating is to set up in the stomach a series of vigorous peristaltic movements, which pass from the stomach along the whole length of the digestive tube. Under normal conditions these movements are sufficient to cause the fecal remains of a preceding meal to move down into the lower and discharging part of the colon, thus setting up the reflex actions which result in their discharge from the body. This statement is not based upon theory alone, but is founded upon careful observations by expert roentgenologists, made upon the stomach and intestines with the X-ray after the administration of the bismuth meal. It also agrees with the every-day experience of normal persons. The natural time for the bowels to move is soon after eating, and under fully natural conditions a bowel movement occurs after each meal, at least, after each principal meal. The writer has met a number of persons whose intestines were so sensitive to the stimulation of food that the taking of food at any time, even in a small quantity, had the effect to produce within a few moments a desire for evacuation of the bowels. Cases are occasionally met in which the taking of food produced such strong stimulation that the patient found it difficult to finish a meal without interruption by the demand of the bowels for evacuation.

In the dietetic treatment of constipation, it

is necessary to understand the particular properties of food stuffs to which stimulation of the intestinal movements is due, and to make use of these several qualities as they may be required in individual cases.

### **The Laxative Properties of Foods**

The properties of food stuffs to which a laxative influence is due may be briefly enumerated as follows:

1. Sapid qualities to which flavor or tastes are due.

2. Bulk, or rather the presence of cellulose, which is capable of forming an indigestible residue.

3. Moisture, that is, a necessary amount of liquid taken at meals or between meals, especially in connection with cellulose which by absorbing water holds it in the intestine.

4. Chemical properties which result from the presence of sugars and organic acids in the food, including the sugars formed by the digestion of starch, and the lactic acids formed by the fermentation of sugar in the intestine. Fats are also somewhat laxative.

In the regulation of the diet for the relief of constipation, the aim must be to make such selection of food stuffs as will furnish these various laxative properties in the measure required by the individual case. This is by no means a simple matter, and requires, first a very thorough know-



ledge of food values and second, a most thorough-going investigation of each individual case, so that not only the particular form of constipation from which he is suffering may be known, whether it is simple, cumulative, or latent constipation, but also at what point or points in the intestinal track the delay occurs, and the cause of the delay. The force of this statement will be fully appreciated if the chapter on "Causes of Constipation" has been read with care.

### **Atoxic and Antitoxic Properties of Foods**

In addition to the laxative properties of food stuffs, there is another quality of equal importance, which must be duly considered in the treatment of constipation, because of the prolonged stay of undigested food remnants in the alimentary canal in constipation, and of the tendency to delay which will always remain, even under the best conditions which can be supplied. It is of the highest importance that the food should be of such a character as to prevent as far as possible the putrefactive changes which are always increased, and often to an extraordinary degree, whenever there is delay.

Of the three essential food elements, carbohydrates (starch, sugars and organic acids), fats, and proteins, the last named only is capable of undergoing putrefaction. Foods rich in starch and sugar do not undergo putrefaction, either outside the

body or within the intestine, and hence, are properly termed atoxic foods.

Fats in excess encourage putrefaction, while starch and sugar in excess produce the opposite effect. By the fermentation of starch and sugar in the intestine, acids are formed, which, as has already been pointed out, by interfering with the growth of putrefactive bacteria, prevent putrefaction. Fats ferment, when taken to excess, forming butyric acid, an irritant poison.

Fruits, starch in vegetables like the potato, and green vegetables of all sorts, which contain little or almost no protein, together with certain sugars, especially milk sugar, maltose or malt sugar, and the sugar of fruits, and to a less degree, cereals, particularly rice, which are very rich in starch, are not only atoxic, being incapable of putrefactive changes, but are also highly antitoxic, since they in a high degree promote the formation of acids in the intestine.

### **Antitoxic Value of Uncooked Foods**

A most important point in connection with this subject, which appears to have been overlooked by writers on dietetics, is the antitoxic value of uncooked foods. Man is the only "cooking animal." To the primitive man cookery was not only unknown, but was as unnecessary as for any other member of the animal kingdom. The only really

valuable purpose served by cookery is to enable man to make use of dried grains and certain coarse vegetables, which would otherwise be unavailable as food. Experience has proved that food is often by cookery deprived of certain elements which are essential to human nutrition. The argument made by certain faddists who advocate the exclusive use of a raw diet, that by cookery the life principle is driven out of the food so that its nutritional value is lost, has no scientific basis; nevertheless, it is true that cookery destroys the life of the cells of vegetable foods, and in so doing, deprives the food of certain properties which are useful in the intestine. Living cells resist the attacks of the microbes which produce fermentation and putrefaction. A raw apple or potato remains intact for months, while a cooked apple or potato is in a few days covered with mould, and is in an active state of fermentation and destructive change. Under favorable circumstances such changes may take place within a few hours, as is seen in the moulding of bread over night if kept in a warm place. In other words, raw food resists the destructive changes which are produced by bacteria, while cooked food makes no such resistance.

An experiment made by the writer some years ago gave very positive evidence of this fact. Two equal portions of cabbage were taken. One portion was cooked. Both portions were then inoculated with equal quantities of putrefactive bacteria,

by mixing with each a portion of fecal matter. The two portions of cabbage were then placed for twenty-four hours in an incubator in which the temperature of the body was maintained. Examination showed that the bacteria in the cooked cabbage had increased enormously in numbers, whereas in the uncooked cabbage the number of bacteria had not increased, but had actually diminished.

Many persons have thought themselves benefited by the use of raw grains, such as wheat and oatmeal. While it would be impossible for a person to live on a diet consisting exclusively of raw grains, it is possible that some benefit may be derived from the use of such food to a moderate extent, through the fact that uncooked starch digests slowly. Cooked starch, as well as sugar and other carbohydrates, is normally wholly absorbed in the small intestine, or practically so, and therefore furnishes no resistance to the growth of bacteria; but raw starch, if taken in more than minute quantities, as has been shown by experiment by the writer, finds its way in considerable quantities into the colon. Here, digestion slowly proceeds, producing dextrin and sugar, which furnish to the acid-forming bacteria just what they require for their growth in a section of the intestine where the help of these friendly organisms is most needed. Man's natural dietary comprises food containing a sufficient amount of raw starch to prevent extensive putrefaction in the colon; and therefore

the art of cookery, while essential under the conditions of modern civilization, is not altogether free from disadvantages, which, however, may easily be obviated by a proper selection of foods or, in special cases, by including in the ordinary bill of fare partially cooked foods containing a certain portion of uncooked starch, such as oatmeal or other grains cooked six to ten minutes.

Fruits are the most highly antitoxic of all food stuffs. They possess in a high degree all the antitoxic properties of food.

1. They are most acceptable in an uncooked state, both to the palate and to the digestive organs. They are completely prepared for human sustenance in the great laboratory of Nature, "cooked in the sun," as they say in Mexico. "Cocido en el sol?" asked a native fruit seller of the writer, who was seeking to purchase some tropical fruit in the market place of a town in Old Mexico.

2. With very rare exceptions, fruits contain a considerable amount of organic acids—citric, malic or tartaric,—all of which possess antitoxic properties. Even many sweet fruits contain a considerable amount of these acids, which are disguised by the sugar, but which are not neutralized or destroyed by it.

3. The sugars of fruits promote to a high degree the growth of acid-forming bacteria in the intestine, and thus lead to the formation of lactic acid, which, like the acids of fruits, is antitoxic.

The antitoxic properties of fruits, though not understood until revealed by bacteriological researches of recent years, have long been utilized in a practical way in what is known as the "fruit cure," the value of which in the treatment of chronic bowel disorders has been well understood for centuries. The grape cure of Switzerland and certain parts of Germany, the cherry cure advocated by Linnæus, the great botanist, and similar "cures" through the use of apples, peaches, and other fruits, practised in several countries, owe their value to the antitoxic properties of these choicest of Nature's products.

### **The Antitoxic Laxative Diet**

Every constipated person, then, requires a bill of fare consisting of antitoxic and laxative foods. It is most essential that his diet should eliminate flesh foods of all sorts, including fish, oysters, fowl, as well as beefsteaks, chops, and other red meats. In many cases it is also wise to avoid eggs, or at least to use them very sparingly. Many persons find themselves able to digest the yolks of eggs, who cannot take the whites either cooked or raw without suffering inconvenience, because of the readiness with which this form of albumin undergoes putrefaction in the intestine. When eggs are freely eaten, especially if hard boiled or poached, or in the form of an omelette, portions of undigested

albumin may always be found in the stools, and in a state of very advanced putrefaction. The gas formed in the colon when eggs are freely used consists largely of sulphuretted hydrogen, which is toxic as well as offensive, and affords most substantial evidence of the luxuriant growth of putrefactive bacteria in the colon.

Those who have been accustomed to the free use of meat and eggs are sometimes afraid to dispense with them lest they should suffer from an insufficient supply of protein; but the experiments of Chittenden and the extensive practical experience of the Battle Creek Sanitarium have shown most conclusively that the amount of protein required by the body is so small that it may readily be furnished by food derived exclusively from the vegetable kingdom. In other words, eggs, and meat, and even cow's milk, are quite superfluous as food, when a good variety of fruit, cereals and fresh vegetables are available. If, however, an additional supply of protein is required, it may readily be obtained from nuts. Peanuts, pine nuts, English walnuts and almonds are all rich in protein; a pound of pine nuts, in fact, contains fifty per cent. more protein than a pound of lean beef, and besides, contains twice as much more nutrient in the form of a most easily digestible fat. Practically the same thing may be said of almonds and peanuts. Any possible deficiency in protein may readily be made up by taking at meals a handful

of any kind of nut meats. It is only necessary to take care to masticate them thoroughly, so that the protein present may easily be accessible to the digestive juices. A somewhat extensive study of the laxative and antitoxic properties of various foods will be found of practical value.

### **Cellulose-Containing Foods**

All vegetable foods contain more or less cellulose, but the amount differs very greatly. This element, as has already been mentioned, is highly necessary as a means of securing normal bowel action. Indeed, bulk, not simply in the food itself, but in the residues left behind after the absorption of the nutritive portions of the food, is of first importance. This quality in food is even more important than the antiseptic properties, for the reason that putrefactive bacteria may always find in the bile and other intestinal secretions abundant material to support their growth, provided sufficient delay occurs to encourage putrefactive changes. The thing most necessary in the prevention of putrefaction is rapidity of movement of food residues and body wastes along the intestine to the exit.

The following tables show the amount and percentage of cellulose found in the dried substance of various food stuffs:



## VEGETABLES

Grains  
per ounce

Dried Beans	40.	<input type="text"/>
Dried Peas	28.5	<input type="text"/>
Lentils	20.	<input type="text"/>
Green Peas	9.35	<input type="text"/>
Cabbage	9.2	<input type="text"/>
Parsnip	8.65	<input type="text"/>
Brussels Sprouts	7.85	<input type="text"/>
Kohlrabi	7.75	<input type="text"/>
Celery	7.	<input type="text"/>
Turnip	6.6	<input type="text"/>
Pumpkin	6.1	<input type="text"/>
B. Potato	5.45	<input type="text"/>
Beets	5.25	<input type="text"/>
Asparagus	5.2	<input type="text"/>
Carrots	4.9	<input type="text"/>
Spinach	4.65	<input type="text"/>
Cauliflower	4.55	<input type="text"/>
Tomatoes	4.26	<input type="text"/>
Green Peas	4.	<input type="text"/>
Cucumber	3.9	<input type="text"/>
Lettuce	3.65	<input type="text"/>
Onion	3.55	<input type="text"/>

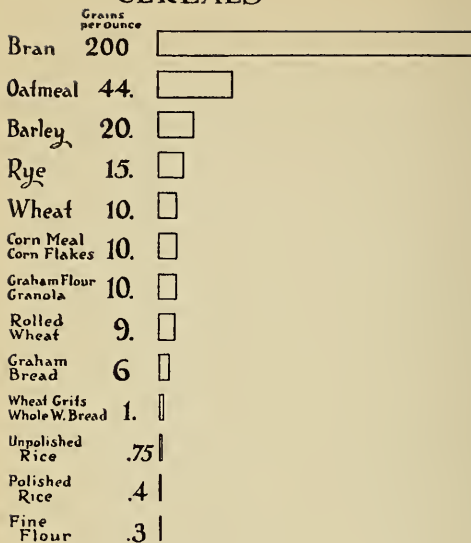
## FRUITS

Grains  
per ounce

Huckleberries	61.5	<input type="text"/>
Red Raspberries	37.	<input type="text"/>
Blackberries	25.	<input type="text"/>
Cranberries	25.	<input type="text"/>
Currants	23.	<input type="text"/>
Figs	22.5	<input type="text"/>
Goosberries	17.5	<input type="text"/>
Pears	15.	<input type="text"/>
Apricots	12.5	<input type="text"/>
Prunes	10.	<input type="text"/>
Cherries	10.	<input type="text"/>
Strawberries	10.	<input type="text"/>
Oranges	10.	<input type="text"/>
Plums	7.5	<input type="text"/>
Grapes	7.5	<input type="text"/>
Raisins	7.5	<input type="text"/>
Stewed Raisins	7.4	<input type="text"/>
Peaches	5.	<input type="text"/>
Apples	5.	<input type="text"/>
Bananas	.3	<input type="text"/>

Chart Showing Proportion of Cellulose in Some of the Common Vegetables and Fruits—Also Grains of Cellulose per Ounce

## CEREALS



## DIETS

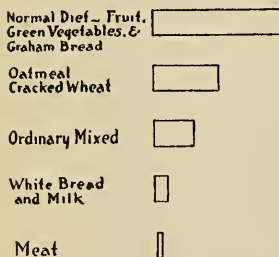


Chart Showing Proportion of Cellulose in Some of the Common  
Cereal Foods—Also Grains of Cellulose per Ounce.

## CEREALS

	Per cent Cellulose.	Number of Cellulose grains in one ounce.	Calories in an ounce.	Grains of Cellulose in 100 calories.	Ounces neces- sary to give 300 grains of cellulose.
Wheat (cooked) . . . . .	2	10	26.3	38	30
Wheat Grits (cooked) . . . . .	1	5	18.4	27	60
Rolled Wheat (cracked) . . . . .	2	9	26.3	36	30
Graham Flour . . . . .	2	10	104	9.6	30
Fine Flour . . . . .	.3	1.5	101	1.4	200
Oatmeal (cooked) . . . . .	10	44	18	37	6
Barley (cooked) . . . . .	4	20	31.08	64	15
Polished Rice . . . . .	.4	2	101.8	1.96	150
Unpolished Rice . . . . .	.75	3.75	101.8	3.68	82
Rye (small) . . . . .	3	15	104	14.4	20
Corn Meal . . . . .	2	10	103	9.7	30
Corn Flakes . . . . .	2	10	103	9.7	30
Beans (dried) . . . . .	8	40	100	40	75
Peas (dried) . . . . .	5.7	28.5	100	28.5	10
Lentils . . . . .	4	20	101.8	19.6	15
Granola (cooked) . . . . .	2	10	101.7	9.8	30
Sterilized Bran . . . . .	40	200	...	...	1.5
Graham Bread . . . . .	1.2	6	76	8	50
Whole Wheat Bread . . . . .	1	5	71.7	7	60

## VEGETABLES

	Number of Cellulose grains in one ounce.	Calories in an ounce.	Grains of Cellulose in 100 Calories.	Ounces neces- sary to give 300 grains Cellulose.
Asparagus . . . . .	5.2	13.9	37.4	57.7
Beans . . . . .	4	30.96	12.9	75
Beets . . . . .	5.25	11.6	45	57
Brussels Sprouts . . . . .	7.85	6	131	40
Cabbage . . . . .	9.2	8.8	145	32.4
Carrot (raw) . . . . .	4.9	14	36	60

Cauliflower (steamed) . . . . .	4.55	10.2	44.6	66
Celery (raw) . . . . .	7	5.5	127	45
Cucumber (raw) . . . . .	3.9	5	78	75
Green Peas . . . . .	9.35	34.4	27	32.2
Kohlrabi (raw) . . . . .	7.75	9	86	39
Lettuce . . . . .	3.65	5.6	65	82
Onion . . . . .	3.55	10.52	33.7	85
Parsnips . . . . .	8.65	17.1	50	36
Peas (dried) . . . . .	28.5	103	27	10.8
Potato (baked) . . . . .	5.45	32.7	16.6	55
Pumpkin . . . . .	6.1	9.3	65.6	50
Spinach . . . . .	4.65	9.3	50	65
Tomatoes . . . . .	4.20	6.6	63.6	71
Turnip . . . . .	6.6	6.1	108	46

## FRUITS

	Per cent Cellulose.	Number of Cellulose grains in one ounce.	Calories in an ounce.	Grains of Cellulose in 100 calories.	Ounces neces- sary to give 300 grains of cellulose.
Prunes (cooked) . . . . .	2	10	27.5	36	30
Apples . . . . .	1	5	101	5	60
Pears . . . . .	3	15	18.5	81	20
Peaches . . . . .	1	5	12.8	40	60
Plums . . . . .	1.5	7.5	24.7	30	40
Cherries . . . . .	2	10	22.8	44	30
Raspberries, red . . . . .	7.4	37	18.3	200	81
Blackberries . . . . .	5	25	16.8	150	12
Huckleberries . . . . .	12.2	61	21.5	300	5
Strawberries . . . . .	2	10	11.4	87	30
Currants . . . . .	4.6	23	16.7	138	17
Grapes . . . . .	1.5	7.5	20.3	36	40
Raisins . . . . .	1.7	7.5	100.3	38.4	30
Raisins (stewed) . . . . .	1.7	7.4	100.6	..	40
Oranges . . . . .	2	10	14.9	67	30
Bananas . . . . .	.3	1.5	28.9	5.2	200
Figs . . . . .	4.5	22.5	92.4	24.3	13.3
Apricots . . . . .	2.5	12.5	16.3	74	24
Gooseberries (stewed) . . . . .	3.5	17.5	19.4	90	17
Cranberries . . . . .	5.0	25	48	51	12

### **Sterilized Wheat Bran**

One of the oldest and certainly the most valuable remedy in the treatment of constipation is ordinary wheat-bran. Bran consists almost entirely or very largely of cellulose in an indigestible form. While wheatmeal contains 2.5% of cellulose, bran contains 18%, and in some cases even more. In the form of bran, cellulose is well broken up, and hence can be passed through the intestine without difficulty. The apprehension which some authors have expressed concerning the irritating effects of bran are wholly without basis, except, of course, that one would not think of using bran in a case of gastric ulcer or acute inflammation of the stomach or intestines: As a matter of fact, when well softened with water, bran is no longer irritating, but is an emollient. The thin films of cellulose become as soft and pliable as wet paper, and excite the bowel, not by scratching or irritating it, but by a gentle titillation, so to speak, and by giving to the food sufficient mass to distend the intestine and stimulate it to vigorous activity.

In its ordinary commercial form, bran is scarcely fit for use, on account of the large amount of dirt which it contains, including multitudes of bacteria. For intestinal use as a laxative, it should be carefully prepared by thorough cleaning and washing of the wheat before grinding and sterilization of the bran. Sterilized bran, first introduced

by the writer several years ago, is now prepared by various manufacturers, and is put up in convenient packages. One or two rounded tablespoonfuls should be taken at each meal, the amount depending upon the character of other foods taken. The writer has never seen any ill effects from the use of sterilized bran which he has prescribed for many years, although there are cases in which it fails to produce the desired effect and has to be supplemented by the use of paraffin oil as a lubricant.

This is particularly true in cases in which the cecum is greatly dilated or crippled by adhesions and in cases in which there is obstruction of other parts of the colon, especially the pelvic colon as the result of adhesions.

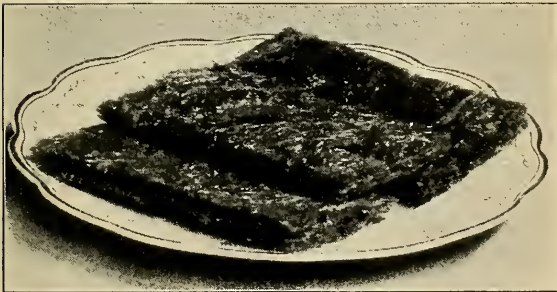
The combination of paraffin oil with bran or agar-agar in some form is also useful in cases of spastic contraction due to colitis.

Experience shows that from an ounce to two ounces of cellulose must be taken with the food daily, to insure sufficient bulk to stimulate the intestine to action. In cases in which the colon is very redundant or is crippled by adhesions, even double this amount may sometimes be needed, at least until the bowel has been trained to normal action. This amount of cellulose is provided by two rounded tablespoonfuls of sterilized bran in addition to other laxative foods.

The amount of food required to furnish an ounce of cellulose may be ascertained by reference to the foregoing tables.



Crude Agar-Agar



Agar-Agar in Sterilized and Edible Form





It should further be mentioned that in the use of cellulose in concentrated form as in sterilized bran, the whole amount used at a meal should not be taken at once, as at the beginning or end of the meal, but should be well mixed with the food by taking small portions at frequent intervals during the meal.

### **Agar-Agar**

The use of agar-agar, a Japanese sea-weed of a nature similar to Iceland moss, is to be most highly recommended as a means of giving the necessary bulk to stimulate the intestine to prompt action.

It may be used without any possible injury in all cases of sluggish bowel action. When properly prepared it is wholly free from unpleasant flavor, and it manifests such astonishing avidity for water that when it is present in the feces they cannot possibly become dry and hard.

In cases in which constipation is due to "greedy colon," agar-agar or bran is indispensable. In such cases the colon has acquired the power to eat up enormous quantities of the cellulose of the food, so that it is very difficult to increase the bulk of the feces by the use of green vegetables. This is the reason for the disappointment experienced by many who hope to find in the free use of lettuce and like green foods a panacea for their intestinal ills. Agar-agar is hemi-cellulose, and has been shown by

the experiments of Mendel and others to be indigestible by any of the digestive fluids with which it comes in contact in the human body. Agar-agar must be taken in sufficient quantity to accomplish the object sought. Two-thirds of an ounce to an ounce is the quantity usually required for adults. For young children a quarter to a half of this quantity is sufficient.

Agar-agar is easily taken in soup, cereal coffee, fruit juice or stewed fruit. It should be allowed to soften and should then be swallowed without chewing.

This remedy should be taken at meals in order that it may be well intermingled with the food, and so prevent the formation of hardened residues in the intestine.

Agar-agar may be used with advantage as a substitute for a meal, when food cannot be taken, and when there is no appetite for food, and when so used it maintains the intestinal rhythm which would otherwise be lost, resulting in constipation. It should in such cases be taken with fruit juice or fresh or stewed fruit. When one finds at night that the usual amount of food has not been taken, an extra dose of agar-agar with a little fruit may be taken before going to bed. No digestive work is required by either the fruit or the agar-agar except to move it along the digestive canal. It is important to take fruit or fruit juice with the agar-agar to excite the necessary peristalsis.

### Number and Size of Meals

In very many cases of chronic constipation the colon, especially the cecum, has become so dilated that it is seriously crippled. Its thin, atrophied walls are unable to handle large masses of material. In such cases, large bulky meals are likely to overweight the cecum and to form an impaction which may remain for days, giving rise to fermentation, distention of the colon with gas, colic pains, and great inconvenience. Complaint is often made that bulky foods cause much flatulence and distress and seem to increase the constipation. The remedy is not to be found in discarding "coarse vegetables" or other bulky foods but in taking smaller and more frequent meals. By this means the amount of material present in any portion of the bowel at any particular time will be reduced, the bowel will never be over distended, and will have an opportunity gradually to recover its normal tone.

The proper plan for the meals in such a case is to take two principal meals and two minor meals. The principal meals should contain the chief part of the nutriment; the minor meals should make small demands upon the digestive organs; the bulk should be about the same for each of the four meals. No fats should be taken at the minor meals and nothing requiring more than two hours for gastric digestion. It is best to confine the minor meals to fruit and cellulose.

The cellulose may be taken in the form of bran mush, bran cakes, colax, (Japanese sea weed or Ceylon moss), or laxa, (sterilized bran and agar-agar). Any sort of fresh juicy fruit may be eaten, but bananas, dates, dried figs and raisins should be avoided. Fresh figs or raw soaked purple figs are excellent. Soaked raw prunes are also very good indeed.

The arrangement of the four meals as regards time may be the following: first, breakfast on rising, say 6:30 a. m., fruit and bran; second breakfast, 9:00 a. m.; dinner 3:00 p. m.; fruit lunch at bedtime. If these hours are not convenient, some other arrangement may be made, care being taken to avoid taking meals too near together.

### The Use of Bran

Wheat bran is perhaps the most useful of all food remedies for constipation. Bran may be taken by itself or it may be used in many combinations. Care must be taken to obtain clean bran, which is not always easy, for the reason that the bran is usually mixed with much dirt and offal removed from the grain. To be fit for use, the bran should be taken from wheat which has been specially cleansed and washed. The bran should be cooked and sterilized to destroy any adhering germs.

Such bran only needs softening and is ready for

immediate use. It may be eaten as a breakfast cereal or it may be mixed with any other suitable food such as oatmeal, toasted flakes, or even mashed potatoes or boiled rice.

Sterilized bran may be added to bread, biscuit, cake and breakfast cakes in proportion of one-fourth or even more. It should be used freely at every meal. Numerous excellent recipes are now available for using bran in various palatable and efficient ways.

### Recipes for the Use of Bran

#### BRAN AND OATS

- 1 cup rolled oats
- 1 cup sterilized bran
- 2½ cups water
- 1 teaspoon salt

Heat the water to boiling. Add the salt, bran and the rolled oats. Let boil five minutes. This dish is a good corrective measure and at the same time an excellent breakfast food.

#### STERILIZED BRAN

Look over and remove foreign substances from bran and place in a rather shallow pan in a moderate oven. Place a pan of hot water in the oven to prevent burning. Bake a half hour, stirring the bran often to prevent scorching. Grind in a coffee mill.

## BRAN AND GRANOLA MUSH

- 1 cup sterilized bran
- 1 cup granola
- 3 cups water
- 1½ teaspoons salt

Mix the bran, granola and salt. Stir into the boiling water and cook for a few minutes directly over the flame.

## GRAHAM BREAD

- 3 cups milk and water (equal parts)
- 2 tablespoons malt honey or molasses
- 1½ cups sterilized bran
- About 2 quarts whole wheat flour
- 2 teaspoons salt
- ½ yeast cake
- ¼ cup warm water

Soak the yeast in the warm water. Scald the milk and cool to lukewarm. Potato water may be used instead of the milk and water. Add water, the molasses and salt, then the softened yeast. Mix the flour and bran together and stir into the liquids. Knead thoroughly, and put to rise in a warm place. When light, mold into a loaf. Let rise again, and when light bake in a hot oven about one hour. Decrease the heat somewhat during the latter part of the baking. This makes 3 small or 2 large loafs. Graham flour may be used instead of the whole wheat, in which case less bran will be needed.

## BRAN GRAHAM BISCUIT

- 1 cup sterilized bran
- 2 cups graham flour
- 1 cup milk
- 1 egg
- 2 teaspoons sugar
- 1 teaspoon salt
- 2 tablespoons butter
- 1 teaspoon soda

80 minims hydrochloric acid (C. P.) (This amount of soda and hydrochloric acid is equivalent to 4 teaspoons baking powder.)

Mix the flour, bran, sugar, and salt together. Beat the egg slightly and add to the milk. Dissolve the soda in the milk, and add the melted butter. Lastly, add the hydrochloric acid. Turn very quickly into the dry ingredients. Mix lightly but quickly. Turn upon a molding board and shape with a biscuit cutter and bake fifteen to twenty minutes in a hot oven.

If baking powder is used, omit the hydrochloric acid and the soda, and proceed as follows: Mix the dry ingredients together, beat the egg slightly, and add to the milk. Stir the liquids into the dry ingredients the same as for cream biscuits. Turn out upon a slightly floured molding board and roll to one-half inch in thickness. Cut into shape with the biscuit cutter and bake in a hot oven.

## BRAN GEMS

- 1 cup sterilized bran
- 1 cup graham flour
- $\frac{7}{8}$  cup milk
- 3 tablespoons melted butter ,
- 1 teaspoon salt
- 1 egg
- 1 tablespoon sugar
- $\frac{3}{4}$  teaspoons soda

60 minims hydrochloric acid (C. P.) (This amount of soda and hydrochloric acid is equivalent to 3 teaspoons of baking powder.)

Mix the bran, flour, salt and sugar together. Beat the egg, add the milk and one-half of the dry ingredients. Stir in the hydrochloric acid. Mix well and add the melted butter. Sift the soda with the remaining half of the dry ingredients and stir into the batter. Turn into buttered muffin pans and bake in a hot oven twenty to thirty minutes.

## BROSE

Mix equal parts of cornmeal, steel-cut oats, and sterilized bran. Stir into three times its bulk of boiling water. As soon as the mixture thickens, it is ready to eat. Should not cook over four or five minutes. This simple mixture will be found a most efficient and satisfactory laxative breakfast food. Eat with cream, butter, fresh or stewed fruit.



## Baths and Other Home Treatments for Constipation

Water may render great service in constipation, through the general improvement in health which may be secured by its systematic use. Cold water is of the greatest service. The short spinal douche is one of the most effective means which can be employed for improving the tone of the nervous system.

The inactive skin, due to the general saturation of the body with toxins, is an indication for sweating baths. In constipation these should be made short, however, barely long enough to stimulate the skin to vigorous perspiration, and should be immediately followed by a short general cold application, including a cold douche to the spine, abdomen and legs. Short, cold applications applied to the surface cause reflex contraction of the internal involuntary muscles. It is for this reason that placing the feet, sometimes even the hands, in cold water will often produce a desire to empty the bladder, through stimulation of the urinary centre.

The defecating centre and intestinal muscles may be stimulated in the same way. Various local applications are of great service in improving the tone of the bowels, though local cold applications must be used with great discretion and with careful

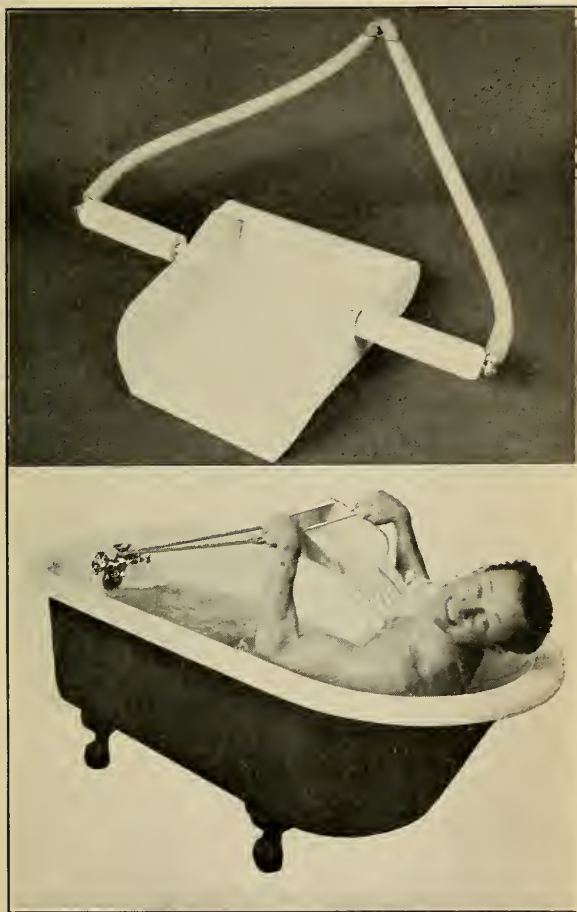
knowledge of the exact nature of the case; for the tendency of cold to produce contraction of the involuntary muscles leads to an aggravation of the condition in colitis with spastic constipation.

Of the many different modes of applying cold water, which may be of service, the following are especially recommended:

### **The Exercise Bath**

Swimming is undoubtedly the best form of bath, as well as the best form of exercise for general hygiene effects. Unfortunately, facilities for this natural exercise bath are not available for the majority of persons, especially during the winter season. Some time ago, it occurred to the writer that most of the advantages of the swimming bath might be secured by combining exercise with the cold bath in an ordinary bath tub. The following is a description of the rowing or surf bath as it is in use at the Battle Creek Sanitarium:

The patient sits in a bath tub partly filled with water, and dips water over himself while at the same time executing the movements of rowing. The temperature of the water may be 100° F. at the start, but should be rapidly lowered by opening the cold water faucet and, if necessary, letting out part of the water while the cold water is running in. The rowing and dipping apparatus consists of a pair of handles to which is attached a dipper and



The Bath Exerciser, or Surf Bath





The Pouring Douche



a rubber cord. The bather fills the bowl as he reaches forward, then dashes the water over his body as he pulls the bowl towards his chest and bends his body back. Strokes are made at the rate of about thirty per minute. From one hundred to one hundred and fifty strokes are made. The temperature of the water grows continually colder to the close of the bath or until pipe temperature is reached. A temperature of 70° F. to 65° F. is easily borne, and one finishes the bath with the same delightful sensation of warmth and glow which one feels after a swim in the surf. The temperature of the water is, of course, under perfect control, an advantage over sea bathing; and the work done may be made as vigorous as one desires.

This exercise bath is most excellent for persons suffering from constipation. The impact of the cold water upon the surface of the abdomen reflexly stimulates intestinal activity.

The exercise bath is especially valuable in cases of obesity. Both the exercise and the cold water help to burn up the excessive accumulation of fat in the abdominal wall and within the abdomen.

### **The Cold Douche**

A short cold douche to the lower part of the back, buttocks, abdomen and feet. The temperature should be 70° to 50° F., and the duration ten to thirty seconds. With patients who are not ac-

customed to applications of cold water, the temperature of the douches should at first not be lower than  $70^{\circ}$ . This should be gradually lowered at each application until the temperature of  $60^{\circ}$  to  $50^{\circ}$  is reached. In general, the douche should be preceded by a short hot bath to prepare the patient for the cold application, and to secure prompt reaction, which is still further encouraged by exercise after the bath.

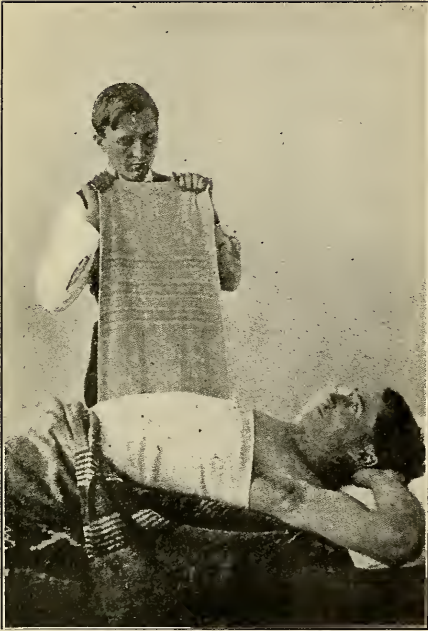
### **The Simultaneous Hot and Cold Douche**

A very excellent form of bath especially adapted to cases of constipation, is the simultaneous warm shower bath ( $100^{\circ}$  F.), with short cold douche to the abdomen. The warm shower bath should be applied for half-a-minute so that the skin will be thoroughly warm first, and the cold spray or broken jet should be applied to the abdomen without interrupting the warm shower. The temperature of the spray should be  $70^{\circ}$  to  $50^{\circ}$ . The duration of the cold application should be not more than a minute. At the end of the bath a short general cold application lasting no more than ten to fifteen seconds should be made to secure reaction, and thus fix the blood in the skin.

### **Abdominal Pouring Douche**

When a douche apparatus is not available, a very efficient abdominal douche may be applied in





Applying a Wet Girdle



an ordinary bath tub. A hot bath at the temperature of  $102^{\circ}$  to  $103^{\circ}$  should be applied for one to three minutes. Then the outlet should be opened and cold water should be poured on the abdomen while the water is running out. By lifting the dipper to the height of five or six feet a sufficient degree of force may be obtained to produce a decided reflex effect. The temperature of the water may vary from  $60^{\circ}$  to ice cold, the temperature being gradually lowered as the patient becomes accustomed to the cold application.

### **Hot Sitz and Cold Pour**

The patient sits in water at a temperature of  $102^{\circ}$  or  $103^{\circ}$  for two or three minutes, then leans back in the tub while the attendant pours cold water  $70^{\circ}$  to  $50^{\circ}$  over the abdomen for half a minute.

### **Rubbing Cold Sitz Bath**

In this bath the patient sits in water at a temperature of  $75^{\circ}$  to  $55^{\circ}$  for two minutes, rubbing himself vigorously meanwhile. This bath produces a powerful reflex influence upon the intestines, especially in the colon, and is frequently followed soon after by a desire to defecate. The patient should rub himself continually during the bath, and the feet may be kept in hot water if there is a tendency to chilliness. The shoulders should be covered by a woolen blanket.

### **The Sedative Sitz Bath**

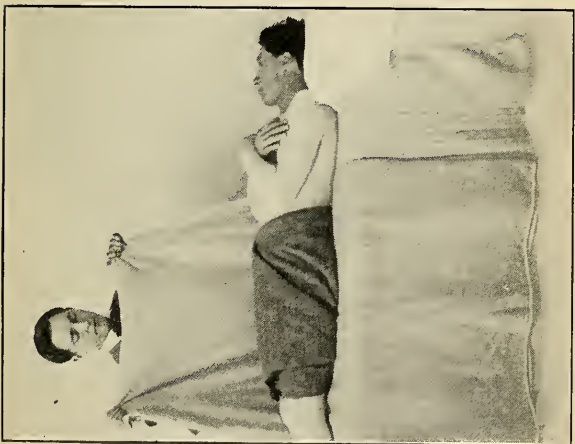
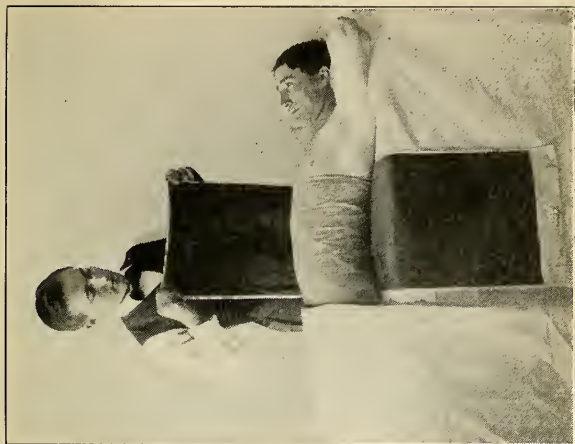
A bath at the temperature of from 60° to 70° for fifteen to twenty minutes produces powerful and prolonged contraction of internal muscular structures. This bath is useful in diarrhoea, and is one of the most efficient means of improving the tone of the abdominal muscles and of an atonic colon. This bath should not be given in cases of spastic constipation. In general, prolonged cold baths of any sort, (that is, baths longer than two or three minutes), are aggravating in this condition.

### **Alternate Applications to the Abdomen**

A hot fomentation to the abdomen for five to ten minutes, followed by a cold application for one minute, is an excellent means of stimulating peristalsis and improving the muscular tone. The cold application may consist of a compress of ice water, but the most effective method is to rub the abdomen with a smooth piece of ice. The effect of this application is increased by repeating the alternation two or three times in succession.

### **The Wet Girdle**

This is a simple method which has been used for centuries by the peasantry of Europe. The abdominal girdle consists of a coarse towel of three yards in length, half of which is wet, the other half remaining dry. Beginning with the wet end, the



Fomentation to Abdomen



towel is wound round the trunk of the body, great care being taken to see that it fits the skin snugly. Outside the towel a flannel bandage is applied. The towel should be changed before it becomes dry. It should be worn night and day to secure the most pronounced effect. The mackintosh or oiled muslin, often applied with the moist bandage, should be omitted when it is the purpose to relieve constipation.

### **Fomentation to the Abdomen**

The abdominal fomentation is a capital means for use in spastic constipation, the result of colitis, and when the ileocecal valve is in a state of spasmodic contraction due to chronic appendicitis or ovarian disease. In general the fomentation is highly useful in all cases of constipation accompanied by pain in the abdomen, no matter what the cause.

The electric fomentation heater is a convenient means of heating a fomentation compress.

The best time for applying the fomentation is soon after breakfast, or shortly before the regular time for moving the bowels. Applications may be made with great advantage two or three times daily, or at least morning and night, so as to relax the colon several times during the day.

In very pronounced cases of colitis, with spastic constipation, a short very hot bath is of great service. The duration of the bath should not be more

than two to four minutes. It produces debility and anemia if long continued and often repeated. The effect of hot applications is to lessen the irritability of the nerve centers, and thus to relieve the intestinal spasm which may be due to congestion or inflammation of the appendix, ovaries, bladder, rectum or gall-bladder, or still more often, to colitis.

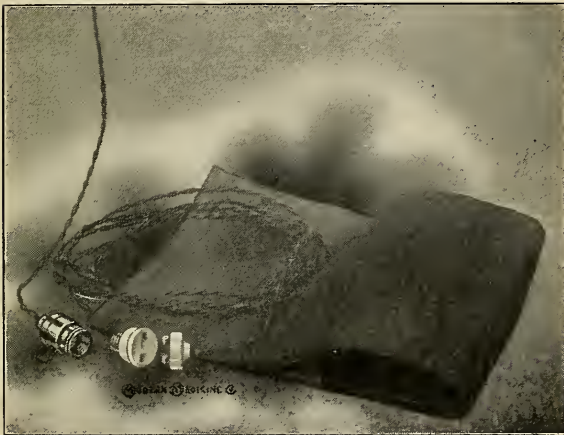
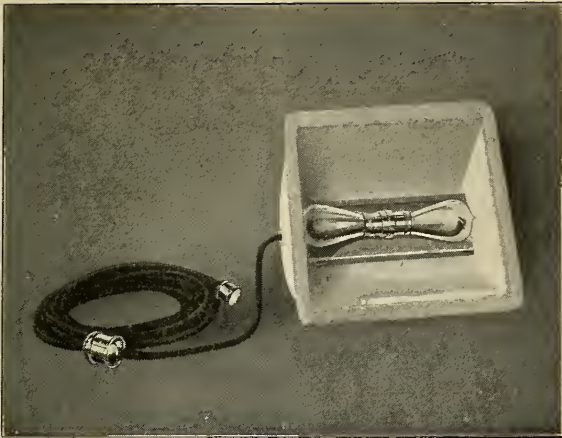
### **Combined Hot Bath and Hot Douche**

Perhaps the most effective measure for the relief of intestinal spasms, such as sometimes occurs in muco-membranous colitis, is a warm bath ( $100^{\circ}$  F.) combined with a very hot spray to the abdomen. The water should be allowed to fall on the abdomen in very fine streams with very little force, at a temperature of  $115^{\circ}$  to  $120^{\circ}$ . The duration of the application should be two to five minutes. It should be followed by a cold application at a temperature about  $80^{\circ}$  for one or two minutes.

### **The Hot Sitz**

The hot sitz bath at a temperature of  $112^{\circ}$  to  $118^{\circ}$ , duration two to three minutes, cannot be too highly praised as a measure of the highest value for use in the treatment of reflex and spastic constipation, with or without colitis. After the sitz no cold application is made. The best time for the bath is on rising in the morning.





Photophore (above) and Thermophore (below)



### **The Photophore, and the Electric Thermophore**

These are measures of great value in the treatment of spastic and reflex constipation, and are especially useful in cases in which pain is a pronounced symptom and a cause of reflex spasm. The applications should be made morning and night in place of the fomentation, and are much more effective.

### **The Enema**

There are unquestionably certain cases in which the colon has become so crippled by inflammations, stretchings, distortions, adhesions and the degeneration of its muscular structures, and consequent weakening of its contractile powers, that it can no longer be made to perform its functions, even by the use of such accessories as act as mechanical or physiological aids. In such cases and in certain emergency cases, the judicious use of the enema is not only helpful, but sometimes necessary. For example, in cases of senile constipation, where as the result of long continued colitis, the muscular walls are thin and greatly stretched, while the colon itself has become abnormally redundant and folded upon itself, the daily or frequent use of the enema may be required.

The best means of administering the enema is the fountain syringe. The tube should be long

enough so that the reservoir, if necessary, may be raised to a height of five or six feet above the patient. When it is desired to stimulate the bowel to immediate contraction, the reservoir should be placed high, but when the purpose is to introduce as large quantity of water as possible into the colon, and to have it retained for a time, the reservoir should be placed at a height not exceeding two or three feet.

The position of the patient during the administration of an enema is not a matter of very great importance. In cases in which the pelvic colon is low down in the pelvis, as is shown by examination, it is well to put the patient in a knee-chest position. The water should be introduced very slowly. Ordinarily, however, the patient may lie upon the back or either side, or the enema may even be administered standing. The water quickly finds its way along the colon, no matter what the position of the patient may be.

The use of the colon tube is quite unnecessary. Indeed, as the writer learned long ago by experience, and as has been abundantly proved by examination with the X-ray, the colon tube can rarely ever be introduced beyond the rectum. It is arrested at the pelvi-rectal fold, and simply returns and coils itself up in the rectum. A tube long enough to pass the water through the anus is as useful as the longest colon tube, unless the long tube is passed into the pelvic colon past the ileosplenic flexure, a procedure

which is rarely required, and, of course, should only be undertaken by a physician.

The enema may be employed in a variety of ways adapted to different occasions and purposes, and it may be repeated as many times as may be necessary. Warm water dissolves hardened fecal matters much more readily than cold water, yet in some cases it may be necessary to repeat the enema, at intervals of fifteen to twenty minutes, five or six times before the effect desired is obtained. When used for the purpose of softening hardened fecal matters, the water should be introduced slowly, and the patient should be instructed to retain as much as possible. The enema should be repeated as long as the water contains fecal matters when returned.

### **The Hot Water Enema**

The temperature of the water should be 105° to 115° F. The quantity may be from one to three pints. This is preferable in cases of colitis and when abdominal pain or tenderness is present.

### **The Hot Soap Enema**

The addition of soap to the water somewhat increases its power to dissolve hardened feces, although the advantage of its use is not so great as might be supposed. The amount of soap should be sufficient only to make very weak suds, as other-

wise, it may be irritating, especially if the soap contains a considerable amount of free alkali. Ordinary soap is best for the purpose.

### **The Hot Saline Enema**

Half an ounce of salt is added to two quarts of water at a temperature of  $105^{\circ}$  to  $115^{\circ}$  F.

The purpose of the addition of salt is to lessen the irritation of the mucous membrane. It is of special use in cases of colitis, in which the enema is administered for the purpose of removing mucous and relieving spasms of the intestine. The application should be repeated until no mucous returns with the water. Care must be taken to secure evacuation of the water so as to avoid retention of a large amount of salt, which may do serious injury.

### **The Cold Water Enema**

A cold application to the interior of the bowel is one of the most powerful means of stimulation which can be safely employed. Half a pint of water at a temperature of  $50^{\circ}$  will usually set up a very strong and painful contraction of the lower bowel. It is on this account necessary to begin with a moderate temperature. The first enema should have a temperature of  $80^{\circ}$  to  $85^{\circ}$  F. The temperature may be lowered on each application five to ten degrees, or until sufficient powerful contractions are

produced to expel quickly the water introduced. By gradually reducing the temperature in this way, one as low as 40° may finally be used without causing excessive pain. Such low temperatures are very seldom required except in dysentery, in which they often render great service.

The cold enema is of special use in cases in which the colon has become gradually dilated and has become atonic, and contracts with insufficient force to expel its contents. In such cases a warm or hot enema is usually retained. By following the warm enema with half a pint or a pint of water at 60° to 70° F., prompt contraction of the bowel almost invariably follows, with expulsion of the bowel contents. This is a very important practical use of the cold enema, as the retention of the water in cases in which the bowel is filled with putrefying fecal matters is very often followed by very unpleasant and even serious effects, through the absorption of enormous quantities of toxic substances, which are dissolved by the water and brought into contact with the absorbing surface of the bowel. In such cases the hot enema should be immediately followed by a small cold enema, and the cold enema should be repeated several times, if necessary.

### The Oil Enema

The amount of oil required is four to sixteen ounces. Either pure olive oil or any sweet oil may

be employed. The latter is just as good as the former, and is less likely to produce nausea and vomiting, which sometimes follows the use of olive oil of an inferior grade. The temperature of the oil should be  $104^{\circ}$ . As a means of softening hardened feces, oil is no better than water; in fact, according to the writer's experience, it is less efficient. It is useful, however, as a means of lubricating the lower bowel, and when introduced at night prevents hardening and drying of the feces. For this purpose 4 to 6 ounces should be introduced at night. When used for the purpose of lubrication only, a good plan is to administer the oil before breakfast. This is an excellent means of securing a thorough evacuation of the colon.

### **Sugar and Water Enema**

Sugar is a powerful stimulant of the colon. A very old-fashioned remedy is the introduction of molasses into the colon. To half a pint or pint of molasses an equal quantity of hot water is added. A prompt action of the colon usually follows the introduction of this mixture. The writer has for years used malt sugar for this purpose, and with most satisfactory results. The malt sugar not only acts as a stimulant to the bowel, but at the same time furnishes valuable nourishment. Four ounces of malt sugar should be added to a pint of water.



### **Paraffin Oil Enema**

Liquid paraffin, or paraffin oil, may be used as an enema in place of olive oil and other oils, and has the advantage that it does not produce nausea or other unpleasant symptoms. Paraffin oil is better than any animal or vegetable oil, for the reason that it is not a fat, and is not absorbed, neither will it undergo fermentation. The oil enema often causes nausea, loss of appetite, and coating of the tongue. This may be avoided by the use of paraffin oil. Only the specially purified refined white Russian oil should be used.

### **The Alum Enema**

In cases in which the bowels cannot be made to move promptly by other means, alum has been found to be effective. A teaspoonful of powdered alum is used in a quart of water. By using cool water 70° to 80° the effect may be increased.

### **The Glycerine Enema**

Pure glycerine introduced into the rectum in a quantity of one to four ounces is a useful means of stimulating bowel movements, by bringing about the defecating reflex. When pure glycerine is found to lead to too much irritation, as is sometimes the case, it should be used with an equal quantity of water.

### The Cold Rectal Douche

By introducing cold water into the rectum with considerable force, a most powerful stimulation may be produced. The temperature of the water should be 70° to 80° F. If the stream furnished by the ordinary fountain douche has not sufficient force for this, a bulb syringe is necessary.

In administering the rectal douche a return tube should always be used, so that the rectum will not be over-distended. A small tube should be connected with the syringe, and a large one should be introduced alongside it, to counteract over-distension of the rectum. When the powerful stimulation of the rectal douche is required, it is not desired to secure the stimulation which results from distention of the rectum, for in these cases the rectum is always relaxed, and has to a certain degree lost its contractile power. It is desired only to obtain the stimulating effects produced by a low temperature and the impact of a stream of water introduced with considerable force, the effect of such an application is to produce almost immediately a very strong defecating reflex, with contraction of the pelvic colon and forcible expulsive efforts.

It is well that the enema tube should be introduced its full length and should be directed somewhat backward, so that the stream of water may be received upon the upper part of the rectum and, if possible, reach the pelvi-rectal fold.

In cases in which the sensibility of the rectum is largely lost, this measure affords a very excellent means of restoring normal sensibility. In extreme cases the alternating rectal douche may be employed, using first water at a temperature of  $115^{\circ}$ , then water at a temperature of  $60^{\circ}$  to  $70^{\circ}$ . In some extreme cases the temperature of the water is as low as  $40^{\circ}$  or  $50^{\circ}$ . The application should be made every ten seconds.

### **Injury from Drug Laxatives**

While the temporary use of medicinal laxatives is sometimes necessary, and always justifiable when required as an emergency means, there can be no doubt that the continued use of drugs of any sort is highly injurious to the intestines, and in many cases to other organs with which the drug comes in contact, particularly the liver and kidneys, which are burdened with the elimination of a certain part of the drugs employed.

All laxative drugs are irritant poisons. They affect the stomach as well as the colon and small intestine. Their long continued use in time gives rise to gastric and intestinal catarrh, colitis and the varied evils which accompany these disorders, especially hemorrhoids, appendicitis, intestinal toxemia and certain aggravation of the constipation which they are given to relieve.

Most drugs which act upon the bowels produce

their effect only after having been absorbed and circulated through the blood. This has been proved to be true even in the case of saline laxatives, which are absorbed in the upper part of the intestine, and acting through the nerve centers controlling the colon, produce a laxative effect long before the drug has reached the colon through the intestine.

The effects of many other laxative drugs may be produced by injection under the skin.

It is thus evident that the action of laxative drugs is not confined to the intestine, but through absorption into the blood stream these irritating substances are brought into contact with all the tissues.

Among the most largely used laxative drugs are aloes, senna, rhubarb and cascara. All of these drugs contain substances which are irritant poisons derived from anthracene.

According to Levin, when a preparation of aloes is "employed for a length of time, there occurs, in consequence of the persistent congestion of the descending colon and rectum, dilation of the hemorrhoidal veins." Fallopius said that "out of a hundred persons who make habitual use of aloes, ninety are attacked by hemorrhoids."

Sollman says that: "When injected hypodermically, aloin causes a tubular nephritis, acute Bright's disease." The extensive use of this irritating drug in various popular laxative drugs and much advertised nostrums may well be one of the

active causes of the alarming increase in disease of the kidneys, which has occurred within the last thirty years.

Rhubarb, according to Sollman, contains a poison that produces a secondary constipation.

Saline laxatives throw an enormous burden upon the kidneys, and when often repeated give rise to a very obstinate colitis.

They also impair digestion, in time, setting up gastric and duodenal catarrh and producing achylia, a condition in which the stomach glands produce no hydrochloric acid, thus leaving both the stomach and the intestine a prey to the various sorts of pernicious bacteria which are constantly finding their way into the stomach through the mouth, especially through the medium of flesh foods, milk, and cheese.

The effects of laxative mineral waters are essentially the same as those of saline laxatives, which they are.

Saline laxatives are particularly injurious to bed-ridden patients, because of the slow emptying of the stomach usual in such cases, in consequence of which the stomach is more than ordinarily damaged.

Calomel, a drug which since the time of Paracelsus has been extensively used as a laxative, and in conditions resulting from constipation, one of the most common of which is popularly known as "biliousness," is often a potent remedy, affording prompt relief, but when its use is often repeated, it

becomes a highly dangerous and injurious agent. All metallic drugs are combated by the liver, which absorbs as much as possible of the poison into its own tissues as a means of protecting the rest of the body. Thus the liver is particularly subject to injury. Bennett, of Edinburgh, showed more than a hundred years ago that calomel does not increase the action of the liver, and his observations have been in recent years confirmed by Rutherford and others.

Every chronic sufferer from constipation should know that there is no laxative drug known, the constant use of which is harmless. All laxative drugs are irritants. The more certain their action as laxatives, the more certainly will their continuous use for any length of time be followed by serious injury. Said an eminent German physician, "Nothing is so bad as the chronic use of laxative drugs."

### White Russian Paraffin Oil

Dr. Neville Wood some years ago, suggested the use of pure liquid paraffin, a product of petroleum. Schmidt, Lane and others have made much use of this preparation and have noted excellent results. The writer has made use of this remedy in hundreds of cases with great success.

Petroleum oil, as found in its native state, has been long used by primitive people and pioneers as a remedy for constipation. Arbuthnot Lane

informed the writer that he had learned from authentic sources that petroleum has been used for centuries by the Kaffirs, and it is well known that it was employed as a domestic remedy in America long before it was used for illuminating purposes. The oil was found floating upon the waters of certain streams, and was collected and sold by itinerant peddlers, and occasionally in drug stores.

Paraffin is not acted upon by any of the digestive juices, and is not absorbed. It prevents the drying of the feces, lubricates the colon and rectum, and also to some extent prevents the absorption of toxins from the intestine. It may possibly to some degree encourage fermentation by preventing the absorption of digesting food stuffs, and in the same way may tend to encourage putrefaction. The writer, on this account, has found it of use to combine it with agar-agar, so as to facilitate intestinal action by increasing the bulk of the feces. By the addition of some syrup, carbohydrates and concentrated fruit juice, honey, or malt syrup, the tendency to putrefaction in the colon may be antagonized, and thereby any possible evil results avoided.

Paraffin oil will not remedy every defect in the defecating process and hence will not cure every case of constipation, but it comes nearer being a panacea than any remedy which has heretofore been found, and does meet a surprisingly large number of indications. After a careful study of its effects in several thousand cases, the writer feels

justified in saying with much confidence that paraffin oil may be relied upon to accomplish the following results in the treatment of chronic constipation:

1. It lubricates the alimentary canal throughout its whole length. In a large number of cases of constipation there is an excessive absorption of water from the colon, leaving the feces dry or pasty and adhesive. An examination of the rectum and pelvic colon in such cases shows the mucous membrane to be deficiently lubricated by mucus, and covered with flakes of adhering feces. The use of half an ounce or an ounce of paraffin oil at bedtime, and half as much an hour before each meal, will in two or three days change the condition completely, as shown by proctoscopic examination.

2. This mechanical lubricating action of paraffin is highly important in overcoming kinks due to redundancy or to adhesions resulting from colitis or other causes. When the mucous surface is kept well lubricated, the fecal matter slips along and easily overcomes mechanical obstacles, which otherwise become formidable sources of obstruction.

3. The human alimentary canal, like that of other primates, as illustrated in the diet of the higher apes, is adapted to a moderately coarse bill of fare. The concentrated diet of our modern civilized life contains so little indigestible material that the residue forms a pasty mass which tends to adhere to the intestinal wall, especially when any obstruction is presented by kinks, folds, adhesive



bands, or a spastic state of the bowel due to colitis. When delay occurs, the further absorption of water converts these pasty residues into hard masses, scybala, which sometimes have almost the density of wood. Fats of all sorts are more or less laxative if taken in sufficient amount, through their effect in modifying the character of the food residues. They render the mass less adhesive and to some extent prevent dryness; but both animal and vegetable fats are digestible and absorbable, and hence are not to any considerable degree effective in changing the character of the stools unless eaten in amounts larger than can be used, so that a considerable portion remains behind in the colon. Such large quantities of fat encourage putrefaction, lessen appetite, diminish the secretion of hydrochloric acid, interfere with the motility of the stomach and the small intestine, and may produce great disturbance of the body metabolism. Paraffin oil is free from these objections, since it is wholly non-absorbable, and a comparatively small amount serves the purpose required, because it all remains in the intestine.

4. Paraffin is useful in all forms of intestinal stasis or stagnation, no matter what the cause, by preventing the abnormal drying out of the food residue which is the necessary result of too long retention in contact with absorbing surfaces.

5. Another remarkably interesting and useful property of paraffin oil is found in the fact that it

stimulates activity of the small intestine. Observations, in a large number of cases, made by Dr. J. T. Case, Roentgenologist at the Battle Creek Sanitarium, have shown that paraffin oil greatly accelerates the passage of material through the small as well as the large intestine. This action is exceedingly important in those forms of intestinal toxemia which depend upon iliac stasis, by far the most serious of all forms of stasis. Stagnation in the small intestine is of far greater importance than stasis in the colon, for the reason that both putrefaction and absorption are much more active in this part of the digestive tube than in the large intestine. Even in cases in which iliac stasis is due to the so-called Lane's kink, as shown by X-ray examination, great relief may usually be obtained by the regular use of paraffin. This has been demonstrated in many cases. It is only in the most extreme cases, when adhesions are so extensive that the lumen of the intestine is very greatly reduced, that surgical measures become necessary.

6. One of the most interesting features of the many-sided useful activities of paraffin, is its behavior toward intestinal toxins. These toxins consist, not only of bile acids and alkaline wastes of various sorts excreted by the intestinal mucous membrane, but in addition, of a great variety of ptomaines and toxins produced through bacterial action, especially in the colon, and also in the small intestine in cases of incompetency of the ileocecal

valve. Paraffin is a highly active solvent, and readily dissolves these waste and poisonous substances, many of which are more soluble in paraffin oil than in water. The result is that the paraffin oil, itself not absorbable, takes up a very considerable portion of toxins found present in the intestinal tract, and thus prevents their absorption. When paraffin is used, it may always be seen in the stools, showing a brownish or blackish color, due to the substances which it holds in solution. In a laboratory test made by a competent chemist by request of the writer, it was found that when paraffin oil was shaken with a watery solution of indol, more than half the indol was quickly taken up by the paraffin. The use of paraffin thus affords an effective means of hindering the absorption of intestinal toxins, and conveying them out of the body.

7. Paraffin oil serves a useful purpose in protecting the mucous membrane when it is in an irritated state, as in cases of chronic colitis. The value of petrolatum and other neutral petroleum products as a dressing for wounds is well known. Paraffin acts in an equally favorable way upon irritated mucous surfaces. It has long been used for this purpose in the treatment of diseases of the nose and throat.

8. Paraffin serves another useful protective purpose in hindering the absorption of poisons by mucous surfaces which have been deprived of their epithelium. The normal epithelial covering of the

intestines has remarkable filtering powers, by which toxins, especially colloid poisons, are excluded.

This filtering power is lost when the surface is denuded. A protective layer of oil renders great service in such cases, by hindering the absorption of these poisonous matters, which occurs with great readiness through abraded surfaces.

9. In cases of colitis, paraffin oil protects the irritated surfaces, but also through its lubricating effect and through softening the intestinal contents, aids greatly in overcoming the spastic condition of the intestine, which in many cases of chronic constipation is so formidable an obstacle to recovery. Laxatives of all sorts increase the spasticity of the intestine, and so aggravate the constipation which they are given to relieve. This is one reason why many are more constipated after taking a laxative than before. Temporary relief is obtained by the production of watery stools which are able to pass through the contracted bowel, but as soon as the first effects of the laxative pass off, constipation becomes worse than before, since the spasm is greater. Paraffin lubricates and protects the sensitive surface of the spastic bowel, and at the same time softens the intestinal contents so as to permit passage through the bowel without mechanical irritation. Cases of colitis are greatly benefited by the regular use of paraffin.

10. X-ray observations of Case, confirmed in many cases at the operating table by the writer,

have shown that incompetency of the ileocecal valve is a most common and effective cause of iliac stasis. Experience in treating several hundreds of cases have shown that, aside from the regulation of diet, and the use of bran and agar-agar, the regular use of paraffin oil is the most effective means of combating this condition. Medicinal laxatives increase the antiperistalsis by which the reflux from the colon into the small intestine is increased. Case has shown by X-ray examination that paraffin increases the motility of the small intestine, *while it does not increase antiperistalsis*. It is thus a rational and efficient remedy of great value in dealing with this very large and important class of cases.

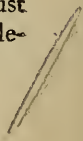
11. In all cases in which the stagnation of the small intestine is due to spasm of the ileocecal valve, induced by chronic appendicitis, ovarian irritation or inflammation, colitis, or possibly painful rectal disease through reflex irritation, paraffin proves itself to be an invaluable remedy, since it has the property of increasing the peristaltic activity of the small intestine to such a degree as to enable it to overcome the spasm of the ileocecal valve without producing irritation, which would inevitably increase the spasm of the sphincter, as do drug laxatives. The neutral character of paraffin, which enables it to stimulate and facilitate intestinal motility without producing irritation, is invaluable.

12. The regular use of paraffin oil very generally

relieves hemorrhoids and fissure, even when of some years' standing. These morbid conditions are usually the result of constipation, and are maintained and aggravated by straining at stool. By the habitual use of paraffin, the stools are made soft, straining is avoided, the intestinal contents are rendered less irritating and infectious, and thus the diseased tissues are readily healed.

Since adopting the use of paraffin, the author has found that the number of cases in which operation for hemorrhoids is needed is greatly reduced. Patients who have contemplated submitting to operation for removal of hemorrhoids of many years' standing, in a short time after beginning the use of paraffin, often find themselves so completely relieved that an operation is no longer necessary.

13. Paraffin is capable of rendering invaluable service in cases of intestinal intoxication, by increasing the number of daily stools. The length of time which foodstuffs remain in the intestine is reduced from several days to a few hours. This greatly lessens the opportunity for development of putrefactive processes and the absorption of putrefaction products. It may be justly said that no other remedy is capable of rendering such important and efficient service in combating constipation as this simple and harmless agent; but it must be continuously, a proper dose (one or two tablespoonfuls) at each meal.



### Objectionable Features of Paraffin

The few unpleasant effects attending the use of paraffin are really so slight in character that they are generally easily overcome. Sometimes, however, they constitute a real obstacle to the use of this most valuable remedy. The chief objections which are met are the following:

1. An unpleasant oily taste which to some people is so disagreeable as to produce nausea and loss of appetite.

2. A disposition to separate from the other intestinal contents. It usually appears as a brown oily liquid separated from the rest of the stool and sometimes the separation is so marked that the stools are very ragged, or consist of hard lumps smeared with brown oil.

3. Paraffin oil is so limpid that it readily finds its way to the rectum ahead of the other bowel contents, and very easily escapes, either with or without the expulsion of flatus. The patient is often unconscious of the escape until it is noted that the clothing is badly soiled.

The difficulty of taking paraffin the writer succeeded in overcoming almost entirely by preparing a very heavy emulsion through the assistance of gum acacia. This emulsion is easily taken in hot or cold weather, but is open to the objections raised under two and three.

### Paraffin Tablets

All objections are removed by the use of paraffin in solid form. Paraffin tablets which are solid at ordinary temperatures, but melt at the temperature of the inside of the body, are easily taken with the food. Paraffin in this form mixes with the feces thoroughly and does not separate. A single tablet (one-half ounce) is sufficient for a dose. One tablet is taken with each meal. Two or more tablets may be taken without injury.

### Lubrication of the Rectum

In many cases of chronic constipation the lower colon and the rectum become dry, the result of atrophy of the lubricating mucous glands which have been destroyed by colitis or chronic proctitis. This condition may extend up into the pelvic colon. As a result, the feces adhere to the walls of the bowel and so accumulate, forming impactions and cumulative constipation, one of the most frequent forms of constipation. In many such cases only partial relief is obtained by a laxative diet. By the use of paraffin oil, one or two tablespoonfuls before each meal, the colon and rectum may be lubricated artificially. In some cases, further lubrication is needed. For this purpose there is nothing so useful as a specially prepared paraffin which melts at a temperature of 102° F., or just above the body temperature. This is heated until it is nearly all



melted, by placing the container in hot water. Then with a piston syringe three or four ounces of the warm melted paraffin is introduced into the rectum.

To enable the paraffin to reach the pelvic colon the patient should assume the knee chest position for two or three minutes after the paraffin is introduced and should take deep breaths to encourage the distribution of the melted oil.

The temperature of the body being about 100° F., or less than that of the paraffin, the latter will be cooled below its melting point, and so will acquire the consistency of a soft ointment which adheres to the surface of the bowel, and serves as a most efficient lubricant.

## Exercises Which Combat Constipation

The exercises that are of the greatest value in cases of constipation are those which bring into strong action the muscles of the abdomen. The abdominal muscles are generally weak and relaxed, and the intra-abdominal pressure is consequently low.

By appropriate exercises the weak muscles may be strengthened; the intra-abdominal pressure may be raised, and the colon may be thus enabled to contract with sufficient impetus to expel its contents.

### Hill Climbing

Hill climbing is a more valuable exercise than walking on the level, because the abdominal muscles are brought into more active play. When mountain climbing is not an available form of exercise, nearly the same results may be obtained by climbing a ladder or by walking up and down stairs. The writer has also made use of the treadmill as the means of securing muscular exercise similar to that required in hill climbing.

### **Horseback Riding**

Horseback exercise is especially indicated as an exercise for constipation. Riding a considerable distance, however, is necessary to produce any decided effect, as, on the whole, horseback riding to a person accustomed to it, is not very active exercise, except when riding a hard trotting horse.

### **Rowing**

Rowing is one of the very best exercises to combat constipation, provided the chest is held high during the exercise, and especially if care is taken to give the trunk as strong a backward movement as possible; but care must be taken to avoid holding the trunk forward with the shoulders rounded and the chest depressed.

### **Tennis**

Tennis may be highly commended for young persons and those who are sufficiently strong to engage in this form of exercise without injury. This very popular game is, however, too vigorous for persons with weak hearts.

### **The Medicine Ball**

This is a capital exercise for persons who are fairly strong. It brings the muscles of the trunk into vigorous action.

### Work Exercise

The movements of chopping and digging, swinging the hammer and mowing are highly valuable exercises if taken with due care to maintain the body in an erect position. Many household occupations, such as scrubbing, washing, and general housework, are excellent forms of exercise when correct posture is maintained.

### Posture

Of first importance to persons suffering from constipation is the maintenance of an erect position of the trunk. When the chest is lowered, as in sitting in a relaxed attitude, the distance between the breast bone and pelvis is diminished so that the large muscles, which form the front of abdominal wall are shortened and relaxed. In this attitude the muscles cannot be contracted sufficiently to produce the proper degree of intra-abdominal pressure. When the chest is held high, the rectus muscles are stretched and are thus able by contraction to produce the maximum effect in compressing the colon. Flat-chested persons are predisposed to constipation because of inefficient action of the abdominal muscles.

The ordinary chair must be regarded to a very considerable degree as responsible for the prevalence of flat chest and round shoulders, and the evils which result from this deformity. It is possible to



Incorrect Standing Position



Getting Correct Standing Posture (First Position).



Method of Getting Correct Standing Posture (Second Position).



Getting Correct Standing Posture (Third Position).



Correct Standing Posture





sit in an erect attitude in a chair of any shape; but with a chair with a straight back, constant effort is required, by forcible contraction of the muscles, to maintain the body in an erect position. The moment the muscles are permitted to relax, the trunk falls into an abnormal and unhealthy attitude, the spinal column being curved backward instead of forward, as is natural and necessary for health. This will readily be understood by reference to the accompanying cuts.

As the result of an habitually wrong attitude in sitting, the same improper attitude is maintained when standing and walking, and the figure becomes deformed. A flat chest, round shoulders, and a forward carriage of the hips are characteristics to be found in the great majority of persons who lead sedentary lives, especially those who sit much at their work, such as accountants, writers, teachers, and professional people generally. One of the first things, then, for a constipated person to do is to correct his sitting and standing attitudes. This may be done by careful execution of the following exercises, which the writer has employed for more than 25 years with much satisfaction in the treatment of cases of this sort.

### **To Correct the Standing Posture**

Stand against a straight wall. Place heels, hips, shoulders, head and hands firmly against the wall.

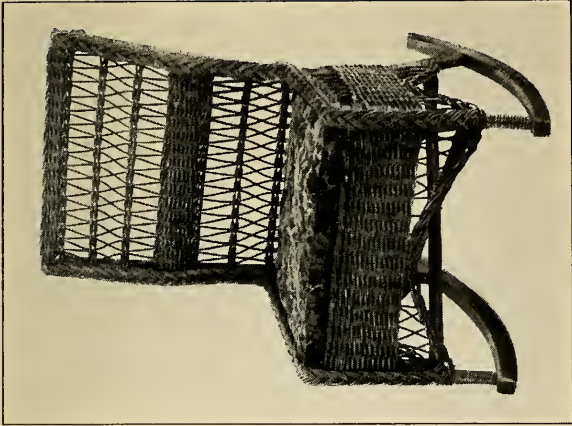
Now bend the head backward as far as possible, or until the eyes look straight up to the ceiling, at the same time permitting the chest and shoulders to move forward. While holding the head in this position, press the hands firmly against the wall; draw the chin down to position without allowing the shoulders to move backward; still holding the body rigid, allowing the arms to fall at the sides. In this position the chest will be held high and the abdominal muscles well drawn in. While holding this position execute movements with the arms; arm raising above the head, swimming movements, etc.

This is the correct standing position and should as far as possible, be constantly maintained in standing and walking. It is impossible, of course, to hold the muscles constantly rigid. In relaxing, however, care should be taken to keep the chest forward, so that the body does not fall back into the former incorrect attitude.

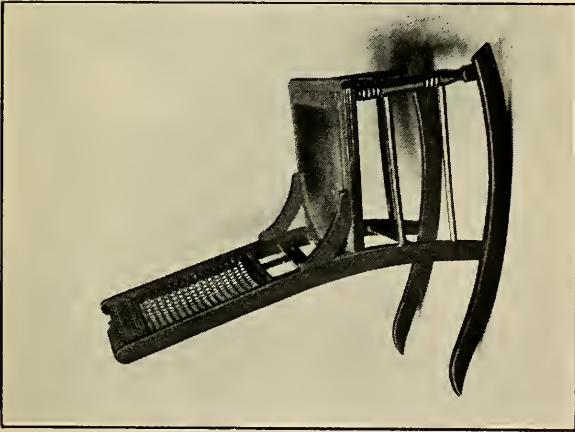
### **Exercises to Correct the Sitting Posture**

Sitting upon a chair or stool, preferably the latter, proceed as follows:

Place the hands on the hips, with the thumbs behind. Bend the head backward so as to look straight up to the ceiling; now bend forward as far as possible while still keeping the eyes on the ceiling; now make firm pressure with the thumbs, and while



A Health Chair



A Disease-Producing Chair



pressing hard bring the body up to the erect position. Still keeping the eyes upon the ceiling, holding the elbows as far back as possible, and without for an instant lessening the pressure on the thumbs, bring the chin down to position.

If this movement is executed according to direction, it will bring the body into perfect position, with the chest raised high and the abdominal muscles well drawn in, as shown in the accompanying cut. To secure definite and beneficial results it is necessary to use a chair having a back of the right shape as shown in the accompanying illustration.

### **Breathing Exercise**

Sit with the hands at the back of the neck, and the elbows in line with the shoulders, the chest held high, and the abdominal muscles well drawn in. Raise the heels and make rapid movements upon the floor with the toes for one minute. Then take ten deep breaths, still holding the arms in position.

### **Rocking Chair Exercise**

Sitting upon the front edge of a chair, with the hands upon the hips, the thumbs behind, the elbows well drawn back, bend forward to an angle of  $45^{\circ}$  and then, holding the body rigid, throw the trunk backward, lifting the feet clear of the floor. Repeat. The effect will be a rocking movement. Breathe

deeply. Repeat forty times. A rocking chair may be conveniently used in taking this exercise.

### **Exercise to Raise the Chest**

Lie upon the back on a hard surface; place beneath the hollow of the back a roll of blankets or a folded pillow or cushion about six inches in diameter. The purpose of this is to give the spinal column the forward curve which is natural to it, and thus to raise the chest. The roll should be placed at such a point as to raise the chest to the fullest extent, while the head and shoulders still rest upon the couch. In this position, deep breathing movements should be practiced at the rate of about ten a minute.

### **To Strengthen the Abdominal Muscles**

With the back supported as in the previous paragraph, raise both legs to the perpendicular. Repeat ten to forty times. A deep breath should be taken just before the legs are raised, and after each movement there should be a pause during which a deep breath is taken.

Feeble and very fleshy persons are often at first not able to raise the legs. In such cases the exercise will begin with the legs drawn up to a fixed position. By extending the legs and allowing them at the same time to drop slowly to the starting position, the abdominal muscles may be brought

into strong contraction, and as they gradually increase in strength, the legs may be flexed less until they can be raised to a vertical position without flexion.

### **Trunk Raising Exercise**

Lying on the back and holding the legs firmly extended, raise the arms forward and raise the body to the perpendicular, then bend forward, and, if possible, touch the toes. Repeat ten to twenty times.

### **Rolling Exercise**

Rolling over on the floor or on a wide bed is a capital exercise for strengthening the lateral muscles of the trunk. Practice for five minutes.

### **Rocking Exercise, Lying**

Flex the left leg upon the abdomen; clasp the hands beneath the knee and pull as hard as possible, so as to force the thigh down upon the abdomen; then, with the other leg fully extended, cause the body to execute rocking movements by quickly moving the leg up and down, assisting by forward and backward movements of the head. Repeat same with the right leg. This is a very effective exercise if taken vigorously and repeated three times a day for five or ten minutes.

### **Arm and Trunk Exercise with Deep Breathing**

Standing with the chest held high, place left hand upon the left hip. With a swinging movement outward bring the right arm to the perpendicular, and then holding the arm in position, bend the body to the left side as far as possible, breathing in. Rise to position, breathing out. Repeat four times and then execute the same movement with the right hand upon the hip, breathing in.

### **Squatting Exercise**

Standing, with the heels separated ten or twelve inches, the hands upon the hips, execute squatting movements, bringing the trunk as near to the floor as possible, and bending slightly forward. An excellent exercise to stimulate bowel movement.

### **Running on All Fours**

With arms and legs extended run about the room for five or ten minutes. Running on all fours. This movement was prescribed by a Berlin physician for an eminent German Statesman, with excellent results.

### **Knee-Chest Breathing**

Placing the body in the knee-chest position, execute deep breathing movements, filling the chest



as completely as possible, then, holding the chest in position, draw in the abdomen as much as possible while breathing out.

### Colon Compressing Exercise

Sitting on a low seat or with the feet raised upon a stool, place the closed fists in the left groin and bend the trunk strongly forward so as to compress the hands between the thighs and the abdomen. Take several deep breaths while holding the body in this position.

### Inclined Plane Exercises

Among the most important of all forms of exercises for combating constipation, series of certain simple exercises are taken upon an inclined plane, with the head low. The special advantages of the inclined plane are:

1. The head-low, hips-high position greatly aids in the replacement of the prolapsed stomach and colon, conditions almost universally present in chronic constipation.

2. The head-low position drains the abdomen of blood, thus relieving congestion of the viscera.

3. Exercises of the trunk muscles should always be taken after the prolapsed viscera have been restored to position. When this is not done, the effect may be to increase the displacement whenever the abdominal muscles are strongly contracted.

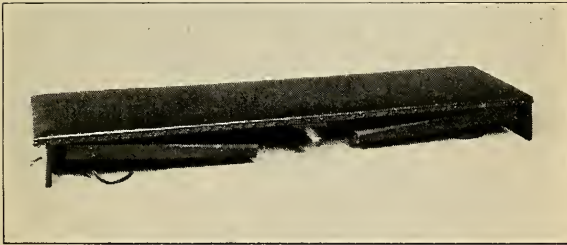
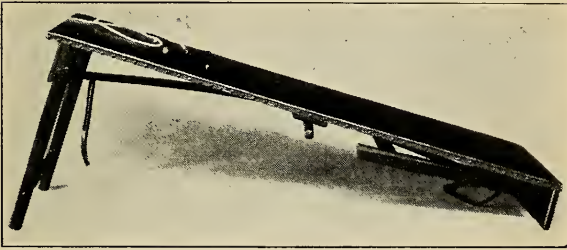
There are three classes of exercises to be taken with the inclined plane, viz: (1) Stretching exercises, (2) Colon replacing exercises, and (3) Trunk exercises.

The folding exercise table is a convenient appliance for use in these exercises. It may be in part replaced by an ordinary ironing board placed with one end resting upon the side of a bed, couch or window sill, the other on the floor. The exercise table is provided with a strap at one end to hold the feet and prevent slipping down and a rope with handle attached for pulling the body up. At the sides are placed handles to be grasped by the patient.

### Getting in Position

The following is a convenient method of placing one's self in position upon the table: Standing upon the left side of the table grasp the strap with the right hand. Sit down upon the table and swing up one foot and place it under the strap and then bring up the other foot in the same way and then grasp the sides of the table or the handles and let the trunk fall down into position. While an ordinary ironing table may be used, the strap for the feet and the handles for the hands are really essential for convenient use.

After getting into position upon the table, the patient takes a few very deep breaths, holding the chest high while breathing out.



The Exercise Table



### Exercises

Grasping the handles, bend the head backward as far as possible, at the same time widely opening the mouth as in yawning.

### Position

Patient lies upon an inclined table grasping the handles. (a) Right arm, left leg stretch. (b) Grasping handle with left hand raise the right arm above the head and at the same time point the toe of the left foot and reach as far as possible in opposite directions. (c) Do the same with the left arm and right leg.

### Colon Replacing Exercises

Lying on the inclined table with feet under the strap, place the hands upon the lower abdomen and breathe deeply; with each expiration press hard upon the little-finger side of the hands and draw the hand upward so as to push the contents of the abdomen toward the diaphragm. Hold the hands firmly in position during the inspiration. Repeat ten or twelve times.

### Abdominal Compression-Breathing

Compress the abdomen firmly with the hands and take a slow deep breath. Repeat fifteen or twenty times.

### **Diaphragm Exercise**

Lie upon the face over a folded pillow or cushion with the feet under the strap and the head resting upon the folded arms. Take deep breaths. This is an exercise for relieving congestion of the abdominal viscera, strengthening the breathing muscles. At each breath the diaphragm is compelled to lift the weight of the trunk.

### **Exaggerated Knee-Chest Breathing**

Grasping the handles, rise from the position of the preceding exercise to a kneeling position, pushing the pillow forward a little and then take the knee-chest position; take ten to fifty deep breaths. This is a most effective means of draining the over-filled blood-vessels of the abdomen and pelvis, and sets gravitation to work pulling the prolapsed organs into position. The exercise is still more effective if taken after filling the colon with water, as the added weight of the prolapsed organ assists in restoring it to position.

### **Leg Raising**

Lying on the back, hands grasping the handles, while holding both legs straight and toes pointed, raise them to vertical position while counting four. Lower at the same rate. Repeat eight to twelve

times, taking one or two deep breaths after each movement.

### **Trunk Twisting**

Back lying, feet under strap, throw the extended right arm over to the left, at the same time turning the face and shoulders in the same direction. Return to position, and repeat eight or ten times. Do the same with the left arm.

### **Hips Rolling**

Back lying, draw the knees up as far as possible, then extend the limbs vigorously as far as possible toward the left, rolling the body in the same direction. When the legs are completely extended, carry them straight across to the opposite side, rolling back toward the right side. Complete the movement by drawing the legs back to the flexed position and returning to the starting position. Repeat ten or twelve times, pausing long enough after each movement to take one or two deep breaths. This is a most excellent exercise for all the muscles of the trunk.

### **Static Exercises**

These are exercises which may be taken while one is engaged in study, writing, book-keeping, or some sedentary occupation, without interfering with the work in hand. The purpose being to

combat the pernicious effects of any form of confining work.

With the chest held high, the abdominal muscles well drawn in, and the body supported in a correct posture, deep breathing may be practiced with most excellent results. The breathing may often be made rhythmical with the work, especially in typewriting, adding and similar work which is more or less mechanical in character. In this way exercise may become a means of increasing efficiency directly, as well as through better aeration of the blood and the resulting improvement in mental and physical activity.

This deep breathing may be practiced under almost any conditions without interfering with the work in hand. When riding on the street cars or in an automobile, even when sitting in church or at a lecture, deep breathing may be practiced almost continually. The practice will be found to promote bowel activity, and to enormously increase efficiency and endurance. When the habit is once formed the deep breathing becomes automatic. Typists, printers, and persons engaged in similarly unhealthful occupations may, by this means so strengthen their resistance, and maintain such a high state of vital efficiency, that they may possibly escape the dreaded pulmonary tuberculosis, the malady above all others that is the most fatal to this class of workers.



### Tension Exercises

During life the muscles are always in a state of tension; that is, every muscle is more or less active even when it seems to be at rest. This tension is increased by cold to the point of producing visible movements of shivering. It is also increased by pain or inflammation, as is seen in the rigid contraction of the abdominal muscles in appendicitis. Tension may also be increased by a simple effort of the will. The mere thinking of a bodily movement, in fact, increases the tension of the muscles which are concerned in the movement, and to such a degree that long-continued fatigue may result, showing that work has been done, as when one watches the performance of acrobats, or a closely contested athletic game. This fact may be made of practical value. Thus if one's feet are cold, they may be quickly warmed by alternately tensing and relaxing the muscles of the legs, or by making slow, tense, flexion and extension movements of the feet.

In like manner all the muscles of the legs may be brought into active play by simply setting or tensing the muscles of the legs that is, holding the limbs rigid with as much force as possible. The muscles of the trunk and arms may be tensed in like manner. All the muscles may be tensed at once, or different sections as arm muscles, trunk muscles, or the muscles of a single limb may be exercised in succession. Tension exercises may be

taken in many cases without the slightest interference with one's work; and when the work is very sedentary one may by this means, without loss of time, secure a large part of the benefit of such active exercises as walking, tennis, playing, etc. Such exercises should not be considered as a substitute, however, for out-of-door exercise, but rather as a supplement to such exercise.

One very excellent form of exercise which may be taken while sitting at desk at work or when reading or studying is rapid raising or lowering of heels, either together or in alternation. The heels are raised so that the weight of the limbs rests on the toes, and the limbs are then set in rapid motion. Bracing the feet together, a similar movement may be executed with the knees rapidly separating and closing. The movement is so rapid that the exercise closely resembles shivering.

One excellent use for movements of this kind is to prevent taking cold when one is exposed to a draft. If, for example, one feels a draft of cold air on the back of the neck, he may prevent ill effects by simply tensing muscles of the neck, or indeed, by holding the muscles rigid while making slow movements of the head, either forward and backward or side-wise. In out-of-door sleeping, exercises of this sort may be resorted to as a means of warming the feet and limbs. These warming exercises are important for persons suffering from constipation, because of the tendency that such

persons have to coldness of the extremities, the result of spasm of the blood vessels, due to the influence of intestinal poisons upon the vasomotor centers.

### **Special Means to Aid Defecation**

The general aim of all the exercises given in this book is to aid defecation by strengthening the muscles of the trunk and abdomen, and forming the breathing movements. There are special exercises which may be employed during defecation which render effective aid in evacuation of the bowels.

The natives of India, as mentioned elsewhere, aid evacuation when the bowels are constipated by pressing a ball formed by a folded cloth upon the lower left side of the abdomen. Many constipated persons have found by experience the advantage of pressing upon this part of the abdomen with one or both closed fists, during defecation.

Persons who have very relaxed abdominal walls often find it very advantageous to compress and knead the abdomen during defecation, especially upon the left side. A medicine ball may be used for the purpose. The ball is held firmly against the abdomen, the under side resting on the separated thighs. By bringing the thighs together at the same time pressing with the hands, the ball is forced against the abdomen. The abdomen may in this way be compressed with considerable force. The closed fist may be used in place of the ball.

### **An Exercise Program**

When possible exercise should always be taken in a rhythmical way. This effect may be secured by means of counting, or better still by the aid of music, for which a phonograph, victrola or a graphophone serves an excellent purpose.

The following is an excellent program of exercises for a person of average strength:

1. On rising, take an exercise bath (see page 242), beginning with the water at a temperature of 90 degrees and ending at 70 degrees to 60 degrees or pipe temperature. Row 100 to 200 strokes counting.

2. Inclined plane breathing and replacement exercises. (See page 281.)

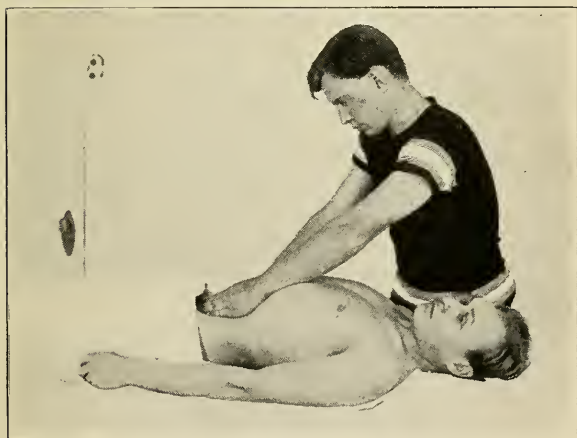
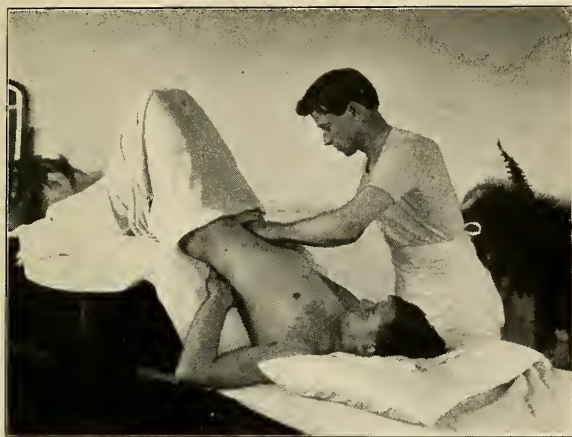
3. Inclined plane exercise to strengthen abdominal muscles. (See page 282.)

4. Special exercise to aid defecation. (See page 289.)

After exercise make an attempt to move the bowels if a movement has not already been secured.

### **Abdominal Massage**

Before beginning the treatment of any case of constipation by massage, a careful study of the case should be made, so that the causes of the condition present may be well understood. Such an examination requires, in serious cases, at least an



Kneading the Colon



X-ray examination with a bismuth meal. The bismuth enema must also be administered to show the condition of the colon and of the ileocecal valve. A radiogram of the colon or at least a tracing made by the aid of the X-ray, showing the position, size and form of the different portions of the colon is of greatest service. With the radiogram and such a sketch of the colon at hand, the masseur can make his applications with such a degree of accuracy as to effect a maximum amount of good with a minimum degree of effort, and without wearying his patient needlessly. The following methods of colon massage are described at greater length in the author's work on massage.\*

### Massage of the Cecum

In cases in which there is stagnation of the fecal matters in the cecum and ascending colon, massage should be applied, with the patient's hips elevated to an angle of about  $45^{\circ}$ . Deep kneading movements should be made from below upwards, working along the colon in the direction of the lower ribs of the right side. When the liver is reached, the kneading movements should be carried across the body in the direction of the transverse colon. The hips of the patient should then be lowered, and the kneading movement should be directed down-

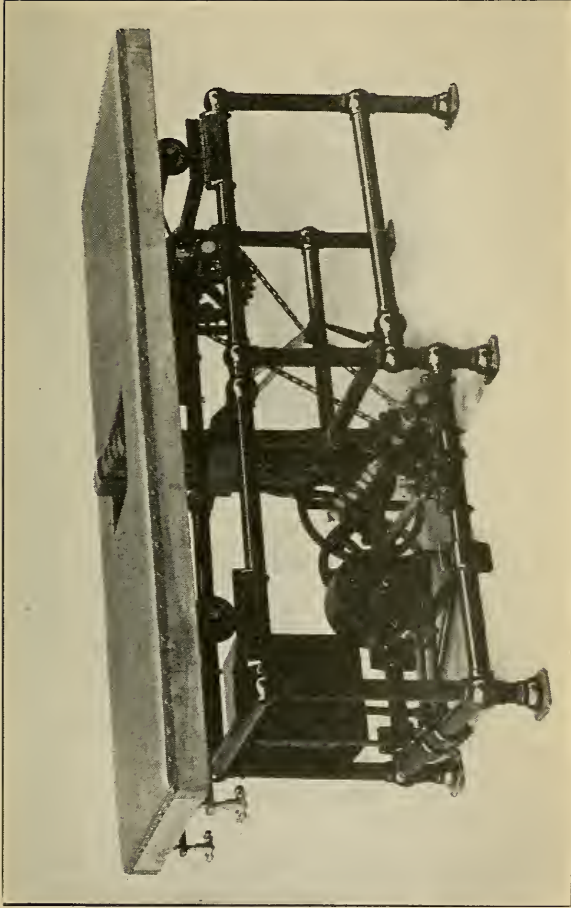
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\* "The Art of Massage." Published by Good Health Pub. Co Battle Creek, Michigan.

ward along the descending colon, starting from high up on the ribs of the left side. When the upper border of the hip bone is reached, the movement should follow the inner surface of the bone to the pelvis. Not infrequently the colon is found in a contracted or spastic state when it feels like a rubber tube and may be rolled under the fingers. It is usually sensitive to pressure. When the pelvic colon is enlarged, it may also sometimes be felt, though not infrequently when it is distended with feces it lies so low in the pelvis that it cannot be reached. By putting the patient in a knee-chest position, and executing deep-breathing movements while making deep pressure with one hand on each side just above the groins, the pelvic colon can sometimes be lifted out of the pelvis, so that it can be brought within reach, and the hard masses with which it is filled may be broken up. In this region the colon will often be found filled with masses of hardened feces.

After careful manipulation of the contracted colon for a few minutes it will dilate, the spastic condition disappearing for the time being. The writer has often noticed this in making examinations of the colon. Harsh manipulations are likely to produce the opposite effect increasing the spasm. This fact has led some authors to forbid massage altogether in cases of colitis, but this is quite wrong. Massage is highly beneficial in these cases but the manipulations must not be too severe.





Bowel Kneading Apparatus





Vibrating Chair



## Mechanical Kneading and Vibration

Mechanotherapy is capable of rendering more service in constipation than in any other single condition.

The mechanical applications which are of greatest service are kneading and vibration. Several mechanical kneaders have been devised. The one shown in the accompanying cut the writer has had in use for more than twenty years, and with satisfactory results. Patients generally realize immediate benefit from the use of the kneader, which may be employed for fifteen or twenty minutes twice a day, an hour after breakfast, and an hour or two after dinner.

The apparatus consists of six kneading arms attached to eccentrics, arranged in such a way as to be brought to bear upon the abdomen in consecutive order. The surface upon which the patient rests is at the same time moved to and fro in such a way that the kneading movement travels in a series of circles round the abdomen. The vigor of the application can be regulated at will.

There are vibrators of various kinds in use. The majority, however, are possessed of too little power to be of service in the treatment of the abdomen. The best for this purpose are the dumb-bell vibrator and the vibrating chair. Hill's dumb-bell vibrator has the advantage that it is heavy enough to compress the abdomen to a sufficient degree; and the

power of the apparatus is sufficient to give the whole abdomen an active vibratory movement. It has been proved that these vibratory movements induce peristaltic action, while at the same time the weight of the instrument increases the abdominal pressure, and tends to fix the parts to which the application is made, so as to secure a maximum degree of effect.

The vibrating chair aids bowel action both by directly exciting the centers of the spinal cord and by stimulating the lower bowel. The use of the chair for ten or fifteen minutes will in many persons develop a lively "call" for bowel movement.

### **Self-Kneading of the Bowels at Stool**

In many cases of cumulative constipation the chief trouble is in the pelvic colon. This loop of intestine, usually about a foot in length, and possessing thick muscular walls, becomes sometimes so enormously stretched and attenuated by accumulations of fecal matters and gas that its walls are weak and contract very feebly, and it is no longer an efficient instrument for forcing the feces into the rectum, and thus inducing the defecating reflex by which the bowel is normally emptied. In such a case the patient may sometimes assist himself by placing the hand at the lower part of the abdomen on the left side and making deep pressure with the tips of the fingers, or placing the fist between the

thigh and the abdomen so as to compress the pelvic colon. Kneading of the iliac colon, which lies in the hollow of the left iliac bone, is also useful.

### **The Cannon Ball**

The cannon ball is a rather old-fashioned but useful means of self treatment, by which the patient may apply massage to the colon in a very efficient way. A small cannon ball weighing about twenty or twenty-five pounds is rolled along the course of the colon from the cecum toward the rectum. The patient should lie with the shoulders slightly elevated so as to relax the abdominal muscles as much as possible.

The cannon ball should be applied daily soon after breakfast, or a little before the time at which the bowels are most likely to move. The chief benefit to be derived from the cannon ball is to aid in propelling into the rectum from the pelvic colon a sufficient amount of fecal matter to awaken a lively stimulation of the defecating center, and so to secure a strong impulse and a full evacuation of the colon below the splenic flexure.

### **The Weighted Compress**

This consists of a thick flannel compress between the folds of which is quilted in a considerable quantity, say fifteen to twenty-five pounds, of lead shot. The compress should be large enough to cover the

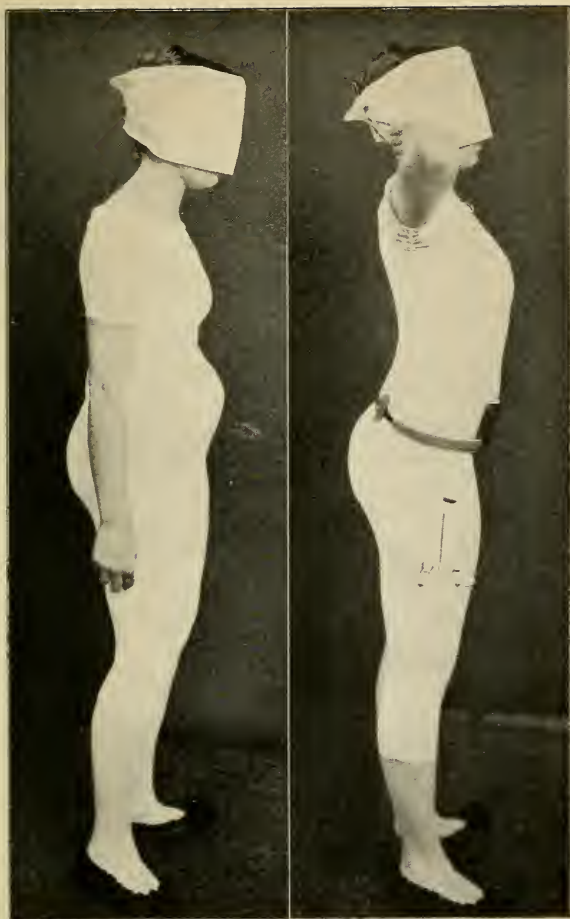
entire abdomen. It should be applied for an hour before time for evacuation of the bowels, deep breathing movements being executed in the meantime at the rate of twelve to sixteen per minute.

### **The Shot Bag**

This device has essentially the same purpose as the preceding, but may be applied in such a way as to secure a more pronounced local effect; as, for example, to force stagnating material out of the cecum or the iliac colon. It may, in some cases, also be of service in forcing feces from the pelvic colon into the rectum, when the pelvic loop has been weakened by excessive overloading and distention with gas. The usual weight of the shot bag is twenty to twenty-five pounds. It should be placed over the spot where the accumulation can be felt with the fingers or seen with the X-ray and should be left in place for an hour, while deep breathing movements are practiced at the rate of twelve to sixteen per minute.

This simple measure has the advantage that it may be used by the intelligent patient at his home, and its use may be continued for an indefinite time without injury, which cannot be said of any drug remedy. All drugs which act by irritating the intestine, sooner or later, usually sooner, produce colitis and other disorders. There are no harmless drugs. Of course this does not apply to such purely mechanical and harmless means, as bran and paraffin.





Relaxed protuberant abdomen, a result of bad sitting position.

The same person standing, poise corrected and abdomen held up by a spring supporter.



### **Pneumatic Compression of the Abdomen**

Compression of the abdomen by an inflated rubber bag is a measure of value, of which the writer has made use for some years. On one occasion, a patient who seemed dead from surgical shock was restored almost instantly by placing a rubber bag under an abdominal bandage and inflating it as fully as possible. The face, which had become ashen gray, while the heart had ceased to beat, at once became flushed with the color of health, the heart began to beat, the patient began breathing, and death was averted. This observation showed the effect of abdominal compression applied in this way, and suggested the use of the same means to increase the intra-abdominal tension as an aid to bowel movement. In using the bag for this purpose, it must be tightly compressed by means of a stout bandage, and must be large enough to cover the whole abdomen, so that when inflated it will well fill the abdominal cavity, pressing before it the relaxed abdominal wall.

The compression bag is of special service in cases in which the abdominal muscles are very greatly relaxed, as in women who have borne a number of children, and whose muscles have not been well developed. It is most applicable to those who have not a superabundance of fat, especially those who have lost much in weight after having been over-fat.

### The Abdominal Supporter

While compression of the trunk at the waist is always harmful, compression and support of the lower abdomen is of great service in many cases, because of the unnatural feebleness of the abdominal muscles. In fleshy patients almost any sort of bandage will accomplish good, but in thin patients an ordinary bandage is of little use, for the reason that it is held out in front by edges of the iliac bones, and so does not press with sufficient firmness upon the lower abdomen where support is needed.

The most effective support in such cases can be secured only by a bandage which is compressed by springs. Such a bandage, which the writer has had in use for more than a dozen years, is shown in the accompanying cut. In fleshy patients a stout bandage made of ducking and cut to fit snugly is of greatest service.

The bandage must be worn constantly when the patient is on his feet. Its purpose is not simply to support the viscera, which the best of bandages can do only in a very small degree, but to increase the intra-abdominal pressure to such a degree as to assist the colon in disposing of its contents. Some patients are completely relieved of constipation by the use of a proper bandage.

In most cases it is necessary to employ perineal bands to keep the bandage in position at the lower abdomen, where alone it can be of service.

Pain in the back is one of the disagreeable symptoms which an efficient bandage often relieves, especially when the pain is due to enteroptosis, or prolapse of the intestines, rather than colitis.

A sense of exhaustion, often resulting from low intra-abdominal tension, which permits an undue amount of blood to accumulate in the abdominal vessels, robbing the brain and spinal cord, is almost immediately relieved by a proper bandage.

The bandage is only a palliative, however, and its use must be accompanied by the development of the abdominal muscles by means of massage, electricity, and suitable exercises.

In cases requiring the use of the abdominal supporter during the day, the moist abdominal girdle should be worn at night to aid in relieving congestion. The bandage should be used with the mackintosh protection, and the bandage should be removed or renewed before it becomes dry.

## Efficient Electrical Methods

While electricity is certainly not a panacea for constipation, nor for any other disease, and is certainly not able to accomplish a tithe of the miracles which have been attributed to it, it is nevertheless, when skillfully applied, a most valuable remedy in constipation. As ordinarily used by means of sponges held in the hands, and employing a current from a small buzzing faradic machine, nothing more is accomplished than a slight titillation of the skin and giving the patient a slight amount of pain, which may, however, in some cases, exercise a beneficial psychological effect.

Electricity may render valuable service in constipation in two ways: (1) By inducing automatic exercise of the abdominal muscles and so restoring their tone and strength; and (2) by stimulating the colon itself and thus inciting bowel action, and (3) by restoring lost nerve sensibility to the rectum. This it does both by directly exciting bowel action and by raising to activity sensibility of the rectum when lost by neglect.

### Automatic Exercise

Automatic exercise of the abdominal muscles may best be administered by the aid of the nimsoidal electrical current. The static farradic cur-

rent may be used, but they are more or less painful and less easily controlled. The sinusoidal current is practically painless. The most convenient method of using the current is by means of the automatic exercise apparatus, which may be adjusted so as to cause any desired number of vigorous contractions of the abdominal muscles per minute.

By this means the abdominal muscles and the nerves and nerve centers which control them may be powerfully stimulated and their functions gradually restored.

### **Electrical Stimulation of the Colon**

Applications of electricity to the surface of the body do not excite action in the colon; but the colon may be excited by the application of the current directly to the interior of the colon. This cannot be done by the patient himself, as the services of an expert proctologist are needed for the proper placing of the electrode.

### **Electrical Stimulation of the Rectum**

The application of the sinusoidal current to the rectum by means of a proper electrode is a most effective means of stimulation of the rectum when its normal sensibility has been greatly diminished or greatly lost by neglecting to attend properly to Nature's "call" for evacuation of the bowels. For this purpose the very rapidly alternated current is

best. The applications should be made daily. The duration of the application should be about ten or fifteen minutes, and the strength of the current as much as the patient can bear without discomfort. Not infrequently the effect of the application is to provoke an immediate evacuation of the bowels.

### **Diathermy or Thermo-penetration**

This new application of electricity which we owe to Dr. Nagelschmidt, of Berlin, is a most interesting medical use of the so-called wireless electrical current. In the body the high frequency waves of electrical energy are wholly converted into heat so that no electrical sensation or other sensation except heat is felt. The special advantage of diathermy over other forms of heat applications is that the heat may be applied to the deepest parts as easily as to superficial parts. This is due to the wonderful penetrating power of this current.

Diathermy is a valuable means for employment in the treatment of colitis. The application of the current to the spastic colon causes it to relax, and likewise relieves the pain in the colon as well as the back and other reflexly related parts.



## Special Treatment of Different Types of Constipation

The practical management of cases of constipation is in its main features the same irrespective of the type or form which the disease may assume. However, there are certain special features of each of the several characteristic phases of this diseased condition, which require special consideration.

Without recapitulating the details of what has been said in the preceding chapters respecting the hygiene and preventive methods, the next few pages will be devoted to a summary of the methods which have proved most effective in dealing with several forms of constipation.

### **Treatment of Simple Constipation**

The patient must set himself resolutely to improve his general health in every possible way. He must avoid all habits known to be injurious, such as the use of tobacco, alcohol, tea or coffee. Indulging in late hours; irregular meals; use of rich and highly seasoned foods; unwholesome dress; worry; and every unnecessary expenditure of vital energy which does not bring with it a compensating addition to vital resources, must be resolutely abandoned. The general rules and principles which have been set forth in the preceding chapters respecting the reg-

ularity of bowel movement and the use of laxative foods in sufficient quantity must be scrupulously followed.

The special exercises recommended for strengthening the abdominal muscles, correcting wrong attitudes in sitting and standing, must be taken systematically twice a day. Feeble persons will, of course, begin with lighter exercises, increasing their vigor as they improve. No less than thirty minutes should be devoted to exercise daily.

The exercise bath is especially recommended because it economizes time by combining the tonic cold bath with vigorous exercise of the most helpful sort.

In all cases in which the colon is prolapsed, and when there is a flabby state of the abdominal muscles, a carefully fitted abdominal supporter must be worn.

### Diet

The most important of all measures is the careful regulation of the diet, not only with a general view to a laxative effect, but to suit the needs of the individual patient. It must be remembered that, above all things, the food must be attractive and it should be eaten at such times and in such quantity that it will always be taken with keen relish. When the mouth waters at the sight and smell of food, it is a good sign that the whole digestive apparatus is ready to undertake the work of digestion with promptness and vigor.

The bill of fare must as far as possible be made up of food stuffs which leave a residue of cellulose. Fine flour bread should be wholly discarded from the dietary. Bread or biscuit made from coarse graham meal or rye meal should replace other bread stuffs. It is in many cases advantageous to increase the amount of cellulose in the bread, by the addition to graham flour of bran to the amount of about one-tenth the weight of the flour. The bran and graham flour should be prepared from well washed wheat. If such flour cannot be readily procured, wheat may be purchased, washed, dried and ground in a hand mill. A few bacteria introduced into a slice of bread prepared from unwashed wheat might not in itself be capable of doing any great amount of injury, but it must be remembered that under the favorable conditions presented by stagnating fecal matters in the colon, poison-forming bacteria develop with extraordinary rapidity.

All green vegetables should be freely used at the principal meals. Potatoes may be eaten in moderation, but should not constitute the chief vegetable food, for the reason that they are almost completely digested, containing a minimum amount of cellulose, as will be seen by reference to the table of vegetable foods. It is well to select those vegetables which are richest in cellulose. When the digestion is fairly good, such vegetables as beet-root, spinach, squash, asparagus, cabbage, carrots, turnips, and cauliflower should be very freely used.

Two or three of these vegetables may be taken at each meal. Uncooked vegetables of some sort should be taken at least twice a day at the principal meals. Lettuce, celery, cucumber and cabbage may always be taken with the greatest advantage, when the digestion is fairly good. There are very few who cannot take one or more of these green vegetables if care is taken to observe that they are fresh and crisp, and pains are taken to masticate thoroughly. Even radishes may be eaten in moderation, if the irritating skin is removed.

Fruit, both stewed and fresh, should constitute a part of each meal. Fruit is especially valuable for the last meal of the day, and fresh fruit may be taken with advantage just before retiring at night, and as an early meal by those who rise early and breakfast late. The acids and sugars in fruits stimulate bowel action, but to secure this effect they must be taken in considerable quantity. Those who take two meals a day may often take with advantage two or three oranges or as many apples just before going to bed at night. Juicy fruit requires no work of the digestive organs, except to move it along and absorb the predigested nutrient which it contains. This remark, of course, does not apply to such fruits as dates, which contain a considerable amount of cane sugar, nor to the banana, which is really quite a hearty food, but relates only to such juicy fruits as oranges, apples, peaches, apricots, berries, pears and grapes.

When the bill of fare consists largely of such food stuffs as fruits and vegetables, it is necessary to give careful attention to the actual food content of the meal. There is a wide variation in the amount of nutriment contained in different fruits and vegetables. For example, an ordinary serving of potatoes represents 100 calories of food, while a serving of cauliflower represents 25, and is mostly wood and water. A serving of beetroot represents 25 calories, while a serving of cabbage or lettuce contains only 7 calories.

Many persons suffering from constipation find it better to take two meals a day rather than a larger number. A full meal is a much stronger stimulus to the stomach and to the intestine than a mere "bite" of food or a half meal. By taking two good sized meals a day, a good bowel movement may usually be secured after each meal, while the same quantity of food taken at three or four meals might produce but one thorough movement, the stimulus of the smaller meals being only sufficient to produce a partial emptying of the intestine. The question as to the number of meals is one that should receive careful consideration, and often requires the exercise of the best skill and judgment. Stomachs which empty slowly require a longer interval between meals.

It is especially important that care should be taken to include in the bill of fare a sufficient amount of fat. Fat is not only a nutrient of the

very highest value, but it is a laxative food element, partly because by its use the secretion of the bile and other intestinal juices is promoted, so that the intestine is benefited by their laxative influence, and also because a portion of the fat remains behind unabsorbed, acting as a lubricant and also as a stimulant to the colon.

Most cases of simple constipation are promptly relieved by the adoption of the measures above recommended. The amount of bran may be increased almost *ad libitum* when necessary. In addition to the bran taken in the food, one or even two heaping tablespoonfuls of cooked and sterilized bran may be taken at each meal. Palatable preparations of bran are now available which makes possible the free use of this most important aid to bowel action without inconvenience.

If any further assistance is needed it is to be found in the use of white Russian paraffin oil, the details concerning which having been given in a preceding chapter. (See pages 260-270.)

### **Treatment of Cumulative Constipation**

In the treatment of cumulative constipation it is to be borne in mind that the principal obstacle to bowel movement is the undue accumulation of fecal matters either in the pelvic colon or the rectum, or as is most often the case, in both the pelvic colon and the rectum. In many cases the

food is carried from the stomach to the colon with a proper degree of rapidity, and the feces move at the normal rate through the colon, until they have passed the splenic flexure. At this point the delay begins. In time, through extraordinary neglect, when the feces are allowed to accumulate for days and even weeks in succession, the colon and even the small intestine may become enlarged through the obstruction at the outlet.

The chief cause of cumulative constipation, in ordinary cases, as has already been pointed out, is neglect to attend to the "call" of Nature for the evacuation of the bowels. When the "call" occurs, it is because the rectum is distended with feces.

If the defecating mechanism then is interrupted in its action, and its purpose thwarted many times, the "call" becomes residuary, and the effort to defecate is so slight that it is easily suppressed. Later, in the worst cases, the desire to evacuate the bowels entirely disappears. In these cases the sensibility of the rectum has become blunted to such a degree that the normal reflex is lost. The rectum tolerates the presence of feces without protest and without giving any signal to the defecating center that bowel movement is required.

It is evident, then, that in the treatment of cases of cumulative constipation the first and most essential thing is restoration of the normal sensibility of the rectum. It must be remembered, however,

that in most cases of cumulative constipation, as well as in other forms of constipation, the condition has existed for a long time. The disease has consequently extended to the entire colon, and perhaps to the entire intestine, and success will not be obtained by attention to the colon and rectum alone; consequently, the treatment of cumulative constipation requires the use of all the measures which have been recommended for simple constipation, the description of which need not be repeated here.

The first thing to be done, in beginning the treatment of cumulative constipation is to thoroughly evacuate the lower bowel and rectum. This is best accomplished by the use of the enema. It is certainly irrational to administer a laxative or cathartic, which disturbs the alimentary canal through its whole length, for the purpose of removing an obstructive accumulation which perhaps lies within six inches of the lower outlet.

A simple water enema at a temperature of  $104^{\circ}$  to  $110^{\circ}$  should be given to soften the hardened feces, and should be repeated at intervals of half an hour, until the colon is completely emptied, as shown by the return of clear water. The addition of soap to the water sometimes hastens the softening of very hard fecal matter. Warm oil has been much recommended, but it dissolves hard feces less rapidly than water. At first it may be impossible to introduce more than a small quantity of water, on account of the extreme distention of the rectum and pelvic



colon with feces. By a persevering effort, however, success will be attained; as the hard feces are gradually softened and dissolved, larger quantities of water may be introduced until the whole colon may be filled with water and emptied of its putrefying contents. In cases in which the fecal accumulation has been going on for several weeks, the patient must be put in charge of an experienced nurse, whose efforts under careful instruction, must be unremitting until the task is completely accomplished. When the feces are very hard, and the masses of considerable size, oil should be used at intervals to lubricate the walls of the bowels, which, in such cases, are often dry and sometimes roughened.

After the bowels have been first thoroughly emptied, infinite care must be taken to see that another accumulation never occurs. Every time the bowel is distended by fecal accumulation, its muscles are weakened, the sensibility of its nerves diminished, and any improvement which may have been secured by previous treatment is lost. By the systematic use of the enema, the bowel being kept empty, gradually contracts and returns to something like its normal proportions.

The cold enema should always be used for contracting the bowel after the fecal matters have been removed by a warm enema. When once the bowel has been thoroughly emptied, warm water may no longer be required, and it will not be necessary to

resort to the use of the hot enema. The temperature of the water ordinarily used for the evacuation of the bowels may then be about 80°. After a little training, a lower temperature may readily be tolerated and is greatly preferable. When very cold water is used, the effect is sometimes to produce a spasm of the anus, so that the contraction of the muscles prevents proper movement. When this occurs, the anus may be relaxed by the application of a sponge or napkin saturated with very hot water, or water of a higher temperature may be used for the enema.

The best time for administering the enema is in the morning, after breakfast; but if circumstances will not permit this, the bowels may be moved at night after supper, or just before retiring. With patients who suffer from hemorrhoids or painful ulcers of the rectum, the hour of retiring is the best time for moving the bowels by an enema, as afterward there may be prolonged rest on the back. This prevents the extrusion of swollen hemorrhoids or prolapsing rectum, and gives rest to the anal muscles, and so prevents the nagging, painful contractions which often follow bowel movement when fistulæ or ulcers are present.

By the systematic use of the cold enema the dilated colon may gradually be restored to its normal size; its relaxed walls will recover their tone, and its function will be more properly performed. When sensibility of the rectum has been lost it may also

gradually be recovered. It is necessary, however, that the greatest care should be taken to see that the colon and rectum are never once distended by fecal accumulation. Many persons suffering from cumulative constipation take an enema every other day, or once or twice a week, waiting for symptoms of accumulation before the enema is taken. This practice is altogether wrong, and results only in a perpetuation of the disease. Of course, when an accumulation occurs, it must be removed, but if a cure is expected, accumulations must not be permitted to occur.

In obstinate cases the application of a sinusoidal electric current to the colon and the rectum aids greatly in the restoration of these parts to a normal condition. By the use of special electrodes electricity may be applied to the interior of the colon, as well as to the rectum, thus securing vigorous contractions of the bowel, which are not always produced by external applications, especially in chronic cases in which the intestine has to a large degree lost its normal sensibility. While strong electrical applications made to the spine and abdomen sometimes stimulate the muscles of the intestine as well as those of the abdominal wall, when the intestinal muscles have long been over-stretched and are perhaps to some degree degenerated, direct applications are necessary. These must be made by a physician by the aid of the proctoscope, which can be readily passed into the pelvic colon.

Vibration and massage of the interior of the rectum are measures of doubtful value. They are likely to give rise to abrasion and irritation of the mucous membrane, and are not to be recommended.

In cases of cumulative constipation, in which painful ulcer or irritable hemorrhoids exist, effort to restore normal action of the bowels may be made ineffective by spasm of the sphincter muscles. This may be relieved temporarily by external applications of heat by means of a fomentation. A very effective plan is to move the bowels while sitting over hot water. Boiling hot water may be poured into a chamber or other suitable vessel. The steam relaxes the anal sphincters, and not only facilitates the bowel movement, but relieves or prevents the pain.

Dryness of the lower bowel due to deficient secretion, the result of chronic proctitis and associated with loss of rectal sensibility, is not infrequently a cause of obstinate cumulative constipation. The stools are exceedingly hard and dry, and are discharged with great difficulty. When the rectum of such a patient is examined, the mucous membrane is found to be exceedingly dry, and often irritated. The normal lubricating mucus is not present. The result is the delay of the feces in the rectum until a dry hard mass is formed, which is not easily gotten rid of. In such cases, lubrication of the rectum is needed. The remedy for this is paraffin, of a special sort which melts at 102° F. For details respecting the use of this highly valuable remedy see pages 260-270.

## Treatment of Latent Constipation

In this form of constipation the stools are regular, the bowels move every day, and there is no accumulation of feces in the rectum. The patient is generally unaware of the fact that he is suffering from constipation, although not infrequently an observing patient becomes satisfied that there is something wrong, often because of too frequent bowel movements, which are not uncommon, together with pain, the passage of mucus, perhaps, and other symptoms.

In a London clinic the writer once heard a Scotch laborer complain of very frequent bowel movement. The examining doctor said to him, "Then you are suffering from diarrhœa". "No, Doctor," replied the patient, "I think I am suffering from constipation in diarrhœa form,"—a good practical description of certain forms of latent constipation. This patient was found to have a very extensive accumulation of feces due to cancer of the rectum.

In addition to the most thoroughgoing application of all the measures recommended for simple constipation, a thorough examination including an X-ray inspection of the whole intestinal tract, after a bismuth meal must be made. The rectum and lower bowel must be carefully examined to exclude cancer or other organic disease. Careful examination must be made in the region of the appendix, and in women a thorough pelvic examination is

necessary, since in many cases the delay may occur above the ileocecal valve, in consequence of spasm of the sphincter at this point. Or the delay may be due to incompetency of the ileocecal valve.

"Lane's kink" may be an occasional cause of latent constipation. It is more likely to be a result of this condition.

When the difficulty is due to spasm of the ileocecal valve, the result of reflex irritation from the inflamed appendix or from inflammation of the ovaries, uterus, bladder, or prostate, or painful disease of the rectum, it is of course necessary that these conditions should be removed by proper treatment. Temporary relief is generally most readily obtained by hot fomentations over the abdomen, with special attention to the seat of pain. The hot sitz bath, the hot enema and the wet girdle covered with mackintosh, worn day and night, are measures of great importance, and often secure very complete and speedy relief.

When the intestinal inactivity is the result of general feebleness, short cold baths should be employed daily. A cold bath may consist of a general cold shower of from fifteen to twenty seconds' duration, a cold douche to the spine, a cold towel rub, or cold sheet rub, according to the strength of the patient. The cold bath should be preceded by a short electric light bath. It aids in the elimination of accumulated toxins, and prepares the skin to react to cold application.

In latent constipation, the enema is sometimes useful chiefly as a means of introducing water by which the accumulated toxins may be washed out through the kidneys. In such cases the difficulty lies too high to be reached by the enema. The large cool or cold enema may, however, render service in cases in which the delay is due to atony, by improving the tone of the bowel muscles and so aiding peristaltic movement, by which the accumulated putrefying material in the lower part of the intestine may be moved on to the colon, and so be gotten rid of. The cold enema should not be used, however, in cases where there is reason to suspect spasm of the ileocecal valve, which is likely to be the case when latent constipation is associated with painful disease in any part of the pelvic region. In these cases a hot enema should be employed.

The rapid absorption of water from the colon is shown by the copious discharge of urine which usually appears within a few minutes after an enema is taken. The increase in the quantity of urine occurs so quickly after a large enema, that some medical writers in the early part of the last century were led to advance the theory that a direct connection existed between the colon and the kidneys. This fanciful theory has, of course, no anatomical foundation.

Mechanical kneading, the application of the sinusoidal current, and intelligently administered massage and other means by which success may be attained in combatting latent constipation.

### **The Treatment of Spastic and Reflex Constipation**

These conditions, most commonly associated with colitis or appendicitis, require the use of special measures. In spastic constipation the cause of stagnation of the intestinal contents may rest anywhere between the ileocecal valve and the anus.

In many cases of so-called spastic constipation, this condition is only a complication of colitis or chronic infection of the colon, due to delay of fecal matters in the colon.

The best means of securing immediate relief in cases of this sort are the hot sitz bath, the hot enema, and hot fomentations or diathermy applied over the abdomen.

In cases of painful disease of the ovaries or uterus, the hot vaginal irrigation must be used in addition to the hot enema.

The constipation which occurs at the monthly period in women suffering from menorrhagia, may often be removed by a hot hip and leg pack applied by means of a woolen blanket wrung out of water as hot as possible. The application of cold water after the pack should be avoided. The patient should be wrapped in dry blankets, and gradually cooled by tepid spraying.

Sometimes the warm oil enema proves more serviceable than the hot water enema, because less irritating. The addition of salt to the water is



sometimes useful in cases in which the mucous membrane of the intestine is eroded, as a weak solution of salt is less irritating to raw surfaces than pure water.

The application of the arc light and the photophore are extremely useful means of relieving the internal spasm. These applications should be made daily for ten to fifteen minutes' duration. In severe cases the light applications may be intensified by a special device through which the excessive rise of temperature is prevented by a stream of cool air or water playing upon the abdomen.

When making general cold applications, the abdomen should be protected by a warm flannel or a hot fomentation. A patient suffering from constipation must take special care to avoid chilling, and must keep the feet and hands warm. The chilling of the hands and feet always aggravates the spasm. The drinking of ice-cold water must also be prohibited.

The cold towel rub is especially suited to these cases, as a general tonic measure.

A person skilled in massage may make good use of this measure in the general application of heat, in cases in which massage is indicated, as when the cecum is loaded as the result of contraction of the transverse colon, or at the splenic flexure. The tendency of massage to aggravate the contraction is counteracted by a general application of heat.

The moist abdominal bandage without the mack-

intosh cover should be done at night and if possible also during the day time.

The abdominal supporter is also highly important in these cases, to prevent drag upon the mesentary by prolapse of the bowels. The writer has observed several cases in which the wearing of an efficient abdominal supporter has given prompt relief from very obstinate constipation.

### **The Treatment of Mixed Cases of Constipation**

In many, perhaps the majority of cases of constipation, the type of the disease is mixed. The association of spastic constipation with latent or cumulative constipation is specially common. Cases which begin as simple constipation, later become cumulative constipation, and finally develop spastic or latent constipation through infection of the colon, or colitis, the natural result of stagnation of the bowel contents.

The measures recommended for the treatment of spastic constipation should be applied with such other measures as may be indicated. If the rectum and the pelvic colon are filled with feces, these must be removed by the means recommended in the treatment of cumulative constipation, and the general measures suggested for the relief of that form of the disease must be perseveringly employed.

In the use of electricity in cases of this sort, the

applications must be combined with hot applications, in order to avoid increase of the spastic contraction.

When electricity is applied to the rectum, a fomentation should be applied to the abdomen during the application, or immediately afterward.

The thermophore affords the most effective means of applying heat to the abdomen during electrical applications. During a general cold application heat should be applied over the abdomen, to protect the intestine.

A flannel bandage should be worn over the abdomen constantly when the moist abdominal bandage is not employed, and an abdominal supporter should be worn.

Coarse vegetables and other bulky food stuffs should not be avoided because colitis is present. Colitis is the result of constipation, and this will be aggravated by the bland concentrated diet, which is commonly recommended for colitis. Experience has very clearly demonstrated the value of a bulky vegetable diet in colitis as well as in constipation.

Agar-agar is specially valuable in these cases, for the reason that it affords bulk, and aids in clearing away the accumulated mucus, while at the same time producing no irritation. The irritation supposed to rise from the cellulose of fruits is far less than is generally thought. Bran and ground wood have been used with excellent results as poultices for raw surfaces and dressings for wounds. Wet bran, like wet paper, is not irritating.

## Treatment of Disorders Which Result from Constipation

While constipation, through the autointoxication to which it leads, is both an exciting and predisposing cause of many very serious chronic diseases from which human beings suffer, there are many other maladies which are so immediately aggravated by an inactive state of the bowels, that this condition becomes a dominant factor in dealing with them. In this chapter a brief mention will be made of the more important of these diseases.

### Catarrhal Colitis

The chief seat of this disease is the lower colon, especially the pelvic colon and the iliac colon. Sometimes, however, the effect extends to the entire colon.

The disease is essentially a chronic infection of the mucous membrane, and is the result of the injury done to the tissues by the prolonged contact with putrefying fecal matters which in constipation accumulate and are often retained for days in the lower colon. To understand the effect of these poisonous matters upon the mucous membrane, when acting continuously for days with constantly increasing virulence, it is only necessary to consider for a moment what result would follow an applica-

tion of the same sort of material to the skin for several days in succession. The remarkable vitality with which the mucous membrane is endowed, enables it to retain its integrity for a considerable length of time, but sooner or later, its resistance breaks down, and it becomes the seat of a chronic inflammation similar to that which affects the mucous membrane of the nose in nasal catarrh. An examination of the stools shows constantly present mucous and white blood cells, which are thrown off by the mucous membrane in its efforts to defend itself against the attack of the myriads of microbes which are constantly assailing it, and the various highly virulent poisons which they produce. The character of these poisons may be judged from the nauseous odors emanating from the putrefying feces which are discharged when a laxative is administered, and sometimes as the result of an enema. The real character of the feces produced by a constipated person cannot always be judged by an examination of the hard, dry masses which are discharged from the lower bowel, for the reason that the noxious substances which they contained have been absorbed higher up in the bowel.

Some persons, indeed, have made the mistake of supposing that the comparatively inodorous feces which they discharged, and which have been retained so long that they have become as hard and dry as wood, afford evidence of an exceptionally aseptic and wholesome state of their intestine. In

one such case the writer succeeded in disabusing the mind of a very optimistic individual, by administering a dose of charcoal, which, acting as a laxative, brought down from the cecum and transverse colon a semi-fluid stool which was loathsome almost beyond description, and which when submitted to chemical and bacteriological examination, was shown to contain prodigious numbers of bacteria, and putrefaction products in extraordinary amount. This person, a man of unusual intelligence, but unacquainted with the physiology and bacteriology of the intestine, lived under the erroneous impression that by the thorough mastication of his food he rendered digestion so complete, and his intestine so sterile, that the putrefactive processes commonly present were suppressed, whereas, the truth was that putrefaction was very active in his colon, and his feces were inodorous only because they had been retained so long that the putrefactive process had consumed everything putrescible, and the malodorous and other substances had been taken up into the blood by the absorption, and had been discharged through the lungs, skin and kidneys, instead of being eliminated through the bowels, the natural and only safe and decent outlet for such loathsome products. In this case, as might be expected, evidence of the presence of catarrhal colitis was present, the little knob of wooden-like feces discharged at intervals of several days, being always covered with a thick layer of opaque mucus.

The frequent bowel movement in colitis is due not only to the irritation produced by the stagnation of fecal contents but to the fact that the contracted bowel relaxes at intervals and permits the passage of material which has been accumulated above it. When the bowel is completely contracted the obstruction is complete. In examining the patients suffering from colitis the writer has often noticed the complete relaxation of the bowel which but a few moments before was so contracted that it could be rolled under the finger like a piece of thick rubber tubing.

In catarrhal colitis, the stools may be either liquid, or composed of hard lumps somewhat resembling the feces of goats, or they may be mixed in character. The stools are sometimes quite watery in character, and may contain traces of blood. Patients often think that they are suffering from diarrhoea, on account of the frequent semi-liquid discharges. The cause of liquid stools is the irritation produced by the hardened and irritating feces. The irritation is not mechanical, however, but is due to the poisonous and irritating substances which are produced by the bacteria growing in the feces, in other words, by the putrefaction which is taking place.

In many cases there is a quite regular alternation of constipation and diarrhoea; the feces accumulate for several days, when the irritation becomes so great that by a profuse flow of serum and an

abundant secretion of mucus occurs, the mass is softened, and temporary relief is obtained through the complete or partial unloading of the bowels by several soft stools.

This condition, which is usually associated with cumulative constipation, is often complicated by a latent constipation, which results from spastic contraction of the bowel. The most common seat of this contraction is the descending or pelvic colon; but it may often be noted in the transverse and ascending colon. In these cases, the autointoxication which is always present is more pronounced in degree, because of the more fluid character of the intestinal contents in the upper bowel. That the disease not infrequently extends to the whole colon is shown not only by the contracted condition of the ascending colon and even of the cecum, but also by the presence of masses of hardened feces which may be frequently felt in both these portions of the colon.

The ultimate effect of long-continued inflammation of the mucous membrane is the same in the colon as in the nose and other parts provided with a mucous lining. After a time, which varies according to the resistance of the individual and the intensity of the disease, degenerative changes occur in the mucous membrane; its glands disappear, and it becomes thin and parchment-like. The degeneration extends to the muscles which lie beneath the mucous membrane. The intestinal wall is thus



thinned and weakened and loses its power of contractility to a large degree; it becomes distended and enlarged by gases and fecal accumulation, and thus the difficulty becomes greatly aggravated. In these cases, the colon, or at least the portion of it which is affected, becomes much like a distended bladder, losing a large part of its functions as a living muscular tube; it fails to respond to the nervous impulses by which the act of defecation is normally affected, and serves merely as a reservoir in which accumulate waste and remnants of undigested and undigestible foodstuffs, there to remain undergoing fermentation and putrefaction, developing offensive gases and irritating poisons, until removed from the body by some mechanical means. In these cases an essential part of the defecating mechanism is practically destroyed or rendered inoperative, and it becomes necessary to resort to mechanical means, as an enema of water or oil, for emptying the bowels. Lane and other surgeons have removed the colon in these cases, an operation which is doubtless sometimes necessary, although less often required than has been advocated by some, provided the patient can have the benefit of a complete regulation of the dietary, and will follow a suitable regimen.

The disastrous consequences which result from chronic catarrhal colitis are not confined to the colon. The disease often extends to the small intestine. In aggravated cases the accumulation in the cecum

becomes so great that the ileocecal valve is dilated to such an extent that the contents of the cecum and small intestine intermingle. The very perfect valve arrangement provided by Nature at the junction of the small intestine with the colon, which is rendered still more effective by a sphincter muscle placed just above it, is evidently intended to prevent any possible return of matters from the colon to the small intestine. In the small intestine the presence of carbohydrates prevents the growth of putrefactive organisms, by encouraging the formation of acids. In the colon, however, especially when there is stasis or accumulation of fecal matters, the delay permits the complete absorption of starch and sugar, so that there is no material to encourage the acid-forming bacteria, and the poison-forming microbes, being unhindered, undergo rapid development, and greatly increase in virulence, finding always plenty of food material in the mucus, bile, and other intestinal secretions, as well as the larger or smaller quantities of food protein which remains undigested or unabsorbed. When these dangerous microbes are carried into the small intestine, they may continue to develop and gradually work their way up the intestine.

The cecum becomes dilated and distorted in shape, because of the weakening of its walls in consequence of the undue accumulation of its contents. The cecum may be so dilated and stretched that it is found far over toward the left side of

the body, or lying deep down in the pelvis. The damaged ileocecal valve no longer controls the opening between the small intestine and the colon. The feces are no longer found exclusively in the colon. The small intestine may for several feet be filled with fecal matters of the consistency of putty, such as are normally found only in the transverse colon and beyond.

Putrefaction of the contents of the small intestine is a very much more serious matter than putrefaction in the colon, for the reason that the small intestine is much more richly supplied with absorbents, and is also less prepared to defend itself against the attacks of the virulent microbes which are always present in connection with putrefactive processes.

This infection of the small intestine with fecal matters introduces a whole series of troubles which unfold as the infection ascends along the intestine. The ascending infection finally reaches the duodenum, which not infrequently becomes the seat of a chronic catarrhal condition, the result of which may be ulceration. Observations of Moynihan and others have shown that duodenal ulcer is three or four times as frequent as ulcer of the stomach. Pain occurring three or four hours after meals is very frequently due to duodenal ulcer. From the duodenum, infection often travels through the bile ducts to the liver and the gall bladder. Chronic infection of the gall bladder and gall stones are thus developed. The infection may also ascend the pan-

creatic duct, which is closely associated with the bile duct, and may cause chronic inflammation of the pancreas, one of the results of which may be diabetes. From observations recently made respecting the causes of diabetes it is probable that inflammation of the pancreas arising in this way is among the most common causes of this disease. Observations made in the X-ray department of the Battle Creek Sanitarium indicate that the ileocecal valve is usually incompetent in diabetes. This is a most significant fact. The ileocecal valve protects the small intestine from infection; when it becomes incompetent, there is nothing to prevent the development of an ascending infectious process, which may bring about all of the conditions above mentioned.

### Treatment

The successful treatment of colitis requires, first of all, a change of the intestinal flora; that is, the infectious bacteria to which the disease is due must be gotten rid of. Since the first cause of colitis is constipation, it is evident that frequent bowel movement is also essential; in other words, the colon must be kept clean. The diarrhea which is sometimes present in colitis is the result of Nature's effort to clear the intestine from offending materials. The mucus which is often discharged in large quantities is a protective material which Nature pours out upon the surface of the intestine to protect the tissues against the attacks of bacteria and parasites

which flourish in the colons of persons suffering from this disease.

Various species of bacteria are capable of giving rise to colitis, according to Tissier. In general, it may be said that colitis is the result of the presence in the colon of excessive numbers of putrefactive bacteria.

In recent years, attention has been called to the fact that acute infections of the colon are sometimes due to animal parasites. Certain amoebæ, flagellates, spirochetes and other forms of protozoa are also found in great numbers in the colon in cases of chronic constipation and colitis, as well as in cases of amoebic dysentery. These organisms have been regarded by most authorities as pseudo parasites, with the exception of those of amoebic dysentery. Dr. Ronald Ross has recently pointed out the fact that all these organisms are parasitic and dangerous. If they do not set up acute inflammation characteristic of amoebic dysentery, they bore into the mucous membrane and thus prepare hiding places for pernicious bacteria, which develop chronic infections and intestinal toxemia. Observations made a few years ago by Miss York show that these animal parasites are rarely found in the stools of persons who subsist upon a non-flesh dietary. They abound in feces which are in part made up of undigested residues of flesh foods.

### Measures Essential in the Treatment of Colitis

As already stated, it is necessary in the treatment of colitis first of all to adopt thoroughgoing measures to secure a change of the intestinal flora. The writer has found that this may be accomplished in a short time by placing the patient on a special diet, which for convenience is termed a fruit regimen. For a description of this regimen see page 191. After a few days of this regimen (three days to a week) the character of the stools will be found to be wholly changed. The stools become soft, almost odorless and frequent, the tongue clears, the appetite is keen and is satisfied with simple foods. Cereals and a moderate amount of fats can now be added to the bill of fare, but the fruits, bran or agar-agar, and paraffin must be continued.

The diet must be made so bulky and laxative that the bowels move three or four times a day. Four movements a day are better than three. The stools should be odorless or they may have a slight sour odor. An ammoniacal or putrid odor is evidence that the flora has not yet been changed, and the fruit regimen must be continued or repeated after a few days. Sometimes several repetitions of the regimen at intervals of a week or two are required for complete success. Animal products of all sorts must be avoided. Even milk must be excluded, as well as eggs and meat. As pointed out by Tissier

some years ago, the bacteria which produce colitis thrive best upon animal protein.

Another point of importance is to supply the colon with carbohydrates. Sugar administered by the mouth never reaches the colon, for the reason that it is so readily absorbed that it is all taken up by the small intestine. Cooked starch is digested so quickly that it is also absorbed from the small intestine, only a mere trace reaching the colon. The way to get carbohydrate into the colon is either to introduce it by enema, or to administer it in an uncooked, or partially cooked, state, so that it may have an opportunity to reach the colon before digestion is complete. It is well known that saliva does not act upon cooked starch.

Raw starch may be digested by the pancreatic juice, but the process is very slow, and so when starch is taken raw a considerable proportion, ten to twenty per cent according to the writer's observations, may reach the colon. In the colon there are always present bacteria capable of digesting raw starch and converting it into sugar. When sugar is present, not only the ordinary lactic acid forming bacillus but the various putrefactive bacteria seize upon the sugar with great avidity and convert it into lactic acid. It appears that even putrefactive germs are putrefactive, or carnivorous, only when compelled to be so through the absence of carbohydrate in available form. When sugar is present, putrefaction does not take place. This important fact was pointed out by Kendall some years ago,

and demonstrates that it is possible to reform the bacteria of the colon, and this is much more easily accomplished than to drive out the various species of bacteria which, in most cases, have been thoroughly established in the intestine for years, and occupy every nook and corner of the colon; they cling so tenaciously to the territory which they have invaded, that it is practically impossible to drive them out so completely that a sufficient number will not be left behind to quickly re-establish themselves when favorable conditions develop.

Raw starch may be introduced in various ways. A convenient method is by the use of "brose" (see page 237). Another excellent plan is the following: Pour into a bowl six ounces of boiling water. Rapidly stir in a heaping tablespoonful of fine oatmeal, or rolled oats, which has been passed through a vegetable grinder. Let it stand one side for five minutes and add a little salt and eat as porridge. The preparation is not unpalatable. If desired, it may be taken as a beverage with the addition of a little water or fruit juice.

In addition to the above, there are several other highly effective measures which may be advantageously employed in the treatment of colitis. Notwithstanding the free use of bran or agar-agar and paraffin, the colon may be so crippled that it does not completely empty itself and a sufficient amount of material is constantly left behind to encourage putrefaction, and to prevent the healing of the diseased surfaces. Examination with the X-ray shows



in these cases a spastic, or contracted, condition of the descending or pelvic colon, and in many cases a prolapsed condition of the pelvic colon, which may be adherent. In these cases, the colon must be daily washed out by means of an enema consisting of two or three pints of salt water. The temperature of the water should be  $105^{\circ}$  to  $108^{\circ}$ . The enema should be repeated several times, or until the water returns clear. The effectiveness of the enema is greatly increased by thorough massage of the colon, especially of the pelvic colon, with the patient in the knee-chest position. When the pelvic colon is distended by the enema it may be manipulated more effectively.

After the colon has been thoroughly emptied, an injection is made consisting of a culture of *Bacillus Bulgaricus* in whey, to which has been added a small portion of well boiled starch and also a small quantity of malt sugar. By this means the colon is inoculated with germs; in other words, a new flora is planted and supplied with the material to promote its growth and development, and to help reform the wild bacteria of the colon to which colitis is due.

It is well to use short tonic baths, the moist abdominal bandage, fomentations and other applications of heat to this region. Light baths, and measures of all sorts which build up the general health, must supplement the local measures above suggested. This method of dealing with cases of colitis has long ago passed the experimental stage. By thor-

ough application of these simple means many hundreds of chronic sufferers from colitis have been not only relieved, but cured. It must be remembered, however, that the measures found necessary to effect a cure of this distressing ailment must be adhered to more or less strictly after the cure, as the only certain means of preventing recurrence.

### Proctitis

In cases in which cumulative constipation involves the rectum, infection, here known as proctitis, develops in this part also. Infection may extend from the pelvic colon into the rectum. When the rectum is involved, the patient often suffers from more or less constant pain and uneasiness in this region; there may be frequent desire to move the bowels, but however frequently the bowels may be moved, there will always be some feces remaining in the rectum, together with mucus and, occasionally, blood. An examination of the rectum sometimes shows ulceration. In advanced cases, the mucous membrane is smooth and dry, with patches of mucus adhering here and there, and frequently raw surfaces which bleed when touched. The conditions are identical with those which are found in the bowel higher up. The point of junction of the colon and the rectum is a favorite seat for ulcerations and thickenings of the mucous membrane.

When the disease extends deeper into the wall of the bowel, as it does sooner or later, thickening and rigidity result. By extension of the disease through the membranous wall, the outer surface becomes inflamed, and adhesions may occur between the lower bowel and the bladder, which sometimes result in fistulæ between the two viscera. Adhesions may also occur between the colon and small intestines and other parts; the ulcerations may heal and form cicatrices, which contract and produce obstruction. The lower part of the rectum and the juncture of the colon and rectum, the pelvirectal valve, usually show the worst effects of catarrhal colitis, and these points are the favorite seat of cancerous growths. The long continued irritation to which these parts are subjected also leads to the development of other growths, which, together with ulcerations, as has been shown by Mummery, a very eminent London specialist, are very prone to develop into cancer, and on this account, every person who suffers from catarrhal colitis, as shown by the presence of mucus in the stools, should submit himself to a physician for examination in order that any existing tendency towards malignancy may be recognized sufficiently early to permit of its radical treatment.

The treatment of proctitis is essentially the same as that already outlined for colitis. Change of the intestinal flora, frequent bowel movements, daily cleansing of the colon, an anti-toxic diet, and the

introduction into the colon of cultures of lactic acid forming organisms are the most important measures. Faithful employment of these measures will usually effect a cure.

### Muco-membranous Colitis

This disease is probably only a variety of the preceding. Of this the writer has been convinced for many years, although most authorities still describe this malady as a nervous disorder. The only particulars in which it differs from catarrhal colitis are:

1. The fact that mucus is not constantly present in the stools as in catarrhal colitis.
2. The presence of membranes which are sometimes complete casts of the bowel, and may be a foot or more in length.
3. Colic pains.
4. Intermittent occurrence of the symptoms.

These differences are not sufficient to characterize this condition as a distinct disease. Constipation is the predisposing condition which lies back of this disease, as well as of catarrhal colitis. If the infection is not sufficiently intense to produce continuous symptoms, it is only necessary that it should be increased by some indiscretion in diet, exhaustion, a severe cold, or some other factor, to precipitate an attack. The casts consist of coagulated mucus, and not mucous membrane as patients often imagine.

The colic pains are due to violent contraction of the colon, which are excited by the accumulation of gas and irritating fecal matter. This disease is often associated with chronic affections of the pelvic organs, and is much more frequent in women than in men.

Colitis in any form is a serious condition which cannot be safely neglected. Sooner or later it creates conditions which are beyond remedy except by surgical means.

### **Treatment**

The treatment of this condition does not differ from that already outlined for the treatment of colitis. Medicinal laxatives of all sorts must be avoided, because these only serve to aggravate and perpetuate the disease.

### **Enlargement of the Liver and Spleen**

Marked enlargement of the liver and spleen are frequently the result of chronic constipation with intestinal autointoxication. The constant flooding of the liver with toxins must result in damage to its tissues. Boix showed this in his experiments upon rabbits. Some years ago the writer encountered a case of enormous enlargement of the liver, in which there had never been any use of alcohol, and there could be found no more tangible cause for the disease than a chronic constipation

which had existed for many years. The writer has seen many cases of decided enlargement of the liver and spleen, in which constipation and autointoxication existed to a marked degree.

### **Fecal Tumors**

When the obstruction which causes a delay in the movement of feces through the colon is permanent, the mass of accumulated feces may attain such a size as to be easily felt through the abdominal wall. Fecal tumors may generally be distinguished from other tumors by their doughy consistency, that is, their shape may be moulded by pressure with the fingers. Such forms sometimes disappear suddenly and may be broken up by the manipulation of the hands, or softened by means of enemas of warm water or warm oil. Sometimes a surgical operation is necessary for their removal.

The late Dr. Lawson Tait told the writer of a case to which he was called to operate for the removal of a large abdominal tumor, which proved to be a tumor of this sort. On opening the abdomen, the small intestine was found to be enormously distended just at the ileocecal valve. On inquiry, it was found that the patient, who was recently convalescent from typhoid fever, had swallowed rather rapidly a large quantity of milk. Suspicion at once arose in the mind of the surgeon that the mass might consist of undigested curds. With this idea in mind, he carefully manipulated the tumor with his fingers,

and finally succeeded in breaking up the mass to such a degree that it became possible to push the fragments through the ileocecal valve, and thus a more serious operation was avoided.

### **Volvulus**

Sometimes the processes which begin in the intestine and work outward through the intestinal wall give rise to inflammatory changes in the membranous fold of mesentery to which the pelvic loop of the colon is attached. As a result the mesentery is gradually shortened until the ends of the loop are brought close together and fixed. With the colon in this position, there is a great risk of obstruction from the twisting of the loop, which occasionally happens, giving rise to what is known as volvulus. In a case of this kind prompt surgical relief is very essential. A short delay may give rise to gangrene of the intestine, and general peritonitis.

### **Disorders of the Stomach**

Although located at the other extremity of the digestive canal from the colon, the stomach is, nevertheless, in various ways and to a profound degree influenced by chronic constipation. Loss of appetite is a very common symptom in constipation, and so constipation is increased through the lack of the vigorous stimulation given to the movement of the intestine by the taking of food with relish.

Hyperhydrochloria, gastritis, and even ulceration in the stomach and duodenum are by many eminent medical men attributed to the stagnation of the intestinal contents.

### **Diseases of the Heart and Blood Vessels**

Palpitation of the heart is a common consequence of an acute accumulation of feces in the colon, probably the result of the excessive absorption of toxins to which such accumulations give rise.

Pseudo-angina pectoris, in which the patient suffers pain in the region of the heart entirely similar to those which occur in angina pectoris, are frequently associated with chronic constipation. Chronic constipation or the autointoxication resulting from it may be regarded as a cause of true angina pectoris as well as of pseudo-angina. Arteriosclerosis affecting the vessels of the heart has been clearly shown by Bouchard and other authorities to be one of the common results of chronic constipation, and attacks of angina pectoris often appear among other symptoms of the degenerative changes which have taken place. Years ago Boix of Paris showed that the poisons produced by the colon bacillus are capable of producing these degenerative changes which result in sclerosis of the arteries of the liver, spleen, and other glands.

### **Premature Senility**

The senile appearance of many persons who have long suffered from chronic constipation, as well as



the steady decline of longevity in countries in which constipation is prevalent, is evidence of the mischievous results of the constant absorption of the poisons produced by colon germs which Metchnikoff regards as the cause of old age. The pigmentation of the skin appearing first about the eyes and as brown spots upon the hands, the thinning of the skin of the hands and parchment-like appearance of the skin are familiar symptoms of senility induced by alimentary toxemia. It is highly important to note that these senile changes are not confined to the skin. The changes in the skin are only the external signs of similar degenerative changes taking place in the bloodvessels, liver, kidneys, and other vital internal parts.

### **Disease of the Kidneys**

The poisoning resulting in chronic constipation is frequently indicated by the appearance of albumen and casts in the urine. A long continuance of this poisoning gives rise to changes in the kidney, which are commonly known as Bright's disease. It is indeed quite possible that chronic constipation may be one of the most important of all causes of this terrible malady. Statistics of all civilized countries show that Bright's disease is increasing very rapidly. In the United States the number of persons dying of it is at the present time 2.31 times as great as thirty years ago. In certain cities the proportion is still higher, the increased mortality rate from this

cause amounting to 164 per cent. The large use of meat in connection with this condition of constipation greatly aggravates the evils arising from this condition, because meat not only affords the poison-forming bacteria just the sort of material they require to promote their growth, but also introduces into the intestine in large numbers the most virulent forms of putrefactive bacteria.

Suppuration of the kidney, shown by pus in the urine as well as by local pains and other symptoms, is usually associated with chronic constipation. Infection of the kidney with colon germs may occur through the urinary tract, the germs travelling by the ureters to the kidney, or direct infection may occur. The bacteria which grow in the intestines, specially when their virulence is increased by stasis or stagnation, readily penetrate the walls of the intestine and adjacent organs. The right kidney lies in immediate proximity to the colon.

Bacteriological examination of the urine in cases of suppuration of the kidney often shows the presence of colon germs.

### **Movable Kidney**

The right kidney is so closely connected with the hepatic flexure of the colon that any change of position of this portion of the colon must have more or less effect upon the kidney. When the cecum and the ascending colon become overloaded, the

drag upon the kidney may become so great as to loosen it from its moorings, and lead to floating kidney.

### **Disease of the Liver and Gall-Bladder**

Recent observations have shown that when putrefying feces accumulate in the colon great numbers of bacteria pass through the walls of the intestine into the branches of the portal vein, and are carried to the liver. The liver destroys many of these bacteria, but not a few of them pass out in the bile, and thus infect the bile passages of the liver and gall-bladder. It is possible, also, that infection may occur directly from the intestine. The bacteria may ascend the gall ducts to the gall-bladder and the liver. Modern research has shown that gall-stones are always due to bacteria, which are found in the interior of the gall-stones. Persons suffering from disorders of the gall-bladder, and from gall-stones, are always chronic sufferers from constipation and alimentary toxemia, to which unquestionably their liver troubles are chiefly due.

### **Insomnia**

One very rarely finds a person suffering from insomnia who is not constipated. Not infrequently, the constipation is present in the latent form, and its existence may not be expected. Examination of the stools and inspection of the tongue give clear evidence of the existence of stasis in the colon. The

insomnia is due to the irritation of the brain cells produced by the poisons with which the blood is saturated through absorption from the colon. The use of soporifics only secures temporary relief with a certainty of making the patient worse through disturbing his digestion, destroying his appetite, and thus making his constipation worse. By relief of constipation through proper diet, and the adoption of other rational measures the insomnia may be made to disappear, and usually with very great promptness.

### Headache

This very common and most distressing effect of chronic constipation is due to putrefaction poisons absorbed from the colon, and constipation quickly disappears when the intestinal flora is changed and the bowels made to move well three times a day. Copious water drinking, especially drinking two or three glasses of hot water two or three times a day ameliorates the symptom by aiding the elimination of poisons. Attacks of migraine are always preceded by an increase of stasis, that is, by an accumulation of fecal matters which throws into the blood a new flood of indican and other toxins. By a thorough emptying of the colon through the use of the enema the attack may always be mitigated and sometimes averted. If the attack has actually begun, however, the result is less satisfactory although

even then the duration of the attack if not its intensity may be lessened by emptying the colon by repeated enemas. When vomiting or nausea is present, the enema should be repeated several times a day as a means of introducing much needed fluid. An excellent plan is to introduce into the colon to be retained and absorbed half a pint to a pint of water every hour or two.

The excruciating pain of migraine may be made more endurable by fomentations or alternate hot and cold applications to the painful parts. The use of morphia and other narcotic or pain retrieving drugs is most pernicious. The use of drugs purchases but present relief at the expense of increased future suffering. Such drugs increase the constipation and so aggravate the toxemia and not infrequently a drug habit is formed.

### **Rachitis, Arrest of Growth and Other Disturbances of Nutrition in Infants**

The researches of Combe and Rouget have clearly shown the relation of intestinal intoxication to the arrested growth and other disturbances of nutrition which are frequently observed in infants and young children and that constipation lies at the foundation in most of these cases. One of the most important of all the duties of the nurse is to attend carefully to the condition of the infant's bowels, as neglect in the first weeks of infancy may lay the foundation

of troubles which years of painstaking efforts will be required to relieve, and which may be irreparable.

### **Diverticulitis**

This newly-described disease affects especially the colon, and particularly the pelvic colon. It consists in the formation of small pouches along the border of the colon, which sometimes increase to a considerable size. These pouches become filled with feces, which often set up irritation and give rise to abscesses.

Many of these pouches have very narrow mouths so that fecal matter readily accumulates in them. This condition involves many serious dangers. If the mouth of a diverticulum becomes closed, the infectious contents quickly give rise to inflammation which may result in ulcer of the bowel, abscess, or adhesions with the formation of a tumor mass and obstruction. When diverticuli are known to exist, the patient should take care to keep the bowels freely open by a very laxative diet and the use of Russian paraffin oil.

Diverticulitis is caused by injury to the intestinal wall produced by colitis followed by overdistention of the bowel by accumulation of fecal matters.

Each diverticulum involves exactly the same dangers which are connected with a chronically inflamed appendix.

Diverticulitis may cause obstruction of the bowels, both by giving rise to adhesions and by causing thick-

ening of the walls of the intestine, and so gradually narrowing its lumen until complete obstruction occurs. This condition is sometimes mistaken for cancer.

### **Cancer**

The discoveries of Ross respecting the cause of cancer show very clearly the reason for the special frequency of cancer in the pelvic colon and the rectum. According to Ross, cancer is due to an abnormal stimulation of the processes of normal cell growth. He has shown by elaborate laboratory researches that cholin and cadaverin, two of the products of the putrefaction of flesh or protein, are powerful augmenters of cell action, and in recent experiments he has been able by these poisons to produce in guinea pigs growths which have all the characteristics of cancer. Certainly no part of the body is more exposed to the influence of these putrefactive products than is the lower bowel. It is evident, then, that this portion of the body should receive prompt attention on the occurrence of the slightest symptoms of disease, and that as a protective measure putrefaction of the feces should be prevented by proper regulation of diet and of the bowel movement.

### **Tuberculosis of the Bowels**

Intestinal tuberculosis appears to be increasing. That this should be the case is not surprising, in view of the fact that constipation is becoming more

and more prevalent each year. The contact of poisonous fecal matters with the mucous membrane lowers its resistance and renders it susceptible to the infectious influence of the tubercle germ. All forms of tuberculosis, as the history of cases shows, are almost invariably preceded by chronic constipation for a prolonged period.

### **Backache**

Aside from symptoms which relate to the rectum, backache is perhaps the most common of all local symptoms arising from constipation. In women this symptom is usually attributed to disease of the womb or ovaries. It is safe to say that in by far the larger number of cases the pain is due not to disease of the organs peculiar to women, but to a diseased condition of the colon, set up by long continued contact with putrefying fecal matters. In many cases tender points can be felt by deep pressure along the iliac or the descending colon. Sometimes the pelvic colon may be located. By the aid of the X-ray and the fluoroscope it is possible to locate and make pressure upon every part of the colon, as well as to note its form and size, and thus the presence of disease may now easily be located when present.

The pain is reflex in character, and may often be produced by pressure upon a contracted and tender part of the colon. Pains over the sacrum are quite as often due to disease of the rectum as to disease of the uterus or ovaries. As constipation is so con-



stantly associated with disease of the pelvic organs, it is a question of interest whether the pain usually attributed to pelvic disease, when this is present, may not in many cases be really due to disease of the colon or rectum. Tender spots in the lower part of the back are usually due to the same cause, and only rarely indicate disease of the spine.

The congestion of the abdominal organs which results from chronic constipation is the cause of a great variety of reflex pains in the back and sides. Coldness, numbness, prickling and creeping sensations, and points of tenderness in the abdomen, a sense of weight, dragging and pressure, are only a few of the distressing symptoms which arise from visceral congestion due to the absorption of toxins from the intestinal tract, and the infection of the intestinal mucous membrane resulting from chronic constipation.

### **Exophthalmic Goitre**

This serious disorder, which is becoming constantly more common, is unquestionably due to chronic intestinal poisoning, and hence may be the result of constipation, which in some form is always present in cases of chronic intestinal autointoxication. To treat this malady simply by removal of a part of the thyroid gland by a surgical operation, or by partial destruction of the gland by the X-ray without giving attention to its cause, is certainly irra-

tional, since the enlargement and activity are the effects, no doubt, the absorption of toxins from the intestinal canal. The gland enlarges because of the extraordinary amount of work demanded of it, its special function in the body being to aid in the destruction of poisons, especially those developed in the intestine by the decomposition of protein. Animals whose thyroids have been removed soon develop convulsions and die when fed on a meat diet, but thrive indefinitely on a diet which excludes meat.

### **Myxedema**

A disease which is the antithesis of exophthalmic goitre, myxedema, is really due to the same cause. The thyroid gland becomes worn out by excessive work, and its function is lost. In consequence, the whole body suffers from peculiar degenerative changes. The skin and hair become dry, pale and sodden in appearance, the speech is thick, the expression is peculiar and characteristic, and the intellect is dulled. The cause of this peculiar disease was wholly a mystery until the function of the thyroid was discovered. It is now known to be due to the failure of this important gland to do its work, as the result of degeneration, which is in most cases the result of the excessive work imposed upon it by the auto-intoxication induced by a high protein diet: that is, by the free use of meat and eggs, especially when associated with constipation.

Hypothyroidism, incipient myxedema, is a very common malady. The thyroid is less active than it should be though its function is not wholly lost. Dryness of the hair, falling of the hair, and dryness of the skin are common symptoms of this condition, seen associated with chronic constipation, and the natural result of long overwork of the thyroid in destroying colon poisons.

### **Chronic Rheumatism and Rheumatic Gout (Osteo-Arthritis)**

Both these diseases are closely associated with constipation and alimentary toxemia. Herter showed that certain putrefactive organisms are always present in great numbers in the stools of persons suffering from rheumatic gout. The experience of many physicians has shown that great improvement often follows the adoption of a low protein diet in these cases; and the benefit derived from securing increased activity of the bowels has made many a mineral spring famous as a cure-all for rheumatics.

The writer has seen hundreds of chronic sufferers from these maladies greatly relieved and many cured by a low protein diet and the restoration of normal colon activity.

### **Pigmentation of the Skin and Skin Diseases**

When meat and eggs are eaten freely, according to Combe, there may be produced in the intestine

a large amount of a brown poisonous coloring substance, "brenzcachin," to destroy which is one of the functions of the suprarenal capsules. When these glands become defective, through overwork, this substance accumulates and, being deposited in the skin, gives rise to dinginess of the complexion, brown circles around the eyes, so-called "liver patches" on the face and other parts, brown spots upon the hands, and a deepening of the color of parts of the skin which are normally pigmented, as the axillary regions, groins, and in many patients a line down the center of the back.

This pigmentation is commonly seen in aged persons, in whom as in others its cause is the constipation which is usually associated with old age. The same pigmentation is sometimes seen in young persons, and even in infants, as the result of intense poisoning from intestinal putrefaction. When an antitoxic diet is adopted, and the bowels are made to act normally, the pigmentation disappears with remarkable quickness. Dr. Lane of London has demonstrated the connection between this abnormal pigmentation and putrefaction in the colon, by removing the colon. He states that the worst cases show a surprising change for the better in a few days, and the pigmentation wholly disappears within a few weeks. Cases seen by the writer in a London hospital seemed to verify this claim, which is also supported by the results of securing frequent daily movements in very chronic cases of constipation.

## Eczema

Eczema, one of the most common and most distressing of skin maladies, has long been known by skin specialists to be caused by constipation. Doctor Bulkley, the eminent skin specialist of New York City, has within the last thirty years many times called attention to the fact that eczema is encouraged by the use of flesh food, and that most chronic cases are curable by strict adherence to a non-flesh dietary, even when all other measures have failed to give relief.

A most distressing form of this disease is eczema of the anal region, one of the frequent results of constipation. This annoying ailment usually disappears very soon when the bowels are made to move three times a day, and meat is excluded from the diet.

Temporary relief from the horrible itching of eczema may be obtained in many cases by bathing the parts with very hot water (120° F.), or by exposing them to hot steam. Then apply an unguent, consisting of the following: lanolin 2 drams, boroglyceride 1 dram, cold cream 6 drams. This method usually succeeds especially well in old cases in which the skin is dry or scaly. The eruption usually disappears very quickly after a proper X-ray application. The actinic ray is sometimes more effective. The affected parts should be constantly and very carefully protected.

### **Psoriasis**

This form of skin disease, usually more obstinate though less distressing than eczema, is generally incurable without the adoption of a fleshless diet and restoration of the normal function of the colon. In many cases nothing else is needed to effect a permanent cure. A few applications of the actinic rays by means of the arc light or the "mercury light" will generally cause the eruptions to disappear. Apply the skin cream given on previous page.

### **Itching Skin without Eruption**

Many constipated persons, especially old persons, suffer from intense itching and burning of the skin, especially of the back and other parts of the arms and legs. The affection is generally worse in cold weather and when hard water is used for baths. A soap and water bath is generally followed by an increase of the itching. If the skin is scratched, an eruption resembling eczema appears.

Besides combatting the constipation nearly always present, bathe the parts with water as hot as can be borne (120° F.) several times daily. Avoid rubbing. After bathing, apply skin cream freely. The cream should be applied to the whole surface of the body after bathing and daily or even twice a day. If necessary to completely relieve the itching, menthol may be added to the cream in the proportion of ten grains to the ounce.

## Vertigo

This unpleasant symptom is a very common result of constipation. Vertigo is a common symptom in cases of arteriosclerosis caused by constipation, and sometimes results from irritation produced by the presence of feces in the rectum. In certain nervous persons, vertigo, faintness or exhaustion are sometimes experienced when the bowels are evacuated by a saline laxative or by an enema. The cause of this is doubtless the absorption of poisons brought into solution by the large amount of fluid present in the intestine. So long as the feces are hard, little absorption can take place. But when they become semi-fluid, the poisons present are brought into solution and are also made to come in contact with the mucous membrane, so that rapid absorption occurs. In some instances, the prostration is such that recovery does not take place for several hours. These are probably cases in which the liver and kidneys are crippled as the result of long-standing disease.

Dr. Case has observed that unpleasant symptoms immediately following an enema are connected with the entrance of the injected liquid into the small intestine through an incompetent ileocecal valve. This is an interesting observation. It suggests that vertigo at other times may be due to refluxed material from the colon, due to antiperistaltic action of the colon. The wretched feeling which many neurasthenics experience in the morning may be

due to the same cause. Case has observed that although the small intestine may be entirely empty at night, in the morning several feet of the intestine may be filled with fecal matters which have returned from the colon through an incompetent ileocecal valve.

### **Disorders of the Urinary and Generative Organs**

Urinary troubles in both men and women, as well as in children, are often traceable to constipation. Very foul-smelling urine often owes its unnatural odor to the presence of putrefaction poisons absorbed from the intestine.

Both inability to urinate and a frequent desire to urinate may result from the accumulation of feces in the rectum. In children the escape of urine during sleep is often due to constipation.

Prolapse and retroversion of the uterus is a common result of the straining necessitated by constipation in women and girls.

Dysmenorrhoea, leucorrhoea, and a varicose condition of the broad ligaments, which is accompanied by much pain and discomfort, may result from the pressure of feces in the rectum and lower colon. Nocturnal seminal losses and an abnormal irritability of the parts, causing erection and also neuralgic pains in the testicles, and varicose veins, may result from the congestion caused by the pressure of feces in the rectum and lower colon.



### Fecal Fever

Accumulation of feces in the colon is a frequent cause of attacks of fever which so much resemble malarial paroxysms that they are usually treated by the administration of quinine. There is often a distinct chill, followed by fever and sweating. The tongue is coated, the breath bad, and there is much headache, and sometimes vomiting. The fever may last several days, but disappears quickly when the bowels have been thoroughly evacuated.

These attacks are very common in persons who are subject to colitis, and much mucus is often discharged when the bowels are cleared out.

Abdominal surgeons have constant occasion to note the effect of fecal accumulations in raising the temperature. A rise of temperature after operation is more often due to this cause than to any other. This fact led to the practice of thoroughly evacuating the bowels before operation, and early moving them afterwards, an innovation introduced by the late Dr. Lawson Tait, and which has been the means of saving more lives than any other modern improvement in surgery, except aseptic technic in operation.

Neglect to secure complete and regular evacuation of the bowels is a frequent cause of rise of temperature after confinement and in convalescence from acute illness. Accumulation of feces not infrequently occurs when the bowels move daily, and even when the bowels are quite loose, as shown by

the immense quantities of loathsome material which may be washed out by means of a thorough enema. The writer recalls a case in which a woman who had very loose movements for two or three weeks was found to have an enormous mass of hardened fecal matter in the rectum, and a very great accumulation of feces in the lower colon.

Bed patients should always be made to sit up when moving the bowels or urinating, when this is at all possible, so as to secure complete evacuation of the urine and feces. In most cases this may be done without injury after the second day. The same remark applies with special interest to cases of confinement. There is so often an accumulation of feces in the colon in pregnancy, especially within the last two or three weeks before confinement, that it is highly important to give the matter prompt attention at once after the child is born, as well as before confinement. Very often a great quantity of putrefying material will be removed, the retention of which may give rise to autointoxication with fever and even worse symptoms.

### **Flatulency**

This symptom may result either from the excessive formation of gas in the intestine, or from the accumulation of gas. A certain amount of gas is natural. The presence of gas in the intestine is an aid to peristalsis. This is especially true of the large intestine.

Excessive formation of gas occurs through the action of bacteria upon the food stuffs. Gas is most readily formed from cooked starch or sugar, but may be formed from cellulose and from protein. Odorless gas is usually formed from starch or sugar, inflammable gas from cellulose, and gas having a foul odor from protein. These different elements of the food are acted upon by different species of bacteria, so that the character of the gas formed in the intestine becomes something of an index to the sort of bacteria present. Bacteria which act upon starch, sugar and cellulose are comparatively harmless while the presence of foul smelling gases indicates the presence of putrefaction and the pernicious bacteria and the virulent poisons which are always present in this condition.

The formation of gas in excess is due primarily not so much to the excessive use of starchy food, as many persons suppose, but to stasis or stagnation of the food. Bouchard showed long ago that if the foodstuffs remain in one part of the alimentary canal, even in the stomach, fermentation and other bacterial changes take place.

An important remedy for flatulence, then, is increased intestinal activity. When the gas is confined to the colon an enema, either warm or cool, will usually secure relief; for permanent relief the causes of the constipation must be removed by systematic treatment.

Flatulence which is not relieved by emptying the

colon is due to incompetency of the ileocecal valve. The absence of the check valve at the junction of the small intestine with the colon permits the gas to pass back into the small intestine. This condition is generally greatly mitigated by increased activity of the bowels; a radical cure may be accomplished by repairs of the ileocecal valve.

Flatulence may become dangerous in cases of high blood pressure with degeneration of the blood vessels. The great accumulation of gas in the intestines forces the blood out of the abdominal vessels into the general circulation, and so raises the blood pressure. If the blood pressure is already high, and the blood vessels seriously weakened, the rise of pressure may be sufficient to cause a rupture and apoplexy with paralysis, if the rupture occurs in the brain.

The wet girdle or moist abdominal bandage is often found a most efficient means of combating flatulence. The bandage must be kept moist, and should not be too warmly covered. The mackintosh cover must be omitted, the purpose being to promote evaporation and thus maintain a mild stimulant action upon the intestine. The bandage will dry out in three or four hours, when it should be renewed. It may be worn with advantage both night and day. The bandage must be changed or boiled daily to avoid producing skin infection.

Flatulence in the colon always means stasis, that is, delayed feces which need removal. Persons who

have been accustomed to a hearty meat diet sometimes suffer considerably from flatulence when a change is made from meat to vegetables, but this should not be considered as a need to return to a highly nitrogenous diet. After a short time the activity of the bowels will be increased to such a degree that the constipation will be overcome, and the flatulence will disappear. In cases in which the free use of cereals or starch food is accompanied by acidity of the stomach or heartburn soon after eating, the difficulty may be relieved by increasing the amount of fat taken with the meals. Usually one or two tablespoonsful of olive oil taken at the beginning of the meal will cause the disappearance of this unpleasant symptom.

### **Foul Tongue and Bad Breath**

These common conditions are more often due to constipation than to neglect of the mouth. A high protein diet, that is the free use of eggs and meats, together with constipation even in very mild degree, will cause coating of the tongue and a fecal odor of the breath. The general low resistance caused by chronic toxemia destroys the ability of the saliva to prevent the growth of germs in the mouth and the result is coating of the tongue, ulceration of the gums and decay of the teeth.

The cure is not to be found in dentifrices, lotions, tooth brushes or dental procedures, "mouth treat-

ment," etc., but in removal of the cause by draining the bowels through diet and other measure, to move thoroughly three times daily. Of course the toilet of the mouth and "mouth treatment" by a skillful dental surgeon must not be neglected.

A diet consisting exclusively of wheat bran and fruit, preferably apples and oranges, continued for three or four days will rapidly clear the tongue and sweeten the breath in ordinary cases. Half a pound of sterilized bran should be eaten daily and apples may be eaten in any quantity which does not cause inconvenience. Twelve to sixteen apples taken at four meals will usually be found sufficient. The fruit must be eaten raw and should be well chewed. One or two apples or other fruit may be eaten whenever a craving for food is felt. Fruit imposes little or no labor upon the digestive organs. Berries, grapes, peaches, oranges, melons, tomatoes, lettuce cucumbers and celery may be added to the bill of fare if desired. The greater the bulk and the less the actual food value represented in the food the better.

The addition of bran is necessary for the reason that the tender cellulose of fruit is often almost completely digested and so furnishes little residue.

The "milk regimen" conducted according to the author's method (see pages 188-190), for one to two weeks rarely fails to clear the tongue and to remove the foul odor of the breath.

### Hemorrhoids

The pain and inconvenience from hemorrhoids is usually the result of infection. The distended veins do little harm unless inflamed. The infection results from the retention of fecal matter in the folds of the mucous membrane. Straining at stool distends the veins and cracks the mucous membrane, thus opening up channels for infection. Abrasions are also often produced by rough toilet paper and by lack of care in the insertion of the enema tube. Thorough cleansing of the parts with water after bowel movement is an excellent preventive measure. This is the universal custom in India and is certainly more sanitary if less convenient than the method in universal use in western countries. The use of an antiseptic suppository after each bowel movement is a most useful precaution. Suppositories made of cocoa butter and containing two grains each of tannic acid are most excellent for this purpose.

When the bowels move freely three or four times a day hemorrhoids are rarely troublesome, at least when the precautions above recommended are employed. In many cases they apparently disappear. When persistent however, they should be removed. This may be done with perfect safety and with so little inconvenience that no one who suffers from hemorrhoids should hesitate to have them removed. Chronic irritation is an invitation to cancer.

### **Anal Fissure or Ulcer**

This painful affection most generally follows hemorrhoids. If it does not speedily disappear when the bowels become regular, resort to operation is necessary. Operation is also indicated when the ulcer renders defecation painful and thus interferes with regular bowel action, which is most generally the case.

The operation need not be dreaded. The modern methods of dealing with surgical cases of this sort are entirely safe and nearly painless.

### **Anal Itching**

This is usually a form of eczema which is kept up by an irritating discharge from the rectum. The measures recommended for eczema will effect a speedy cure after the bowels have been regulated and the rectal irritation or proctitis has been cured.

### **Rectal Prolapse**

In cases of prolapse of the rectum frequent movements of the bowels are necessarily avoided on account of the inconvenience involved. Such cases may be cured by a simple and safe surgical procedure. Such an operation should be the first step in the effort to cure the chronic constipation present. After the operation, the free use of bran and paraffin at each meal will prove efficient.



### **Anal Incontinence**

Persons whose anal sphincters have been paralyzed by disease or by careless surgery often keep the bowels constipated to avoid annoyance from incontinence. In such cases it is of course necessary first of all to remedy the anal defect. This may usually be done by a skillful surgeon and the operation is attended by no serious risk.

### **Anal Spasm**

Undue contraction of the anal sphincter is generally associated with fissure, hemorrhoids or rectal irritation. If not speedily relieved by removal of the source of irritation the operation of stretching the sphincter is necessary. Excessive tension of the sphincter appears to be sometimes present without evidence of local irritation.

### **Abdominal Tenderness**

Very hot fomentations applied two or three times a day for ten or fifteen minutes are almost a sovereign remedy for the abdominal tenderness usually found in chronically constipated persons, especially when colitis is present. The moist abdominal bandage used at night with a mackintosh cover is a very old-fashioned and still unrivalled remedy for tenderness, soreness and ill-defined pain in the abdomen. These remedies are more than

merely palliative, but of course are not in themselves curative unless the constipation which gives rise to the congestion of the sympathetic nerve centers, to which the pain is due, is also cured by use of the proper means.

### **Colic Pains**

Apply very hot fomentations to the abdomen and administer a hot enema. Repeat the applications both of the fomentations and of the hot enema until the pain ceases as it soon will do. Heat is a most excellent antidote for pain. It also relaxes muscular spasm; it is thus a most appropriate remedy for intestinal colic.

### **“Kinks”**

So much is being said about “kinks” in current medical literature it is not remarkable that the laity should begin to take an interest in the subject. The writer’s chief purpose in mentioning this subject here is to emphasize the fact that “kinks” are of far less consequence than was at first supposed. X-ray evidence has demonstrated that kinks and folds in the colon are seriously obstructive only in very rare cases. To advise a surgical operation simply because the X-ray shows a “kink” or fold in the transverse colon or a very pronounced prolapse is most improper. It has been proved that the so-called “Lane’s kink” of the terminal ileum

is seldom a source of trouble and very rarely requires surgical interference. By the adoption of an atoxic diet from which all animal protein is excluded and by the employment of the necessary measures for securing three bowel movements daily the troubles supposed to arise from "kinks" rarely fail to disappear; and without the adoption of these measures surgery affords only temporary relief, sometimes not even that, as a return for the very great risk to life and the severe suffering and shock involved in such operations as "short circuiting" and removal of the colon.

## Bowel Habits of Uncivilized Man

Civilized human beings have departed so far from natural primitive modes of life, and have adopted so many unphysiologic practices, that it is quite impossible from the conventional usages of civilized people, to form any just conclusion of what are natural or biologic modes of life for human beings. This is particularly true of customs and habits in relation to human alimentation. From a study of the modern hotel bill of fare one could not possibly obtain even a suggestion of man's primitive and biologic diet. The natural conclusion would be that man is a universal feeder, since the average hotel menu presents practically everything that any animal eats; but biology teaches us that man is naturally frugivorous, and science offers no reason why he should have departed from his original bill of fare, to which his nearest relatives, the anthropoid apes, the chimpanzee, the orangoutang and the gorilla, living in their native forests, still scrupulously adhere.

Man has not only developed wrong habits in relation to the kind of food he eats, but has become unbiologic in almost every phase of his daily life. Constipation is simply one of the natural consequences of these perversions. It is scarcely too much to say that the average civilized man is the victim of chronic constipation. If his bowels move once

a day, or even once in two days, he feels that his condition is very satisfactory; whereas Cannon, in his work entitled "The Mechanical Factors of Digestion," has shown that practically all the digestible food taken at an ordinary meal is digested and absorbed within eight or nine hours from the time it is eaten, and the unuseable residue is at the end of this period found deposited in the colon, ready for ejection. Since the chief business of the colon is to eject wastes from the body, why should the performance of its function be so long delayed? The colon contents are largely made up of bacteria and excretory products, the undigestible elements of the food constituting only about one-half its bulk, while starch, fats, and protein are found in only very small and negligible quantities. It should be remembered that bowel movement is not simply for the purpose of discharging the unuseable residues of food. An equally essential reason for bowel movement is the discharge of the bile and other highly poisonous excretions which are discharged into the colon from the blood. No possible good, but only much harm, can come then from the prolonged retention of these body wastes and unuseable residues. There is in fact no physiologic reason why food residues should be retained in the body more than twelve to eighteen hours, or at longest twenty-four. It is evident, then, that bowel movements should occur at frequent intervals, for the purpose of removing these waste and poisonous materials.

The natural intestinal rhythm, as has been previously explained, provides for an unloading of wastes by a bowel movement after each meal and sometimes an additional one on rising. This requires three or four bowel movements daily. Although convinced by careful and extended observations in dealing with many thousands of invalids, that the bowels should be made to move several times a day, the writer several years ago set about collecting from original sources facts concerning the habits of uncivilized tribes of human beings.

The keeper of the London Zoological Gardens, informed the writer that the chimpanzee, orang, and the other large apes move their bowels four times daily with perfect regularity. Professor Hornaday, superintendent of the Bronx Park informs us that the large apes in the great collection under his supervision move their bowels three times a day.

Extensive inquiries made by means of a questionnaire sent out to physicians practising among primitive people in various parts of the world, show that the custom among many of those who live in a really primitive state, and have been little influenced by contact with civilization, is the same as that of the higher apes. Replies were received from one hundred and forty physicians who have had abundant opportunity to become acquainted with the habits and usages of the wild or half civilized people with whom they have been closely associated, and among whom they have practiced for years. A sum-

mary of these replies will be found highly interesting, especially in the light of the physiological facts which have been presented in the previous pages. It is most instructive to find wild and primitive people in widely separated portions of the globe following identical usages to which they have been trained by Nature, the universal teacher. A common instinct has led to a practical uniformity of habits among wild tribes who have not yet been sophisticated and perverted by contact with civilization. It is interesting also to note the same identity between wild tribes and those most remarkable creatures of the tropical wilds, the anthropoids, in practices connected with eating and bowel action. For much valuable and interesting information, a small portion of which is summarized in this chapter, I am indebted to scores of missionary physicians who have devoted their labors to the noble work of civilizing and Christianizing the people of heathen lands.

From the original and authentic information the fact appears that among tribes which have been uninfluenced by the customs of civilization, who still adhere to primitive habits in diet, and who live a free and active life in the wild, the bowels move two or three times daily. A single daily movement is regarded by such people as constipation, and gives rise to alarm. The one-movement-a-day habit appears only among those classes or castes who live a sedentary life and have adopted unnatural habits

in diet, such as the use of hot condiments, concentrated food, etc. The aristocratic classes of India and China afford striking examples of this, suffering much from constipation in consequence of their idle and luxurious habits, and from the use of curries and other unwholesome condiments, while the working classes whose diet and habits are more nearly normal are generally exempt.

As regard the frequency of bowel movements, physicians located in the following countries, reported the usual custom to be two or more daily, usually two, for the very good reason that two meals only are eaten, the first movement being on rising, or after the first meal, and the second soon after the second meal, or before retiring:

Rhodesia, Uganda Protectorate, Nyassaland, Nigeria, Harda (India), Delhi (India), Punjab (India), Kashmir, Nagpur (India), Bawda (India), Persia,—three or four times in summer when fruits are plentiful. Aintab (Turkey), Harpoot (Turkey), West Coast of Africa,—two or three. Portuguese Congo,—two or three. Egypt,—children four or five. Japan, Arabia,—two or three.

It is interesting to note that the experience of the millions of primitive and half-civilized people who inhabit the above named countries demonstrates perfectly that an intake of food should be soon followed by an output of food residues and wastes.

In all these countries, as among practically all



primitive people, great attention is given to the bowels. The mothers carefully train their children to move their bowels at regular times, and much pains is taken to make the diet such as to promote intestinal activity. The virtues of fruits and green vegetables are fully appreciated, and where rice is the principal food, as in most of the Orient, large use is made of green vegetables.

It is especially of interest to note the frequency with which some custom in relation to bowel hygiene is found in vogue among primitive people who have practiced it from time immemorial, while among civilized people the same practice has only recently become known as one of the discoveries of modern medical science. It is becoming more and more evident that our modern civilization in emerging from barbarism has left behind much that was not only useful but essential to a healthy physical life, and we may therefore profit by a careful study of the habits of primitive people and even of those wild animal species which belong with man in the class of primates, and are closely allied to the human species in structure and function.

Here are a few extracts from the replies to our questionnaire, which will be found most instructive as well as interesting:

"I am of the opinion that diet has a great influence. The Labances eat plenty of figs, either alone or mixed with juice of grapes or juice of carob beans, brown bread, fruits, vegetables, olive oil,

olives, etc., and drink plenty of spring water at meal times.”—A. J. Manasseh, M. D., Bruana, Beyrout, Syria.

“Laxative foods used are the following: Cooked manioc leaves, bananas, pineapples, bingondia (a sour-sweet seedy fruit), plantains, peanuts, palm oil, pumpkin seeds mashed and cooked. Raw guava leaves are used for diarrhoea, also the clay mounds built by white ants.”—Mattie and P. Frederickson, Belgian Congo, West Central Africa.

It is interesting to note that the most primitive tribes of savages have recognized the importance of regular and frequent bowel action and provided for the maintenance of this important function by including in their dietary special laxative foods such as named above. This usage is practically universal among wild tribes in all parts of the world.

“In the Cape Colony the staple food is stamped maize and sour milk; the absence of the sour milk leads to constipation. In the Northern Transvaal the staple food is thick maize porridge, sour milk, and, in summer, green vegetables. People go more often (*i. e.*, say three times a day) when taking both vegetables and milk. When these are scarce, they may go only once.”—Neil Macvicar, M. D., Lorendall, South Africa.

It is especially interesting to note that the Cape Colony natives have by experience learned to appreciate the value of sour milk as a laxative food and corrective of intestinal disorders. Several Af-

rican travelers have called attention to the fact that among the native tribes of Africa milk is generally used in the soured state. The custom is to put the milk into a gourd at night which is reserved for this particular purpose. In the morning the milk is soured and ready for use. At night a new supply of milk is put into the empty gourd which is never washed and so preserves the lactic-acid-forming ferment in an active state.

"The natives are, in Toro, almost entirely vegetarians, living on millet or plantains or beans. They rarely get meat. In 9642 out-patients seen during the last seven months of 1911, there were 174 cases of constipation, one and eight-tenths per cent of the whole."—J. Howard Cook, M. D., Uganda Protectorate, East Africa.

In this country the percentage of patients in whom constipation is present is just the reverse of that in Uganda. Whereas in Uganda there are less than two per cent who are constipated, in civilized countries among sick people there is scarcely one in a hundred who is not constipated.

"The rather coarse diet, largely grains and vegetables, has a favorable influence on the bowel movements. The stools are usually very large and fairly soft."—A. H. Norton, M. D., Haiju, Korea.

"The people eat large quantities of rice, turnips, peppers, roots, vegetables and little meat. The large quantity of residue must act as a stimulus to peristalsis."—W. C. Purviance, M. D., Chung Ju, Korea.

"Cereals, as wheat, barley, oats, millet seed, and all kinds of vegetables, are the staple food here (extreme north of Korea); very little fish and less meat is eaten."—F. H. Birdmann, M. D., Dotson, Korea.

The natives of Korea like those of China and Japan are generally known as rice eaters. It is interesting to note that the natives of Korea make large use of turnips and vegetables and little use of meat. Flesh foods are unquestionably constipating in their nature, not only because they are completely digestible, leaving little residue behind, but because the putrefaction to which they give rise results in the formation of ammonia and other alkaline substances which paralyze the bowel. "Meat bacteria" which swarm in all kinds of flesh foods are also a prolific cause of colitis, which by causing spastic contraction of the descending colon and the pelvic colon, produces mechanical obstruction to bowel movement, and also as shown by Dr. J. T. Case, induces powerful retro-peristaltic contractions by which the intestinal contents are forced back into the right half of the colon. The cecum and ascending colon become greatly dilated as a result, and in time the cecum becomes movable and prolapsed. The stretching of the colon enlarges the ileocolic junction until the ileocecal valve becomes incompetent, thus establishing the condition known as intestinal toxemia with its long train of evil consequences. The vegetarian habits of the people of Korea are without doubt of great service to them

in enabling them to successfully combat the highly unsanitary conditions under which they live.

"Bowel movement full and frequent among the working people, who eat large quantities of vegetables; more disturbed among the better classes, who eat more meat."—J. K. Cox, M. D., West China.

"My experience with patients has been that they are not so subject to constipation as persons in the U. S. whom I have treated. Think probably the free use of greens and other vegetables has something to do with the difference, as well as not postponing the call of Nature, as is done by civilized persons."—Ida M. Scott, M. D., Tak Hink Chan, South China.

"The vast majority of the people live on coarse grains and coarse vegetables, which are favorable to large bowel movements."—Geo. D. Lowry, M. D., Peking, China.

"In my own case, going onto a purely local diet of rice and coarse vegetables is usually accompanied with looser motions."—George Hadden, M. D., Yung-an Fookin Pwo., China.

"Rice is the principal diet, but is usually accompanied by considerable quantities of vegetables, largely what we call greens. The Chinese have a great variety of leaves and stocks that are used for greens, such as cabbage, lettuce, and many other kinds that we do not see in America. With this diet and exercise, the healthy Chinaman usually has free bowel action. I think the 'greens' is a very

suitable diet for this climate.”—Jean McBurney, M. D., Cheung Chow, Hong Kong, China.

“Foods coarse, and largely vegetable, especially among the country people, which means four-fifths of the population. Chinese are not meat eaters to a great extent.”—F. F. Tucker, M. D., Pangkiachwang, Shantung, China.

“The natives eat much vegetables, which regulate the bowels.”—Cecil I. Davenport, M. D., Shanghai, China.

The people of China as well as those of Korea are evidently protected from the natural constipating tendency of a rice diet by the free use of coarse vegetables. The large use of vegetables of all sorts which is practiced in the Orient is generally forgotten by those who call attention to the fact that rice is the staple foodstuff in this part of the world. It is true that rice is the chief source of nutriment but at the same time nature has taught these people to make ample provision for the bulk which is essentially to stimulate normal peristalsis by the use of greens and vegetables of all sorts. Vegetables are used not only during the summer months but at other seasons also. Turnips and several other roots are preserved by pickling in salt brine as cucumbers are preserved in this country. A very large use is also made of bamboo sprouts, of the leaves and roots of certain lilies which are preserved by drying and of several varieties of seaweed, from some of which a gelatinous substance known as Japanese isinglass or agar-agar is made while others

are used in their native state as Iceland moss and Irish moss are used in this country.

"The natives note that in eating pumpkins and prunes they have more bowel movements. An old man told me that if a person, early in the morning before taking any food, eats ten fresh prunes from the tree, he'll have bowel movements easily."—G. Yeram, M. D., Gumaldjine, Turkey.

The most primitive people have learned by observation the importance of bulk, a lesson which has yet to be learned by the great majority of people in civilized lands. Knowledge of the laxative value of fruits, especially of prunes is, however, quite widely diffused. The Turkish peasant who told our friend Dr. Yeram that ten fresh prunes taken from a tree would produce a laxative effect was perhaps not aware however, that dried prunes may be so freshened by soaking in cold water for 24 hours that their laxative quality is to a large extent restored. The free use of raw soaked prunes is a highly valuable food remedy for constipation which has long been in use by many European and American physicians.

"The principal food of both city and rural population of the region is boolghoor (cracked wheat, which has been cooked, dried, and the thin outer skin removed before cracking. It is cooked in many ways. The commonest is to boil it about ten minutes, and add a little melted butter before serving), and coarse bread of wheat or barley, varied by lentils and other legumes, and the fermented milk of

the country (yougurt in Turkish, leben in Arabic, or matzoon in Armenian). The village people eat considerable fruit, especially grapes in season, but very little meat or vegetables. The city dwellers eat a good deal of meat and vegetables, more fruit, and less youghurt than the villagers. They also eat finer bread and more spices and condiments. In general, I may say that constipation is relatively much less common than in America, and much less common among the villagers than the city people; in fact, very seldom seen in those who eat boolghoor. The posture assumed in defecation may also have something to do with it. They never sit on a stool, but always use the natural, squatting posture. In the city, where they have regular privies, the arrangement is a slit or opening in the floor, over which the person squats. The universal habit is to move the bowels three times a day."—F. D. Shepard, M. D., Aintab, Turkey.

The above interesting account of the dietetic habits of the people of Turkey kindly sent us by the late Dr. Shepard contains enough practical hints about dietetic methods of combating constipation to enable almost any practical person to formulate for himself an efficient and laxative dietary. It is evident that however much we may be in advance of the ignorant Turkish peasant in the various forms of culture which together make up what we call civilization, we may study his methods in diet with great profit.

The matter of the position in sitting at stool to



which Dr. Shepard also called attention is one of no small importance. We are learning more and more the importance of making a careful note of the hints which nature gives us in the instinctive leadings of animals and human beings living in a wild or primitive state which have resulted in the formation of customs and habits, the essential relation of which to our physical welfare has been heretofore too much disregarded.

In all parts of Turkey, it is the custom of the people to move the bowels three times daily which is the natural result of the use from early childhood of the several laxative foods above mentioned. Of this we are assured by a personal statement made to the writer by the late Dr. Shepard who was most intimately acquainted with the habits of the Turkish people through living and practicing among them for more than thirty years. That the custom of tri-daily bowel movement is common to all classes is shown by an incident related to the writer by the eminent Sir Arbuthnot Lane of London, England. The famous surgeon was one day consulted by an official from the Turkish Embassy in London who desired relief from constipation. When asked for a particular account of his symptoms he admitted that his bowels moved once a day but declared that he was greatly constipated and not half a man, and that when his bowels moved three times a day his vitality and stamina were more than doubled.

“Yoghurt is the form in which milk is taken

in Persia. We rarely see appendicitis in the natives. I often wonder whether the yoghurt may be the preventive. The common people live on yoghurt, cheese, bread, and fruit. Meat only occasionally. They all consider milk (not yoghurt) a laxative, and so it seems to be for the natives."—W. S. Vaunemann, M. D., Labriz, Persia.

It is certainly very interesting to note that the custom of using sour milk should be nearly universal among the hundreds of different tribes and nations filling the vast territory from the southern tip of the dark continent to Persia. It is also interesting to observe a verification of the observations made some years ago by Dr. Senn who studied the people of the east coast of Africa and noted the absence of appendicitis, an observation also confirmed by Dr. Lucus-Champonniere of France, who found appendicitis very rare among the wheat- and date-eating Arabs of Algiers, and among the inmates of prisons and insane asylums in France where meat is rarely made a part of the bill of fare.

"The diet seems to favor looseness, since it consists largely of coarse bread from unbolted flour; also in summer of large quantities of fruit ingested."—J. A. Funk, M. D., Hamadan, Persia.

The use of superfine white flour appears to be almost wholly confined to civilized nations and there can be no doubt that to this practice is largely chargeable the almost universal prevalence of constipation in countries which claim to be the most advanced in civilization.

"It is a common saying among them that milk acts as a laxative, especially if freshly milked and unboiled."—P. W. Brigstocke, M. D., Jerusalem, Palestine.

The fact that boiled milk is constipating has long been recognized in this and other civilized countries. It appears that the same fact is known to the uneducated natives of Syria. It is only recently that science has offered the explanation which has been supplied by the bacteriological laboratory that boiled milk undergoes putrefaction in the intestine because of the destruction of the acid-forming bacteria which abound in raw milk which has been exposed to the air, and stimulate bowel action and prevent putrefaction.

"The diet is largely a vegetable and cereal one, meat being eaten only occasionally."—A. F. Grant M. D., Assiut, Egypt.

It is instructive to note that the Egyptians are still as in ancient times practically non-flesh eaters. The experience of two or three thousand years has not convinced these simple tillers of the soil that the natural products of the earth are not capable of affording ample and sufficient nourishment. The fertile valley of the Nile in centuries far remote from the present supported a population perhaps more dense than has been maintained in any other part of the world. It may be that some future time will again see this highly favored region teeming with human life and enterprise, supported as of old by the products of its marvelously fertile soil.

"The coarse simple diet—millet or corn porridge or bread, cabbage, soup, etc.—of the country seems to favor regularity of the bowels."—Mrs. Estella A. Perkins, M. D., Pao Ting, China.

"The almost exclusive vegetable diet—rice, cabbage, etc.,—seems on the whole to be favorable, and constipation is not so common among the sedentary classes as might be expected."—B. S. Browne, M. D., Ningpo, China.

"Constipation is not common, but the inhabitants of Manchuria are mostly vegetarians, i. e., eat little butcher meat except on festive occasions."—Drs. Christie and Muir, Mukden.

"People suffering from diarrhoea frequently take rice and 'dahi' (curds, sour milk), to check it. Ordinary milk they generally consider constipating."—N. C. Henderson, M. D., India.

A specimen of dahi sent us by a friend from Darjeling was found to be practically identical with the yoghourth of Bulgaria, the matzoon of Armenia and the leben of Egypt. The so-called *Bacillus Bulgaricus* is apparently the active acid producer in all these fermented milks. The strain obtained from dahi appeared to be particularly active, growing with much vigor and producing lactic acid very freely.

"People eat wheat, Indian corn, and millet seed breads. The first named is supposed to be constipating, and the last two laxative."—W. L. Pennell, M. D., Bannu, India.

"The coarse wheat and barley flour used for

their bread is, without doubt, favorable to regularity."—Edna B. Kuslar, M. D., Phalera, India.

It is probably not known to most civilized people that wheat as well as rice is very largely used in India. England annually obtains enormous quantities of wheat from her Indian provinces the price of which is such that the Hindu peasant finds it necessary to make rice his staple, although considerable quantities of wheat bread are used by the wealthier classes. It is interesting to note, however, that the wheat thus used by the natives is chiefly employed in the state of coarse meal, rather than the fine bolted flour from which two most important elements, cellulose and vitamins, have been removed by the milling process.

"Usual diet of rice with green vegetables, lentils or occasionally meat, favors regular motions. Boiled radishes favor diarrhoea, and fish favors constipation."—Dr. Minnie Gomery, Iddamabad, Kashmir.

"Diet, rice and vegetables, rarely meat. Rice is eaten in great excess. People pass large stools, as a lot of rice is ejected. Presumably nitrogen and salts are used up and starch excreted."—H. E. Rawlence, M. D., Srueagai, Kashmir, India.

Even remote Kashmir, which has been so little in touch with modern civilization, appears to be really up to date in matters dietetic. Meat is only used occasionally, whereas green vegetables and lentils combined with rice constitute the regular dietary.

The passing of quantities of undigested rice is

doubtless due to the fact that the rice is imperfectly cooked, a custom very common in rice-eating countries, and perhaps a wholesome one. The Scotch highlander eats his oatmeal less than half cooked and is wonderfully sturdy. Some undigested starch in the feces prevents putrefaction.

The diet being chiefly vegetarian (among the Hindus it is so entirely), the large amount of vegetables taken seems to act as the necessary stimulus to the bowel."—Robert Madison, M. D., Rajshalu, India.

"Diet of the people mostly fruit and vegetable. Have found that when fruit and salad oil could be added, tongues are clean, moist and red. Where the white bread is taken in imitation of the foreigner, troubles begin similar to those at home. The national custom is to eat but two meals a day."—Belle J. Allen, M. D., Baroda Camp, India.

The observation made by Dr. Allen, that the natives of India begin to suffer from constipation when they adopt the use of white bread, though previously free from this curse of civilization, is highly instructive. It is interesting to note that the U. S. Agricultural Department is making a strong effort to bring to the notice of the American the importance of using the whole grain instead of discarding the outer portion or bran which is now known to contain by far the largest share of the lime essential for perfect nutrition as well as the highly essential vitamins. It is also interesting to note that though the native of India as well as of

most other countries of the globe eat but two meals a day, the prevailing bowel habit among these people is two or three movements daily. More frequent meals should give rise to more frequent movements and would doubtless produce this effect in this and most civilized countries were it not for the highly concentrated and highly constipating character of the diet.

"Motions are large, bulky and not formed, but pultaceous. People of these parts eat largely of ground wheat and vegetables, not much meat. Hindus seldom eat flesh."—A. H. Browne, M. D., Amristsar, India.

"Meat tends to constipate; vegetables and milk tend to loosen."—M. M. Brown, M. D., Sargodha, Punjab, India.

Dr. Brown as well as other close observers of the relation of diet to health among people of simple habits notes the effects of a meat diet in producing constipation. The reason for this as indicated elsewhere is that a meat diet produces colitis and intestinal putrefaction.

"People coming from the interior are much more regular than those living in Smyrna, where more meat is eaten than in the interior. After some time in Smyrna, such people tend to become less regular."—D. McKenzie Newton, M. D., Smyrna.

"The use of peanuts in all forms, and the eating of cooked green leaves of several kinds, used daily keeps their bowels in good shape."—A. Sims Roma, M. D., Ferrovia, Italy.

“On the ordinary native diet there is scarcely ever any constipation. On other diet, occasionally.”  
—E. MacKenzie, M. D., Hog Harbor, Santo, New Hebrides.

### **Rare Occurrence of Cancer and Appendicitis Among Primitive Tribes**

It is the universal testimony that cancer and appendicitis are extremely rare. Doctor Shepard, of Aintab, Turkey, who has had an enormous practice among the Turks for more than a quarter century, and is perhaps recognized as the leading abdominal surgeon of the Orient, writes:

“There is relatively very little appendicitis here. I do from 500 to 600 important surgical operations a year, but only six to eight appendectomies. Cancer of the intestinal tract is quite rare (as are all forms of cancer), although ulcer of the stomach is common.”

Dr. W. W. Peter, of Shanghai, says, “I never heard of appendicitis in a Chinaman.”

The fact that cancer is a disease peculiar to advanced civilization is clearly shown by the replies received from one hundred and twelve physicians located in the following countries: Mexico, Palestine, Arabia, Turkey, Egypt, South Africa, East Africa, Central Africa, Nigeria, Japan, Syria, Korea, Persia, Siam, India, Asia Minor, New Hebrides. Forty-three of the one hundred and twelve reported that they had never seen cancer of the bowels. Nine physicians from different parts of



Africa, the west coast, Tunis, Nigeria, Rhodesia, Uganda, East Africa, British Central Africa, the Portuguese Congo and Belgian Congo all report having never seen a case of cancer of the bowels among the natives.

### **Primitive Remedies for Constipation**

The following extracts from replies to our questionnaire illustrate the habits of people in relation to bowel movements and the simple but often highly sensible methods employed by them for relief:

"The chief duty of the Indleburds, or priestly caste, is the care of such matters (the movement of the bowels). A fine is levied in case of neglect."  
—P. N. Darling, M. D., India.

The observation of Dr. Darling that one of the duties of the priest in India is to educate the people in reference to the proper care of the bowels is highly suggestive. In this country, the subject of bowel hygiene has been so universally neglected that even parents are quite ignorant concerning the bowel habits of their children and often allow them to drift into diseased conditions, the evil effects of which are felt throughout their entire lifetime. Physical, mental and moral evils resulting from constipation are so great that it is not an exaggeration to say that teachers as well as preachers could not make a better use of a portion of their time and talents than by the education and training of the children in the proper care of the colon.

"The natives give prompt attention to the bowels.

I have again and again had it given me as a reason for not living in Aden, that people had there to go to the closet in order to evacuate their bowels, rather than relieve themselves any place, as this was only permitted for children.”—John C. Young, M. D., Sheikh Othman, Aden.

The above observation by Dr. Young affords powerful testimony to the importance attached by the Arabs to the prompt response to the call of nature for evacuation of the bowels.

Dr. Davidson of Travancore, India, says: “Appendicitis very rare here. Only about six cases out of at least 1,000 major operations.”

Dr. Davidson’s experience in meeting only six cases of appendicitis among a thousand major operations is striking evidence of the rarity with which appendicitis occurs among non-flesh eating people. This observation agrees with that of Dr. Senn who noted the absence of appendicitis among the vegetable-eating natives of the east coast of Africa. An examination of the annual report of the Mayo Clinic shows 19 per cent of all cases examined to be suffering from appendicitis, and at operation the appendix was found diseased and requiring removal in 21 per cent of all cases operated, whereas, Dr. Davidson found in India only six tenths of one per cent, a frequency thirty-five times less.

“No instruments used; people generally boil molasses (not maple, but grape juice) and common salt together to the consistency of wax, and make

suppositories to apply per rectum.”—S. C. Kavalgian, M. D., Ada Pazar, Asia Minor, Turkey.

“In cases of constipation or obstruction, very forcible measures are employed, such as massage, kneading the abdominal wall and exerting pressure upon the abdomen, and even kicking.”—E. Margaret Phillips, M. D., Ping Yin, China.

“Brown sugar is the laxative usually relied upon.”—Walter W. Williams, M. D., Yung-an Fookin Pwo., China.

The above observations in China and Turkey show the sagacity of primitive people in discovering simple food remedies for constipation. When taken in large quantities, sugar produces laxative effects, not only because of its specific stimulating effect upon the intestine but because of the stimulating effect of the lactic acid produced by the fermentation of the sugar in the colon.

“For relief of constipation a sort of large rolling pin is freely rolled up and down the abdomen while the patient is lying supine.”—H. G. Barrie, M. D., Kuling, China.

The use of the rolling pin as a means of relieving constipation is an original Chinese invention, although a cannon ball as well as various kinds of apparatus have been long in use in this country as a means of mechanically stimulating the bowels to activity.

“They use a smooth stalk of millet to stimulate the lower bowel.”—Elizabeth Beatty, M. D., Kwangning, Manchuria, China.

Mechanical stimulation of the rectum has long been known to be a powerful means of exciting peristalsis, but the method is not to be recommended because of the danger of producing inflammation and infection of the rectum, the result of which might lead to hemorrhoids, fissure or abscess, inducing fistula.

"A very crude method for giving an enema is to take a small slender piece of bamboo for a nozzle and a bag made of pig gut, and use it as a syringe."—William M. Berss, M. D., Chenchow, South Hunan, China.

"They have no instruments, but often use honey suppositories."—W. H. Park, M. D., Soochow, China.

"They have a funnel-shaped enema which is being displaced by European bulb syringes."—J. Davidson Frazier, M. D., Resht, Persia.

"The people have few or no remedies, save the drinking of a large quantity of hot water, which they often do when conscious of the need, and with quite good effect."—H. W. Schwartz, M. D., Yokohama, Japan.

"Massage is employed; drugs very rarely."—Walter Virden, M. D., Rhodesia, South Africa.

"Enemata given in the knee-elbow position with a funnel made of a leaf, and a pipe made of a gourd or vegetable stump."—J. Howard Cook, M. D., Fort Portal, Uganda Protectorate, East Africa.

It is interesting to note that even the mem-

bers of savage tribes are acquainted with the value of the enema and have been able to improvise means for the getting of water into the bowels. Some of the means employed are like the above very highly ingenious. It is also interesting to learn from the observations of Dr. Cook of the employment of the knee-elbow position by the natives of Uganda. The credit for the invention of the knee-elbow position has been given to an American physician. It seems, however, that in this particular civilized people are as in many other ways in matters pertaining to physical welfare, easily outdone by the natives of many primitive tribes.

“Roots are sometimes cooked in water and given as an enema by means of an ox horn with perforated end—large quantity poured in. In the Northern Transvaal purgatives are not required. Enema appliances not known.”—Neil Macvicar, M. D., Lorendall, South Africa.

“The natives regularly use enemata, introduced with gourds.”—D. Robertson, M. D., Itu, South Nigeria.

“They have medicines for use as purgatives, and also use enemas, which are administered by means of a sort of gourd with long neck. The gourd is filled, and the water flows in by gravitation. The patient lies prone.”—E. C. Sirley, M. D., W. Coast of Africa.

“The use of common soap passed up into the anus or some similar substance is often used by the na-

tives of this country to overcome constipation.”—  
W. O. Ballantine, M. D., Rahuri, Western India.

“Soap suppositories is a common native remedy; enemas are never used; they consider it shameful. Massage of the abdominal wall is practiced, too.”—  
R. T. H. Cox, M. D., Persawan, N. India.

The Hindu mother knows the value of the suppository as a remedy for infants as well as does the American mother. Experience is a wonderful teacher and in this school the most ignorant savage mother has just as good an opportunity to learn and make advancement as the mother of the most highly civilized land.

“A smack in the stomach with a colo spade is often used, and is invariably productive of a profuse and continued motion. Some of the hill tribes carry under the left arm pit finely engraved brass tongs for the purpose of extracting in their entirety the masses of fecal matter. These are shaped by the women of the tribe, and are used in their war catapults in tribal warfare.”—P. N. Darling, M. D., India.

This drastic method of stimulating bowel action may sometimes produce injury, but could not possibly be more productive of mischief than is the common, almost universal, use in all civilized countries of laxative mineral waters and drastic cathartic remedies of all sorts.

“The population generally deal largely in drastic purgatives. A man will take a month’s leave from work for nothing more than a course of purgation,

often very severe.”—F. V. Thomas, M. D., Palwal, near Delhi, India.

This method of dealing with constipation could scarcely be more injurious than the continued use of stomach and colon irritating drugs. As Von Noorden well says, “nothing is so bad as the chronic use of laxative drugs.”

“The native position, squatting at stool, with front of thigh against the abdomen, encourages evacuations.”—W. J. Maule, M. D., Miraj, India.

The squatting position in moving the bowels appears to be universal among all people with the exception of those who call themselves civilized. It is singular indeed that in relation to this most important function of the body the wildest and most unsophisticated natives are really in advance of the most highly civilized people. The value of the squatting position as a means of relieving the bowels has been recognized for years but the knowledge has had little influence upon the habits of the people in this particular. It is pointed out elsewhere in this work how the objectionable features of the ordinary closet seat may be overcome by elevating the feet upon a stool eight or ten inches high placed in front of the closet seat.

“The position in which the native helps his expulsion of feces from colon and rectum is this: he sits on his haunches and presses the left side of the lower abdomen with the hand or a bunch of cloth.”—T. Davidson, M. D., South Travancore, South India.

The practice above referred to by Dr. Davidson is interesting evidence of the East Indian's capacity for intelligent observation. The descending colon and pelvic colon are located in the lower left side of the abdomen and pressure just at this point may be of the greatest value in aiding evacuation of the bowels. The writer has for many years recommended patients to assist themselves when necessary by pressing firmly with the closed fist or with both fists upon the left side of the lower abdomen. Deep pressure made at this point will often arouse the lower bowel to immediate action, causing instantaneous expulsion of gas and in many cases within a few seconds a large evacuation of retained fecal matters. The use of a bunch of cloth for the purpose of increasing the pressure is an original invention of the East Indian and is highly suggestive. A patient recently reported to the writer the discovery that a newspaper folded into a round mass serves an excellent purpose for making compression over the pelvic colon.

"The use of a piece of oiled soap is common, which may have been learned from the English; an oiled rag is used, too."—A Missionary Physician of India.

For more than thirty years the writer has made occasional use of an oiled ball of cotton or of a cheese cloth pledget saturated with oil and placed in the rectum at night as a means of combating certain forms of constipation. The results have been very excellent. Saturation of the pledget with a



culture of the *Bacillus Bulgaricus* is still more effective in some cases.

"The chief practice is the habit of squatting at stool. Have had patients leave the Hospital because they could not have a normal movement without their own kind of commode. Complaints ceased with a native place provided."—Belle J. Allen, M. D., Baroda Camp, P. O., India.

An opening in the floor over which the user squats is the provision made for bowel evacuation in many parts of France, as well as in Oriental countries. Even in Paris, as recently as twenty years ago, the writer found this arrangement in use in the small hotels of the suburbs of the city. It is interesting to note that Dr. Allen's patients were willing to forego the advantages of hospital care rather than suffer the serious consequences of disturbed bowel action from interference with the normal mode of defecation.

A missionary physician writing us from South Africa related the following incident as an illustration of the care which the natives take to secure free movement of the bowels. Said the doctor, "A native called on me yesterday morning and asked for medicine to relieve a dreadful constipation. I said to him, "When did your bowels move last?" He replied, "This morning, Doctor." "But I understood you to say you were constipated." "Yes," replied the native, "I am horribly constipated. My bowels only move once a day."

Since the publication of the first edition of this

work the writer has learned from Dr. Wilfred Grenfell, of Labrador, that it is the custom in that country to feed reindeer moss to the dogs that are used almost exclusively for transportation. After mixing with oil the moss is eaten by the dogs with great avidity and they appear to thrive upon it. It is strange, indeed, that civilized man should be about the only creature among the members of the animal kingdom who neglects to supply his alimentary canal with the material necessary to supply the intestine with the normal stimulus to action. In civilization, domestic animals fare better than human beings in this regard. When the horse, ox, or cow loses appetite and becomes constipated, bran mash is the farmer's ready and efficient remedy. But strange to say the farmer never thinks of giving himself the benefit of this simple and natural remedy, but instead dopes himself with purgative pills or mineral waters which ruin his digestion, spoil his kidneys, increase constipation, and ultimately induce colitis, one of the most common and most formidable of all the evil effects produced by chronic constipation.

### THE COLON CODE

1. Move the bowels at least three times a day. (See pages 211, 212, 219.)
2. Answer the "call," even the slightest, at once. Delay of five or ten minutes may be disastrous. (See pages 42-50, 122-124, 208.)
3. Give the bowels an opportunity for evacua-

tion on rising, at bedtime, and after each meal, even if there is no call. (See pages 40-50.)

4. Allow sufficient time for complete and thorough evacuation of the colon. (See pages 125-128.)

5. If the "call" returns after a movement, make a second or even a third visit to the toilet. (See page 214.)

6. Place a stool in front of the closet seat to raise the feet. (See page 128.)

7. Eat laxative food at every meal. A single omission may upset the bowel system for several days. (See pages 220-234.)

8. If necessary to secure three full evacuations daily, take a tablespoonful of bran, or one-third of an ounce of agar-agar, and half an ounce to an ounce of white Russian paraffin oil at each meal. (See pages 231-239.)

9. Eat regularly and avoid concentrated foods.

10. Change the intestinal flora by the fruit regimen or the milk regimen (186-188). The constipation will not be permanently cured so long as the stools are putrescent or very foul smelling.

11. Drink two or three quarts of water daily, one or two glasses of cold water at bedtime and the same on rising. (See pages 111, 112, 118.)

12. Take deep breathing and abdominal exercises daily. (See pages 69, 84, 114-116, 272-298.)

13. Wear loose clothing and if the abdomen sags wear a spring supporter constantly when on the feet. (See pages 84, 203, 298.)

14. If necessary, use an enema after breakfast—three pints of water at 80° to 70° F. A smaller enema of cool water (one-half to one pint) may be used after each meal or after dinner and at bedtime to establish the three-a-day rhythm. (See page 312.)

15. A small enema (half pint of tepid or cool water at bedtime often secures a good morning movement. An enema of a few ounces of paraffin oil (four to six) may be used to combat dryness of the stool. (See page 312.)

16. In many cases of colitis, with spastic contraction of the descending or pelvic colon, a complete movement rarely occurs. The feces are slowly pushed through the constricted bowel. In such cases what may be termed supplementary bowel movements are necessary. A few minutes after the movement, or it may be an hour after, a slight "call" may be experienced. This should be responded to at once, and even if the call is repeated. When the bowels do not move satisfactorily, it is well to wait for several minutes, meantime occupying the mind with reading the morning paper, perhaps. This affords time for a new instalment of waste material to be pushed down from the upper part of the colon.

17. A very hot sitz bath for two to five minutes, or a hot fomentation, taken before breakfast, is an excellent means of relaxing the contracted colon in cases of colitis, and so preparing the bowel for a good after-breakfast evacuation.

18. Fruit on rising, and on going to bed, may be taken when necessary as an aid to other measures. One or two oranges, an apple, a couple of plums, or a dish of berries eaten without cream (malt sugar may be added), or a bunch of fresh grapes are suitable for this purpose. The fruits named do not tax the digestive organs because they contain no fat, very little protein, and no raw starch, the starch having been digested by the process of ripening. They are all rich in vitamins and highly refreshing. When taken into the stomach they induce a lively peristalsis which is continued down the intestine and helps to advance the fecal mass toward the point of exit. The fruit taken on rising helps to secure a full bowel movement after breakfast. The fruit at bedtime prepares the way for a bowel evacuation on rising.

### THE CARMINE TEST FOR INTESTINAL MOTILITY

The length of time required for the passage of material through the alimentary canal may be readily ascertained by the administration of some substance which will give to the intestinal contents a decided color which can be easily recognized. Animal charcoal, carmine and even highly colored fruit, such as the huckleberry, may be used for this purpose. It is necessary, of course, that while taking the test care should be taken to avoid taking foods of such a color as might lead to confusion

with the color of the test substance. In applying the test, two capsules containing five grains each of carmine are usually given at breakfast, say at 8 A. M. Each stool is afterwards examined and the time noted when the red color of the carmine appears. The examination of the stools continues until the color disappears. This time is also noted.

From a large number of observations, several hundred, it has been determined that in a normal person the color should make its appearance within twelve hours from the time it has been taken and should disappear within twenty-five hours. In a considerable number of persons the color appears in less than twelve hours and disappears in eighteen hours or even less. It is probable that the shorter periods mentioned are more nearly the normal and that the periods of twelve hours for appearance and twenty-five hours for disappearance should be regarded as the extreme limits of normal motility. The normal time for the stomach to empty itself is four to five hours. At the end of seven or eight hours the small intestine should be emptied and the unutilized food residues should be found wholly in the colon. These residues normally find their way to the rectum in three or four hours more, and there seems to be no good reason why unusable and putrescible materials should be retained for a longer time to undergo decomposition and contaminate the blood through the absorption of the poisonous products.

In barn yard fowls the length of time required for food to traverse the entire alimentary canal is three hours and a half. In some animals the period is not more than one hour.

In cases of chronic constipation the time for the appearance and the disappearance of the test color is very greatly lengthened. The time of appearance is not infrequently prolonged to twenty-four or thirty-six hours and the time of disappearance is, in a large proportion of cases, forty-eight hours or more. Seventy-two hours or three days is not an uncommon observation and the writer has observed cases in which the color did not disappear until the end of four days and in one case, six days. Cases are occasionally observed in which the color disappears and then reappears. The explanation of this circumstance is the existence of a greatly dilated cecum in which a portion of a meal may be retained while the residues of a subsequent meal pass over and on to exit.

By means of the carmine test the degree of stasis or stagnation of intestinal contents may be ascertained and the improvement resulting from diet or treatment may be observed. This test is one that ought not to be omitted in any case of obstinate constipation which does not readily yield to the measures applied and it is advantageous in all cases.

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