JOHN HARVEY KELLOGG (1852-1943)

Lectures, Speeches, Notes, and Articles, ca. 1890-ca. 1943
(undated by topic)
Colon and Gastro-Intestinal Tract
The purpose of this invention is provided by which efficient means by which irrigation or flushing of the colon may be accomplished more conveniently, efficiently, safely and conveniently than is now the case. It has been provided by the means in correct use.
has led to the development of various means of facilitating these modes of heating. One of the devices or methods that have proved to be capable of meeting the various needs indicated by cases encountered is... commonly used with and overcoming certain serious inconveniences.
to endangers and other
disadvantages.

The purposes of irrigation and cleansing of the colon are:

1. To quickly or cleanse
   cleansing or solution

2. 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To accomplish these purposes, safely, that is without causing either transient or more definite and lasting injury. For this it is necessary to know constantly the temperature of the liquid introduced. The amount which has been returned and by difference the amount retained in the vessel, and the
The intestine could be constantly and accurately known while this apparatus offers many unique and useful features which contribute to its convenience and efficiency and help to make it an instrument of scientific precision and therapeutic utility. Special emphasis...
is laid in our claims for original invention to the means provided where for accurately showing the amount of fluid retained in the intestine. The construction of my device is clearly shown by the accompanying photographs, drawings, and
This is accomplished by weighing both the inflow and the outflow by special devices adapted to the purpose.
and detailed description.

Drawing or photo
Description

The cabinet, made preferably of metal, such as stainless steel, has the back side in a tightly fitting door. The top and bottom are tightly closed. The fan inside sucks the air from the cabinet through a tube which starts just above the receptacle into which the material discharged from the colon is received. In most cases in which irrigation is needed, the intestinal contents are highly offensive and
It is highly disagreeable to both the patient and the attendant, and not infrequently to the district. The window permits inspection of the contents of the receptacle without permitting the foul odour to escape from the cabinet.

The track (f) shown in dotted lines is made of glass and is only 10 or 12 inches deep. This prevents the very considerable change of treasure
which occurs in the use of the long conical vessel in general, these which in some instances permit a fall in pressure of nearly fifty percent.

The small reservoir is fortunate in giving medicated liquids, acidophiles, and other cultures, and in creating alternate hot and cold applications to the meatus or vagina or bladder.
The thermometer (c) is placed inside the tank and is read through a small window in the wall of the cabinet.

At (d) is shown the dial of a scale upon which rests the tank or reservoir. The figures on the dial to which the traced points slide the reservoir from 0 to 100 without any liquid present in the reservoir at any

The upper dial shows when the tank needs refilling and the lower dial shows when the waste receptacle needs to be emptied.

The manometer (f) indicates the pressure under which the stream of liquid is entering the bowl and also the amount of negative pressure due to the column of water in the discharge tube (g). The inlet pressure is controlled by the valve (i), the negative pressure by valve (l).
The upper dial is connected with a scale on which the tank rests. The lower dial carries the weight of the waste receptacle.
The capacity of the water receptacle (\( v \)) is the same as that of the tank (\( b \)).

The temperature of the water may be regulated by a temperature controller and mixer (\( y \)).

The valve (\( z \)) permits withdrawal of water for making medicated mixtures or other purposes.

The flexible pipe (\( m \)) is provided for the convenient emptying and flushing of the receptacle (\( v \)). At (\( n \)) is shown one of the hinders which is controlled by the valve (\( k \)).
(1) When the valves (a), (i), (j), (k), and (l) give the operator complete control of the apparatus, without leaving his seat, he opens the main valve (j) and, leaving previous valve (f), leaves the water circulating controller the temperature controller so that it will deliver water at the desired temperature. After the colorimeter is introduced, the valve (j) is closed, to open the discharge tube, every 10 minutes or so, or closed for giving an

Further information is needed.
and the valve (e) is opened fully or partially according to the amount of liquid desired when the amount of liquid has been introduced as shown by the upper dial (d); valve (7) is closed and valve (d) is opened. The negative pressure valve (g) is always sufficient, often excess, so that the mercury excess is drawn into the membrane and the tube causing the ejection of the nutrient broth of the output.
If it is desirable give a
medicated solution, value (i) is
kept closed and value (ii) is
opened, the medicated solution
having been placed in the small
accessory reservoir shown at
('W').

When an alternating hot and
cold or "Scott" irrigation is to be
given, the small bell tank is
filled with cold water,
the large one with hot
water, and the valves
opened and
closed in alternation. This

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Composition.—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, pyrrhol, 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 chiefly composed 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 which are rich in protein, the result of a mixed or flesh diet, contain enormous quantities of anaerobic or proteolytic or putrefactive bacteria, which produce alkaline substances in decomposing the proteins—ammonia, putamines, and various toxins. When considerable quantities of starch are present, as with a vegetable diet, with very little protein, aerobic or
acid-forming bacteria and 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 ........ species of anerobes 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 gases and highly active poisons. This microbe, as well as the other putrefactive organisms which are found in the feces, are 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 these dangerous bacteria which carry on in the body the same putrefactive processes to which they give rise outside of the body in the presence of protein substances.

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 feces produced in the intestines in a single day at not less than one-quarter of an ounce and the number more than 100,000,000,000,000, of which a large proportion may be poison-forming anerobes. Only a small share of them is found alive in the feces, but all have been alive and have produced each 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 mucous membrane covering is only seven square feet, almost exactly one third 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.

All of these poisons are found in the feces and help to make up the total of this most complex and often most loathsome of the waste products of the body, but which until very recent times has received surprisingly little attention.
In view of the above facts, it is very singular indeed that the two most important elements of the feces, the microbes and the microbic and other toxins, should have been until recently almost wholly ignored. Even at the present time the bacteriological examination of the feces is rarely undertaken, even in the laboratories of the richly endowed metropolitan hospitals where it would seem that the sick man should be afforded every possible means of examination and relief known to modern medical science. Examinations of this sort are certain to receive more attention in the future than in the past. The following is a partial list of the poisons which have been shown to be produced in the human intestine by putrefaction processes set up by bacteria:
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.

The 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.

**Protective Microbes.**

(Here add article about)

**Are Bacteria Necessary for Normal existence?**

(Insert matter already written)

See Combe, etc.
NORMAL BOWEL ACTION.

There is perhaps no important bodily function which is so much neglected and with such damaging results as defecation or bowel movement. This function seems to be looked upon as a humiliating act which should be avoided whenever possible, and which may be properly 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 be no longer suppressed, or until it disappears.

This wrong attitude toward one of the most important functions of our 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, and for this education is the only remedy. It is the duty of every physician and every trained nurse to do all possible toward the education and enlightenment of the chronically sick with whom they come in contact, and especially to see that children and young persons who have not yet suffered all the dire consequences of chronic constipation are thoroughly instructed respecting the proper care of the bowels and the terrible consequences of neglect.

This subject is one that is too commonly tabooed by a false modesty which should be laid aside. Mothers and school teachers especially should
give this matter special consideration. They should make sure that each child under their supervision is not only informed of his duty to himself, but that he has formed and maintains correct and regular habits in relation to evacuation of the bowels.

The act of defecation or moving the bowels involves the whole colon, especially its lower half, and is assisted by the abdominal muscles and the diaphragm. Before we can understand this somewhat complicated and, we may say, most remarkable and interesting function, we must have in mind a general idea of the form and structure of the colon.

The Colon.—The colon may be roughly described as a muscular reservoir about five feet in length and an inch and a half to three inches in diameter (Fig. ...). This reservoir is divided into four secondary reservoirs, the caecum, 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 for a definite interval in each with the exception of the last.

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

From the caecum 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, the hepatic flexure.

From this point the colon passes across the body above the umbilicus, and sloping upward to the diaphragm 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), the descending colon. Passing obliquely across the hollow surface of the left iliac bone, it reaches the upper border of the pelvic cavity. Here is formed 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 lower end of the pelvic loop 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 very important factor in controlling bowel movements. When the pelvic loop is full, it rises and thus gradually obliterates the fold.

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 projecting folds of membrane (sometimes three) known as Houston's valves. The thick muscular walls of the rectum are ordinarily contracted so that no cavity exists in the upper part, although some gas and often a small amount of fecal matter are 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.

Just above the internal anal sphincter is found a series of raised points or papillae, first described by Homer of Philadelphia many years ago. These papillae 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 if 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 papillae 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. They are attached below and above to the coccyx and ............... 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 center of the colon on its front and back surfaces there is a thick band of muscle tissue which acts in defecation like a gathering string. In contracting, it draws the lateral pouches together so as to empty them of their contents. These sacs or pouches are well shown in Fig. ............., a rare view of the colon obtained by means of a powerful X-ray apparatus.

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. This remarkable arrangement has led to extensive experiments for the purpose of ascertaining the exact nature of the nervous control of the colon, but the matter is still more or less of a mystery.

**WHY DO THE BOWELS MOVE PERIODICALLY?**

There are two principal factors in causing a periodical movement of the bowels in normal
bowels in normal persons. These are, 1. Regular meal hours; and 2. The morning awakening and movement.

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 the feces are dealt with by each of these in succession. In the caecum 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 or what might be approximately styled the liver gate into the transverse colon. In this horizontal portion of the canal the feces rest for a time for further extraction of water and removal of the last traces of digested food. 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 it left 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. It is 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 be now easily seen at once how the "call" and thus 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 sufficient in bulk, the pelvic loop will be only partly filled and hence will not rise sufficiently to permit feces to pass into the rectum, and hence there will be no "call" and no normal movement. It is evident 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 prevent the onward movement necessary to reach the rectum, even though the loop may be raised and the gate which guards the entrance to the rectum may be open. In starvation no "call" will appear, 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 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 abdominal wall. By this means the feces in the loop, even though it may be not wholly filled or though they may be somewhat hardened, 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 or the abdominal muscles gives the little extra help needed and the "call" comes.

By straining movements such as accompany bowel movement, sufficient fecal matter may be pushed over into the rectum to create an effective "call."

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, so pushing its contents along.

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

The act of swallowing a glass of water, especially 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 liver gate of the colon, 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 might seem to
produce no effect, whereas a bowel movement the next morning might be the
result of the impulse given to the fecal mass by means of which the stagn-
nation in the ascending colon was overcome.

THE LAST "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, our 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. The feces may be still in the rectum, but they produce 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 to be heard at all. The rectal nerves have lost their normal sensibility. They do not respond to the irritation produced by contact with 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 used 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 found 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 periodical bowel movements in normal individuals. The first is the practice of taking food only at stated intervals, regular meal hours. The second is the 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 barnyard fowls, have almost incessant bowel movement.

The taking of food is the most powerful 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, the more it is relished, the more pronounced is this effect. This explains the almost universal experience that the bowels move most regularly soon after the morning meals.

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 sufficient to accomplish this. During sleep the intestinal movements are slowed. The progress of 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 something 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 factors which are in our own control and are easily understood.
The colon bacillus is a parasite and not a normal resident of the human colon. When first discovered B. Coli was regarded as a parasite. Of this much, the latest edition of Park and Williams' great work on bacteriology speaks as follows: Quote from page 479:

B. Coli has never established its claim to be a normal resident of the colon. There are many reasons for believing it to be a parasite as it was considered by its first discoverer. The fact that it is so frequently found in the alimentary canal of men and animals almost universally is no proof that it is a normal member of the family of bacteria which constitutes the natural intestinal flora in either man or other mammals. There are, on the other hand, many reasons for believing it to be an invader. Here are some of them: The alimentary canal, particularly the colon, presents conditions______________________________

______________________________.

In other words, it is a__________ incubator for micro-organisms. On account of its vulnerability to attract__________organisms

__________natural residue____________________should be prepared
to act as a protector, able to defend the____________________

against invasion by harmful organisms and of course____________________

______________________________.

The colon bacillus and the conditions which frequently develop in the body________ becomes highly active as a__________ agent. In fact, it may easily be seen that its presence in the body is a constant
menace to health. This _________ is always accompanied by the
production of a number of highly active ____________________

Through other conditions which are constantly arising in the
animal body the colon becomes the source of highly destructive
pathogenic processes. It is to be noted also that the colon
bacillus is not only harmful through its own pathogenic activities
but through ______________ which ______________, such as Welch's
bacillus or ______________.

On the other hand, as pointed out by Tissier, Moro and
other observers there is a group of organisms which are implanted
in the intestines of all nurslings during the act of suckling,
which drive out the colon bacillus and various other pathogenic
organisms from the alimentary canal and produce conditions which
prevent invasion by pathogenic organisms of any sort so long as
the proper conditions are supplied for their development. (Here
tell the story of Tissier's discovery and Moro's discovery.)

WRONG IDEAS ABOUT IMPLANTATION

The protective organism is not implanted. Its residence
in the intestines depends entirely upon the food supply. It de-
pends upon carbohydrates for its support. Two special carbohydrates,
lactose and achroödextrin, especially favor its development. This
is especially true as regards the colon for the reason that lactose
and achroödextrin are not readily absorbed in the small intestine
as are other carbohydrates and so find their way into the colon
in larger quantity where they are needed for the sustenance of the
lactic acid-forming bacilli, bifidus acidophilus and exilis. Nor-
mally no microorganisms of any kind are implanted in the intestinal
tract. The fact that an organism is implanted there is evidence of infection. The fact that the colon bacillus is driven out from the infant colon by bifidus and acidophilus is evidence that it is not a normal resident.

Tissier showed that the colon bacillus is driven out of the colon by bifidus in the case of young infants so long as they continue to nurse their mothers, that is, so long as they receive an abundant supply of lactose. Moro showed that acidophilus performs the same protective function, and Torrey has shown that when animals and adult human beings are fed on a diet containing an abundance of lactose and vegetable proteins are eaten instead of animal, especially flesh protein, the dominating organism of the intestines is acidophilus and Not B. Coli. The mere fact of permanent residence in the colon without relation to diet is evidence of infection.

MEMO: Make deadly parallel between B. Coli and acidophilus.
The pipe leading from the tank joins the service tube in front of the service valve (ii) and is controlled by the valve (i), in the way shown below.

\[ x + h^5 \]

So as to leave small room for intermittent and medicated solution to reoccur in the pipe after use.
tum which in the colon are either filtered out by the mucous membrane or absorbed so slowly that they are destroyed or eliminated by the liver and kidneys. Rapidly enough to prevent serious complications.

Not infrequently, also, such quantities of water are forced through the intestinal ileocecal valve into the ileum that the patient becomes actually waterlogged and suffers because of osmotic pressure demand within the midjejum and an undue loss of sodium chloride.
Control of the amount of water retained in the bowel is highly necessary, for the reason that in practically all cases in which drains or irrigations are needed, the ileal valve is incompetent and freely permits a reflux of liquids into the small intestine. When this occurs, patients are likely to suffer from nausea, headache, and other toxic symptoms. Because of the rapid absorption by the mucous membrane of the products of putrefaction... (over)
complete control of the apparatus without leaving his seat.
He fills the tank by opening valve (k), having previously adjusted the temperature controller (y) so that it will deliver water of the desired temperature.

After the colon or enema tube (f) is connected with the patient, the valve (l) is closed, and the valve (j) is opened fully or partially, according to the amount of pressure desired. When the desired amount of liquid has been introduced, as shown by the upper dial (d), valve (j) is closed and valve (l) opened. The negative pressure is always sufficient, often so excessive that the mucous membrane is drawn into the openings of the tube, causing stoppage of the outflow. The negative pressure is perfectly controlled by valve (l).

If it is desirable to give a medicated enema, valve (j) is kept closed and valve (l) is opened, the medicated solution having been previously placed in the small accessory reservoir shown at (w).

When an alternating hot and cold or Scotch irrigation is to be given, the small tank is filled with cold water, the large one with hot water, and the valves (l) and (j) are opened and closed in alternation.

This powerful reductive application may render invaluable service in a great variety of therapeutic applications other than the treatment of rectal and colon affections, such as vaginal irrigations, certain eye affections, and for circumscribed superficial exudates and other conditions requiring vigorous stimulation of the local blood circulation.

When the application is finished, or before if necessary, the waste receptacle is quickly emptied by opening valve (k), which sets in operation the aspirator (n), by which the contents
a - Cabinet
b - Tank
c - Thermometer
d - Dial for tank
e - Dial for waste receptacle
f - Manometer
i - Valve for medicated fluids
t - Valve for service tube
f - Valve for filling tank
k - Valve for emptying receptacle
l - Valve for controlling discharge
m - Tube for emptying receptacle
n - Aspirator
o - Water-closet
p - Service stool
q - Discharge tube
r - Colon tube
s - Window
t - Ventilating tank
u - Flexible air tube
v - Waste receptacle
w - Accessory tank
x - Air inlets
y - Temperature controlling mixing valve
z - Valve
a - Cabinet
b - Tank
c - Thermometer
d - Dial for tank
e - Dial for waste receptacle
f - Manometer
g - 

h - Valve for medicated fluids
i - Valve for service tube
j - Valve for filling tank
k - Valve for emptying receptacle
l - Valve for controlling discharge
m - Tube for emptying receptacle
n - Aspirator
o - Water closet
p - Service stool
q - Discharge tube
r - Colon tube
s - Window
t - Ventilating tank
u - Flexible air tube
v - Waste receptacle
w - Accessory tank
x - Air inlets
   Temperature
y - Damper controlling mixing valve
z - Valve
IMPROVED APPARATUS FOR IRRIGATING
AND FLUSHING THE COLON

The purpose of this invention is to provide a means by which irrigation, or flushing, of the colon may be accomplished more efficiently, safely, and conveniently than is possible by the means in current use.

The almost universal prevalence of constipation in civilized countries and the frequency of resulting crippled conditions of the colon which render necessary the mechanical emptying of the colon by flushing with water and treatment by irrigation with hot or cold water, or other liquids, either plain or medicated, has led to the development of various means and methods for facilitating these modes of treating the colon. However, none of these devices or methods have proved to be capable of meeting the various indications presented by cases commonly met with and overcoming certain serious inconveniences, even dangers and other disadvantages.

The purposes of irrigation and flushing of the colon are

1. To empty or cleanse it.
2. To apply cleansing or soothing solutions or other liquid medicaments or healing agents in liquid form.
3. To train the delinquent or incompetent colon to function in a more normal and efficient manner.

To accomplish these purposes thoroughly and safely, that is, without causing either transient or more definite and lasting injury, it is necessary to know constantly the
Control of the amount of water retained in the bowel is highly necessary, for the reason that in practically all cases in which enemas or irrigations are needed, the ileoceleal valve is incompetent and freely permits a reflux of liquids into the small intestine. When this occurs, patients are likely to suffer from nausea, headache, and other toxic symptoms because of the rapid absorption by the small intestine of the products of putrefaction which in the colon are either filtered out by the mucous membrane or absorbed so slowly that they are destroyed or eliminated by the liver and kidneys rapidly enough to prevent serious symptoms. Not infrequently, also, such quantities of water are forced through the incompetent ileoceleal valve into the ileum that the patient becomes actually water-logged and suffers because of an excessive demand upon the kidneys and undue loss of sodium chloride.
Powerful revulsive applications may render invaluable service in a great variety of therapeutic affections such as rectal, cervical, vaginal, eye, ear, and for many circumstances requiring superficial stimulation and other conditions requiring increased blood circulation.

When the application is finished, or before necessity is perceived, the insertion is quickly removed by
hand points show the number of pounds or pints of liquid present in the reservoir at any moment when treatment is being given. By subtracting the amount indicated from the amount shown at the beginning of the seance, the approximate amount of liquid introduced may be known by subtracting from this the figures shown on the lower dial, the amount of liquid left in the intestine may be ascertained.

The upper dial (d) shows when the tank needs refilling, and the lower dial (e) shows when the waste receptacle needs emptied and to be flushed.

The upper dial (d) is connected with scales on which the tank rests. The lower dial is connected with another scales that carries the weight of the waste receptacle.

The manometer (f) indicates the pressure under which the stream of liquid is entering the bowel through the service tube (p) and also the amount of negative pressure due to the column of water in the discharge tube (q). The positive pressure is controlled by the valve (j); the negative pressure by valve (i), when valve (j) is closed.

The capacity of the waste receptacle (y) is approximately the same as that of the tank (b).

The temperature of the water may be regulated if desired by a temperature controller and mixer (y).

The valve (g) permits withdrawal of water for making medicated mixture or other purposes.

The flexible pipe (m) is provided for the convenient emptying and flushing of the receptacle (y). At (n) is shown an aspirator, which is controlled by the valve (k).

The valves (b), (i), (j), (k) and (l) give the operator
Q. Please give me some of the symptoms of colitis?

A. Now, there is just one symptom of colitis that is decisive, and only one, and that is the passage of masses of mucus, or strings, or shreds, or films, or masses of mucus.

Q. Where are the proteins digested in the alimentary canal?

A. In the stomach and intestine.

When a farmer finds his sheep are troubled with parasites, he gives them a dose of tobacco; he just gives them a tobacco bath. He gets some tobacco, nicotine, makes a decoction, bathes his sheep in that tobacco juice. Tobacco is a deadly poison; it will kill everything that lives; it will kill even plants. A great scientist made an experiment. He put a sensitive plant, a sundew that catches flies, under a bell jar; then put some tobacco smoke into the bell jar, and the sundew refused to catch flies. It was unable to catch flies; it was poisoned, and it took it some days to recover from it.
The American people are almost universally suffering from blockade of the colon. Constipation, the common term applied to this condition, is generally regarded as an inconvenience rather than a menace to life and health. It is one of the most prolific of all causes of disease.

Thousands of men and women think themselves in good health because their bowels move once a day, regardless of the fact that they have coated tongues, a foul breath, and many other indications of autointoxication. The fact is that the bowels should move three or four times a day at least once after each meal.

The normal alimentary cycle is twelve to fourteen hours. Here are simple facts, as shown by means of X-ray examinations, experiments upon animals, and other scientific modes of investigation:

The work of digesting and absorbing the food occupies about eight hours. At the end of this time the unusable food residue is found deposited in the colon, ready to be dismissed from the body as waste and useless material. The process of gastric digestion is finished in four hours; the small intestine completes the work of digestion, and absorption in four hours more, and further the residue moves through the ileocecal valve into the colon, the usable portion of which is practically gone, leaving a small residue of indigestible and unusable remnants, together with mucus, bile and certain other waste matters to be dismissed from the body by the colon, a wonderful mechanism provided by Nature to serve the body for waste and garbage disposal. There is in many ways close analogy between "the house we live in" and an ordinary domicile. It is almost literally true that the stomach is the kitchen of the body, the small intestine the dining room, and the colon the garbage and waste disposal system, more than a mere waste receptacle.

The stomach prepares the food materials for digestion but really digests and absorbs very little of the food.

The small intestine is the great digesting and absorbing department of the human economy. Of its seven square feet of mucous membrane are found four million of absorbing receptacles - the "villi" - that hang out into the cavity
of the intestine. The contents of the intestine, which bathe these absorbing rootlets, constitute the soil out of which the body grows. As the soil is exhausted, the worthless remnant is pushed on into the colon, to be dismissed from the body as useless and undesirable.

The great work of the stomach and small intestine, involving marvellous changes that fit the food to enter the blood and become part of the living structure of the body, is done in eight hours. During this time the length of intestine passed over is nearly twenty-five feet.

Clogging of the Colon.

At the end of eight hours the residues are in the colon and within four or five feet of the lower outlet. If the whole mass of food, weighing several pounds in all, has been able to travel twenty-five feet in eight hours, or at the rate of three feet an hour, it certainly would seem that the small residue of waste, amounting to only a few ounces, ought to finish the journey in four hours more.

And that is exactly what occurs in the wild man who lives a natural life in the forest and in those men-like beasts, the higher apes. But among civilized people a blockade develops in this lower region of the digestive tube, a very frequent impairment which is the worst sort of obstruction to the commerce of the body and to all its manifold activities.

X-ray studies by Dr. James T. Case have shown that the food residues of a meal reach a point beyond the middle of the colon in less than ten hours from the beginning of the meal. In two hours more, or at the end of twelve hours, these unusable materials should be cast out of the body. Certainly two hours ought to suffice for a journey of only two feet, when nearly thirty feet have been traversed in ten hours. Instead of this, more than twenty-five two hours to go.

But the astonishing fact is that the time required for the food residues to travel the last two feet of the colon is, in the average person, whose bowels move once a day, about forty hours, or twenty times longer than it should be.

In this astonishing fact is to be found the secret of nine-tenths of all the chronic ills from which civilized human beings suffer, and perhaps not
a small part of our moral and social maladies.

In the last two feet of the colon is found the seat of the most destructive blockade that has ever opposed human progress. Let us look a moment at the real situation. The accompanying diagrams will help to make this clear.

Suppose a test meal is given at breakfast on Monday morning. Within the fifty or more hours that elapse before the residues of the meal are dismissed on the following Wednesday, at least six more meals are eaten. The residues of all these meals as well as those of the test meal are packed away in the colon. The residue of the test meal is Number 1. Diagram. Numbers two to seven represent the next meals in the regular order.

How far different this condition is from a normal or ideal state will best be appreciated by reference to the second diagram. When the colon acts normally the food residues are moved along in a procession with intervals between the meals which afford the intestine an opportunity for rest, and, still more important, a chance to cleanse itself by means of its lubricating and disinfecting mucus. Each residue should be moved along by itself and discharged at once when it reaches the end of the colon. Here is the normal program of the procession of food:

Breakfast at 7 a.m.

At 11 a.m. the stomach is empty and has an opportunity to rest and cleanse and disinfect itself before dinner. The breakfast is all in the small intestine and beginning to pass into the colon.

Dinner at noon.

The new peristaltic impulse given the whole food tube by the new intake of food carries the breakfast over into the colon and by five o'clock p.m. the breakfast has begun to enter the descending or last half of the colon, the dinner is in the lower part of the small intestine, and the stomach is again empty, resting and

Supper at 6 p.m.

The new food intake makes another vigorous move all along the line,
the result of which in four hours should be to dismiss the whole residue of the breakfast, to move the dinner residue into the colon, and to carry the supper to the lower end of the small intestine, leaving the stomach empty and so prepared for rest during the night.

DURING SLEEP.

During the hours of sleep the intestinal movements are much slowed. By morning however, the dinner residue of the day before will have reached the lower colon, so that the intestinal activity set up by the act of rising should lead to a before-breakfast bowel movement.

The breakfast intake should cause the dismissal of the residue of the supper of the day before; or if the after-breakfast movement fails or is incomplete, the dinner intake should lead to a complete clearance of all the residues accumulated from the food intakes of the day before.

When this program is carried out without interruption, no part of the food tube is overburdened with an undue accumulation of waste material, and the food residues are moved along so rapidly that there is no time for harmful putrefaction.

It is known that the first changes that occur in the foodstuffs are simple acid fermentations that are harmless. It is only after the lapse of twenty-four hours or more that putrefaction and poison-forming processes begin. It is thus evident that the maintenance of the normal alimentary cycle is a matter of the utmost consequence for health preservation, and that the restoration of this function when lost is a matter of fundamental importance.

X-ray studies have clearly shown that in by far the great majority of cases of constipation, perhaps in nine-tenths of all cases, the real difficulty is to be found in the lower part of the colon, the result of neglect to anticipate.

A common and most valuable remedy which has been resorted to even by the most primitive people and from the most ancient times, is the enema, by which the crippled colon is mechanically emptied. This measure affords only temporary relief.

The most valuable remedies, measures that actually succeed, even in very obstinate cases, are found in two very simple substances - bran and paraffine oil. One affords bulk, the other lubrication.
By the proper use of bran, or agar agar, and paraffine oil, each meal, the bowel may be made to move normally, or at least in a manner approximating the normal rhythm - that is, three times a day, or after each meal. The amount of bran or other bulk material must be large, two ounces daily being required in some cases.

The amount of paraffine required also differs. In some cases the dose must be quite large - even so much as an ounce and a half at each meal. The amount of bran and paraffine should be gradually increased until sufficient to accomplish its purpose.

When the tongue is coated and the breath bad, it is well to begin the battle for raising the blockade with a few days of fruit regimen. This consists of a dietary composed wholly of fruits, with bran and paraffine. Under this regimen the tongue becomes clean, the breath sweet and the bowel move three or four times a day. By careful management of the diet, this improved condition may be rendered permanent, but a never-ending battle must be waged against constipation. The colon is crippled and will always need special attention and help. It has become overstretched and half-paralyzed, and so an extra amount of roughage or bulk-making material in the shape of fruits, vegetables, bran or agar agar will always be needed. The mucous glands have atrophied and perhaps the appendix has been removed, and so the lubricating system of the intestine is damaged, and it will be necessary to make permanent use of an artificial lubricant - paraffine oil in some form. Bulk and lubrication must be provided for every meal.

Evacuate the food residues and body wastes at least three times a day.

The Alimentary Cycle.

The digestive tract or alimentary canal has its cycle, its rhythmic periodicity as well as has the moon and the planets. Each part requires a certain time for the performance of its work upon the food, before passing it along to the next. Indeed the digestive tube is a series of living laboratories, each of which performs a certain definite work upon the foodstuffs which prepares the way for the work of the next succeeding laboratory. The thirty-foot long muscular tube transports the food from one laboratory to another, giving to each its proper time in which to complete the work to be done.
The wonder precision with which the food is moved along at just the right intervals is one of the marvels of physiology. Recent discoveries by Keith have shown the existence in the intestine of the same timing mechanism which maintains the regular action of the heart. That is, each movement of the stomach, each peristaltic wave is a beat like the beat of the heart and is automatically controlled.

Constipation is due to a derangement of this timing mechanism. It is irregular or too slow, and during the delay things happen which upset the body's system of garbage disposal completely, putrefaction, poisoning, inflammations, infections, etc.

Here is the time table of the food tube as determined by careful observations upon some thousands of human beings.

At end of 4 hours, stomach empty, food all in small intestine.
At end of 8 hours, food residue at middle of colon.
At end of 10 hours, residue in pelvic colon ready to be dismissed.
At end of 12 hours, food residue dismissed by natural action of the colon. [After breakfast]
At end of 25 hours, colon cleared of residues of the preceding day's meals.

The Carmine Capsule Test.

This test consists of the giving at meal time of a capsule containing five grains of carmine by which the intestinal contents are deeply colored, and may be easily distinguished from the residues of preceding or following meals.

After the capsule is taken, careful watch is kept of the bowel movements and note is made of the exact minute when the carmine color makes its appearance.

The observations of the stool still continue for the purpose of determining the time of the total disappearance of the carmine.
Six Dangerous Errors About the Colon.

It is probable that more disease, premature old age and death, misery and even crime, originate from constipation than from any other bodily disorder. Constipation is not in itself a disease, but is a symptom the cause of which may be disease or simply neglect.

There are several very prevalent errors respecting the colon and its functions which are probably responsible for most of the mischief which arises from disorders of this part of the body.

False Modesty, one of the most universal and mischievous of errors about the humble colon is that its function is one which modesty imperatively demands shall be concealed even at the expense of great suffering. It is indeed only in very recent times that public transportation companies, railroad and trolley lines, have begun to make anything like decent or adequate provision for the colon needs of patrons. And even at the present time there are hundreds of small station and waiting rooms wholly unsupplied with toilet conveniences.

Very few of our cities and towns offer any sort of public toilet provisions for either men or women.

Thousands of factories and other places where men or women are employed provide no adequate toilet arrangements.

It is a most dangerous error to suppose that the colon function can be neglected or postponed with impunity. Many people, perhaps the majority, regard the moving of the bowels as a disagreeable duty which may be postponed to suit the demands of business or convenience.

The results are most disastrous. The majority of chronic human ills are the result of their neglect.

Primitive people show better sense in relation to care of their bodies and have proper respect for their natural functions. For example, Dr. P. N. Darling, a medical missionary of India in a letter to the editor states, "The chief duty of the Indleburd, or priestly caste, is the care of such matters (the movement of the bowels). A fine is levied in case of neglect."
Another Missionary physician, Dr. J. C. Young, located among the Arabs of Sheikh Othman, Aden, makes in a letter to the writer the following interesting statement which clearly shows the importance which these people attach to regularity and promptness in regard to bowel action which occurs with them three or four times daily: "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."

It is more important for a parent or a teacher to know whether a boy's bowels move regularly three times a day than to know concerning his progress in his studies. Constipation is one of the most common obstacles in the way of mental and moral development and training.

THE FORMED STOOL DUE TO CONSTIPATION.

Another common error which is held by most medical men as well as by the laity is that the stool should be "formed." This is a false notion which has grown out of the universal constipation habit which prevails among civilized folk. The vegetarian Hindus of Amristar, who live chiefly on ground wheat and vegetables, according to Dr. A. H. Browne, have "large, bulky, and not formed, but pultaceous stools."

A well formed stool always means constipation. The significance is that the colon is packed full like a sausage and that the fecal matters have been so long retained that they have been compacted by the absorption of water. The whole colon is filled, and the bowel movement is the result of the pressure of the incoming food residues at the other end. When the body wastes are promptly discharged as they should be, the colon never contains the residues of more than two meals and at the after-breakfast movement should be completely emptied so that the disinfecting and lubricating mucus which its membrane secretes may have opportunity to cleanse and disinfect the body's garbage receptacle and thus keep it in a sanitary condition.

The California Doctor who advised his patient to restrain his desire for bowel movement at night and "save it till the next morning" so that "he might have a well formed stool," had not the first conception of the normal function of the colon.

One Movement a Day is Constipation.

That one bowel movement a day is a normal and sufficient evacuation
of the bowels is another error which is universally entertained. One bowel movement a day is positive indication of constipation. X-ray examination of the colon after a test meal shows that in persons whose bowels move once a day the body wastes are usually retained for fifty hours or more. Hart of London, and not a few other authorities, finding this condition almost universal have been led to regard it as normal. In this they are certainly in error. X-ray examinations show that in eight hours from the beginning of a meal the process of digestion has been completed, the digested food has been absorbed, and the unusable residue has been pushed half way through the colon, in other words is within two and a half feet of the outlet of the bowel. In eight hours the food has travelled more than twenty-five feet or ten times the distance which remains to be travelled. The work of digestion is finished, the useful part of the food has been absorbed, there remains nothing to be done but to dispose of the indigestible and useless residue by pushing it along two or three feet further. Certainly no good reason can be assigned for the retention of these useless residues. It is indeed highly absurd to suppose that forty hours are need to transport the feces two and half feet when they have already traveled twenty-five feet in less than ten hours.

The bowels should move at least three times a day, or after each meal. Four movements daily is still better rhythm and is easily established by a biologic regimen. This the writer has proven not in a few exceptional cases but in hundreds of individuals who were willing to take the trouble to train their bowels by means of a proper diet and other simple and natural means.

Foul-Smelling Stools Unnatural, Unnecessary, and A Health Menace.

A fourth error which leads to wrong conclusions and paralyzes efforts toward change of conditions is the supposition that the stools or fecal matters are necessarily putrescent and loathsome. This is by no means true. The writer has had under his care at different times a number of people who had temporary openings close to the lower end of the small intestine where it joins the colon. Examination of the intestinal contents when they have an opportunity to escape at this point shows that they are practically free from offensive odors and other evidences of decomposition.
This fact, as well as many others, shows that the changes which take place in the colon are the cause of the offensive character of the stools. This is the natural and necessary result of the long delay of putrescible material in the warm, moist colon, always swarming with germs and presenting conditions the most favorable possible for the promotion of putrefactive processes. Let the reader try to imagine what would happen to a beefsteak carried in an inside pocket next the warm skin for two or three days. It would certainly become far advanced in decay. And that is just what happens to particles of undigested meat and other proteins in the colon. The change known as putrefaction is slow in beginning; it makes little advancement the first twenty-four hours, but after that the intensity of the process increases very rapidly.

The carmine capsule test shows that in most cases in which the bowels move once daily, the waste disposal function is always several days in arrears. The colon contains the waste and residues of several meals—anywhere from five to twenty or even more—so that there is ample opportunity for the putrefactive process to get well under way.

This putrefaction is the source of the foul odors and gases which originate in the colon, and which are not only most offensive to the sense of smell, but as is well known, are also highly poisonous, and may give rise to nausea, "biliousness," loss of appetite, foul tongue, bad breath, dingy skin, headache, Bright's disease, and a host of other grave disorders.

The stools of a person who lives biologically, that is, whose diet is restricted to food stuffs which do not readily undergo putrefaction; such as fruits, grains, nuts, roots, green vegetables and milk, are almost odorless. The offensive, sickening, ammoniacal odor usually present is absent. The stools are odorless or have a slightly acid odor, like the bowel discharges of a young breast-fed infant. The difference is the same as that between the stools of a dog and those of a sheep, and for the same reason. In the case of the dog and the meat-eater there are always to be found in the colon fragments of decaying flesh; while in the colon of the sheep, the nursing infant or the flesh-abstainer, the food residues present consist of starch, sugar and
other substances which ferment, producing acids, but do not undergo putrefaction.

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Constipation was the rock on which "Fletcherism" foundered. Nevertheless Mr. Fletcher made a contribution of incalculable value to the cause of diet reform by his demonstration of the practical advantages of the low protein dietary and especially in the initiation and financial support of the scientific investigation made by Chittenden of Yale which furnished the technical laboratory proof of the sufficiency of a diet containing not more than one-third of the protein which Atwater and others had previously maintained to be essential to healthy and vigorous life. As a reward for this great public service Mr. Fletcher is entitled to recognition and remembrance as a public benefactor.

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The wonder precision with which the food is moved along at just the right intervals is one of the marvels of physiology. Recent discoveries by Keith have shown the existence in the intestine of the same timing mechanism which maintains the regular action of the heart. That is, each movement of the stomach, each peristaltic wave is a beat like the beat of the heart and is automatically controlled.

Constipation is due to a derangement of this timing mechanism. It is irregular or too slow, and during the delay things happen which upset the body's system of garbage disposal completely—putrefaction, poisoning, inflammations, infections, etc.

Here is the time table of the food tube as determined by careful observations upon some thousands of human beings.

At end of 4 hours, stomach empty, food all in small intestine.
At end of 8 hours, food residue at middle of colon.
At end of 10 hours, residue in pelvic colon ready to be dismissed.
At end of 18 hours, food residue dismissed by natural action of the colon.
At end of 25 hours, colon cleared of residues of the preceding day's meals.

The Carmine Capsule Test.

This test consists of the giving at meal time of a capsule containing five grains of carmine by which the intestinal contents are deeply colored, and may be easily distinguished from the residues of preceding or following meals.

After the capsule is taken, careful watch is kept of the bowel movements and note is made of the exact minute when the carmine color makes its appearance.

The observations of the stool still continue for the purpose of determining the time of the total disappearance of the carmine.
This period should be not longer than 14 to 18
hours. When it lasts 24 hours, nine or less
Purification takes place. In such a case a
large amount of lubricating oil and of
paraffin oil in some form is needed.

Sometimes, in many cases, in fact,
the enema must be used regularly,
preferably at bedtime, once in seven
minutes to have the colon to empty itself.
The quantity should be 2 quarts and the
temperature 110°F. to 115°F. The use of the new
lubricant is safe at ordinary temperatures and

Paraffin oil is a new remedy of remarkable
value at which serves the purpose of Bath
Bulk and lubrication.

Changes in the intestinal is another measure
drawn up. Purification cleanses the
Colon. The acids produced by "friendly sewerz"
are the natural colon stimulants.
Six Dangerous Errors About the Colon.

It is probable that more disease, premature old age and death, misery and even crime, originate from constipation than from any other bodily disorder. Constipation is not in itself a disease, but is a symptom the cause of which may be disease or simply neglect.

There are several very prevalent errors respecting the colon and its functions which are probably responsible for most of the mischief which arises from disorders of this part of the body.

False Modesty, one of the most universal and mischievous of errors about the humble colon is that its function is one which modesty imperatively demands shall be concealed even at the expense of great suffering. It is indeed only in very recent times that public transportation companies, railroad and trolley lines, have begun to make anything like decent or adequate provision for the colon needs of patrons. And even at the present time there are hundreds of small station and waiting rooms wholly unsupplied with toilet conveniences.

Very few of our cities and towns offer any sort of public toilet provisions for either men or women.

Thousands of factories and other places where men or women are employed provide no adequate toilet arrangements.

It is a most dangerous error to suppose that the colon function can be neglected or postponed with impunity. Many people, perhaps the majority, regard the moving of the bowels as a disagreeable duty which may be postponed to suit the demands of business or convenience.

The results are most disastrous. The majority of chronic human ills are the result of their neglect.

Primitive people people show better sense in relation to care of their bodies and have proper respect for their natural functions. For example, Dr. P. N. Darling, a medical missionary of India in a letter to the editor states, "The chief duty of the Indulebord, or priestly caste, is the care of such matters (the movement of the bowels). A fine is levied in case of neglect."
Another Missionary physician, Dr. J. C. Young, located among the Arabs of Sheikh Othman, Aden, makes in a letter to the writer the following interesting statement which clearly shows the importance which these people attach to regularity and promptness in regard to bowel action which occurs with them three or four times daily:

"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."

It is more important for a parent or a teacher to know whether a boy's bowels move regularly three times a day than to know concerning his progress in his studies. Constipation is one of the most common obstacles in the way of mental and moral development and training.

THE FORMED STOOL DUE TO CONSTIPATION.

Another common error which is held by most medical men as well as by the laity is that the stool should be "formed." This is a false notion which has grown out of the universal constipation habit which prevails among civilized folk. The vegetarian Hindus of Amristar, who live chiefly on ground wheat and vegetables, according to Dr. A. H. Browne, have "large, bulky, and not formed, but pultaceous stools." A well formed stool always means constipation. The significance is that the colon is packed full like a sausage and that the fecal matters have been so long retained that they have been compacted by the absorption of water. The whole colon is filled, and the bowel movement is the result of the pressure of the incoming food residues at the other end. When the body wastes are promptly discharged as they should be, the colon never contains the residues of more than two meals and at the after-breakfast movement should be completely emptied so that the disinfecting and lubricating mucus which its membrane secretes may have opportunity to cleanse and disinfect the body's garbage receptacle and thus keep it in a sanitary condition.

The California Doctor who advised his patient to restrain his desire for bowel movement at night and "save it till the next morning" so that "he might have a well formed stool," had not the first conception of the normal function of the colon.

One Movement a Day is Constipation.

That one bowel movement a day is a normal and sufficient evacuation
of the bowels is another error which is universally entertained. One bowel move-
ment a day is positive indication of constipation. X-ray examination of the colon
after a test meal shows that in persons whose bowels move once a day the body wastes
are usually retained for fifty hours or more. Hertz, of London, and not a few other
authorities, finding this condition almost universal have been led to regard it as
normal. In this they are certainly in error. X-ray examinations show that in eight
hours from the beginning of a meal the process of digestion has been completed, the
digested food has been absorbed, and the unusable residue has been pushed half way
through the colon, in other words is within two and a half feet of the outlet of the
bowl. In eight hours the food has travelled more than twenty-five feet or ten times
the distance which remains to be travelled. The work of digestion is finished, the
useful part of the food has been absorbed, there remains nothing to be done but to dis-
pose of the indigestible and useless residue by pushing it along two or three feet
further. Certainly no good reason can be assigned for the retention of waste
matters. It is indeed highly absurd to suppose that forty hours are need to trans-
port the feces two and half feet when they have already travelled twenty-five feet
in less than ten hours.

The bowels should move at least three times a day, or after each meal.
Four movements daily is still better rhythm and is easily established by a biologic
regimen. This the writer has proven not in a few exceptional cases but in hundreds
of individuals who were willing to take the trouble to train their bowels by means
of a proper diet and other simple and natural means.

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It is just that Mr. Fletcher's disciples should know that he no longer either advocates or practices constipation, but has so modified his regimen
as to secure daily free bowel movements. A further modification whereby the normal
rhythm of three bowel movements daily is necessary to secure the enormous ad-
vantages of the true biologic regimen in which thorough mastication of the food
plays an important though not the dominant role.

While it is doubtless true that less food is usually consumed by persons who are constipated, this fact is not always the result of increased food
economy but may be due to lack of appetite. The toxemias which lessen the
appetite lessens also initiative, endurance and efficiency, and cannot be con-
sidered in any way an advantage.

The Snare in Mineral Waters. Still another grave error which has come
to be almost universal is the trust reposed in saline waters and other laxatives
as means of combating colonic stasis or constipation. X-ray examinations, made
by Dr. J. T. Case and others in hundreds of cases, have proven that laxatives
of all sorts do great harm by causing spasm or spasticity and hence obstruction,
in the lower part of the colon and by increasing antiperistalsis, by which the
fecal wastes are held back in the cecum and first half of the colon which thereby
becomes distended, overstretched and permanently damaged.

One of the consequences of this overstretching of the colon is the
crippling of the ileocecal valve which is rendered incompetent so that the putrid
fecal matters accumulated in the colon are forced back into the small intestine
and are thus mingled with the digesting foodstuffs and absorbed into the blood
along with them. This is essentially the same thing as discharging a sewer pipe
on the dinner table and mingling sewage with the food.

All laxative waters and medicinal laxatives of every sort are harm-
ful. They afford temporary relief at the expense of increasing the difficulty
by irritating the colon and by causing colitis and obstinate contraction of the
descending and pelvic colon, a condition practically equivalent to stricture
of the bowel. The habitual use of laxatives is the most certain method of produc-
ing the most intractable forms of constipation.

Our Waste Disposal System.

The colon is the garbage receptacle and waste disposal apparatus of
The flesa and other circular muscles, which may be used for an indelibility period with no harmful effects, the colon may be trained to do its work efficiently. It must be remembered, however, that a crippled colon is permanently damaged. Here are some of the irreparable injuries which permanently cripple it: prolapse and adhesion of the circular colon; atresia of the cecum; dilatation, swol

en of the cecum; incompetence of the ileocecal valve. These injuries of the colon cripple it so seriously that it cannot be expected even with a normal
diet, to function efficiently without the support afforded by various simple measures, such as the free use of every meal yogurt, or whey or egg yolk, or seaweed or rice, or mineral oil. In bad cases, the systematic use of the kidney at bedtime is required. By the faithful use of these harmless measures, the damaged colon may be so helped that no harm will ever cease to be a menace to health and even life. Many who suffer from polyps can be reformed; but the cancers which are too badly damaged that removal is needed are very rare. But when the seat of cancer, tuberculosces, or permanent mechanical obstruction, surgery must be appealed to for relief, and in the hands of skilled operators, the results of such operations are most gratifying.
Every child should be trained early to empty the bowels at least after each meal. The habit is natural, and with a proper diet is easily acquired by children. The decision of a “home” for idiots and imbecile minded children informed the writer that she kept her charges clean and the atmosphere of her wards sweet by washing them all after each child used the toilet after every meal. If idiots can acquire the three-a-day habit, certainly intelligent children can too.

The advantages of this good “housekeeping” are very great. Children thus trained are free from indigestion, they are seldom ill, they are cheerful, less irritable, sleep well, have good appetites, grow and develop better and make better progress in school.
kidneys and skin are not compelled to act as sewers in attempting to carry off the filth which the colon has failed to dispose of.

So long as the body wastes are disposed of in this prompt and normal manner the terrible effects which arise from intestinal toxemia or autointoxication are not seen. The skin is clear, the tongue clean, the breath sweet, the appetite keen, the mind active, optimistic and serene, sleep sound and restful, endurance great and resistance high.

Unfortunately, this happy state is seldom met among civilized men who have advanced beyond the age of infancy. The customs of civilized life nearly all tend to render the colon sluggish and to cripple its function as a waste disposal system. The flesh-eating habit loads the colon with remnants of undigested flesh which undergo the same changes which take place in the decaying carcass of a dead animal left to itself. Thus the body is flooded with the most horrible and loathsome poisons and the marvel is not that human life is so short and so full of miseries, mental, moral, and physical, but that civilized human beings are able to live at all.

The civilized colon with its accumulated residues of five to fifteen meals, or more, is a Golgotha of pollution, a veritable Pandora's Box of disease.
How to Change the Intestinal Flora

Change of the intestinal flora was first accomplished by Dr. Tissier of the Pasteur Institute, Paris. He, when assistant to the late Prof. M. Neetanoff, discovered the antagonism between fermentation acid germs and putrefactive germs. He also noted that all young human beings, as well as of all warm-blooded animals, are supplied with an outfit of normal acid ferment germs which occupy their colons and prevent the establishment of putrefactive organisms in their young and feeble bodies.

To long, the green acid as a nursing, where productive
How to Change the Intestinal Flora

The intestinal flora consists of some billions of germs which live in the colon. The botanists use the term flora to designate all the different plants which grow in a given locality. The only plants that grow in the colon are yeasts, molds, and germs, which hence constitute its flora.

There are good and useful germs, just as are good plants. Foods, flowers, and other useful plants, like bad ones, weeds, thistles, and other weeds. Good germs protect the body, just as a good plant of wheat prevents weeds from growing.
germ is active and the infant remains well; but if improper feeding or neglect to keep the bowels active the protective germ is lost and the intestinal flora establish and thereafter begin, among which are colitis, appendicitis, malnutrition, arrest of growth and susceptibility to disease, which may often lead to tuberculosis. And after death, if not in infancy, soon after adolescence, the flora is changed by following a special regimen, and making use of foods which encourage the growth of the protective organisms while discouraging the growth of the foreign invading germs.
The best foods for this purpose are glycerine and lactose. Care must be taken to keep the colon empty and flesh meats of all sorts must be avoided. In many cases it is well to avoid the use of eggs for a time at least. The change of flora will be evidenced by the disappearance of the bad taste in the mouth when present. Clearing of the tongue and a sense of well being will occur. The stools will cease to be greasy and will occur more frequently and constant. The use of drugs like diarrhea and fever no means by which the recollected and rapid a change may be induced in a person's physical condition as by this 66
a change has once been effected it
and should be
may be maintained by the con-
tinued use of the means by which
the change was accomplished.

For keeping the intestine in a
state of cholericlike cleanliness,
the things essential, the freer use of
laxatives, and that is, lubricating
and detergent foods, acid the
and avoidance of indigestible and
avoidance of indigestible and
avoidance of indigestible and

Dictation to H. Hopkins
ending with nice room
which live.
The flora of the colon needs to be changed because it becomes inhabited through wrong eating habits and neglect to keep it free from stagnating residues.

To change the flora means simply to stop putrefaction. To change the putrefactive germs which produce acids and putrefactive odors, for harmless and friendly germs which produce acids and in so doing drive out the disease-producing germs which cannot thrive in the presence of acids.

The two things necessary for changing the intestinal flora are:

1. The bowels
must be made to act more freely, and the colon must be kept free so as to keep the colon free from stagnating residues. 2. The diet must be such that the residues left in the colon will not be refractive. The normal diet or biologic diet of man is one which leaves residues which do not refract easily. If such a diet were always adhered to, there would be no occasion for changing the flora of the lower bowel; especially through the use of whole and the liberal use of eggs, especially by the use of game, cysters, and other real foods, substances which are usually in an advanced stage of refractation when eaten, the colon becomes infected with putrid residues; and this is the cause of
By suppressing altogether
from the dietary foods that
are indigestible or which leave
a digestible residue, the
character of the stools will
change greatly in a short
while. This method of changing
the stools is this is the only
the chief reasons for the belief.
Gut grains seem to follow from
the exception of some crustaceans,
with

raw foods, with

meat, eggs and

milk to a lesser extent milk, are

not very little indigestible, much

less if they cooked foods.

Besides, raw foods are sick in
vitamins which aid the bowel action and nutritive excretion.

My means of an exclusive fruit diet or regimen the flora may be changed materially within a few days. This is the reason for the benefits derived from the "Prune cure", the apple, peach and other fruit "cures" by an exclusive milk diet the intestinal flora will overcome lose their offensive character as putrefaction is suppressed.

The flora may be greatly improved with little change in the "flora" by simply adding to it a liberal amount of carbonate or a liberal amount of carbonate or a liberal amount of sugar. The addition required will vary. The use of toddy is 8 to 10 ounces a day. The use of toad of an amount of carbohydrate will naturally decrease the appetite for other
foods because it will supply 800 to 1000 calories of energy. Twelve
if the intake of other foods is not
totally diminished there will be
a marked increase in weight which
is of course sometimes very desirable.
Dietary showed that dextrose
will act as well as lactose well
change the blood. Some observers
found dextrine more ef-
ficient than lactose. A combination
of the two has been found highly
desirable and more agreeable in
use than either lactose or
dextrine.
A butter rich in
fats prepared by stirring.
milk with a germ derived from the colon, known as *Bacillus acidophilus*, will change the flora if used in sufficient quantity. For good results, two or three quarts a day are required daily. Ordinary buttermilk or raw milk with lactose added in sufficient amount will change the flora equally as well as the *Bacillus acidophilus* milk. A good combination of *acidophilus* milk and lactose or lacto-dermew will give much better results than *acidophilus* milk alone.
“Cultures” are not necessary for changing the flora. This is evident when it is recalled that nature plants out in life every human infant and every infant mammal with an excellent acidophilus flora by which it is protected against destructive fermenting bacteria which are prone to invade the intestine when conditions are favorable for their growth. An adult who has lost his aciduric flora may get it back by returning to the natural diet which supplies to the colon non-putrefiable residues. For the colon,
There are several very convincing reasons for believing that putrefaction of the intestinal contents is an abnormal condition due to infection of the intestine by foreign and parasitic bacteria. To the writer incontestable facts permit no other conclusion.

1. The stools of breast-fed infants are acid and not putrid so long as they are exclusively breast-fed and remain in good health.

2. When an infant's stools become foul it loses appetite, ceases to grow at the proper rate, and recovers when with a proper change of diet the stools become normal.

3. The same is true of adults. The headaches, coated tongue, foul breath and so-called biliousness disappear when by a change of flora the stools lose their foul odor.

4. Prof. Carl Akeley of the Natural History Museum of New York told the writer that in his study of the gorilla and its habits in its native African habitat he found the stools, which were very bulky and abundant, wholly free from putrefaction and the same was true of the entire alimentary tract which he dissected with great care from one end to the other.

The suppression of intestinal putrefaction by means of antiseptic drugs was offered as the solution of the problem of intestinal sepsis soon after Bouchard's great work on autointoxication appeared, and for some years various agents were widely used; but the results were most disappointing. Laboratory tests showed the utter futility of this method. The administration of betanaphthol for several days failed to lessen the number of bacteria (Stern). The principle was wrong. Complete sterilization of the intestine by chemical means would be harmful rather than beneficial for the reason that it destroys the protective flora as well as the pernicious organisms and leaves the field well prepared for
the rapid development of the proteolytic type of organisms. Nature's method of protecting the intestine against invasion by harmful bacteria is not by keeping it sterile, but by maintaining in the fluids which bathe the mucous membrane a luxuriant growth of harmless acid-forming organisms which by their product, lactic acid, render the field inhospitable to bacteria of the proteolytic type. When the intestine becomes infested with foreign and pernicious bacteria, it is because the protective *Lactobacillus bifidus-acidophilus* has been lost or rendered inactive.

The character of the intestinal flora is chiefly influenced by two factors: (1) the character of the food and (2) the length of time the food residues and body wastes which constitute the feces, remain in the colon.

Foods rich in animal proteins, such as meats, fish, oysters, game, and eggs, not only readily undergo putrefaction in the presence of warmth and moisture, but when eaten are already in a state of more or less advanced decomposition because they become well inoculated with intestinal bacteria in the act of killing or in the case of game, by the penetration of the tissues by bacteria from the intestines which begins immediately after death.

Proteolytic bacteria very readily attack animal proteins, but according to the observations of Tissier, Torrey and others, vegetable proteins are much more resistant to these bacteria. Cannon found that vegetable proteins "in many cases exert a distinct antiputrefactive effect."

Carbohydrates encourage the development of the acid-forming lactobacilli. This is especially true of lactose and dextrin.

The souring of milk affords a good illustration of the difference in the effects of proteins and carbohydrates. Meats and eggs readily undergo putrefaction. Milk is "liquid flesh." It consists of protein and fat,
the same as does meat, but has also another element, lactose, a carbohydrate, and to this is due the fact that it sours instead of undergoing decay. Putrid meat is poisonous; while sour milk is wholesome, thanks to the fact that milk-souring bacteria are not pathogenic, while the same bacteria that cause putrefaction may give rise to abscesses and various pus infections.

Lactobacilli in milk readily dominate the field because of the presence of lactose. A beefsteak placed by the writer in a jar of sour milk remained intact and free from taint of decay for 17 years (the sour milk was changed weekly). A careful bacteriological examination showed no spore bearers or proteolytic organisms present.

When proper conditions are supplied, the same effects can be obtained and maintained in the human colon. For this it is necessary to possess a lactobacillus that is capable of living in the colon. Ordinary sour milk germs do not even reach the colon when ingested. They cannot exist without oxygen. Morro and Tissier discovered the bifidus-acidophilus lactobacillus which thrives in the colon, being a facultative anaerobe provided it is supplied with an abundance of the lactose or dextrin which it needs.

While the intestinal flora may be greatly improved by simple modifications of the diet, such as the omission of meats, or in cases of constipation the free use of bulkage, for a radical change, it is necessary that a more comprehensive and thoroughgoing plan should be adopted. An examination of the stools of the average mixed feeder will usually reveal a flora showing 0 to 25 or 30 per cent acidophilus. In quite a number of cases the number of L. acidophilus present will be so small that they can be discovered only by special refined methods. The organism has run out or become so attenuated that it barely survives and is rendering little or no service as a protection against the invasion of the proteolytic organisms which cause putrefaction and give rise to various pathogenic
effects, such as colitis, appendicitis, ulcer, as well as general vulner-
ability to infection through the lowering of vital resistance and the in-
fec tion of neighboring organs (E. coli infections of the genito-urinary
tract and the gall bladder and bile ducts).

To correct such conditions, which are often dismissed by internists
as incurable and turned to surgeons whose best efforts also are frequently
unsuccessful, it is necessary to change the flora to such an extent as to
secure a count of 85% to 95% and to maintain this condition. This may be
accomplished by comparatively simple means if thoroughly applied, and
with the patient's complete cooperation.

The following plan has been found efficient in the treatment of
hundreds of cases:-

1. Liberal carbohydrate feeding.

2. Discarding of flesh meats and animal fats (Combe) of all sorts,
and eggs also for a time at least.

3. Increasing the activity and efficiency of the colon so as to
secure complete clearance of the intestinal tract at least once in 24
hours.

4. Liberal feeding of a potent culture of L. acidophilus.

As careful attention to detail is necessary to secure necessary
definite and dependable results, further consideration must be given to
each of the above measures.

1. Carbohydrate feeding is so essential that in some cases it
will effect a very marked change in the flora almost immediately. This
is most likely to occur in cases in which the intestinal motility is
unusually active, so that the carbohydrate quickly reaches the colon in
ample quantities and in which a good strain of L. acidophilus is present
in the intestinal flora although in too small numbers to prevent the
development of proteolytic bacteria and the formation of putrefaction products.

The nature of the carbohydrate is a matter of much importance. Cane sugar, maltose, dextrose, honey, syrups and sweet fruits all have value, being utilized by the lactobacilli, but none are really efficient. All are absorbed so quickly that they do not reach the colon in sufficient amount to make the L. acidophilus dominant. The rapid absorption of the sugars in large quantities raises the blood sugar so high that sugar is likely to appear in the urine and harm may be done in cases of incipient diabetes. Cane sugar in more than small amounts is irritating to the stomach and duodenum and delays gastric digestion (Ogata). Cane sugar also encourages the growth of streptococci. It is nevertheless decidedly antitoxic and in Holland is used by rowing clubs "to counteract the bad effects of a meat diet" and thus prevent the appearance of "the dreaded symptoms of overtraining."

Milk sugar or lactose and dextrin are found to be so far superior to other sugars that they are the only ones employed in laboratory tests and clinical use. The superiority of these two carbohydrates is probably due to the fact that they are absorbed much more slowly than are any other carbohydrates. Dextrin is usually formed slowly by action of the digestive juices upon starch and is absorbed as it is produced. When two ounces are taken at once a portion is likely to reach the colon before being absorbed.

Lactose must be inverted by the ferment lactase to form dextrose and galactose before it can be absorbed. Lactase is present only in small amounts in most adults and so lactose, when given in liberal amounts, has an opportunity to reach the colon before being absorbed in sufficient amount to promote a luxuriant growth of L. acidophilus.
Ordinary lactose or milk sugar is not readily soluble and has little
sweetness. In efforts to render it more soluble the writer discovered a
practical method of changing the ordinary alpha lactose into its isomer,
beta lactose, which is three times as soluble and more than three times as
sweet. This delightful sweet had been previously known to chemical ex-
erts (though not to the author) as a laboratory curio. It is now avail-
able for use as a table sugar in place of cane sugar products under the
commercial name of B-Lac (beta lactose). It has been, in fact, extensively
used for more than ten years in lacto-dextrin of which it is the essential
ingredient.

The dextrin of the drug stores is made by the action of a mineral acid
upon starch. It is a very crude product and so disagreeable in flavor that
few patients will persevere in its use for any length of time. For use in
changing the flora a specially prepared dextrin is desirable and is now
available. Dextrin has the advantage that it does not so readily affect
the blood sugar and hence may be used more freely. For this and other
reasons the author was led some years ago to combine lactose and dextrin
so as to utilize the best qualities of both while avoiding danger of
raising the blood sugar. This combination, known as Lacto-Dextrin, has
come into wide use and has proved an effective means of changing the in-
testinal flora in many thousands of cases.

The quantity of lacto-dextrin required varies with individual cases.
The essential thing is that a sufficient amount of the carbohydrate shall
reach the colon to enable the few lactobacilli that may be present to de-
velop so rapidly that they may acquire
Leukitis or Infectious Colitis

A catarrhal disease of colon, little essentially
similar in character to
catarrhal infectious colitis
not due to specific infection
but to a virulent con-

dition of pathogenic organism
ordinarily present as in
case of invasive catarrh,
appendicitis, + many other
local infections.

1. Mild catarrh, diarrhea
2. Severe malnutrition, diarrhea
3. Ulcerative colitis
Associated with eczema (chronic) and dermatitis
CausE Etiology

Nerve - worry, anger, fear
Ischemia - ischemia, stasis
Infection

Slates causes infection.

Therapy

Diet - low starch, acid-free diet
B. acidophilus
Probiotics
Mineral oils, paraffin
Fruits, greens, vegetables

Whereas:
B. acidiphilus increases the activity of the lactase enzyme, thus aiding the digestion of lactose.
We carried on very extensive experimental work at Miami during the last ten years and have learned a lot of things about the colon, by means of which we have been able to simplify the management of these cases very much, especially the following practical suggestions:

The chief aim is not to change the flora, but to stop putrefaction or bacterial digestion, as the biochemists now call it, in the intestinal tract. The bacterial digestion is all right and a necessary process, but it belongs to the compost heap and should not occur in the alimentary canal or any other part of the body. Its normal function is to reduce the dead bodies of animals and vegetables to liquid form so that they can return to the soil. In normal animals provision is made first to establish in the nursing infant bacterial protection of the body through the inoculation of the nursing infant with the L. Acidophilus by fermenting milk sugar, which it receives in its mother's milk, thus producing lactic acid which maintains an acid state in the alimentary tract from the stomach to the rectum, thus preventing putrefaction. The most important factor in maintaining this acid state is lactose. This is preferable to any other sugar, first, because it is better tolerated than any other sugar, and it absorbs so slowly that it reaches the colon as do no other sugars. Only one other carbohydrate, the achroodextrin, a derivative of starch...
The first step in suppressing putrefaction (I avoid the use of the term change of flora because, in fact, the bacterial flora is not changed. The flora of the intestine depends almost wholly upon the diet and is constantly undergoing more or less modification, but in general, under fairly normal conditions the bacteria do not change in the healthy colon, the flora consists almost wholly of the L. Acidophilus, the normal protective, and the B. Coli, a parasite, which is harmless when supplied with available carbohydrates, most of which are lactose and aehroodextrin, or lacto-dextrin. These are the dominant carbohydrates. So long as the acidophilus is present in the colon and the stools are acid, very few bacteria or parasites are present. The parasite B Coli and its cozeners are the chief organisms in the colon, but when putrefaction is active, accompanied by the usual offensive odors, the reaction of the stool becomes alkaline and a great deal of toxic-forming organisms develop in the intestine.
LD-LAX
A HIGHLY EFFICIENT COLON AID

Emollient Bulkage
No Irritating Roughage

Food, not Medicine

Contains Lactans, Lactose, Pentoses, and other Aciduric-Flora Nutrients which Successfully Combat Intestinal Infections and Putrefaction.

Read carefully the accompanying circular.

Before taking.
Duty of sanitation man and faculty, and of every person employed here to work for the purposes named in its charter. Pretend willingly, therefore, and remain to do otherwise than workers have understood.
** 1 1/3

All unmedicated laxatives irritate the bowel, and
make it spastic (contracted),
and no causes constipa-
colitis and more consti-
tipation and colitis. The colon
must be kept clean
until the flora is changed,
that is until the stools
are free from bad odor;
then the colon will take
be able to take care of itself.
The Useful Enema.

When the colon is so badly crippled that it cannot retain residues are returned more than 24 hours, the enema is generally needed as a call for training it to normal habits. This condition is generally indicated by gas distension. The best time for the enema is just before retiring.
In this high temperature should be 105° to 110° F. Use quantity, 3 or 4 pints. Add the juice of one or two lemons if return is slow. Repeat if necessary. Used in this way to reheat and also warm if possible.
putrefaction which gives rise to foul smelling stools. Alcoholic liquors and tobacco must be strictly avoided, also tea and coffee and hot condiments such as mustard, pepper, etc. These irritate the bowel and prepare the way for infections which cause colitis, gastric ulcer, appendicitis and gall bladder troubles.

Care to see that the colon is thoroughly emptied daily by a bowel movement after each meal is essential to complete success.

The Useful Enema

When the colon is so badly crippled that residues are retained more than 24 hours, the enema is generally needed as a help in training it to normal habits. This condition is generally indicated by gas distension.

The best time for the enema is just before retiring. The temperature should be 105° to 110° F., the quantity, 3 or 4 pints. Add the juice of one or two lemons if return is slow. Repeat if necessary. Used in this way no "habit" is formed and no harm is possible.

Retention of fecal residues over night gives opportunity for putrefaction and absorption of poisonous putrefaction products. These colon poisons also paralyze the bowel and may cause colitis and other infections and through absorption may give rise to chronic fatigue or so-called "nervous exhaustion."

Medicinal laxatives of all sorts must be strictly avoided. All medicinal laxatives irritate the bowel and make it spastic (contract), and so causes constipation and colitis. The colon must be kept clean until the flora is changed, that is, until the stools are free from bad odor and then the colon will usually be able to take care of itself.

NOTICE

If you desire to learn how to live so as to enjoy super health, to increase efficiency and length of life, you should join the Aristocracy of Health. A letter addressed Aristocracy of Health, Battle Creek, Michigan, or to the undersigned, accompanied with a dime or three 3 cent stamps will bring you a copy of
Rules for Right Living by Dr. John Harvey Kellogg, "a code of health" which has helped many thousands of persons to notable health betterment and greatly increased efficiency and physical comfort. You may also receive with the booklet an invitation to join the Aristocracy of Health which will keep you in touch with the world's progress in health promoting ideas and methods, including new foods and new health literature.
the atmosphere. The atmosphere is composed of a mixture of gases that, under certain conditions, can form clouds. These clouds are a natural occurrence of water vapor in the atmosphere, which is why they are often referred to as "natural clouds." According to some theories, these clouds play a crucial role in the formation of precipitation and other weather phenomena. The exact nature of these clouds and their behavior remain a subject of ongoing research.
Excessive acidity is prevented by the reflex of other alkaline fluids from the duodenum. Bile is most often forced into the fluid withdrawn from the stomach.
APPENDIX 8 - 10ft. Grant. Cape
NORMAL COLON HABITS - 11ft. Grant. Cape

By J.H. Kellogg, M.D.

The number of notes ("1," etc.) refer to the list of references at the end of this Appendix.

See footnote to Appendix 3.

["Footnote to go at bottom of page 1 of Appendix 8 to follow on separate page"]
Results in the development in the colon of a great number of parasitic bacteria and other organisms, some of which produce virulent toxins, while others under special conditions become highly virulent, giving rise to colitis and other infections of the colon, small intestine, and gall bladder, and even penetrate the blood vessels, producing infections of the kidneys and urinary bladder and other parts. Putrescible accumulations of refuse in the colon afford favorable conditions for the development of amoebae and scavenger parasites of other sorts.
The capacious colon of man and other mammals is provided by nature to serve as a reservoir for the accumulation of alimentary residues and body wastes and their evacuation at regular intervals rather than almost continuously as in fishes and other lower forms of animal life. This arrangement permits the disposal of refuse with the least possible interference with movement and other bodily activities.

The possible injury resulting from the overaccumulation of residues, and especially the fact that food residues readily undergo putrefaction and other changes due to active bacterial development at temperatures near that of the body, resulting in the production of highly toxic substances wherewith the blood and other tissue fluids may be contaminated, render the question of the proper spacing of the evacuations of the colon reservoir one of high importance. The researches of Bouchard, Metchnikoff, Christian Herter, Combe and other physiologists and clinicians have clearly shown that the stasis or prolonged retention of food residues, bile, and other body wastes results in the development in the colon of a great number of animal and vegetable parasites, bacteria, putrefying streptococci and other disease-producing bacteria, amebae, various types of dangerous protozoa, yeasts, molds, worms and other parasitic organisms hostile to human life and health.

Delayed evacuation necessarily results in accumulation of residues and undue distension of the colon, which may be voluminously increased by the formation of carbon dioxide and various noxious and malodorous gases. Gases are chiefly the result of the decomposition of carbohydrates and sugars. Fats give rise to butyric acid and other toxic products. Undigested protein
encourages the rapid development of vast numbers of proteolytic or putrefactive bacteria, B. coli, Cl. Welchii, the gas bacillus, Cl. sporogenes, Cl. putrificus, and scores of other organisms which, according to Strassburger, may attain such prodigious numbers as 300 trillions in 24 hours. It is evident, then, that the evacuation of the colon residues at reasonably frequent intervals is desirable, while retention in the colon for a sufficient length of time to permit fermentative and putrefactive changes to take place with the development of noxious and pernicious intestinal flora is in no way beneficial but is in every way undesirable and may become a menace to life and health.

That Nature has provided for the evacuation of colon residues soon after each meal is suggested by the fact that the act of eating or even tasting food sets up strong movements of the colon whereby its contents are pushed forward into the pelvic colon and rectum, thereby producing the "call" which, unless resisted, automatically produces an evacuation.

The colon, or large intestine, is about five feet in length. It is anatomically divided into three sections: (1) the right, the cæcum and ascending colon; (2) the transverse colon; and (3) the left, the descending or distal colon, at the lower part of which the pelvic colon initiates bowel action by means of the "call," a desire for evacuation caused when residues are pushed forward from the pelvic colon into the rectum.

As shown by the X-ray observations of Burst of London, the time required for passing through each part of the colon—ascending, transverse, and descending—is about two hours. That is, about the same period is occupied in passing through the 2 feet of colon between the cæcum and the splenic flexure as through the 22½ feet of small intestine. The movements of the human colon, however, appear to be less active at night than
during the day."

The careful studies of Hurst showed that the activity of the colon is greatly accelerated during the taking of food. He found that, apart from meals, progress through the colon was slow, but that after each meal there was perceptible advancement of the contents. More progress occurred, for example, during the dinner hour than during the previous four hours.

Commenting upon these observations Cannon remarks: "If approximately nine hours are required for material to reach the descending colon in man, the waste from food taken at eight o'clock in the morning might be discharged at five o'clock in the afternoon. If defecation should occur regularly at four o'clock, however, the waste from breakfast must be retained for another twenty-four hours. Thus, as Hertz has pointed out, the interval between a meal and the excretion of its residue will vary normally, when the bowels are opened regularly once a day, between nine and thirty-two hours, the period depending on the time of eating and the time of defecation."

The above facts indicate that under normal conditions an intake of food is usually followed by an output of residue of a previous meal, the natural result of the forward movement of the colon contents due to the act of eating, which pushes the residues forward into the pelvic colon, an automatic and highly efficient discharging device. There are other factors and considerations which strongly support this common practice of moving the bowels only once a day leads to the retention of residues for at least 36 hours, during which time a high degree of putrefaction may be attained, especially when free use is made of meats and other animal proteins.
From the above it is very clear that the number of evacuations will be strongly influenced by the number of meals, since, as pointed out by Hurst, the taking of food is the chief cause of colon activity. If a person takes but two meals a day, the contents of the bowel will not be advanced toward the exit with sufficient rapidity to secure more than two movements during the waking hours. If, however, the diet is of such a character that a good intestinal flora is maintained, and if the entire colon contents are evacuated every 24 hours, no harm will result, because putrefaction is inhibited, and toxins, virulent bacteria and other harmful factors are not present.

The number of evacuations per diem is also influenced to a marked degree by the amount of exercise taken. The movements of the diaphragm in breathing aid the colon by compressing and advancing its contents toward the exit. The amount of help which the colon receives from the diaphragm depends largely, however, in sedentary persons upon the maintenance of an erect posture, so that the diaphragm in its descent compresses the colon against tense abdominal muscles. In a stooped or forward-bent posture this helpful action is lost. Exercise with the body held in an erect posture with tense abdominal muscles and accelerated and deep breathing movements is a great aid to normal colon activity. The writer has known many persons who believed that they were greatly profited by securing a fourth evacuation before breakfast by a horseback ride, a brisk walk, a daily dozen or some other form of exercise.
Tissier, an assistant of Pasteur, began in the latter part of the last century and continued for many years an exhaustive study of the intestinal bacteria. He discovered in 1900 that the stools of infants, though sterile at birth, within a few hours become contaminated and show the presence in great numbers of the colon bacillus and other germs found in adult stools. These bacteria are speedily driven out by a new germ which appears in the stools within two days after the infant begins to nurse, and within two weeks occupies the entire field. This germ, the Lactobacillus acidophilus, produces lactic acid in such quantities that the growth of putrefactive and other harmful bacteria is inhibited and in consequence they quickly disappear.

The rapid development of the Lactobacillus acidophilus in the infant's intestine is the result of the presence in the mother's milk of a large percentage of lactose, or milk sugar. So long as the diet of the infant contains this sugar in sufficient amount, the Lactobacillus acidophilus continues to flourish. Dextrin, a derivative of starch, likewise encourages the growth of the Lactobacillus acidophilus and the production of lactic acid; in other words, growth of a protective acidurie flora.

The facts seem clearly to justify the conclusion that nature has provided for the maintenance of a condition in the colon which, while not sterile, is kept free from harmful bacteria by the luxurious growth of harmless acid-forming organisms which render the conditions so inhospitable to putrefactive and other offensive organisms that their development is prevented and thus protection afforded against a grave cause of disease. Confirmation of this view is afforded by the fact that so long as an infant's intestinal flora is 90 to 100 per cent acidurie or Lactobacillus acidophilus, it remains free from the intestinal infections which produce diarrhea, gas, and other disturbances to which bottle-fed infants are greatly subject, much more subject than are those who are breast-fed.
It is important to note that so long as the colon is regularly emptied of its contents after each meal, there is not time for putrefaction. Delay leads to putrefaction because the special carbohydrate which nourishes the aciduric organism is absorbed, while the protein remains (12 to 15 per cent escapes digestion and hence absorption).

A very significant fact which may be noted in this connection is that furthermore when a potent culture of the Lactobacillus acidophilus is administered to an infant suffering from intestinal troubles, together with lactose in some form, the disturbing bacteria quickly disappear and within a few days the stools lose their offensive character, gas and other symptoms disappear, appetite returns and normal conditions are restored. This was well illustrated in the case of the famous Canadian quintuplets, who, in spite of the most meticulous care to prevent infection, were attacked by a form of intestinal trouble which destroys the lives of many thousands of budding citizens of this country annually. When, at the suggestion of the writer, Dr. Dafoe gave them soy milk cultures of Lactobacillus acidophilus, they quickly recovered and have since, now more than three years, been kept free from bowel troubles by the daily use of the culture. The quintuplets required the artificial culture for the reason that although they had been fed with breast milk from their fourth day, they had missed the protection of the Lactobacillus acidophilus which infants normally receive in the act of nursing.

When the colon is emptied with normal frequency, that is, within less than 24 hours after the food is taken, the time between intake and output is insufficient for the development of advanced putrefaction; and if the diet is of proper character, an aciduric flora, once established, may be maintained. One-a-day stools show a putrefactive flora.
In the examination of many thousands of stools made at the Battle Creek Sanitarium, occasionally one has been found which showed 75 per cent acidophilus and freedom from evidence of putrefaction. Such stools were invariably from persons whose diet approximated the normal private dietary.

A bacteriological examination recently made of the stools of a nine-year-old chimpanzee showed a well developed protective flora, 85 per cent Lactobacillus acidophilus. The animal was thoroughly healthy and had never suffered from bowel trouble.

Carl Akeley informed the writer that in his studies of the gorilla in its native African wilds, he observed that the animal evacuated several times daily, and that the stools were free from putrefactive odor. He also described the complete alimentary tract to one which he dissected, and which he said showed nothing in the slightest degree offensive. He added with emphasis, "It was the cleanest thing, internally and externally, that I ever encountered in my life."

On inquiry at the London Zoo in reference to the bowel habits of the chimpanzee and other large apes, I was told by the keeper that they moved their bowels regularly four times a day. Dr. Hornaday informed me that the anthropoids of the Bronx Zoological Garden evacuated three times a day. At the Washington Zoo the keeper stated that the chimpanzees Koko normally evacuates four to six times a day. He observed that occasionally the number of evacuations was only two or three, and that then the animal seemed depressed and uncomfortable, would not perform, and sat crouched in a corner most of the time clapping his head with his hands. A meal of onions caused normal colon activity and immediate recovery.

A questionnaire sent to a large number of missionary physicians
located among wild and primitive people brought 140 replies. The evidence obtained from these original sources clearly indicates that among native tribes which have been uninfluenced by the customs of civilization and who still adhere to primitive habits of diet, living a free and active life, two or three evacuations occur daily, the number of evacuations depending upon the number of meals eaten. These primitive people are keen observers. They give great attention to the bowels, carefully training their children in correct bowel habits. A single daily movement is regarded by them as constipation, and gives rise to alarm. The one-evacuation-a-day habit appears only among those classes or castes whose habits are sedentary.

A physician writing from South Africa said: "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 move only once a day.'"

This state of one-a-day constipation is very prevalent in many highly civilized countries, but by no means universal. Among working men the habit of two and three evacuations daily is quite common.

The advantage of suppressing putrefaction in the intestinal canal by frequent evacuation is shown by the fact that among people who move the bowels frequently, bowel troubles and other disorders associated with intestinal infections and intoxications are relatively infrequent. For example, of 118 American physicians practising among the natives of the following countries, 43 reported that they had never seen cancer of the bowels: Mexico, Palestine, Arabia, Turkey, Egypt, South Africa, East Africa, Central Africa, Nigeria, Japan, Syria, Korea, Persia, Siam, India,
Asia Minor, New Hebrides. Appendicitis was likewise infrequent.

Dr. Davidson of Travancore, India, wrote me in reply to a questionnaire: "Appendicitis is very rare here. Only 4 cases out of 1,000 operations." An annual report of the Mayo Clinic showed 19 per cent of all cases examined to be suffering from appendicitis and 21 per cent of all cases operated upon.

Not only bowel troubles but systemic disorders of various sorts are by eminent members of the profession believed to be attributable to colon poisons. In a symposium on alimentary toxemia at a meeting of the British Royal Society of Medicine, the evil effects of retention of colon residues long enough to permit putrefaction was pointed out by numerous eminent authorities of which we mention only a few. Dr. W. E. Ollier, Professor of Materia Medica in King's College, London, enumerated among other highly poisonous substances produced in the colon by the putrefaction of food residues, ammonia, which causes hardening and degeneration of the liver; tyramin, a very highly poisonous product; indol, skatol and cholin; sepsin (of which a small dose killed a large dog), a ptomain which is always found in the colon of meat eaters, and which is decomposed into pressure-raising poisons (Barger and Salpole).

Lord Dawson of Penn, physician to King George, drew the following picture of persons suffering from alimentary toxemia, the result of intestinal stasis: "The sallow, dirty complexion, the inelastic skin, the dusky lips and nails, the dirty tongue, evil-smelling breath, constant abdominal discomfort of one kind and other, doughy, inelastic abdomen, cold extremities, the physical and mental depression, are among the prominent features."

When the bowels move but once a day, the residues of a test meal are, according to Horst J. T. Case, M. D., and other roentgenologists, retained
in the body 53 to 54 hours, or \(\frac{21}{2}\) days. In the meantime seven other meals have been taken and the residues of these meals are still retained, so that the colon, which at the most should never contain the residues of more than three meals, contains the residues of six, or more than twice as many meals, and naturally becomes distended with putrefying residues and overdistended by gases, the result of putrefaction and fermentation. This stretching of the intestinal walls causes redundancy, atrophy and inability to evacuate completely. Pouches and diverticula are formed, and colitis develops with its long train of ills and a predisposition to appendicitis and diverticulitis.

The syndrome above referred to Dr. Jordan, roentgenologist of Guy’s Hospital, attributed hardening of the arteries to intestinal poisons.

Dr. Mummery of St. Mark’s Hospital said, “I believe that many of the cases of crippling arthritis that we see from time to time are due to poisons formed in the large bowel.”

Dr. Sigley, a skin specialist, believed these colon poisons to be the cause of a large number of skin eruptions, and added, “It is not the frequency of the evacuation that is important, but the quantity; that is to say, that the contents of the large bowel be systematically removed, and that there be not an ever-increasing residue left behind.”

The highly beneficial results which follow the adoption of the practice of evacuation after each meal bear very eloquent evidence of the physiologic value and correctness of this practice. Among the over 200,000 persons who visited the Battle Creek Sanitarium for medical relief during the last 30 years, many hundreds have become convinced of the importance of regular after-meal evacuations. The writer has been informed by a very large number of persons that they had experienced notable
relief from headache, dullness, inability to concentrate, deficient appetite, foul breath, coated tongue, chronic fatigue and other symptoms usually attributed to intestinal toxemia, and had noted a remarkable increase in endurance and working power. One well-known college professor, who for years found it necessary to rest a couple of hours in the middle of the day, within three weeks after the adoption of the practice of evacuating after each meal reported himself, as he said, "able to keep up a full head of steam the entire day, thereby adding two hours to my working day."

Strong evidence that after-meal evacuation is physiological is afforded by the ease with which the habit is acquired. Many years ago, I received a letter from the superintendent of an institution for the care of idiotic and feeble-minded children in which the writer stated that having heard of my advocacy of the three-a-day evacuation practice, she thought I might be interested in an observation she had made. She stated that she had often been complimented by the fact that her institution was free from the bad odors usually present in such establishments because of the lack of intelligent control of evacuations by the inmates. She said she was often asked the question, "How do you manage it?" The answer was, "After each meal I place each child upon the toilet. Nature does the rest."

If in addition to a regular visit to the toilet within an hour after each meal a person whose bowels move but once a day will add to a laxative diet some colon-stimulating food accessory, and if prompt attention is habitually given to the "call," which indicates readiness for action by the colon, the colon usually may be easily trained to prompt elimination of its contents after every intake of food. In many cases, when the best aids are employed, the colon becomes so sensitive to the
stimulus of eating that a visit to the toilet is found necessary im-
mediately after the meal is finished and in many cases even when an
apple or fruit of other sorts is taken between meals.

Laxative drugs must be scrupulously avoided. Exercise and other
measures for encouraging colon activity must not be neglected. In cases
in which X-ray examination shows that the colon is permanently crippled,
the colon should be emptied daily at bedtime by an enema of 3 or 4 pints
of water at 105° - 110°. This harmless mechanical means may be used in-
definitely without injury, and often when intelligently used will effect
a cure of a badly crippled colon by training the colon to normal activity.
In every case of serious colon function impairment a competent physician
should be consulted.
Colon Poisons

Numerous highly poisonous substances have been found in the fecal matters of both animals and human beings by various investigators. Brieger and Selmi found muscarin, cholin, cadaverin, putrescin, neurin, neuridin and saprin, all highly potent toxins. Dr. R. L. Benson in an article in the Canadian Medical Association Journal (February, 1937, p. 129), stated that "the colon contains enough histamine to kill a regiment." A toxin found by Marmorek possessed such a high degree of toxicity that a single grain was sufficient to destroy seven billion rabbits.

Several years ago, the Royal Society of Medicine of Great Britain held a symposium on the subject of alimentary toxemia in which numerous eminent medical men participated. Prof. Dixon of King's College, London, called special attention to sepsin, a very virulent toxin produced by streptococci which is always found in lean meat and in the stools of meat eaters.

Barger and Walpole called attention to two poisons produced by the putrefaction of sepsin which raise the blood pressure, an observation of much importance for the reason that, as stated by Dr. Dixon, "In recent years it has been shown by different workers in our Cambridge laboratory that any drug that has the power of considerably raising blood pressure will, when injected into the circulation of healthy animals, bring about degeneration of the middle coat of the arteries." These effects were observed in young animals as well as older ones. Bain found these colon poisons present in the blood of persons who have high blood pressure. It has been shown, according to Dr. Dixon, that the same effects are produced by these colon poisons that are known to be caused by digitalis, nicotine "and the inhalation of tobacco smoke."
Said the eminent Sir Lauder Brunton, "The Bacillus coli seems to have a special power of producing fatigue toxins, and many people in whose intestines it exists in great abundance suffer from constant weariness and a feeling of fatigue."

Said Dr. Mantle, "Rheumatoid arthritis and other joint symptoms may arise from poisons absorbed from the intestinal mucous membrane. The joints are especially susceptible to certain poisons."

Said Sir Lennox Wainwright, "I am quite sure of this, that the mental effect on many patients of prolonged intestinal toxemia is such as to make them almost demented.

"The state of the tongue may be a good index of intestinal health, and a foul condition of the breath speaks volumes of what may be suspected lower down, although the patient may not be constipated."

Said Lord Dawson of Penn, for many years physician to King George V, in drawing a picture of the effect of these colon poisons, "The sallow, dirty complexion, the inelastic skin, the dusky lips and nails, the dirty tongue, evil-smelling breath, constant abdominal discomfort of one kind and another, the doughy inelastic abdomen, cold extremities, the physical and mental depression are among the prominent features."

There are perhaps no medical questions which during the last 40 years have received more attention and been more widely discussed than those relating to the facts and effects of intestinal toxemia. At the present time I think it may be safely said that by far the great majority of leading clinicians will agree with Metchnikoff that "The microorganisms inhabiting our bodies have set going there a poison factory which shortens our existence and by secreting poisons which penetrate all our tissues, injures our most precious organs, our arteries, brain, liver and kidneys."
Very few are found in the stools of nursing infants. According to Tissier of the Pasteur Institute, student assistant of Pasteur, 90 per cent of all the bacteria in the intestine of a child brought up under biologic conditions (lacto-vegetarian diet) belong to the group of acid formers, and the protective Lactobacillus acidophilus is present to the extent of more than 70 per cent. Dr. Dafoe reports that the flora of the quintuplets is maintained at 85 per cent aciduric. The writer found the intestinal flora of a nine-year-old chimpanzee to be 80 per cent Lactobacillus acidophilus and has under observation a child of two years whose intestinal flora has been carefully watched since birth and has rarely been found less than 90 per cent aciduric. At the time of this writing the percentage of Lactobacillus acidophilus in this case is 95.

The normal condition of the human colon is due, as Herter has shown, to the character of the diet of the average man. All uncooked meats contain great numbers of streptococci and other poison-forming and disease-producing bacteria with which meat becomes infected in the process of slaughtering. Herter found that a watery extract of the feces of a carnivorous animal produces speedy death when injected into the body of a guinea pig or a rabbit, while a similar extract of the feces of an herbivorous animal does not.

Sanitary authorities have established standards for the bacterial content of water, milk, and other foodstuffs, but until recently no standard has been recognized for meats. A few months ago the city of Portland established a precedent by passing an ordinance forbidding the sale of meats containing more than 10,000,000 bacteria per cubic centimeter (300,000,000 per ounce). Such meat differs in no essential particular from carrion. The standard for certified milk is 10,000, mostly harmless lactic-acid formers.
1. Bouchard, Ch., Auto-intoxication in Disease, F. A. Davis Company, 1907.


6. Hurst, loc. cit.

7. Hurst, loc. cit.


Stings all the Way Down.

We were forcibly struck not long since by the argument used by a New York professor in a medical college, in favor of pepper as a remedy for certain conditions of the bowels, for the reason that it is not digested like proper food substances, and so exerts its peculiar action the whole length of the alimentary canal. As evidence to support his theory, he notes the fact that a person who has eaten raw oysters with pepper for supper, experiences the next morning a burning, stinging c sensation in the rectum. Every body knows that pepper stings in the mouth. After it has been swallowed, the peculiar burning sensation which it produces is no longer unpleasantly felt, but its irritating effects again become apparent when it has reached the lower bowels, after having traveled through the thirty feet of large and small intestines.

During the passage through the alimentary canal, no sensation is experienced, except at the two extremities, for the reason that these parts only are fully supplied with nerves of sensibility. The same disastrous consequences are produced in the form of gastric and intestinal catarrh and various disturbances of the stomach and other digestive organs. What is true of pepper is true of pepper-sauce and all other condiments which bite and sting as they go down the throat.
SPECIAL ADVANTAGES OF NUFLORA AS
A MEANS OF CHANGING THE INTESTINAL FLORA

1. By this method, the protective germs which exist in and are native to the body, although they may be so few in numbers that their influence is not felt, may, by special feeding, become dominant. These native bacteria are known to be much more efficient in protecting the body than those which have been by culturing outside the body, converted into buttermilk, the efficiency of which as body protectors has not been fully demonstrated.

2. Nuflora contains a special vegetable concentrate which stimulates the growth of the B. acidophilus in a most extraordinary manner.

3. Dextrin, the chief constituent of Nuflora, does not raise the blood sugar, as do all sugars. This preparation is on this account especially adapted to persons who have a tendency to obesity or diabetes, and cases of high blood pressure.

4. Nuflora is highly emolient, and is thus of special value in cases of duodenitis, gastro-duodenitis, or acute enteritis.

5. Nuflora makes to its users not infrequent contributions of vitamins, a full assortment, in fact, a very unusual quality, especially in natural foods and food products.
1. Rather marked incompetency of the ileocecal valve. Note the spasticity of the iliac and pelvic colon, shown by the narrowed shadow of the colon. An enema was given in this case.

2. Marked incompetency of the ileocecal valve, shown by passage of the opaque enema into the ileum at the time of the enema.

3. Marked incompetency of the ileocecal valve.


5. Roentgenogram of expulsion of enema. Same case as preceding slide. This is post-operative. Valve has been repaired.

6. Post-operative study showing marked incompetency of the iliocolic opening. Removal of the cecum, ascending and part of transverse colon, with anastomosis of ileum into transverse colon near the stump. End-to-side anastomosis. Incompetency, as shown by enema test, and by marked ileac delay.

7. Ileosigmoidostomy by ordinary (Lane) method. Incompetency of the ileosigmoid opening. Shown by enema. At once after operation, three weeks

8. Extreme dilatation of the terminal ileum which looks like the colon as for size, and for the retention of ingesta longer than the twenty-sixth hour, as shown in the next slide. This slide made after injection of enema.
Same case as preceding slide. Appearance of abdomen twenty-six hours after ingestion of opaque meal. Patient has had several satisfactory (to her) bowel movements since the meal was eaten, yet when she comes at twenty-six hours we find most of the barium in the colon, having been carried by antiperistalsis into the proximal colon, even filling the cecum, and in the terminal ileum which is enormously dilated. (a) Ileum.
(b) Proximal colon.

Ileosigmoidostomy by Dr. Kellogg's method. Artificial valve made in performing the ileosigmoidostomy. Resection of cecum, ascending and most of transverse colon. Artificial valve competent as shown by the enema. See next slide.

Plate made nine hours after ingestion of barium meal. Barium all in colon — NO ILEAC DELAY.

Similar case. Artificial valve competent to enema.

Double slide, showing contour of pelvic colon I believe to be normal. Shown by enema, and in the second half of the slide, after the evacuation of the enema. There was no hindrance to the entry or evacuation of the enema.

Redundant but freely movable pelvic colon, shown by enema. No hindrance to filling by enema. No trouble in easily expelling entire enema content of colon afterwards. This test by enema is best to determine presence of pelvic colon adhesions, by noting the failure of the pelvic colon to rise in cases of obstructing adhesions. All cases should also be tested by the meal also.

Extremely redundant pelvic colon, but no binding adhesions.
In such cases there may be obstruction, nevertheless, owing to incarceration of redundant loops. This case was not constipated and the x-ray test meal showed no colonic stasis.

Marked spasticity of pelvic colon shown by enema. Note spastic distal colon, especially the iliac and descending portion, and incompetency of the valve, which is nearly always present in these cases.

Marked spasticity of pelvic loop of colon, shown by isolated small rounded boluses spaced out along the spastic segment of the bowel.

A case of rectal constipation. Note that the markedly prolapsed transverse colon has not seemed to offer any obstruction to the passage of the barium meal into the rectum where most of it is already lodged, at the 26th hour after eating.

Plate 50 hours after eating. Note high grade of rectal constipation.

Large ovarian tumor. Gallstones. Note how the pelvic colon is displaced by the tumor. Valve competent and found so at operation. In this case the gallstones had not been diagnosed before the x-ray examination. Illustrates importance of making pre-operative studies in all laparotomies.

Another similar case. Right kidney stones were found during the course of the barium meal. Here the pelvic loop is adherent at its midpoint, and the valve is incompetent. See next slide.

Post-operative. Kidney stone has been removed. Also at another operation the appendix removed, ileocecal valve repaired, and pelvic colon
adhesions broken up, after which pelvic colon was suspended.

23 Adhesions of pelvic colon, low down. Note that the pelvic loop has not risen properly during the injection of the enema. See next slide. Valve incompetent.
24. Steinback again. Postoperative study showing how the pelvic colon is now able to rise satisfactorily situs during the injection of the enema, and that the ileocecal valve is now competent.

**POSTOPERATIVE ACUTE INTESTINAL OBSTRUCTION**

25. Marked gas-distension of the abdomen. The characteristic appearance of the gas-filled bowel shows that it is colon, not small bowel, which is distended.

26. Kewley. A similar case, the abdomen being distended by gas-filled colon. Note the haustral markings.

27. Lawson. Acute small intestine obstruction, post-operative, shown by the characteristic appearance of small bowel filled with gas. Contrast this appearance with the preceding slide. Fatal case.

28. McCormick. Acute small intestine obstruction, post-operative. A plate made the evening before this one was not conclusive (to the surgeon) and so delay was decided upon. Meanwhile barium was administered by mouth, and now, twelve hours later, it is manifest that there is a high grade of dilatation of the small bowel, as identified by the barium, and the need of operation is at once apparent. Recovery.
COLON IRRIGATION

3 Sections
1 Rectum
2 Descending colon
3 Cecum and ascending colon

Rectal irrigation
Position - on back

IRRIGATION

Features
Barium enema. Barium meal also desirable.
Locate lesion. Colon often crippled.

Conditions may be found
Spastic anus, maybe fissure, ulcer, abrasion, dilated rectum. hemorrhoids - infection, antiseptics.

Most often pelvic or descending, may be transverse or ascending or whole colon.

Prolapsed pelvic colon

Impaction
Adhesion
Trans omental suspension

Enlarged pelvic colon

Dilated atonic colon

Whole colon or section of it, either ascending, transverse or descending.

Incompetent ileocecal valve
COLOM IRRIGATION

Colitis - ulcerated

Diverticulosis - Diverticulitis

Position

Back - rectum

" hips raised
" with abdomen weighted
" head and shoulders raised

With heat applied to abdomen

Fomentation, photophore

Photophore with glass screen

Diathermy

For bad spastic cases and ulcer cases

Ulcers of bowel do not heal because of bloodless state of gut. Need long and frequent irrigation, diathermy, photo with glass screen, abdominal bandage night and day, dry bandage, abdominal support

Left side - descending colon

Right side - cecum and ascending colon

" " hips raised to fill colon
lowered to empty

Tube - Short tube 4-6 inches.

Continuous flow

Intermittent flow

Long tube - place with proctoscope
Solutions

Pipe water
Salt water - avoid - kidneys
Lacto-Dextrin - when putrid acidophilus cultures
Avoid antiseptics

Temperature

110° F. May begin 105° F.
May increase to 115° F.
Can drink 120° to 125°

High temperature necessary to kill pain reflex.

Well shown in skin irritations. Most active when applied to seat of pain. May also act reflexly.

PURPOSE OF IRRIGATIONS

Detergent or cleansing in cases of spastic colon and cecal pouch when carmine shows delay more than 24 hours.

Thermic - spastic or ulcerated colon due either to colitis or vagotonia from worry.

Rectum - Hot for catarrh, ulcer.

Hot and cold for relaxed or dilated rectum.

Carmine -

Diagnosis

Guide in treatment

Use with and without irrigation or enema
Cuts showing colon conditions.

Write home about. See Dr. Norman. Write Dr. Case

Change of flora - need of

New laxative Kaba

Paramela

Fig bran - onions

Study temperature of return water

Cultivate normal bowel habits.

3 per day - savages, Turks, apes, normal persons, - idiots.
Length of application

Dangers?
Too long
Too hot
Burns
Perforation
Don't try to insert long tube
Ileocecal valve
Colon quacks
When needed

All cases colitis

When colon is spastic

When backache, headache with foul tongue

Hypotension with foul breath and tongue

Rheumatism

Diarrhoea

Amebic dysentery

Jaundice

Diabetes

Skin troubles

Nervous exhaustion

Insanity

Depression

Tired all time - neurasthenia

Gall bladder disease

Peptic ulcer

High N. P. N.

Bright’s disease
History

My own early experience

Extravagant claims by charlatans

Injuries done - perforations, ulcers

The Battle Creek system developed by more than 40 years' experience.

First of all thorough examination of the colon.
  Barium meal, barium enema.
  Inspection with proctoscope
  Examination of anal region and palpation of abdomen

The operator should have a roentgenogram for his own information and to show to patient when best to do so.

In cases of chronic constipation the colon is usually crippled.

Injury is often done to the colon in early childhood.

Among the conditions found are the following:

Spastic Anus

A spastic condition of the anal muscles, so-called tight anus.
  It may be associated with fissure, ulcer, abrasions, or hemorrhoids.

  This condition is due to infection. It may be prevented by cleanliness and antiseptics.

Dilated Rectum

Lost call due to neglect.

Spastic Colon

Spasticity located most often in pelvic or descending colon. Transverse or ascending or whole colon may be involved.

Prolapsed Pelvic Colon with Impactions or Adhesions associated with Chronic Colitis which Has Penetrated Wall

This condition with other adhesions due to bloodless
and defenseless state of the bowel when spastic.

**Enlargement of the whole colon or of sections**

(a) dilated pelvic colon
(b) cecum and ascending colon
(c) enlarged or pouchd cecum
(d) dilated or atonic colon

Incompetent ileocecal valve associated with a spastic
descending colon and dilated cecum, colitis and ulceration of the colon

**Diverticulosis**

**Technic of Treatment**

**Position**
NOTE ON THE WORK OF DR. MAX LISSAUER," ON THE BACTERIAL CONTENT OF HUMAN AND ANIMAL FECES.\(^{(a)}\) In Lissauer's interesting work my observations on the bacterial content of human feces are mentioned in the bibliography, quoted from the "Zentralblatt f. Bakt." I am sorry that Lissauer has apparently overlooked my extended publications in this journal; he would, then, certainly not have accepted Strassburger's criticism concerning the microscopic method of counting described by me, a criticism which there was completely refuted, because the results of Lissauer demonstrate **exceptional clearness** the great exactness of this microscopic method of counting.

In the following table I have placed in parallel columns the number of bacteria in millions to 1 milligram of fresh feces from Lissauer's 14 investigations, with mixed feeding, reckoned from the weight of the dry bacterial substance, in which he holds that 4000 millions dry bacteria weigh one milligram; and the number of bacteria likewise reckoned in millions to one milligram fresh feces obtained by me in 16 cases from mixed feeding through my microscopical counting method.

<table>
<thead>
<tr>
<th>Bacterial content in millions per milligram of fresh feces reckoned according to the weight of the dry bacterial substance (Lissauer)</th>
<th>Number of bacteria in millions per milligram of fresh feces counted microscopically (Klein)</th>
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<td>48</td>
<td>52</td>
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</table>
The agreement is in respect to the variations of the individual results really remarkable; the average number of the 14 determinations of Lissauer is 45, and the average number of my 18 determinations is 54.

Still more remarkable is this agreement shown in the case of the feces of the rabbit. Lissauer finds in these feces a much smaller quantity of dry bacterial substance than in human feces. He reckons from the three cases investigated by him respectively 20, 20 and 9 millions dry bacteria to the milligram of fresh rabbit feces. Through my microscopic counting method, there were found by me in six cases respectively 17, 34, 6, 5, 13 and 5 millions bacteria to 1 milligram of fresh feces. (See tables XVI to XXI of my publication: "Dickdarm und Rectum"). The average number of the three determinations of Lissauer is 16 millions; the average number of my six determinations if 14.

While through these comparisons the unusually great exactness of my microscopic counting method is anew illustrated, on the other hand it may be concluded from the complete agreement of the results of the two investigators who have worked with fundamentally different methods that the results of Lissauer and those obtained by must also be correct.

In regard to the great significance of the question under consideration, this agreement—where the results until now differed so markedly— is to be considered a most important one.

Strassburger's numbers are decidedly too high in my opinion. I believe
Strassburger included not only bacterial bodies, but, as may be concluded from the description of his microscopic method, also a large quantity of intermixed impurities.

To Lissauer belongs the merit of having shown that Strassburger's method with the more exact application is capable also of furnishing correct results.

From "Archiv für Hygiene," Band 59, Heft 4, S.283.
REGIMEN FOR CHANGING THE INTESTINAL FLORA

The dietetic methods and principles relating to change of the intestinal flora are based upon the following established scientific facts and observations:

Half a century ago, Prof. Bouchard, a member of the French Academy of Sciences, called attention to the fact that the alimentary canal is an incubator of bacteria of various sorts, many of which produce highly offensive and toxic excretions. He found that small doses of watery solutions of human feces quickly killed rabbits and guinea pigs, causing death in coma or convulsions. He found the stools of meat eaters and mixed feeders twice as toxic as those of vegetable feeders. Bouchard coined the word auto-intoxication which has given rise to more discussion, perhaps, than any other in the language.

Of the scores of volatile and non-volatile poisons produced in the intestine, the following were mentioned in a discussion of alimentary toxemia by the Royal Society of Medicine of Great Britain: Indol, skatol, phenol, cresol, indican, sulphuretted hydrogen, ammonia, histidin, methylmercaptan, tetramethylendiamin, pentamethylendiamin, putrescin, cadaverin, neurin, cholin, muscarin, butyric acid, beta-imidazolylethylamin, methylguanidin, ptomatropin, botulin, mytilotoxin, tyramin, agmatin, sepsin, indolethylamin, sulphemoglobin.

Some of these poisons are almost as powerful as the venoms of snakes.

Distaso points out more than twenty species of putrefactive bacteria that are found in the stools of flesh eaters, all of which produce very highly toxic products.

In more than one hundred and sixty different species of bacteria found in the feces by Roger, more than one-third were found to possess pathogenic or disease-producing properties.
The most common of the various putrefactive organisms found in the colon are Cl. Welchii, B. coli, Cl. butyricum and Cl. sporogenes. These are the principal species of harmful bacteria which it is necessary to combat in changing the intestinal flora, especially the Cl. Welchii and B. coli, both of which produce troublesome gases and active toxins.

Tissier (1900) of the Pasteur Institute discovered in the acid non-putrefactive stools of breast-fed infants the acid-forming Lactobacillus bifidus. Moro discovered in the stools of infants and young children a similar organism, the Lactobacillus acidophilus, organisms which produce neither gas nor toxins, and have a remarkable tolerance for acids, and which are now believed to be identical. The study of these organisms showed that they prevented the development of Cl. Welchii, B. coli and other putrefactive bacteria because these require an alkaline medium for their development. This principle had long been made use of by Western pioneers in western America who preserved fresh meat by immersion in buttermilk and by the Tartars of western Asia who used mare's milk for the same purpose.

Quincke suggested that harmless-acid forming bacteria might be substituted for the injurious ones. Metchnikoff adopted the idea and undertook to implant the lactic acid forming L. bulgaricus of yoghurt by feeding cultures of this bacillus and thought he had succeeded. His Lacto-bacilline was widely exploited but proved inefficient. The Bulgarian bacillus is an aerobe and will not penetrate farther than the upper part of the small intestine and dies in the colon.

Having failed in attempts to change the flora with the Bulgarian bacillus and various other milk-souring ferments obtained from India, Iceland and Mesopotamia, the writer began the study of the influence of
special foods upon the flora. It was soon found that a strictly fruit
diet would quickly suppress putrefaction. After a few days indigene
disappeared from the urine and the stools lost their offensive odor. The
same was true of an exclusive diet of milk if managed in such a way as to
prevent constipation. This was generally easily done by giving two or
three fruit meals daily with bulkage in connection with the milk feeding,
a combination which constitutes the milk regimen.

This study made quite clear the fact that one of the chief ad-
Advantages of the "milk diet," the "whey cure," the "buttermilk cure,"
the "grape cure" and other fruit "cures" was the suppression of in-
testinal putrefaction.

In the summer of 1916, the fruit and milk regimens were supple-
mented by addition of whey cultures of Tissier's L. bifidus which were used
both by mouth and by lavements of the colon. Later (1932) cultures of L.
acidophilus were made in milk prepared from the soy bean, in which the L.
acidophilus grows much more vigorously than in cow's milk, and apparently
retains to a higher degree its normal potency and adaptation to the human
intestine which appears to be largely lost by long cultivation in ordinary
dairy milk.

Distaso discovered (1912) that the intestinal flora might be changed
by adding dextrine to the diet in liberal quantities.

Torrey showed (1915) that the liberal feeding of lactose will suppress
intestinal putrefaction. Coleman demonstrated (1915) the great value of
lactose feeding in typhoid to suppress gas and intestinal putrefaction.

Dragstedt and Cannon showed that intestinal stasis or complete ob-
struction cause putrefaction in the intestine "irrespective of the character
of the diet," due to absence of carbohydrates.

Under favorable conditions lacto bacilli readily outgrow other organ-
isms because of their ability to tolerate acids. The writer kept a beefsteak
An experiment by Prof. Cruickshank of Aberdeen demonstrated the readiness with which \textit{L. acidophilus} acquires dominance under favorable conditions. Two grams of fresh human feces was added to a half pint of milk. After 10 days incubation at 100\(^\circ\) F. the contents of the flask was found to be a pure culture of \textit{L. acidophilus}. This observation has been many times confirmed by other bacteriologists.

With the foregoing facts in mind it is easy to see that it is possible to change the flora very rapidly in any case requiring this form of dietotherapy and such cases include practically all cases of indigestion, constipation, colitis and most forms of chronic disease. Even when not the specific cause of a major ailment, putrefaction in the colon may be such a handicap to the curative forces of the body in their efforts to effect recovery that failure will result when otherwise speedy recovery might occur.
There are several very convincing reasons for believing that putrefaction of the intestinal contents is an abnormal condition due to infection of the intestine by foreign and parasitic bacteria. To the writer incontestable facts permit no other conclusion.

1. The stools of breast-fed infants are acid and not putrid so long as they are exclusively breast-fed and remain in good health.

2. When an infant's stools become foul it loses appetite, ceases to grow at the proper rate, and recovers when with a proper change of diet the stools become normal.

3. The same is true of adults. The headaches, coated tongue, foul breath and so-called biliousness disappear when by a change of flora the stools lose their foul odor.

4. Prof. Carl Akeley of the Natural History Museum of New York told the writer that in his study of the gorilla and its habits in its native African habitat, he found the stools, which were very bulky and abundant, wholly free from putrefaction and the same was true of the entire alimentary tract which he dissected with great care from one end to the other.

The suppression of intestinal putrefaction by means of antiseptic drugs was offered as the solution of the problem of intestinal sepsis soon after Bouchard's great work on autointoxication appeared, and for some years various agents were widely used; but the results were most disappointing. Laboratory tests showed the utter futility of this method. The administration of betanaphthol for several days failed to lessen the number of bacteria (Stern). The principle was wrong. Complete sterilization of the intestine by chemical means would be harmful rather than beneficial for the reason that it destroys the protective flora as well as the pernicious organisms and leaves the field well prepared for
the rapid development of the proteolytic type of organisms. Nature's
method of protecting the intestine against invasion by harmful bacteria
is not by keeping it sterile, but by maintaining in the fluids which
bathe the mucous membrane a luxuriant growth of harmless acid-forming
organisms which by their product, lactic acid, render the field in-
hospitable to bacteria of the proteolytic type. When the intestine
becomes infested with foreign and pernicious bacteria, it is because
the protective *Lactobacillus bifidus-acidophilus* has been lost or ren-
dered inactive.

The character of the intestinal flora is chiefly influenced by two
factors: (1) the character of the food and (2) the length of time the food
residues and body wastes which constitute the feces, remain in the colon.

Foods rich in animal proteins, such as meats, fish, oysters, game, and
eggs not only readily undergo putrefaction in the presence of warmth and
moisture, but when eaten are already in a state of more or less advanced
decomposition because they become well inoculated with intestinal bacteria
in the act of killing or in the case of game, by the penetration of the
tissues by bacteria from the intestines which begins immediately after
death.

Proteolytic bacteria very readily attack animal proteins, but accord-
ing to the observations of Tissier, Torrey and others, vegetable proteins
are much more resistant to these bacteria. Cannon found that vegetable
proteins "in many cases exert a distinct antiputrefactive effect."

Carbohydrates encourage the development of the acid-forming lacto-
bacilli. This is especially true of lactose and dextrin.

The souring of milk affords a good illustration of the difference
in the effects of proteins and carbohydrates. Meats and eggs readily under-
go putrefaction. Milk is "liquid flesh." It consists of protein and fat,
the same as does meat, but has also another element, lactose, a carbohydrate, and to this is due the fact that it sours instead of undergoing decay. Putrid meat is poisonous; while sour milk is wholesome, thanks to the fact that milk-souring bacteria are not pathogenic, while the same bacteria that cause putrefaction may give rise to abscesses and various pus infections.

Lactobacilli in milk readily dominate the field because of the presence of lactose. A beefsteak placed by the writer in a jar of sour milk remained intact and free from taint of decay for 17 years (the sour milk was changed weekly). A careful bacteriological examination showed no spore bearers or proteolytic organisms present.

When proper conditions are supplied, the same effects can be obtained and maintained in the human colon. For this it is necessary to possess a lactobacillus that is capable of living in the colon. Ordinary sour milk germs do not even reach the colon when ingested. They cannot exist without oxygen. Morro and Tissier discovered the bifidus-acidophilus lactobacillus which thrives in the colon, being a facultative anerobe, provided it is supplied with an abundance of the lactose or dextrin which it needs.

While all soluble carbohydrates tend to antagonize putrefaction, lactose and dextrin are the only ones that can be depended upon for prompt and efficient effects. These special carbohydrates appear to be designed by Nature to play this particular role among the various activities concerned in human nutrition. A combination, lacto-dextrin, has been found in clinical experience to be more satisfactory than either one alone. The combination is not only more palatable but has the great advantage that it may be used in the largest required doses without exceeding the minimum limit of sugar tolerance. This is due to the fact that dextrin does not increase the blood sugar as do all the sugars. Lactose, unlike cane sugar, is non-irritating (Sherman) and dextrin is emollient.
While the intestinal flora may be greatly improved by simple modifications of the diet, such as the omission of meats, or in cases of constipation the free use of bulkage, for a radical change, it is necessary that a more comprehensive and thoroughgoing plan should be adopted. An examination of the stools of the average mixed feeder will usually reveal a flora showing 0 to 25 or 30 per cent acidophilus. In quite a number of cases the number of L. acidophilus present will be so small that they can be discovered only by special refined methods. The organism has run out or become so attenuated that it barely survives and is rendering little or no service as a protection against the invasion of the proteolytic organisms which cause putrefaction and give rise to various pathogenic
effects, such as colitis, appendicitis, ulcer, as well as general vulnerability to infection through the lowering of vital resistance and the infection of neighboring organs (B. coli infections of the genito-urinary tract and the gall bladder and bile ducts).

To correct such conditions, which are often dismissed by internists as incurable and turned to surgeons whose best efforts also are frequently unsuccessful, it is necessary to change the flora to such an extent as to secure a count of 85% to 95% and to maintain this condition. This may be accomplished by comparatively simple means if thoroughly applied, and with the patient's complete cooperation.

The following plan has been found efficient in the treatment of hundreds of cases:-

1. Liberal carbohydrate feeding.

2. Discarding of flesh meats and animal fats (Combe) of all sorts, and eggs also for a time at least.

3. Increasing the activity and efficiency of the colon so as to secure complete clearance of the intestinal tract at least once in 24 hours.

4. Liberal feeding of a potent culture of L. acidophilus.

As careful attention to detail is necessary to secure necessary definite and dependable results, further consideration must be given to each of the above measures. This

1. Carbohydrate feeding is so essential that in some cases it will effect a very marked change in the flora almost immediately. This is most likely to occur in cases in which the intestinal motility is unusually active, so that the carbohydrate quickly reaches the colon in ample quantities and in which a good strain of L. acidophilus is present in the intestinal flora although in too small numbers to prevent the
development of proteolytic bacteria and the formation of putrefaction products.

The nature of the carbohydrate is a matter of much importance. Cane sugar, maltose, dextrose, honey, syrups and sweet fruits all have value, being utilized by the lactobacilli, but none are really efficient. All are absorbed so quickly that they do not reach the colon in sufficient amount to make the L. acidophilus dominant. The rapid absorption of the sugars in large quantities raises the blood sugar so high that sugar is likely to appear in the urine and harm may be done in cases of incipient diabetes. Cane sugar in more than small amounts is irritating to the stomach and duodenum and delays gastric digestion (Ogata). Cane sugar also encourages the growth of streptococci. It is nevertheless decidedly antitoxic and in Holland is used by rowing clubs "to counteract the bad effects of a meat diet" and thus prevent the appearance of "the dreaded symptoms of overtraining."

Milk sugar or lactose and dextrin are found to be so far superior to other sugars that they are the only ones employed in laboratory tests and clinical use. The superiority of these two carbohydrates is probably due to the fact that they are absorbed much more slowly than are any other carbohydrates. Dextrin is usually formed slowly by action of the digestive juices upon starch and is absorbed as it is produced. When two ounces are taken at once a portion is likely to reach the colon before being absorbed.

Lactose must be inverted by the ferment lactase to form dextrose and galactose before it can be absorbed. Lactase is present only in small amounts in most adults and so lactose, when given in liberal amounts, has an opportunity to reach the colon before being absorbed in sufficient amount to promote a luxuriant growth of L. acidophilus.
Ordinary lactose or milk sugar is not readily soluble and has little sweetness. In efforts to render it more soluble the writer discovered a practical method of changing the ordinary alpha lactose into its isomer, beta lactose, which is three times as soluble and more than three times as sweet. This delightful sweet had been previously known to chemical experts (though not to the author) as a laboratory curio. It is now available for use as a table sugar in place of cane sugar products under the commercial name of B-Lac (beta lactose). It has been, in fact, extensively used for more than ten years in lacto-dextrin of which it is the essential ingredient.

The dextrin of the drug stores is made by the action of a mineral acid upon starch. It is a very crude product and so disagreeable in flavor that few patients will persevere in its use for any length of time. For use in changing the flora a specially prepared dextrin is desirable and is now available. Dextrin has the advantage that it does not so readily affect the blood sugar and hence may be used more freely. For this and other reasons the author was led some years ago to combine lactose and dextrin so as to utilize the best qualities of both while avoiding danger of raising the blood sugar. This combination, known as Lacto-Dextrin, has come into wide use and has proved an effective means of changing the intestinal flora in many thousands of cases.

The quantity of lacto-dextrin required varies with individual cases. The essential thing is that a sufficient amount of the carbohydrate shall reach the colon to enable the few lactobacilli that may be present to develop so rapidly that they may acquire dominance. The amount of lacto-dextrin or dextrin ingested is sufficient if it is associated with an increase
of gas. At first the amount of gas produced is often so great as to cause discomfort. The gas is produced by B. coli and Cl. Welchii, the principal harmful bacteria which are combated by L. acidophilus in changing the flora. These organisms are great gas producers, especially Cl. Welchii, which is commonly known as "the gas bacillus." As the character of the flora improves, the gas will lessen and finally become normal in amount as the percentage of acidophilus increases.

If the amount of gas produced is so great as to cause painful distension, as sometimes occurs in cases of constipation with spastic colitis, the amount of lactose or dextrin should be lessened. Even a slight increase of gas indicates that some lactose or dextrin has reached the colon, and this quantity is sufficient. Sometimes as much as 2 or even 3 ounces must be taken at each meal for a few days. In other cases, half an ounce (a rounded tablespoonful of lacto-dextrin or half a glassful of dextrin (Nutlora) is adequate. After the flora has been changed, the amount may be greatly reduced.

2. Elimination of Animal Proteins.--For the certain and rapid change of the intestinal flora it is necessary to discard flesh meats of all sorts, fish, fowl and sea food as well as meats, for the reason that these foods promote the growth of the harmful species of bacteria just as lactose encourages the growth of the protective acidophilus. Animal proteins not only supply the kind of nutriment which putrefactive bacteria require, but when eaten, even when cooked in the usual ways, almost invariably contain great numbers of highly active colon bacteria of the most harmful sorts.

The marked difference in the character of the stools of a vegetable-eating animal like the sheep and those of a carnivorous animal like the dog is clear evidence of the influence of a meat protein diet in promoting putrefactive changes in the intestine. The same difference
is observed between the stools of a flesh-eating man and those of a flesh-abstainer. When meat and eggs are eaten freely, a part of the proteins (one-seventh) escape digestion, find their way into the colon and there undergo putrefactive changes. It is certainly highly significant that the foodstuffs which constitute man's natural dietary are not active in producing putrefactive changes in his alimentary tract.

Eggs are somewhat less objectionable than meats if perfectly fresh, although they usually contain objectionable organisms. If used at all, it is best to eat only the yolks and very sparingly, and very great care must be exercised to select only eggs that are perfectly fresh.

Combe of Lausanne, an eminent paediatrician and a pioneer in this line of therapeutics, required his patients to "avoid the fats of meat for they increase putrefaction." He permitted the moderate use of butter, finding "its action much less harmful."

Christian Herter and his associates who made extensive observations on the influence of diet upon the intestinal flora (1899-1909), described two types of putrefaction, (1) the indolic type, due to the activity of B. coli, and Cl. putrificus, characterized by highly putrid alkaline stools and (2) the butyric type, characterized by a strong rancid odor and acid reaction, caused by Cl. Welchii and Cl. butyricum.

The indolic type of putrefaction is encouraged by animal proteins, especially meats and eggs. In some cases of hyperacidity, cow's milk, when freely eaten, especially when taken at the same meal with meats, forms large and hard curds, many of which may reach the colon undigested and if constipation exists may set up a very intense indolic putrefaction with production of great quantities of indican, which is derived from tryptophan, in which the casein of milk is especially rich.
The butyric type of putrefaction is encouraged by the free use
of fats, especially fats of animal origin and those of the higher melt-
ing points, such as beef and mutton fats.

Herter's observation that the mucous membrane of the colon acts
as a filter, binding indol and other poisons, and so preventing their
absorption, is true, however, only when the mucous membrane is intact.
When it becomes congested after the use of salines and other laxatives
or is denuded of its epithelium as in colitis, it loses its protective
function.

Schmidt of Dresden pointed out that even when putrefaction exists
in the colon, there is none in the small intestine so long as the ileo-
cecal valve remains intact, but that when the valve becomes incompetent,
the infection is carried into the small intestine by reflux of the colon
contents and rapid absorption, causing indican to appear in the urine in
large quantities.

**Milk and Vegetable Proteins.**—What has been said about flesh and
egg proteins does not apply to milk, for milk proteins are less putrescible
than are flesh proteins, and besides are protected against putrefaction
by the presence of lactose. When the lactose is removed with the whey, as
in cheese making, the casein of milk gradually becomes putrescible and
in time becomes unwholesome, as in so-called "well ripened" cheese.

Vegetable proteins are never eaten in a state of putrefaction as
is always the case with fresh meat proteins and they show much less tendency
to putrefaction. This was clearly shown experimentally first by Tissier
and later by Torrey. Said the latter, "Vegetable proteins did not offer
the slightest encouragement to the growth of intestinal putrefactive
types of bacteria."
Observations on rats by Dr. Helen Mitchell in the Nutrition Laboratory of Battle Creek College fully confirmed the findings of Prof. Torrey. Rats were fed for some days on raw meat exclusively. They were then given a daily dose of 2 grams of dextrin, the meat feeding being continued. At the end of four days, a careful bacteriological examination showed that the proteolytic flora had been replaced by an aciduric type, the L acidophilus.

In discarding meats no risk is run of a deficiency of protein. In recent years it has been clearly shown that a low protein diet (1.5 calories per pound of body weight) is not only safe but highly advantageous, and one of the chief points of superiority is the better flora resulting from its use. There are many vegetable foods which are rich in protein. Even the cereals contain as much protein as is required by a well balanced ration. All the legumes are rich in protein. All the nuts contain a surplus of protein and in the case of the "oily" nuts the protein is of superior quality, and may be readily used to supplement the defective proteins of the cereals and legumes. The peanut and the soy bean supply a high percentage of protein of most excellent quality. Fruits and vegetables in general, furnish excellent protein, if the percentage is low.

The soy bean provides a basic protein of high quality, and is rich in food minerals and vitamins and has the added advantage that it stimulates the development of protective flora. This gives to the soy bean special value in efforts to change the flora by special feeding. All soy bean products are to be commended, especially a milk prepared from this legume which closely resembles ordinary milk both in appearance and in composition.
3. **Increased Intestinal Motility.**

The intestinal contents readily undergo putrefaction unless prevented by some efficient protective means, as an aciduric flora, such as *L. acidophilus* or *bifidus*. This is true of the secretions of the intestinal tract as well as of the food remnants and excretory matters which make up the colon contents or feces. When carbohydrates are present in the intestine in abundance, with *L. acidophilus*, the *Lactobacillus* flourishes and there is no putrefaction, for proteolytic types of bacteria can not grow under such conditions. When stasis or stagnation of intestinal contents occurs, the carbohydrates are speedily absorbed and the aciduric flora is replaced by proteolytic bacteria since an abundance of nutrient material for such types is provided by the mucus and other secretions as well as by food remnants of which undigested and unabsorbed proteins constitute the chief part.

Dragstedt, Cannon and Dragstedt showed experimentally (1922) that intestinal stasis "led to the development of a proteolytic intestinal flora irrespective of the character of the diet."

To secure and maintain a non-putrefactive flora it is essential that the motility of the intestine should be quickened sufficiently to insure complete emptying of the intestine at least every 24 hours. According to Prof. Cannon of Harvard, the normal process of digestion is completed quickly enough to permit the evacuation of unusable food remnants in 14 hours from the time the food is eaten (Mechanics of Digestion). X-ray observations of the movements of the stomach and the intestines during digestion show that the average healthy stomach becomes empty in about four hours after the beginning of a meal and the small intestine discharges the last remainders of the meal into the large intestine two to four hours later. Three or four hours later, in the case of a perfectly normal person, the undigested and unusable residues of the food, mixed with
excretory substances derived from the liver and mucous membrane, may be discharged from the body. Under such circumstances there is little or no opportunity for putrefactive changes. In carnivorous animals the time required for the transit of foodstuffs through the alimentary canal is much shorter. Results of experimental researches published by the United States Government show that the time elapsing between the taking of food and the discharge of the unused residues is, in the carinorous barnyard fowl, only three and one half hours. In the fruit-eating bat of South America the time is only one hour, and the feces have the odor of the bananas upon which these bats feed and are practically sterile.

In healthy infants, the bowels usually move soon after feeding. The same is true of healthy animals and active, healthy boys and girls who are fed upon a natural diet.

The savage moves his bowels three times a day, as does also the Turk. A Hottentot said to a missionary doctor whom he consulted for relief, "Doctor, I am horribly constipated; my bowels move only once a day."

The chimpanzees and other big apes in zoological gardens move their bowels four to six times a day.

When the bowels are evacuated but once a day, the time required for food transit of the intestinal tract from mouth to anus is 54 hours (Hurst). Of this long period, two days and a quarter, only 8 or 10 hours are required for the digestion and absorption of the food (Cannon). During the remaining 44 hours, the food residues are lying in the colon undergoing the same sort of changes that would occur in the presence of warmth and moisture outside of the body. Nothing is gained by this long retention of the fecal residues, and much harm is done. By the long
continued contact of putrefying material with the mucous membrane of
the colon its epithelial covering is damaged and its protective functions
are impaired. It becomes less efficient as a filter and permits not
only bacterial toxins to enter the blood stream but also bacteria which,
carried by the blood to the liver, kidneys and other viscera, become
a grave menace to health and even life.

These dangers are easily escaped by taking care to see that the
body wastes and food residues are evacuated with such frequency that there
is no time for putrefaction. The habit of evacuating after each meal
is readily acquired by persons in average health whose bowels have not
become crippled by adhesions or other organic damage.
A visit to the toilet should be made very soon after each meal and be-
fore retiring. If an attempt to move the bowels is thus made regularly,
the colon will in a short time begin to "call" for evacuation and if
the "call," if ever so slight at first, is responded to with promptness
and unfailing regularity, it will soon became an imperative demand for
colon clearance, and with the acquisition of this new health habit there
will be experienced such an uplift in sense of physical fitness, mental
clearness, buoyancy and endurance, as will be more than ample compensa-
tion for the little effort required to acquire normal colon habits.

As the change of flora progresses, the bowels function more
and more normally, because the acid formed by the acidophilus in the colon
is a physiologic intestinal stimulant. When the change is so far ad-
vanced that the stools have lost their offensive odor and gas production
has ceased to be an inconvenience, the bowels, even if chronically con-
stipated, will begin to act in a more normal manner.

In the meantime if the bowels do not move naturally, they should
be assisted by the enema. On no account should laxatives be employed. In this all experts agree. Medicinal laxatives of all sorts interfere so seriously with the effort to develop or implant a protective flora as to it. Only purely physiologic means may be used, such as a liberal increase of bulkage (Kaba, psyllium seed, agar).

4. **Implantation of L. Acidophilus in the Intestine.**

Since the L. acidophilus is a normal inhabitant of the intestine, it would seem to be sufficient to encourage the growth of this beneficent organism by the methods described in the preceding paragraphs. The rapidity with which lacto-dextrin won its way into popular favor with both the medical profession and the laity and the great vogue it has attained are substantial evidence that the average colon is the host of L. acidophilus, but the great difficulty experienced in changing the flora in many cases, the large amount of special carbohydrate required and the long time elapsing before tangible results appeared, have led many patients and physicians to abandon the effort as hopeless. In such cases careful studies of the stools have sometimes shown that the protective organisms have disappeared, or that the few remaining aciduric bacteria have become so deteriorated by unfavorable conditions for growth that they cannot be revived. In such cases a potent artificial culture of the L. acidophilus is a real "life saver."

The first cultures of this sort were employed at the Battle Creek Sanitarium (1912). The medium used was whey, in which was grown first the L. bifidus of Tissier, now believed to be identical with L. acidophilus which was later introduced to the profession by Rettger of Yale, and on his recommendation was adopted and used first as a whey culture and later prepared from skimmed milk.

Favorable results were obtained from these cultures, but only
when they were combined with liberal feeding of lactose or lacto-dextrin. The results were disappointing in many cases and search was made for more efficient measures which resulted in the discovery of the fact that a milk prepared from soy beans is a more suitable medium for the cultivation of the \textit{L. acidophilus}. When grown in this medium \textit{L. acidophilus} develops much more rapidly than in cow's milk, maturing in 10 hours, about half the time required for cow's milk cultures. The individual bacteria are fully 50 per cent larger, and far more robust in appearance. The number of bacteria per c.c. exceeds the count of milk cultures by 50 to 100 per cent. Soy milk acidophilus cultures are also much longer lived, retaining their vitality for many weeks, and appear to preserve the natural characteristics of the organism so that it more readily adopts itself to the anerobic life of the human intestine.

This highly potent culture of the \textit{L. acidophilus} may be used with great success in cases in which the normal protective flora has been lost or has become inactive. Lacto-dextrin should be used with it, but smaller quantities are required with than without the culture. By the use of the culture in connection with lactose or dextrin, the time required for the change may be much shortened. In fact, with this combined method improvement is often noted almost immediately, and success may be expected in every case if the instructions given in the preceding paragraphs are thoroughly carried out.

From two to three pints of soy acidophilus milk should be used daily, with one or two ounces of lacto-dextrin for each pint of the culture. The culture should be taken at room temperature. The most convenient time for taking the culture is at meals, but if this is not convenient, it may be taken before or after meals.

In stubborn cases, especially cases of constipation, a pint of the culture should be used in an enema at least once a day. An excellent
time is just before retiring. One or two ounces of lacto-dextrin or better, dextrin, should be added to the culture with warm water in sufficient amount to facilitate administration. The acidophilus milk serves two purposes: it stimulates the colon by its acidity and at the same time implants the protective bacteria where it is needed. If colitis is present it will speedily disappear. Gas formation also lessens promptly.

**Practical Problems**—In most cases beneficial effects from the lacto-dextrin feeding are experienced almost from the first dose; but in some cases there is at first a marked increase of gas production. This is chiefly due to the presence of Welch's bacillus and may be somewhat annoying but need cause no alarm. It is simply an indication that the change is taking place. The Cl. Welchii are making a harmless gas instead of virulent poisons and are helping in their own destruction by creating acids. As the flora is changed, the gas will diminish, disappearing when Welch's bacillus and the colon bacillus have been greatly reduced in numbers. The disappearance of putridity of the stools and of gas is an indication that the change of flora has taken place, and with this change the production of colon poisons and the mischief which they produced will cease.

The gas distension is due to a spastic state of the colon which prevents evacuation. A hot enema (3 pints at 110° F.) will afford relief. Repeat if necessary. If the enema is not returned promptly, add half a teaspoonful of lactic acid to each pint of water. More effective is a pint of soy acidophilus milk with an ounce of dextrin and a pint of hot water (115° F.). The dose of lacto-dextrin should be lessened and should be considered as a part of the food intake.

To insure complete evacuation of the colon, an enema at bedtime
(three or four pints at 110 to 115°F), at least three times a week, is a wise precaution. In cases of extreme toxemia, it is well to employ the enema daily for several weeks.

Not infrequently the taking of a large dose of lacto-dextrin lessens the appetite for other food. This need not give alarm, for it is to be remembered that this carbohydrate is not only a remedy, but a highly concentrated food. A heaping dessert-spoonful represents about 100 calories, and a maximum day's dose represents fully half the amount of food required by the average individual engaged in light employment.

Persons who are thin in flesh and desire to add to their weight should take the lacto-dextrin about two hours after meals. When taken at this time lacto-dextrin does not so much affect the appetite for other food and so may be taken in addition to the regular full diet and will thus insure a decided and usually a rapid gain in flesh.

Persons who are overfat or of average weight and hence do not desire to add to their weight must necessarily reduce the amount of food eaten while taking lacto-dextrin. Such persons should make the diet consist chiefly of coarse vegetables such as cabbage, cauliflower, green peas, string beans, lettuce, celery, brussels sprouts, asparagus and fresh fruits of all sorts with a moderate allowance of bread, potatoes, cereals, milk, buttermilk, etc.

An enema at bedtime will be of benefit whenever the colon has failed to empty itself thoroughly during the day. A sense of fullness or heaviness or other abdominal discomfort is usually an indication of stasis or retention of residues which can never be beneficial in any way and may be the source of great mischief, since putrescible residues in the colon undergo the same putrefactive changes as similar refuse elsewhere in the presence of warmth and moisture.
With lactose feeding, as with the milk regimen, there is not infrequently at first a very marked looseness of the bowels, due, possibly, to the temporarily increased development of Welch's bacillus. A lessening of the dose to one ounce three times a day or the use of dextrin instead of lactose will usually correct the looseness at once; then the smaller dose may be taken and as the flora is changed the tendency to diarrhea will disappear.

When the cecum is adherent, the descending colon spastic, the pelvic colon prolapsed and adherent or impacted, the change of flora is more difficult of accomplishment because of the delay of residues whereby opportunity is given for the absorption of the lactose, permitting the development of the putrefactive organisms. In such cases, the colon must be emptied thoroughly by an enema daily, or even twice a day.

In many of these cases there is incompetency of the ileocecal valve, so that when the colon contracts it discharges backward into the small intestine as well as forward to exit from the body. This causes accumulation of gas in the small intestine and interferes with evacuation of the colon. Repair of the ileocecal valve by a method described by the author some years ago corrects this difficulty in part; but when the acidophilus percentage of the intestinal flora is raised to 80 or 90, excessive gas formation ceases and the peristaltic activity of the intestine is increased to such a degree that reflux does not occur and putrefaction is suppressed. There is no occasion for surgery.

While very offensive odors are indicative of a very bad flora, the absence of pronounced odor such as often may be noted in cases of chronic obstinate constipation with dry, hard stools, does not indicate a good flora, but simply an extreme degree of stasis. The fecal residues have been so long retained that those offensive products of putrefaction, indol, skatol, ammonia, etc., have been absorbed and
eliminated through the lungs and kidneys. A laxative or an enema will demonstrate this by bringing down from the upper colon quantities of most offensive material.

A nonputrefactive flora has little or no odor. Sometimes a faint odor is perceptible. There should be no trace of putrescence. An ammoniacal or rancid odor signifies butyric putrefaction. As the flora becomes changed for better or worse, these offensive odors become less or more pronounced. By noting the odor of the stool from day to day the state of the flora may be judged with considerable accuracy. It is necessary to form the habit of doing this. It is more important for one to keep well informed about his colon than about his bank account.

A normal stool will have the consistency of mush, not fluid, but of such consistency as to have form; but the so-called "well-formed stool" should never be seen. This is itself proof of chronic constipation.

The color of the stool will largely depend upon that of the foods eaten. Unless the foods are highly colored, it will be yellowish brown.

The volume of the food intake should be large enough to insure three ample evacuations daily.

An examination of the stools by a bacteriological expert who is familiar with the special methods of studying the intestinal flora should be secured when possible. Although this is in general not necessary for demonstrating the change, such examinations are essential for accurately checking clinical results.

The stools of a healthy breast-fed infant show acidophilus present to the extent of 90 to 100 per cent. An earnest effort should be made to reach as near as possible the level of infancy.
To Maintain a Non-Putrefactive Flora

Even when the flora has been completely changed, a return to old habits of eating will cause a rapid relapse. The old putrefactive flora will in a few weeks flourish as vigorously and perniciously as before. Like causes naturally produce like results.
The character of the intestinal flora is wholly determined by the nature of the residues left in the colon after digestion and absorption are completed. It is evident, then, that the character of the flora will change with the diet, and that the change of flora can be maintained only so long as the diet and other measures by which the change has been accomplished are maintained. When they are discontinued, the pernicious bacteria, that is, a putrefactive flora, reappears within a few days. The changes in the character of the flora are usually followed by noting

To keep the flora changed requires a constant battle. The things which must be done without fail and systematically are the following:

1) The colon must be thoroughly emptied every day. To insure this, the bowels should be trained to move three times a day or after each meal. In many cases an additional movement occurs before breakfast and this is advantageous. To secure this efficient action of the bowels the use of large quantities of bulky foods is necessary together with proper lubrication. An ounce to two ounces and a half of bran is required in most cases and mineral oil is also needed. Fresh fruit, greens and such vegetables as lettuce, celery, cabbage, beets, parsnips, etc., should be freely used. Bulky or laxative foods must be used in liberal quantities, not once a day only, but at every meal. If one of the daily meals is taken away from home at a lunch counter, hotel or restaurant, a quantity of "ballast" if need be, may be taken along in the pocket. Material convenient for this purpose is now available. If the ordinary meal is omitted, fruit may be eaten so as to avoid interrupting the normal intestinal rhythm.
For Colitis—in case of colitis and when the colon is very spastic, care must be taken to chew the food very thoroughly, and coarse foods, such as spinach and fresh vegetables, must be pureéd. In extreme cases, bran products must be avoided, not because they cause mechanical injury, but because they impose too much work upon sensitive parts. Kaba, a tropical gum, is an excellent bulkage food accessory. It is highly hygroscopic, and its granular particles do not cohere and so cannot become impacted. Psyllium seed is also excellent as well as agar. Any of these may be used with good results. As the change in flora proceeds, less and less accessory aid will be necessary.

Soy acidophilus milk should be used regularly. One or two pints a day is usually sufficient to keep the flora in good condition if the diet is right. One or two ounces of lacto-dextrin should be used at each meal to insure development of the protective acidophilus. When given without the nourishing carbohydrate, the \textit{L. acidophilus} soon perishes.

Attempts to suppress intestinal putrefaction by means of vaccines, serums, and similar means have wholly failed. The bacteria which must be combated are outside of the living tissues. Although in the intestine, they are as really outside the living organism as though they were upon the body surface. The only rational method of combating intestinal putrefaction is by a radical change of the intestinal flora.

\textbf{The Antitoxic Diet}

To maintain a good flora, the colon must receive as scrupulous care as a fine automobile or any other mechanism. When discussing Lane's operation for removal of the colon to get rid of the mischiefs incubated in it, Keith, the great English anatomist, very aptly remarked, "While some blame the engine, for my part I think the fault is with the fuel."
The idea that food habits are a dominant health factor is by no means a modern idea. The wise men of ancient Egypt, according to Herodotus, believed that "all the diseases which exist are produced in men by the food on which they live." A recognition of this fact by the Egyptians made them, according to the historian, "The most healthy of all men next to the Lybyans."

The antitoxic dietary has for its aims, not the suppression of bacterial growth in the intestine, but by control of the intestinal residues, through dietary restriction and regulation, to maintain a protective or aciduric flora, and so prevent the formation of toxic and harmful putrefaction products.

The intestinal flora is the bacterial vegetation of the intestinal tract. The cavity of the intestine presents conditions exceedingly favorable for the development of microorganisms. It is an admirable incubator. This is especially true of the lower portion, the colon, where residues accumulate and are likely to be delayed (stasis). Nature's chief method of protecting the body against injury from harmful invading bacteria is similar to that by which we protect our front lawns from noisome weeds. It is not sufficient to destroy the weeds; they will soon grow again.
even on the poorest soil. Grass requires an abundance of the right sort of plant food; with this, it will occupy the ground so completely that there will be no room for weeds.

There are plant antagonisms. Certain plants leave behind in the soil products which are poisonous to certain other plants and prevent their growth. Such an antagonism exists between the acid-forming germs, *Lactobacillus acidophilus* and *Lactobacillus bifidus*, and the putrefactive and disease-producing organisms which produce ammonia and other alkaline substances, such as indol and skatol and other offensive and poisonous products. Chief among these is the well-known gas-forming bacillus, *Clostridium Welchii*. The chief antagonists are *L. acidophilus* and *C. Welchii* (Burnet). The former thrives in a one per cent acid solution, while the latter cannot tolerate one-sixth of one per cent.

It is interesting to note how admirably Nature in accord with this principle has provided for the protection of the human interior.

The first food of the young infant is made non-putrescible. Milk sours, while meat putrefies. This is due to lactose, which is always found in milk and nowhere else.

When the infant is weaned, it loses the protecting influence of lactose; but Nature supplies in its place, dextrin, a substance which in the intestine encourages the growth of *L. acidophilus* equally as well as does lactose.
Another very remarkable provision which Nature makes for protection against invading bacteria is in the unique character of the proteins found in the cereals, fruits, legumes and other products of the soil intended for human sustenance. Vegetable proteins do not putrefy in the intestine. In extensive experiments, Torrey found that vegetable proteins "did not offer the slightest encouragement to the growth of intestinal putrefactive types of bacteria."

The antitoxic dietary has five essential characteristics.

1. It must be laxative so as to prevent stagnation in the colon, thus giving the residues and wastes no opportunity for putrefaction.

2. It must be free from putrefaction products and so far as possible from the bacteria which produce putrefaction.

3. It should be poor in substances capable of undergoing putrefaction; that is, it must be low in animal proteins.

4. It should be rich in carbohydrates and especially in lactose and dextrin which encourage the growth of protective bacteria in the intestine.

In arranging an antitoxic bill of fare the following important facts should be kept in mind:

1. Meats of all kinds, including fish, flesh, fowl, and shellfish, together with many varieties of cheese, as limburger and roquefort, must be wholly discarded.

2. Eggs must be used sparingly. The yolks of eggs may be eaten more freely than the whites. Raw whites must be wholly discarded.
(3) In some persons milk produces such decidedly toxic effects that it must be avoided. The ill effects, shown by coating of the tongue, loss of appetite, headache and often constipation, may be due to a special sensitization against milk. They may also result from toxemia arising from the putrefaction of undigested curds in the colon. It should be noted, however, that milk, as shown by Tissier, Torrey and others, is much less likely to encourage putrefactive changes in the colon than is either meat or eggs.

(4) Greens and such coarse vegetables as turnips, carrots, parsnips, celery, lettuce, cabbage, etc., should be freely used together with bran and coarse cereals. Fine flour bread and other superfine cereal products should be avoided. Polished rice may be used, but only in connection with the coarser foods mentioned. A liberal supply of roughage should constitute a portion of every meal.

(5) Certain vegetables, such as carrots, seem to possess a special antitoxic value. Metchnikoff found that the stools of animals fed upon carrots were sometimes nearly sterile. Salads prepared from uncooked materials, edible raw fruits and vegetables of all sorts are valuable as antitoxic foods.

(6) Milk sugar, because of its slow absorption, affords an excellent means of getting carbohydrate into the colon where it is needed. Milk sugar has the additional advantage that it encourages the lactic acid fermentation. A few ounces of lactose or milk sugar is thus a valuable addition to the antitoxic bill of fare. The improved lactose, beta-lactose (B-Lac) should take the place of cane sugar for table use.
(7) Raw, or imperfectly cooked starch is digested more slowly than well cooked starch, and hence has a better chance to reach the colon and encourage the growth of a non-putrefactive flora. This may be provided by the use of fresh fruit and such fresh vegetables as lettuce, cucumbers, radishes and salads of various sorts, and especially by the use of scalded oatmeal; that is, steel-cut oats cooked six to ten minutes like the brose of the Scotch Highlander.

(8) Fats, especially animal fats, must be used in moderation as an excess of fats encourages intestinal putrefaction.

(9) In order to secure promptly the maximum amount of benefit from the antitoxic diet it is important to initiate the effort with a few days' special regimen to change the intestinal flora. The fruit regimen is best for this purpose. After the flora has been changed, then the antitoxic diet should be followed systematically for an indefinite length of time.

The antitoxic diet was undoubtedly the dietary of primeval man, and hence may be safely adopted by modern man. Says Elliot of Oxford, respecting the diet of prehistoric man:

"On the bushes by the rivers and along the shore there were all sorts of fruits and nuts. For the subsistence of our lemur-monkey-man in the early stages of evolution, what fruits would seem a priori most suitable?

"I think that one would select the banana and breadfruit. Ancestral forms of both were flourishing in the Eocene. Many other fruits with which man has been afterwards continually (perhaps one might venture to say most intimately) associated occur at this period. These are, most of them, found in so many places that one
is apt to think they were then of world-wide distribution.

"In the temperate brushwood and on the river-sides, acorns, hazel-nut, hawthorn, sloe, cherry, and plum might be found. Here and there he might alight upon a walnut or almond; figs also of one kind or another seem to have been common. Palm trees existed, and some of them were of enormous size.

"Moreover, there was not, so far as we are aware, any carnivorous creature in the Eocene period, or one which might have been a serious enemy."

Says Tibbles, an eminent English authority on dietetics: "A course of lacto-vegetarian dietary is exceedingly useful in the state of high arterial tension which precedes arteriosclerosis, in some forms of renal disease—e. g., Bright's disease—in Grave's disease, gout, gravel, chronic rheumatism, liver trouble, constipation, intestinal fermentation, autointoxication, skin diseases—e. g., chronic urticaria and psoriasis—in neurasthenia, neuralgia, sciatica, cardiac and gastric neuroses, etc. A pure vegetarian diet is good for some of the patients; for others a lacto-vegetarian diet is better."

Torrey found that a diet of bread and milk produces a good or aciduric flora.

It was long ago shown by Bachman (Zeitschrift für Klin. Med., 1902) that while intestinal putrefaction is increased by fat and albumin, it is decidedly decreased by a farinaceous diet as well as by milk.
The diet should be made very simple and laxative. Fresh green vegetables and fruits should constitute a large bulk of the diet. Protein should never constitute more than 10 per cent of the day's ration. Cottage cheese, buttermilk, or egg yolk may be used once a day in most cases. Greens should be used daily. When buttermilk disagrees, malted nuts may be substituted for milk with great advantage.

Nearly all modern writers on dietetics recognize the importance of suppressing intestinal putrefaction. Says Taylor, an able writer on dietetics, in reference to the treatment of cases of autointoxication, "In normal bacterial disintegration of food-stuffs in the alimentary tract no known toxic substance is found." This is perfectly true since normal bacterial disintegration which takes place in the alimentary canal is fermentative and not putrefactive. Consequently, when Taylor further says: "Although protein putrefaction yields phenol, skatol, indol, and cresol from aminoc acids and hexone bases, none of these are toxic," he is certainly in error. For example, Lee, of Columbia University, found that the skatol and indol submitted to him by Herter for physiologic tests were powerful fatigue poisons, and a long series of observations carried on by Metchnikoff and his students in the Pasteur Institute, of Paris, showed that indol given to small animals produced marked changes in the blood vessels in the course of a few months. Boltz, of Paris, showed by experiments upon animals that fecal matters mixed with their ordinary diet, even in small quantities, produced cirrhosis of the liver and other degenerative changes. Taylor himself in directing the treatment of autointoxication, both acute and chronic, gives the following wise advice:
“Absolutely prohibit those forms of nitrogenous foods that favor the development of putrefactive bacteria, particularly animal protein except milk, e.g., meat, fish and eggs,” and names among additional foods to be especially avoided, bouillon, meat soups, meat juices and jellies, meat extracts, white of egg or dishes which are made of it, and further directs that “in autointoxication from acute enteritis an exclusive farinaceous diet must be given for several days.”
A departure from a strict antitoxic diet is likely to be followed by relapse within a short time. It must be constantly borne in mind that disorders and symptoms such as above described do not appear until after some essential part of the defensive mechanism of the body has been broken down, so that dietetic digressions which produced no apparent effect when the body defenses were intact, even when indulged to an immoderate degree, become disastrous even when the departure from a strict antitoxic regimen is comparatively slight. It must be remembered, also, that when the results of intestinal toxemia have become well developed and have existed for a considerable length of time the damage to the defensive mechanism has become so serious that it is probably to a considerable degree irreparable, and for this reason relief can be secured only by the most exemplary following of a carefully arranged regimen with no digressions.

When the kidneys have been badly damaged, as shown by the presence in the blood of an abnormal amount of non-protein nitrogen, the protein of the diet must be kept down to the very lowest limit and should never exceed one calorie per pound of body weight. In many cases the protein may be with benefit reduced to half this amount for periods of a few days at intervals, and in extreme cases it is desirable to eliminate the protein from the bill of fare entirely for short periods so as to make the work of the kidneys as light as possible.

In chronic cases of intestinal toxemia it is often necessary to repeat the special regimen for changing the flora at intervals of a week or two for some time in order to secure a radical change in the intestinal flora, and the fruit regimen
DISEASES IN WHICH THE INTESTINAL FLORA MUST BE CHANGED.

Scarcely a disease is known in the treatment of which change of the intestinal flora may not play a useful rôle. The antitoxic regimen and maintenance of an aciduric flora may render special service in the following disorders, as well as all others in which intestinal toxins are a probable causative factor:

Achylia, gastric ulcer, cancer of the stomach, duodenal ulcer, inflammation of the gallbladder, gallstones, abscess of the liver, cirrhosis of the liver, pancreatitis, diabetes, exophthalmic goiter, toxic goiter, cystic goiter, myxedema, Addison's disease, Bright's disease, pyonephrosis, arteriosclerosis, jaundice, syphilis, multiple neuritis, intestinal toxemia, dementia praecox, manic depressive, toxic neurasthenia, eczema, acne, degenerative disorders of the nervous system, chorea, pernicious anemia, splenic anemia, cancer in any part of the body, chronic appendicitis, chronic bronchitis, bronchial asthma, cardiac asthma, migraine, or so-called sick headache, so-called biliousness or torpid liver, acidosis, apoplexy, osteo-arthritis or chronic rheumatism, chorea, colitis, chronic diarrhea, premature old age, sprue, pellagra, fever.

In the dietetic management of chronic diseases, change of the intestinal flora is one of the most efficient of all known therapeutic measures, but it is by no means a panacea, neither are its beneficial effects other than temporary.

All other natural measures must be employed, and especially those which may combat the specific caused involved in an individual case.
Regimen for Changing the Intestinal Flora

The intestinal contents is a culture medium for bacteria and the body itself affords conditions which render it an excellent incubator. Normally the gastric juice destroys most bacteria when in the vegetative state with the exception of spore bearers. The lactobacilli are aciduric and so readily pass through the stomach to the small intestine where they find a slightly alkaline medium well suited to their requirements except that it is deficient in oxygen. Ordinary milk souring organisms quickly die. The B. Bulgaricus survives in the upper part of the small intestine but does not reach the colon. The Lactobacillus acidophilus reaches the colon and thrives there in spite of the absence of oxygen if it is amply supplied with the carbohydrates needed for its nutrition. This fact gives to the Lactobacillus bifidus-acidophilus preeminence over all other aciduric bacteria as a means of protecting the intestine against invading parasitic bacteria which require nitrogenous nutrients and cannot live in a decidedly acid medium. An acidity of 1/10 of one per cent inhibits the development of the Clostridium Welchii, the pernicious gas bacillus of evil repute. B. coli is more tolerant of acids than Cl. Welchii, but dies in a medium in which L. acidophilus maintains a vigorous growth. These characteristics of Lactobacillus acidophilus enable it easily to dominate the field in the intestine when abundantly supplied with appropriate nutriment.

It is evident, then, that regulation of the diet is a matter of first importance in efforts to combat intestinal putrefaction and all other forms of bacterial infection of the intestinal tract.
THE INTESTINAL FLORA OF THE ANTHROPOID

John Harvey Kellogg

On ________ Leonard J. Goss, D. V. M., Ph. D., of the Hospital and Laboratory of the New York Zoological Park, at the writer's suggestion, delivered to Dr. Kopeloff, bacteriologist at the Medical Center in New York, fresh stools of a chimpanzee and a gorilla, both adult animals, aged about ______ years, that have been in captivity since they were about eighteen months old.

Dr. Kopeloff was asked to study the intestinal flora of the animals, and especially to determine the percentage of \textit{L. acidophilus} present. On __________ he reported finding in the stool of the chimpanzee 98\% \textit{L. acidophilus}, and in that of the gorilla, 96\%. Dr. Kopeloff's findings agree with the observations made by the late Carl Akeley, who stated to the writer that in dissecting the gorilla, he made a careful examination of the alimentary tract from mouth to anus and found nothing in the slightest degree offensive, and, although he looked carefully for parasites, with which other animals in this region are greatly infested, he found none.
Further studies by Dr. Kopeloff of the stools of the anthropoids, including specimens from an adult orangutan, seem to justify the conclusion that while fluctuations occur in the percentage of acidophilus, their intestinal flora is normally aciduric.

These findings by Dr. Kopeloff are interesting because of the discovery made in 1900 by Dr. H. Tissier, of the Pasteur Institute, and Professor E. Moro, an eminent German paediatrician. In the study of the bacterial flora of the human intestine, they found that nursing infants have a strongly aciduric intestinal flora, which exercises an important protective influence by preventing the development of proteolytic, pathogenic, putrefactive, and gas-producing organisms, since these require an alkaline medium. Both clinical and laboratory observations indicate that an aciduric flora is protective against animal as well as vegetable parasitic organisms, such as the amoeba and other protozoa.
HYPERACIDITY.

Excessive production of hydrochloric acid, Deficient production of pepsin.

Excessive formation of acid may be due to ---

(1) Exciting food, meats, etc., especially purin bodies.
(2) Excessive chlorides in the blood.
(3) Too long contact of food, dilated stomach, diminished motility, ulceration caused by lodgment of food.

Deficiency of pepsin due to ---

(1) Deficient pepsin stimulants in the food, especially deficiency of dextrin.
(2) General lowered resistance, lack of vital tone, exhaustion.
(3) General anemia, or changes in the blood, consumption, fever.
(4) Local anemia.

Remedies:

(1) Substitute \textit{maxx} peas, beans purées (hulls should be removed before cooking), gluten breads, nuts, protose, nuttolene, also dextrinized cereals; no mushes.

(2) Emulsified fats,--cocoanut cream, ripe olives, sterilized butter.

(3) Dextrinized foods, malt honey, malted nuts, malt honey candy, granut, malt extracts, honey.

(4) Sweating baths, electric light, two hours before meals to diminish chlorides, followed by short cold bath to fix blood in the skin, energize the nerve cells, encourage circulation. It is the blood that heals.
(5) Hot compress over stomach, covered with flannel. Keep legs warm, circulation good.

(6) Massage, manual Swedish movements, resistive movements, gentle exercises, vibration to work blood to muscles and skin. In extreme cases, hot pack to legs and hips.

Hypopepsia. Generally indicates lowered vital resistance, consumption, fever, infectious diseases.

Indications ---

(1) Blood movement by cold baths.

(2) Increase stomach secretion by ice bag over stomach half hour before meals. Hot over stomach after meal. Must be confined to the stomach and must not produce general perspiration. Outdoor gymnasium, sun baths, cold baths. Each breath is a cold bath. 1000 such baths XXXX an hour.
The average civilized colon is badly crippled. This is the natural result of the over-distension due to the fact that when the bowels move but once a day, evacuation is always two to four days in arrears, permitting the accumulation of 8 to 20 meal residues instead of the normal two or three. And this condition has become so general, especially among students, professional men and other persons who lead a sedentary life, that some medical writers maintain it to be physiological.

An English medical writer, Professor Watson, physician to Queen Victoria, actually advocated evacuation of the bowels every other day as a measure of food economy since it would lessen appetite and afford time for more complete absorption of food material.

Unfortunately the one-a-day practice of evacuation is the natural result of house breaking to which, like pet animals, we are all subjected in early childhood.

The natural colon rhythm is destroyed by failure to respond promptly to the "call" for evacuation. This is the origin of the one-a-day constipation, to use a term originated by the late Dr. Fiske, which has become nearly universal among highly civilized people, being aggravated by errors in diet and sedentary habits, faulty postures and other perversions.

Dr. J. Howard Cook, located in the Uganda Protectorate of East Africa, wrote me as follows: "In 9,642 out-patients seen during the last seven months of 1911 there were 174 cases of constipation," 1.8 per cent of the whole. In civilized countries among sick people seeking medical relief nearly 100 per cent complain of more or less intestinal irregularity and the great majority are badly constipated.
Dr. John C. Young, speaking of the Arabs who always move their bowels at least three times a day, said, "I have again and again had it given 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."
That nature has provided for the evacuation of colon residues after each meal is clearly shown by the observations of Cannon, who was one of the first to study the functions of the colon and the movements of food residues through it by means of the X-ray. A full account of his remarkable observations is given in his work, "The Mechanical Factors of Digestion" (See p. 162).

The colon, or large intestine, is about five feet in length. It is anatomically divided into three sections, the cecum and ascending colon, the transverse colon and the descending or distal colon.

In an ordinary bowel movement only the third portion or descending colon is emptied. At the same time a forward movement begins in the ascending and transverse colons which continues until the third section of the colon is again filled which occurs chiefly as the result of the advancement of the colon contents during the taking of the next meal. If the advancement is sufficiently active, shortly after the end of the meal the residues will enter the rectum and produce a "call" leading to evacuation of the third section of the colon. When this is repeated after each of the three daily meals, the colon will be entirely cleared of the residues of the food eaten during the preceding 24 hours; that is, if a test meal is given in the morning, the residues of the meal will be evacuated before or soon after the morning meal of the next day.

As shown by the X-ray observations of Hertz of London, "the time required for [passing through] each part of the colon--ascending, transverse, and descending--is about two hours. That is, about the same period is occupied in passing through the 2 feet of colon between
the caecum and the splenic flexure as through the 23½ feet of small intestine.* The movements of the human colon, however, appear to be less active at night than during the day.

The taking of meals also is stimulating to the colon; by making tracings hourly after a bismuth breakfast, Hertz found that, apart from meals, progress through the colon was slow, but that after each meal there was perceptible advancement of the contents. More progress occurred, for example, during the dinner hour than during the previous four hours.**

Commenting upon these observations Cannon remarks, "If approximately nine hours are required for material to reach the descending colon in man, the waste from food taken at eight o'clock in the morning might be discharged at five o'clock in the afternoon. If defecation should occur regularly at four o'clock, however, the waste from breakfast must be retained for another twenty-four hours. Thus, as Hertz has pointed out, the interval between a meal and the excretion of its residue will vary, when the bowels are opened regularly once a day, between nine and thirty-two hours, the period depending on the time of eating and the time of defecation."

Dr. Rissier of the Pasteur Institute discovered (1900) that nature provides for each new-born mammal an efficient means of protection against the invasion of the alimentary tract by putrefactive and other disease producing organisms. This protection consists in the inoculation of the infant by contact with the mother's breast in the act of nursing with a vigorous growing lactic acid-producing organism, the Lactobacillus bifidus-acidophilus which by producing an aciduric flora in the colon prevents the development of proteolytic or putrefactive

**Hertz, loc. cit., p. 18.
flora which requires an alkaline medium. If this condition, which
is always present in the intestinal tract of the healthy nursing infant,
were maintained during adult life, the long retention of food residues
would be of little consequence other than mere mechanical inconvenience,
and, in fact, would not be likely to occur for the reason that the acids
produced by the protective acidophilus are a normal physiologic stimu-
lus for the colon insure evacuation at sufficiently frequent intervals
to prevent the possibility of putrefactive changes. So long as the
infant is properly fed, the bacterial flora of its intestine will be
strongly aciduric or 80 to 100 per cent Lactobacillus acidophilus.

Almost universally, however, the dietary customs and bowel habits
of civilized people are such as to discourage the growth of the pro-
tective acidophilus and to such an extent that its protective influence
is greatly diminished and often lost altogether, and with the result
that the prolonged retention of food residues, which with an aciduric
flora would rarely occur, has become so general that residues and
wastes instead of being evacuated within about 24 hours or less from
the time the food is eaten are retained for two to four days or even
longer. In fact, Hertz and other roentgenologists report that the aver-
age motility period of the alimentary canal as observed in persons sup-
posed to be enjoying good health is 50 to 54 hours and an evacuation
once a day has come to be regarded as normal and physiologic.

Nearly 30 years ago, the writer became convinced, however, by
clinical experience that this was an error. Several observations led
to this conclusion. One was the fact that domestic animals usually
evacuate soon after being fed. Dairy cattle evacuate many times a day,
doubtless the result of rumination, which is quite in agreement with the
observations of Hertz on the effect of eating in accelerating activity
of the colon.

Another suggestion came through the meeting of a number of examples of remarkably vigorous men over 80 years of age who were still extraordinarily vigorous notwithstanding their utter disregard of hygiene during their entire lives and liberal indulgence in the use of alcohol and tobacco and other unwholesome practices. Several of these persons after boasting of their utter disregard of personal hygiene in diet and may other respects, remarked, “My bowels are remarkably regular. I have never used cathartics of any sort and my bowels move regularly three times a day.” Meeting several cases of this sort led me to make inquiry of every aged person I met who had given no special attention to health rules and was notwithstanding unusually robust and active at an advanced age, and with scarcely an exception I found in every case the same unusual bowel activity, always two and usually three evacuations a day.

I think it fair to draw from these cases the inference that regular and frequent bowel evacuation is a health factor of primary importance. I may also note that I have met hundreds of persons who reported habitual evacuations two or three times daily and who experienced inconvenience and lowered efficiency when having but one daily evacuation. I have especially observed that in robust, active boys three evacuations daily, usually one after each meal, is very common, if not usual. In infants also an evacuation after feeding is quite general.

A questionnaire sent to a large number of missionary physicians located among wild and primitive people brought 140 replies. A survey of these replies showed that the bowel habits of people living under primitive conditions in widely separated portions of the globe, habits in which they had been trained by nature, were practically identical.
The evidence obtained from these original sources clearly indicates that among native tribes which have been uninfluenced by the customs of civilization and who still adhere to primitive habits in diet, living a free and active life, two or three evacuations of the bowels daily is the almost universal practice. 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.

Reports from the following countries showed the universal custom to be a bowel movement after each meal, twice a day when two meals were taken and three times a day when the number of meals was three: Rhodesia, Uganda Protectorate, Nyassland, Nigeria, India—Harba, Delhi, Punjab, Kashmir, Nagpur, Bawda; Persia, West Coast of Africa, Portuguese Congo, Egypt, and Japan. Dr. Shepard, a well known American physician who had a very extensive practice in Turkey for more than 30 years, reported that the practice of moving the bowels three times a day is so universal in Turkey that a person considers himself sufficiently ill to require the services of a physician if his bowels move less than three times a day. Said Dr. Shepard in a personal letter, "The universal habit in Turkey is to move the bowels three times a day."

A correspondent writing from South Africa stated that natives in that region move their bowels regularly three times a day and added,
"A native called upon me yesterday for relief of constipation which he said was very bad. I asked him when his bowels moved last. He replied, "This morning, Doctor."

"But you just told me that you were suffering from constipation."

"I am, Doctor, I am horribly constipated. My bowels move only once a day."

One good result which may be fairly traced to the practice of freedom of bowel movement is the infrequency of appendicitis where this practice prevails.

A report from the Mayo Clinic showed 19 per cent of all persons examined suffering from appendicitis and 21 per cent of all cases operated on.
"Call" for evacuation is induced by the entrance of residues into the rectum. When this does not normally occur, "voluntary contraction of the muscles surrounding the abdominal cavity may cause some feces to enter the rectum and thus effect the 'call'" (Cannon, "The Mechanical Factors of Digestion," p. 161).
That evacuation after meals is physiologic and advantageous is clearly proven by the observations of Cannon and Merst, two most eminent authorities whose observations are mentioned above. Dr. Cannon has been for many years Professor of Physiology at Harvard University and is internationally famous because of his fundamental discoveries. Dr. Merst of London is equally famous as a roentgenologist and internist who has devoted many years to the special study of the functions of the colon.

Their observations prove most conclusively that nature has provided for the prompt dismissal of portions of the food which are found indigestible or unusable, together with the bile and other excretory products which are normally eliminated through the colon. The process of gastric and intestinal digestion and absorption is shown by the observations of these and other equally eminent authorities to be completed in 8 or 9 hours, the unusable residues being then deposited in the colon, along which they are ordinarily transmitted at a rate which will secure their evacuation in 6 to 10 hours more provided the "call" is promptly heeded when it occurs.

The fact that the "call" readily disappears when not heeded is highly significant, as is also the fact mentioned by Cannon that the "call" may be produced by a voluntary contraction of the abdominal muscles whereby additional material is forced from the colon into the rectum.

These facts clearly indicate that the common practice of evacuation of the colon once a day has been acquired. If the entire colon were regularly emptied at each evacuation, probably little injury would result from the habit of one-a-day bowel movement, but, as Cannon, Hertz and other observers have shown, the colon is ordinarily only partially emptied when evacuation occurs, a large part of the contents being held back in the cecum, ascending colon and transverse colon. It should also be remembered
that under physiologic conditions the colon is never filled from end to end with a continuous solid mass of residues which are pushed forward altogether. This condition naturally exists in the distal or descending colon prior to evacuation, but not in the ascending or transverse colon.

During and after meals to permit the absorption of liquid from the residues after they have entered the colon from the small intestine, a reverse peristalsis takes place in the right colon, the purpose of which is to detain the liquid material which enters the cecum from the small intestine long enough to permit the absorption of a large part of its liquid content. At frequent intervals this retarding reverse peristalsis which churns and mixes the contents of the cecum and promotes the absorption of water by spreading the liquid material over the mucous membrane is stopped for a few seconds. During this brief interval a portion of the thickened material is separated from the rest and pushed forward along the transverse colon and over into the descending part of the intestine in which, if evacuation has recently occurred, it passes rapidly to the bottom. By repetition of this process the transverse colon is gradually filled.

The acceleration of the colon movements at the next meal naturally results in pushing enough material out of the colon into the rectum to produce a "call" and an evacuation of the distal colon, preparing it for a repetition of the same process after the next meal.

As has shown, if evacuation occurs but once a day, material which escapes evacuation and remains in the colon to be held over for 24 hours, during which time wonderful opportunity is afforded by the advanced development of putrefactive changes and the production of considerable quantities of highly toxic material, not only those disgusting volatile poisons, indol and skatol, well known fecal odors, but many other poisons, including carbolic acid, pyrrol, brenzcatechin, toxins produced by streptococci and well known highly toxic substances known as histamine (Journal of the Canadian Medical Association).
Dr. __________________________, writing in the Journal of the Canadian Medical Association, states that the colon often contains "enough histamine to kill a regiment."

In a symposium on alimentary toxemia at a meeting of the British Royal Society of Medicine, the evil effects of retention of colon residues long enough to permit putrefaction was pointed out by numerous eminent authorities of which we mention only a few. Dr. W. E. Dickson, Professor of Materia Medica in King's College, London, enumerated among other highly poisonous substances produced in the colon by the putrefaction of food residues, ammonia, which causes hardening and degeneration of the liver; tyramin, a very highly poisonous product; indol, skatol and cholin; sepsin (of which a small dose killed a large dog), a ptomain which is always found in the colon of meat-eaters, and which is decomposed into pressure-raising poisons (Barger and Walpole).

Dr. Langdon Brown of St. Bartholomew's Hospital, London, attributed the rise of blood pressure in later life to colon poisons, which as he observed, "do not give rise to antibodies," so that, "the only way to secure immunity is to create a normal intestinal flora."

Doctor Beezly Thorne of Grace Hospital held that "the great majority of cardiovascular troubles are associated with an alimentary toxemia."

Doctor Boltentuit of Plombieres noted that "practically all subjects of long-standing colitis present myocardial weakness, generally with dilatation."

As Hertz and other roentgenologists have shown, the motility period of the alimentary tract, that is, the length of time the food residues remain in the body, is 53 to 54 hours, or 2½ days; that is, the residues of a meal taken at eight o'clock tomorrow morning will be evacuated on the second day following after dinner. In the meantime 7
other meals have been taken and the residues of these meals are still retained so that the colon, which at the most should never contain the residues of more than three meals, contains the residues of six, or more than twice as many meals, and naturally becomes packed and distended with putrefying residues and it is almost invariably over-distended still farther by gases, the result of putrefaction and fermentation. This over-distension of the intestinal walls causes redundancy, atrophy and paralysis.

Persons who move the bowels frequently are remarkably free from bowel troubles and other disorders associated with intestinal infections and intoxications. For example of 112 physicians in the following countries, 43 reported that they had never seen cancer of the bowels: Mexico, Palestine, Arabia, Turkey, Egypt, South Africa, East Africa, Central Africa, Nigeria, Japan, Syria, Korea, Persia, Siam, India, Asia Minor, New Hebrides.

The long retention of fecal residues in the colon gives opportunity for extensive absorption of these poisons which gives rise to the following picture drawn by Lord Dawson of Penn ef-London, physician to King George: "The sallow, dirty complexion, the inelastic skin, the dusky lips and nails, the dirty tongue, evil-smelling breath, constant abdominal discomfort of one kind and other, doughy, inelastic abdomen, cold extremities, the physical and mental depression, are among the prominent features."

Harvey showed that intestinal poisons cause nephritis and fatty degeneration of the heart.
Dr. Jordan, roentgenologist of Guy's Hospital, had often found atheroma of the aorta at an unusually early stage in subjects of intestinal stasis.

Dr. Mummery of St. Mark's Hospital said, "I believe that many of the cases of crippling arthritis that we see from time to time are due to poisons formed in the large bowel."

Dr. W. Knowsley Sigley stated, "The treatment of a large number of general skin eruptions resolves itself into the scientific treatment of chronic constipation.

"It is not the frequency of the evacuation that is important, but the quantity, that is to say, that the contents of the large bowel be systematically completely removed, and that there be not an ever-increasing residue left behind."

Dr. James Galloway, senior physician of Charing Cross Hospital, held that intestinal toxemia is capable of producing nearly all forms of skin disease.
in the light of these facts it seems clear that substantial benefit
might be expected from the prevention or at least great restriction of putre-
factive changes in the colon by encouraging the evacuation of the distal
colon as soon as it occurs, that is, after each meal, because during the eat-
ing of food the forward movement of the intestinal contents is increased to
four times the ordinary rate.

Since the "call" may be artificially produced by forcible voluntary
contraction of the abdominal muscles, the habit of evacuating three times
daily may be easily acquired. It is only necessary to visit the toilet at
a regular hour after each meal and to make a voluntary effort to evacuate the
bowels. At first the exercise of patience by waiting ten or fifteen minutes
may be necessary. The mind should be diverted in the meantime by reading.
Nervousness or fear of failure may prevent success by causing spastic con-
traction of the descending colon, a structure which is exceedingly responsive
to changing emotional states and contracts strongly under the influence of
fear, worry, anger, anxiety and other depressing emotions.

Of course it is important to encourage evacuation by proper diet and
the use of laxative food accessories. BULKAGE is of paramount importance.
Highly hygroscopic gums such as those of caraya, Plantago psyllium and other
members of the Plantago family are highly efficient.

The diet should be such as to encourage an aciduric flora, that is,
the intestinal flora should be changed by suppressing putrefactive foodstuffs
and the free use of lactose in some form. Free use of the soybean is to be
highly recommended as it encourages the growth in the intestine of the protective
organisms. Very ripe bananas, the tomato and fruits of all sorts are likewise
highly beneficial.

Drug laxatives should never be used except when prescribed by a physician
and then only temporarily. It may be said with confidence that there are other
means so much more efficient than drugs as a means of relieving constipation that cathartic and laxative drugs may be dispensed with altogether except in very rare and exceptional cases.

Colon massage may also be relied upon as a means of cleansing the

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Among the 200,000 persons who visited the Battle Creek Sanitarium for medical relief during the last 30 years, many hundreds have become convinced of the importance of regular after-meal evacuations. People have also reported relief from headache, dizziness, nausea, deficient appetite, foul breath and coated tongue and other symptoms usually attributed to intestinal toxemia, together with a notable increase in endurance and working power. One well known college professor, who for years found it necessary to rest a couple of hours in the middle of the day, within three

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Strong evidence that after-meal evacuation is physiological is afforded by the ease with which the practice is acquired. Many years ago, I received a letter from the superintendent of an institution for the care of idiotic and feeble minded children in which the writer stated that having heard of my advocacy of the three-a-day evacuation practice, thought I might be interested in observations she had made. She was free from the bad odors usually present in such institutions because of the lack of intelligent control of the evacuations by the inmates. She said she was often asked the question, "How do you do it?"

The answer was, "After each meal I place each child upon the toilet. Nature does the rest."

The views above presented have been taught and the results of their practical

**p. 10.**

If in addition to a regular visit to the toilet within an hour after each meal a person whose bowels move but once a day will add to his diet some colon-stimulating food accessory, and if prompt attention is habitually given to the "call," which indicates readiness for action by the colon, the bowels may be easily trained to prompt ejection of its contents after every intake of food, and in many cases when the best aids are employed, the colon may become so sensitive to the stimulus of eating that a visit to the toilet is found necessary immediately after the meal is finished and in many cases even when an apple or fruit of other sort is taken between meals.
means so much more efficient than drugs as a means of relieving constipation that cathartic and laxative drugs may be dispensed with altogether except in very rare and exceptional cases.

Colon massage may also be relied upon as a means of cleansing the colon when properly used.

The highly beneficial results which follow the adoption of the practice of evacuation after each meal bear very eloquent evidence of the physiologic value and correctness of this practice. The writer has been informed by many persons who have through his advice adopted the practice that they had experienced notable relief from headache, dullness, inability to concentrate, deficient appetite, foul breath and coated tongue and other symptoms usually attributed to intestinal toxemia, together with a notable increase in endurance and working power. One well known college professor, who for years found it necessary to rest a couple of hours in the middle of the day, within three weeks after the adoption of the practice of evacuating after each meal reported himself, as he said, able to keep up a full head of steam the entire day and he added two hours to his working period.

A lady superintendent of an institution for the care of idiotic and feeble minded children, after reading a work by the author published many years ago in which these views were presented ( ), stated that she had often been complimented by the fact that her institution was free from the bad odors usually present in such institutions because of the lack of intelligent control of the evacuations by the inmates. She said she was often asked the question, "How do you do it?"

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application observed at the Battle Creek Sanitarium for more than 20 years, and to say that the special attention given to the suppression of internal putrefactions by such frequent and thorough evacuation of the colon as to secure complete emptying once in 24 hours has been found to be a most potent and useful factor in the treatment and training of patients suffering from chronic disease in various forms and premature senility is a very modest expression of the aid afforded by a systematic effort to keep the interior of the body as clean as the exterior. No harmful result has ever been observed from this practice and in hundreds of cases notable evidences of rejuvenation have followed the change in bowel habits in connection with the observance of other phases of the biologic mode of life, the disappearance of wrinkles, return of normal skin elasticity and color, nerve and muscle tone and such rejuvenescence as justified Benjamin Franklin in writing his wife at the age of 74 that through changing his habits of living at the age of 70 he had "walked back four years, so that you may now consider me 66 instead of 74."

The therapeutic value of the after-each-meal plan of evacuation is especially notable because of the fact that most of the patrons of the Battle Creek Sanitarium are persons who are suffering from chronic ailments which have stubbornly resisted the application of the measures of treatment ordinarily employed even by the most eminent practitioners and whose only hope for betterment lies in the adoption of a therapeutic program which includes thorough health training and a change of habits. Among the classes of cases especially benefited are chronic cases of insomnia, myocarditis, high blood pressure, including so-called hypertension, arteriosclerosis, angina pectoris, and Bright's disease.
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The stomach acts only under stimulation.

While the food in being masticated reflex stimulation occurs through the ______ of the nerves of digestion.

After the completion of the meal, the stimulation of the stomach continues through the influence of the sugar formed by the action of saliva upon starch.

Then at the end of an hour or hour and a half sufficient amount of gastric juice has accumulated to neutralize the saliva its action ceases.

A peptone is formed by the digestion of protein through the action of the gastric juice.

Trypsin is also a powerful gastric stimulant and so the secretion of gastric juice continues until the process of gastric digestion is completed.

It should be noted that the gastric juice is not capable of complete digestion of protein. It only begins the work.

*/ It is continued in the intestine by the trypsin of the pancreatic juice and the erepsin of the intestinal juice.

Each of these digestive agents prepares the way for its successor so the digestion of protein is much like the modern process of milling, a gradual reduction process.

The huge protein molecule is partially broken up by pepsin in the stomach.

The trypsin of the pancreatic juice later takes the molecule and reduces it to smaller proportions.

But the erepsin of the intestinal juice is required to finally break the molecule up into its elemental constituents, amino-acids, which are the building bricks of protein and which after absorption are by the tissues built into body protein.
The most common cause of constipation is neglect to properly answer the call of nature. To attend to nature’s call should be regarded as a serious duty which should be neglected only when impossible to do otherwise.

When the call of nature is neglected the lower part of the colon loses its normal sensitiveness.

When fecal matter accumulates in the rectum and lower colon these parts become hardened and impacted so that movement cannot occur without the use of such mechanical means of enema or the use of some powerful laxative.

The habitual use of laxatives is highly detrimental. It not only aggravates constipation but produces colitis and other disorders of the intestine, and besides damaging the stomach and impairing the whole digestive process.

Enema often only empties the lower part of the colon. Its habitual use frequently distends the colon and may produce great damage, and sometimes, probably, giving rise to the incompetency of the ileo-cecal valve.
contract until it had not a quarter of its normal size. It did not
lie down in this way, but stood up straight like that, and there was
a constriction like an hourglass, or a woman with a tight corset all
laced up tight would have the very same shape. I had to make an
incision in the stomach to incise it and bring these two ends together
so as to broaden it out in that way. But we patched it up in good
shape and I think the lady will be all right now when she gets well
and her reformed stomach will do a great deal better work than it has
been doing, for it has made her a good deal of trouble.

But most always the ulcer is down here in the duodenum and is
produced by the excessive gastric juice. The worst thing about these
ulcers is that they are likely to become cancers. Forty percent.
of all the cancers of the stomach begin with ulcers. So it is an
important thing if you have ulcer of the stomach to cure it up for
it is going to become cancer by and by, if it has not already
started in that direction.

That shows a comparatively normal stomach. In the case I
was telling you about, the ulcer was right there and the stomach
had been diminished down to about one quarter of its normal diameter
at that point and we made an incision here and brought the two ends
together and that spread out the suture line this way so we broadended
out the stomach.

Now the stomach in some cases gets worn out and does not have
enough gastric juice and it makes less and less and less as the glands
are worn out until by and by it makes no gastric juice at all.
Now see what happens to that person. In the first place, he can not
have any gastric juice produced, when the food is being chewed in his
mouth, so when the food gets into the stomach, there is no gastric
juice there ready to digest it or promote the power of digestion in
the stomach, upon which we depend to set up the general motion by which
each of the digestive processes helps on the next one. The gastric juice is not there to stimulate the stomach to move the food about and to turn it and pass it on into the intestines and the pylorus is left wide open—it can not get shut because there is no gastric juice to come in contact with the mucous membrane and cause the pylorus to be shut up, so the pylorus remains open and everything goes right down into the intestine without waiting for digestion in the stomach, and if the stomach has been dilated, it sags down and the food settles down into the hollow place and remains there and the food stays there until it gets jostled out by counteractions of the diaphragm in breathing, or in other ways. That is the reason why we say to some of our patients "Lie down for half an hour on the right side after dinner". That gives the food a chance to run out through the open door, don't you see, so it won't stay down in this pouch so long. Sometimes these pouches go way down to the bottom of the abdomen and the food goes way down there and stays there and there is no power to spoon it out, you see, because the gastric juice is gone and it is very important for such persons to lie on the right side to let the food go out into the intestine, but it is a great trouble because of the failure of the gastric digestion. The gastric juice disinfects the food properly but when there is no gastric juice, there is no disinfection. The food, instead of being disinfected, goes down into the intestine, carrying with it all the germs that have been taken in, the germs in the mouth, those horrible germs that are growing on your dirty tongue, those awful germs that have come in from the butcher shop that come along with the beefsteak and mutton chop, that are swarming with germs, perhaps ten or fifteen billions in every single mouthful. You can not find such a thing as a piece of meat or a piece of steak, mutton, turkey or fish or anything of that kind in the market that is
not swarming with these putrefactive organisms and when you have no gastric juice in your stomach, you take this food in and the germs keep right on swarming all the way down the alimentary canal. You might just as well make a meal off from dead rat as some of the horrible specimen of dead flesh you find in the meat shop. You do not know anything about what you are getting from the meat shop.

It is less than five years since the fact was gotten out in the newspaper in Boston, for example, that the State Board of Health of Massachusetts would not any longer require that all of the animals with tuberculosis should be buried, but they required only that they should be killed and that the parts that apparently had tuberculosis in them should be removed, and the rest of the animal went to the meat shop and was sent down to Boston and right into the meat markets there and sold to everybody who wanted to buy meat. There was no discrimination at all. It was not labeled, at all, and there was a great protest on the part of the newspapers and many of the leading men of Boston and they said "Won't you at least label it so we can know when we are eating diseased meat so we can enjoy it to the fullest extent?" but the thing was not done and it was found out that that thing was being done all over the United States, that in every state it was being done and that was done at all the great packing houses. They do not throw away an animal that they find has a mere cancer on the jaw, for example, or a few abscesses on the liver, they can not afford to waste so much money as that. They simply dispose of the cancer, perhaps. I have a cancerous jaw in my museum here that I got from one of the packing establishments in Chicago. I had a man down there for three days one time to see what happened. He saw them cut off a cancerous jaw from a cow and the rest went right along for fine beef.

Now, if your stomach has any gastric juice, you can depend upon it you are getting full benefit of it. If you have got good gastric
juice, you can disinfect food so you can stand it for a while, you only get without any active life in it. This lack of disinfection in the food results in the infection of the entire intestine and catarrh of the stomach and catarrh of the intestine and colitis naturally result from this lack of gastric juice in the stomach to disinfect the food.

When the gastric juice gets into the small intestine, it not only causes the pylorus to shut, but it stimulates the contraction of these ducts in the liver. It causes the gall bladder to contract and the bile ducts to contract so they empty out the bile and send it down to make soft soap out of the fats, and it neutralizes the free acid of the gastric juice and so protects the mucous membrane of the intestine, and there are still other things that the gastric juice does as it comes down here into the intestine. It helps develop the kinase, which activates the pancreatic secretion. When the gastric juice comes down from the pancreas, it can not digest anything. It has to have this kinase added to it before it becomes active, because were the pancreatic juice in the pancreas able to digest, it would digest the pancreas, but it is not able to digest until it gets down into the duodenum and there it meets this kinase which combines with the elements of the pancreatic juice and causes it to become active.

The hydrochloric acid somehow helps about that so it aids in the process of the pancreatic juice and after doing its work in the stomach, it comes down to the duodenum here and helps about the intestinal work. The saliva which is swallowed along with the food and is in the stomach, after a while becomes inactive because of the presence of a large amount of acid and when it gets down into the intestine here, it becomes active again so that it is ready to begin
work again and if you have been faithful in chewing your food, you need not worry about that saliva having only a short time to exercise its prerogative in the stomach because when the food gets out of the stomach into the intestine, the saliva will begin again its work and exercise its properties to the fullest extent so you see it is a very important thing to have gastric juice enough, to have acid enough.

The question is, Can we do anything for a person who has lost his acid? Yes, it is now possible to do two things for that man. First, he has forever lost his gastric juice, perhaps, so he can never have it again. Now, he must select such foods as will not require stomach digestion and the very first thing for that man who has no gastric juice to know is that he must not eat beefsteak. That is the first and most important thing for him to know. He must not eat meat of any kind. You say I rejoice in telling you that, and I do. When a man has no gastric juice, it is important for him to know that he can not digest meat in his stomach any more than he can digest cast iron. You might just as well stick into his stomach a piece of cast iron so far as his stomach is concerned, as a piece of me. His stomach can not digest it any more than if he puts it in his pocket. If he puts it in his pocket, it will lie there and rot and if he puts it in his stomach, it will lie there and rot just the same. It can not be digested, because there is no gastric juice there, and meat is one of the things that require the work of the stomach for digestion. Another thing he must not eat is hard-boiled eggs or egg albumin that has been coagulated and taken into the stomach. It can not be digested because it requires the action of the stomach to digest it and convert it into liquid form so it can pass down the intestine; and milk may not be very good for him, it forms curds in the stomach. These things that are not digested lie
in the stomach and rot and decay. Then he becomes bilious, has wretched sick headache attacks and vomits most offensive putrefying material. Now that stuff was in your stomach rotting and poisoning your body, defiling your blood and all your tissues and that was why you felt so bad and this effort of nature to get rid of it was to relieve you of that putrefying, festering mass. If it had gotten into your intestine, it would have been all the worse for you because you would have had to stand its poisons all the way along; it would have had to be carried all the way along that thirty feet of intestine to have gotten it out of the body and you would be absorbing it, sucking the poisons out of it all the time, so you see it is better to vomit it out than to dispose of it in any other way.

Some people are living in a state of this chronic biliousness because they have rottenness all the way along. They have no gastric juice in the stomach, no acid, and the whole alimentary canal gets into a state of infection. Then this infection works up into the bile ducts,—then there is gathering of the bile ducts and jaundice. Then it works up into the gall bladder and causes catarrh of the gall bladder and the patient has gall stones, and then gall stone colic, and awful pain; and then it works up into the large intestine, then into the appendix and it gets into the other parts of the colon and sets up colitis and paracolitis, and diverticulitis, and then comes cancer. Cancer of the stomach and cancer of the colon are among the most frequent forms of cancer to which human beings are subject. About one-third of all the cases of cancer are cancer of the stomach or colon, but there is almost never a case of cancer of the small intestine. The small intestine is better able to take care of itself. There are two things a man without hydrochloric acid in his stomach can do, one is
to eat food that does not require gastric juice. He must
not eat meat, he must not eat fish, he must not eat fish or
oysters or anything of that sort, and it is very important that
he should not eat eggs very freely, or very much milk. What shall
he eat then? There are lots of things he can eat, all the grains
and all the splendid fruits and the legumes and the splendid
vegetables. All of these things require no gastric juice. They
are all digested in the intestine. They can pass right on through
the stomach and go right on into the intestine and be well digested
there, provided they are properly prepared, but they must be very
thoroughly chewed. Everything must be chewed so that the intestine
may have a chance to act upon it because the stomach work is
lacking and the mouth must do its work extra well in order to make
up for the work the stomach does. The other thing this man can
do is to eat food which contains hydrochloric acid in a harmless
form. We can not help him very much by giving him hydrochloric
acid because we can not give him enough of it. If we should give
him enough of it, it would take the mucous membrane off his
throat because the stomach has to have, for the digestion of an
ordinary meal, about forty or fifty minims, about one and one-half
teaspoonfuls of chemically pure hydrochloric acid, a teaspoonful and
a half of the strongest spirits of sea salt or muriatic acid. The
stomach requires that much for the digestion of an ordinary meal,
and to get that into the stomach, you would have to dilute it with
about a pailful of water and it would dissolve your teeth then, put
your teeth all on edge, take all the enamel off and it would
scald the throat as it went down, but the stomach is able to bear
this strong acid. Some of you have had some of it come up from your
stomach sometimes and you know what it tastes like. That was hydro-
chloric acid that was developed in the stomach in excess and that is
why you had pain and irritation and distress, but it is present, normally, in proportion of about 1% of commercial hydrochloric acid in the ordinary process of digestion. Now you could not swallow it so strong as that, you couldn't possibly do it, but there is another way in which you can do it. It can be combined with gluten, with protein, for it enters into combination with it and becomes a natural substance so it can be swallowed, and can be introduced by administering say an ounce of what we call acid gluten. It is possible to give that to a person. In an ounce of acid gluten there is all the hydrochloric acid he needs for a meal and he can take it at every meal and the gluten is a food and it helps out his feeble digestion. If my stomach had gone out of business and had no hydrochloric acid in it, I should take an ounce of acid gluten at every single meal I eat, for the rest of my natural life, if I could possibly get it, because it would disinfect the stomach, kill off the germs, help the stomach in its work and help to regulate the hydrochloric acid, to stimulate the stomach, to pour out the bile and keep the gall bladder from getting infected and to be the best possible disinfectant for the small intestine because it would kill off the germs that get in from the mouth, that are taken in continually through the mouth, and so keep the alimentary canal in a clean and wholesome state.

So you see it is worth while to give attention to some of these matters and to give attention to the things that are best to be done.

But I see it is half past nine, so I wish you all good night. I thank you for your attention.

JHK-v-s-6-9-12.
Q—Should not three weeks of colon massage begin to bring about a gain in the situation of the colon?

A—Yes, unless there is some mechanical obstacle. May be you have a condition of the pelvic colon that cannot be overcome. If the treatment does not relieve you, you may be pretty sure there is some mechanical obstacle that requires mechanical relief.

Q—Is the following diet proper for a person suffering from spastic colitis of long standing: Wheat bran, cream, soft-boiled eggs sparingly with Colax, nut meal, spinach, lettuce and if possible use fruits wisely?

A—Yes, all kinds of fruits are good and all kinds of vegetables. Perhaps the eggs if used at all must be used very sparingly and they might be dropped out altogether with advantage.

Q—What would you advise for redundancy of the pelvic colon?

A—I should advise you to give great care to that pelvic colon and take care to keep it empty and if it is impossible to live with it, then you will have to by and by make up your mind to live without it, but forty-nine cases out of fifty of this sort can certainly get along very well. We had a case sometime ago, a lady from New York. The doctors had given her up, had said she must have an operation. She had been a confirmed invalid for eight or ten years and had finally got bedridden and the doctors had given her up and said she must have an operation. She was the daughter of one of the most prominent physicians of New York City and the doctor wrote me about the case and I said, "Bring her here and he brought her here and at the end of three or four months she went home, rosy, plump, healthy and she has had, went home with the rosy bloom of health but she has to be infinitely careful of that pelvic colon; she has to follow just the right diet and stick right to it and she has to take care to eat proper food. She uses Colax or Laxa biscuit
An upright position required by the ordinary toilet-seat prevents the important assistance of the pressure of the thighs against the abdomen. This may be obviated by placing the feet upon a platform 8 or 10 inches in height placed at the front of the closet-seat.

When the bowels become habitually constipated the colon becomes over distended and the walls become weakened so that they do not contract effectively upon the bowel contents.

Hemorrhoids, fissures or other sources of irritation of the rectum are present.

Constipation may be produced in many numerous ways, as by incompetency of the ileo-cecal valve; by overstretching and folding of the colon producing kinks, a condition which is encouraged by the stooping posture in sitting which maintains a relaxed condition of the abdominal muscles.
Exophthalmic goiter and probably other disorders involving the thyroid gland is unquestionably due, in many cases at least, to the chronic over-stimulation of the toxins absorbed from the intestinal canal. Dr. William Thompson of New York has for many years been reporting cases of disease cured by the use of buttermilk. The writer has already seen a considerable number of cases recover by the aid of a low protein or anti-toxic dietary combined with simple physiologic measures directed toward the improvement of elimination and the building up of general vital resistance. Dr. Stuckey has shown the close relation between ear, nose and throat disorders and intestinal auto intoxication.

This shows that the most powerful therapeutic measure which can be brought to bear in combating maladies dependent upon entero toxins resulting from intestinal putrefactions must be a low protein or anti-toxic dietary combined with other measures as will suppress intestinal putrefactions. Our sagacious forefathers made very shrewd observations some of which modern progressive medicine, with its delight in innovation, has apparently forgotten. These shrewd men, Sydenham, and their disciples prefaced their therapeutic campaigns with a thorough cleansing of the alimentary canal, which invariably appears as the first item of their prescriptions. Though wholly ignorant of the wonderful facts which have been made known to us through the researches of Huchard, Bunge, Escherich, Tissier, Metchnikoff, they realized the necessity for internal cleansing through the removal of decaying food remnants and putrefying bile long before bacteria and ptomaines were dreamed of. Benton showed a century ago that calomel diminished the secretion of bile by the liver, and confirmed his observation three-quarters of a century later; yet doctors have continued the use of mercury, the greatest force as a remedy in various conditions supposed to involve the liver. Those who have seen its effects have observed that it has no favorable effects upon the liver but the emptying of its putrefying contents and its simultaneous disinfection through the antiseptic properties of mercury in whatever form administered.
The favorable effects observed from the use and administration of laxatives of various sorts in chronic maladies has unquestionably laid the foundation for the reputation of numerous spas and mineral springs establishments scattered over this country, as well as over the whole continent of Europe. By far the most successful of these resorts have been those whose waters possess decided laxative properties. The enormous sale of laxative nostrums is rather evidence of the close relation between intestinal autointoxication and chronic illness.

quoted by Combe showed that the amount of entero toxins eliminated through the urine is twice as great when the bowels are constipated as when bowel looseness exists. Metchnikoff has shown that there is an intimate relation between the length of the alimentary canal and arteriosclerosis and the various conditions connected with senility. He finds that the animals which have the longest colons have the shortest lives, and this irrespective of the dietary. Another observer has called attention to the fact that the urine of various animals often contains as large a proportion of indol as does the urine of carnivorous animals, evidently the cause of the increased opportunity for absorption in the long intestine. Some years ago, in making a study of the urine of various animals, I was very much surprised to find the very high acidity of the urine of a cow. That putrefaction is present in the intestines of carnivorous animals is clearly enough shown by the strong odor of skatol, indol and aromatic toxic acids presented by the fecal discharges of a flesh-eating cat or dog, and if fed upon a dietary of bread and milk a remarkable change occurs in this effect. A dog is protected to a large degree from the evil effects of intestinal putrefactions by its short alimentary canal, its frequent intestinal movements and the enormous capacity of its liver and other poison-eliminating glands. The almost universal autointoxication which is found among the people of civilized countries is undoubtedly largely due to the unnatural conditions of our civilized life, par-
particularly sedentary habits and the adoption of a dietary which tends to produce intestinal inactivity. The bowels of an infant move after each meal. Most animals empty their colons soon after feeding. It is probable that this should be the rule with human beings by adopting the means of securing evacuation of the bowels at least two or three times daily, thus giving little opportunity for intestinal putrefaction and preventing the absorption of entero-toxins. It is important to remember that bile and other intestinal excretions are anti-toxic. The bile is considered by Huchard to be twice as anti-toxic as the urine. The prompt removal from the body of these toxic matters is just as important as the discharge of urine and other excretions. The taking of food into the stomach is the only means of setting up peristaltic activity and thus securing evacuation not only of undigested or unabsorbed food remnants but of the bile and mucus and other excretory matters. Black, the famous faster, and the writer has found large quantities of indican in the urine, as well as enormous quantities of putrescent bile stored in the intestine in the case of persons who have fasted several days without bowel movement. Frequent intestinal activity is absolutely necessary for the maintenance of health. Fermentation, constipation, and a high protein diet, that is the free use of meat and eggs, must necessarily result in the reproduction of an enormous quantity of entero-toxins and the flooding of the body with these poisons through absorption.
There seems to be good ground for the belief that a close relation exists between intestinal auto-intoxication and pulmonary tuberculosis. Daland has called attention to the fact that in favorable cases of tuberculosis the progress toward recovery is often seriously interrupted by attacks of intestinal toxemia. Daland also insists upon the essential importance of recognizing intestinal auto-intoxication when present in cases of tuberculosis. A tubercular patient makes no progress toward recovery so long as his tissues are flooded with entero-toxins.

This observation is highly important in view of the prevailing belief that a high protein ration is essential in the treatment of pulmonary tuberculosis. A careful study of this question has fully convinced me that the large quantities of protein in the form of meat and eggs, which are frequently given in excess in tuberculosis, are a detriment to the patient and greatly lessen his chances for ultimate recovery; and that a low protein dietary, .80 to 1.00 gram of albumin per kilogram of body weight per diem, is entirely consistent with health, vigor, and a high degree of efficiency and endurance in health.

While a patient suffering from pulmonary tuberculosis doubtless requires a small increase in the intake of nitrogen, an excessive increase involves grave dangers to the patient, both (a) by decreasing his general vital resistance, and (b) by imposing unnecessary and dangerous burdens upon the liver, kidneys, thyroid, and other organs which are already overburdened and often seriously crippled in this disease.

There is no evidence that a larger proportion of consumptives recover under a high protein diet than under a protein ration sufficiently above the Shattenden standard to replace than the nitrogen loss due to febrile conditions in certain states of the disease.

The majority of consumptives die from disease of the liver and kidneys.
The toxins peculiar to this malady and to the process of immunization against tuberculous disease, while tending to cure the latter, tend at the same time to produce disease of the kidneys, and to such a degree that patients not infrequently die of renal disease after having apparently recovered from tuberculous disease.

In consumption the organism is required to deal with various highly virulent poisons which overstimulate and ultimately cripple or destroy the thyroid, adrenals, liver, and other antitoxic organs. A high protein diet produces similar effects in healthy animals and persons, and destroys life in animals whose poison-destroying functions are seriously impaired.

A high protein diet is recognized as an important factor in the causation of renal disease and is universally condemned in grave affections of the liver and kidneys. Vegetable proteins are much less objectionable than flesh proteins for the reason that they are entirely free from toxins and very much less readily undergo putrefactive changes in the intestine.

It readily appears to the writer that the logical and inevitable conclusion from these facts is that a high protein dietary is not only unnecessary but injurious, and even dangerous, in the treatment of phthisis pulmonalis, and that vegetable proteins may be with advantage largely substituted for flesh proteins in the dietetic management of this malady.
That the low protein dietary is entirely competent to maintain a high
degree of health, vigor and endurance, has been abundantly proven by the researches
of Chittenden, Fisher and numerous others who have made a study of this question
from the standpoint of eugenics. A dietary which relieves the liver and the
kidneys of the burdens imposed upon them by the absorption into the blood of large
quantities of toxins resulting from putrefaction in the intestine, can have no
other effect than to greatly increase vital resistance and recuperative power.

The writer has no doubt that the recognition of the great value of a
low protein dietary as a therapeutic measure would be accompanied by an enormous
increase of success in dealing with the great majority of chronic maladies.

The good results which often follow moderately prolonged fasts; the wonderful
cures accomplished by the grape cure, the milk cure, the kumysse cure, and the
good results sometimes noted as a result of following a raw food dietary or
some similar fad, all owe their chief value, in the writer's opinion, to the
fact that they diminish the protein intake and discourage intestinal putrefac-
tion.

Modern studies of the bacterial flora of the intestine have shown that
the development of micro-organisms in the alimentary canal is marvelously
influenced by the diet. In general it has been observed that foodstuffs which
readily undergo putrefaction outside the body, readily take on this same change
within the body when not properly digested and absorbed. The experiments of
Hertter, Combe, Metchnikoff and other investigators have shown that a meat diet
encourages the growth of poison-forming and disease-producing organisms; while
a low protein dietary, especially a dietary rich in starch and other carbohy-
drates, not only encourages the growth of a harmless class of acid-forming
organisms, but at the same time discourages the growth of disease-producing
bacteria.
It is possible to divide foods into two classes which may be properly called toxic and antitoxic. High protein substances, with the exception of milk, are decidedly toxic, for they not only encourage the growth of toxin-forming organisms in the intestine, but generally contain, when eaten, enormous quantities of putrefactive organisms which have already begun their work, and are ready to take on a still higher degree of activity under the favoring conditions found in the alimentary canal. The examination of various meats as they are exposed for sale in the markets, and after preparation for the table, showed that putrefactive bacteria are always present in number varying from three or four millions to 300 millions in each gram. Fish and oysters, as pointed out by Dujardin-Beaumetz many years ago, are particularly likely to encourage intestinal putrefaction because of the great number of bacteria which they contain.

Antitoxic foods, that is foods which contain no excess of protein, such as fruits, cereals, and fresh vegetables, combat intestinal putrefactions in several ways: 1. Antitoxic foods are practically sterile, being free both from bacteria and from bacterial poisons. 2. Foods of this class discourage the growth of bacteria in the intestine through the formation of acids which prevent the development of the anaerobic or toxin-producing species of bacteria. 3. Antitoxic foodstuffs, through their greater bulk, and especially through the presence of cellulose and other insoluble substances, encourage intestinal activity, thus hastening the passage of the foodstuffs through the intestine, thus giving no opportunity for putrefaction, and the absorption of putrefaction products.

Of the various antitoxic foods, Combe has shown that rice is one of the most valuable. This, perhaps, accounts for the fact that this cereal feeds a larger proportion of the world's inhabitants than any other. The average
Asiatic consumes twelve ounces of rice a day. Besides being the most antitoxic of cereals, it is the most digestible of all foods, and taxes the eliminative organs the least because of the small amount of alkaline salts which this cereal contains. 

**Milk**

Milk is, to a considerable degree, antitoxic because of the large amount of soluble carbohydrate which it contains in the form of sugar of milk. I have at home a pan of sour milk in which is a beefsteak which was placed therein one year ago last June. The milk has been changed at intervals of a few days. The meat remains as sweet as when it was placed in the milk, showing not the slightest taint or evidence of decomposition, although nearly a year and a half has elapsed since the beginning of the experiment. This method of preserving meat is often used by the Arabs and other natives of hot countries where meat decomposes with very great rapidity, and where ice is not available.

Milk, especially buttermilk, exercises a similar antitoxic effect in the intestine, although there are certain cases in which milk gives rise to intestinal auto intoxication, as shown by the coating of the tongue, the bad breath, decay of the teeth, and other disagreeable symptoms, probably due to the retention of undigested curds in the colon, and the unusually rapid absorption of the sugar of milk to which the antitoxic action of milk is wholly due.

Fruits, as well as cereals of all sorts, are highly antitoxic, and should constitute a large element in the antitoxic dietary. Fruits contain protein in small proportion only, and fruit acids hinder the formation of bacterial toxins. Vegetable proteins are less putrescible than animal proteins because less easily attacked by bacteria, and also because they are received
into the body in a sterile condition. Vegetable fats are more readily digestible than animal fats, and less likely to encourage intestinal auto-intoxication, as pointed out by Combe.

In this brief paper, I have not undertaken to exhaust the subject of the antitoxic or low-protein diet; merely to offer a few hints with reference to its utility. I trust that some reader who has not yet had an opportunity to test the advantages of a dietary based upon the new standard established by Chittenden and Mendel, of the Sheffield Scientific School, of Yale University, may be led, through the facts which have been presented, to make a trial of this comparatively new method in dietetics, feeling sure that the good results observed will prove more convincing evidence than any argument that can be put down on paper.
A BRIEF SYNOPSIS OF THE MOST IMPORTANT TRUTHS DEVELOPED BY PAWLOW.

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Digestive secretion is not what the text books have represented it to be.

Comparison between digestive apparatus and chemical laboratory.
The work of the digestive canal is elaborately contrived, beautifully
performed, and most carefully adapted to the tasks in hand. 3.

With each advance in technique we enlarge our horizon. 4.

Dietetics represents one of the most intricate sections of
therapeutics. 3.

In order to explain digestion it is necessary to obtain the juice
at all time absolutely pure in accurate quantities under normal conditions
with animal in perfect health. 4.

Usual experiments on the pancreas result in no secretion. 4.

Pawlow's successful method. 5.

Pancreatic experiments are conducted under greatest difficulty until
flesh was omitted from the dog's dietary and alkali was given. 7. What
conclusion?

The operation of esophagotomy. 9.

In sham feeding you can secure gastric juice from the dog almost
as we obtain milk from the cow. 10.

Its taste is the same as a 5% solution of hydrochloric acid of
same strength. May be used therapeutically. 10.

Pawlow's ingenious method for securing isolated stomach. 12.

Crude damage done in ordinary vivisection work sets up number of
inhibitory influences which react on its different function. 15.

The different organs are linked together in the most delicate
fashion, and perform common and purposive work. An injury done to one part
reasts upon the whole for the purpose of economizing its energies.

A description of the surgical section of the St. Petersburg institute for experimental medicine. 16-19.

There is an exact relationship between the food eaten and quantity of juices. 21.

There is a physical exactness in the complex physiological process.22.

Even the variations that do occur undoubtedly due to fixed conditions. 23.

Digestive power of juice determined by coagulated egg albumen in fine glass tubes. 25.

The quantity of pepsin in compared fluids is as the square of the amount of fluid digested in tubes. 26.

This law also holds good for trypsin. And also for the pancreatic amylolytic ferment. 27.

The ferments vary from hour to hour. 28.

What is demanded of the glands they furnish each time to a hair's breadth, no more no less. 29.

Strong digestive ferments may occur in scanty as well as copious secretion. 30.

Juice as poured out by gastric glands always same degree of acidity.30

Variations by mucus may be purposive. 31.

In a normal stomach the acidity can be reduced twenty-five percent by mucus. 31.

Variations in acidity made by variations in quantity and not quality. 31.

The neutralization of the gastric juice by mucus must be regarded as purposive with a definite aim. 31.

Strongest gastric juice poured out when most needed. 32.

Every individual kind of food calls forth a particular
digestive activity and special properties of the digestive juices. 32.

The speciality of the work applies not alone to the properties of juice but to rate and duration of secretion and also to quantity. 33.

Bread juice greatest digestive power. Bread juice represented by 44, flesh juice by 16, and milk juice by 11. 33.

Greatest total acidity, however, with flesh, the least with bread. 34.

Most active juice occurs with flesh in the first hour, with bread in the second hour and third hour, with milk in the last hour. 35.

Make a chart of figure eight. 36.

The work of the digestive glands although elastic to a high degree are characteristic, precise, and purposive. 36.

Bread protein required four times more pepticin than the same quantity of milk protein. 37.

During digestion of bread excess of hydrochloric acid is avoided because of starch. 37.

There is a definite aim in the latent period which is to allow the action of the amylolytic ferment to continue its action. 36.

In pancreatic digestion starch holding food receives a juice rich in amylolytic ferment. In fat containing food the juice is rich in fat splitting ferment. 39.

In pancreatic digestion there being no hydrochloric acid to hinder starch digestion, more juice is poured out on bread than meat. 40.

When food is altered the ferment contains of the juice become from day to day more adapted to their requirements of the food. 41-43.

Practical conclusion? 44.

But in some cases this adaptation takes place very slowly. 44.

However, this adaptation is not so marked in the stomach as in pancreas. 44.
The work of the digestive glands unusually complex and elastic, but at the same time astonishingly exact and purposive. 44.

Gastric and pancreatic glands have what we may call a form of instinct. 45. They secrete precisely the same kind of fluid that is most advantageous for digestion of meal.

It has been known that two sets of nerves for saliva, one for water and salt, another for ferment. 46.

Physicians have satisfied similar arrangement for stomach. 46. Pathological phenomena is nothing but an endless series of different and unusual combination of physiological occurrences, which never make their appearance in the normal course of life. 46.

We investigate nervous control over an organ by first cutting it, second, stimulating associated nerve after this one is cut, third, noting evidence from daily accurate observation. 47.

We become more and more convinced every day that the animal body is governed on the principle of mutual help and defense by the several organs. 48

Sham feeding gastric juice begins to be secreted in 5 minutes and continues as long as sham feeding continues. 50. Prolonged chewing.

Continues several hours after sham feeding. 50.

It is possible in sham feeding to have a dog secrete 700 cc. gastric juice in five or six hours. 50.

Evidently must be nervous connections between mouth and stomach. 50.

Division of the left vagus and a division of the right laryngeal and cardiac fibers preserve the dog alive, but no gastric juice from sham feeding. 51.

In the act of eating the gastric glands receive their normal impulses to activity through nerve fibers which run in the vagi. 52.

Some vagi fibers preside over the secretion of watery portion, while others the ferment contents. 53.
The stronger we stimulate the appetite the more and richer the juice. 52

Excitation of the sciatic nerve for two or three minutes bring gastric digestion to a standstill for several hours. 53.

Excitation of cut end of vagus by electricity produced a secretion of gastric juice. 54.

The stomach seems to pour out gastric juice readily fifteen or twenty minutes after coming out from under chloroform. 54.

The vagus is the secretory nerve of the pancreas. 57.

It also contains inhibitory fibers. 59.

The pancreas is extremely sensitive to circulatory disturbances. 58.

Vaso constrictor and secretory nerves go to the pancreas in a sympathetic nerve. 60.

Vagus nerve is an excitor of gastric and pancreatic glands.

Sympathetic nerve the same for pancreas and highly probably for the stomach. 61, 62.

The nerve and organs respond to specific stimuli. They seem aware of their purpose, conscious of their duty. 63, 64.

To get physicians to recognize that digestive glands only respond to specific excitability was Pavlov's main object in giving these lectures. 64.

Specific excitability of nerve cells lies at the bottom of purposive action. 64.

Nerve inhibiting processes play a large part in the working of the abdominal glands, but they are almost absent in the case of the salivary glands. 65.

Eager longing for food must be accepted as an excitant to nervous centers of salivary glands. 66.

Great number of excitments of the salivary secretion accounts for the complicated physiological functions of the saliva. It plays host to every substance taken in. Moistens, dissolves, envelopes with mucus, chemical transformation, and washes out the mouth. 66, 67.
Feeling of disgust produced almost as abundant flow of saliva as sight of tasty meal. 67.

The specific excitability of endings of salivary nerves very comprehensive and widely extended. 67.

Submaxillary saliva duct brought to surface, sight of meat, eating meat, fine sand in the mouth, acid in the mouth, all flew of saliva. 68.

Appetite is juice. 76.

Secretion of juice the first hour same for bread and flesh because the first enthrush in the preliminary psychic juice. 77.

Milk which in sham feeding calls forth no appetite juice in normal feeding greatest quantity of juice comes late. 78.

Giving flesh in decided rations each time increase in juice volume and digestive power. 78,79.

Digestive juice parallel in quantity and strength in main and isolated stomachs. 80.

Bread, egg white when directly introduced, no secretion whatever. Flesh produced scanty secretion in from 15 to 45 minutes, and low digestion power. 81.

Compare three tables on the top of page 82.

The quantities of juice obtained by direct introduction of food into the stomach and when added to that obtained from sham feeding and the result is almost the same as in the normal eating. 82.

Direct introduction of flesh lost in weight six grams, while if swallowed it lost thirty grams, the difference present the digestive value of having food pass through the mouth. 83.

Without eager desire for food many forms of food stuff which gain entry to the stomach will remain wholly devoid of gastric juice.

The appetite juice continues to flow from 3 to 4 hours. 84,85.

Gastric secretion by mechanical influence on stomach wall is only
The most mechanical stimulation of the stomach does not produce a particle of gastric juice. 86-90.

The stomach and esophagus has a sort of appetite of its own. The initial impulse toward awakening the appetite may even originate in the stomach. 91.

Introduction of food into the stomach sometimes necessary to start appetite. 91.

Water is a mild chemical excitant of gastric secretion. 94.

Is effective when vagi is cut. 95.

Sodium has an inhibitory influence. 95. But also inhibitory influence on pancreas. 126.

Egg white has no chemical influence on the stomach. Certain peptones and proteids do. Most broth juice and meat solutions active exciters. 96.

The exact nature of the chemical excitant in these substances not yet explained. 97.

Starch, fat, grape sugar, cane sugar are not chemical excitants. Although bread and egg albumen produced no juice if put directly into the stomach, yet when swallowed only one half or even one-third of the juice secreted can be accounted for by psychic ferment.

What brings about the remaining portion is not yet discovered. The supposition is that the psychic juice developed some chemical agency from the food which starts the flow: 100.

If you take the digestive egg albumen from the dog and put them directly into the main stomach of the dog there is a stronger secretion than if the egg albumen alone had been put in. 100, 101.

In the digestion of most part of the chemical exciting substances no doubt developed in same way. 101.
The appetite juice therefore in the case of bread is an almost indispensable initiator of the secretory process and the necessary condition for its continuation. It plays the role of igniting material. 101.

If bread was eaten without appetite some chemical excitant might play the part of igniting material. 101, 102.

The psychic juice for all kinds of food possesses a uniform digestive power. The variations in the juice is produced by the dissimilar chemical influence of different foods. 102.

Although starch does not directly excite gastric secretion, yet when combined with flesh produces a stronger gastric juice than flesh alone. This explains why bread produces stronger digestion juice than meat. 103.

Fat inhibits the normal energy of the secretory process and even inhibits to a large extent the psychic juice. 104,105.

Prolonged sham feeding overcome inhibitory effect of fat. 105 P.P.

This probably accounts for the small amount of juice secreted after taking milk. 106.

Giving cream lowered amount of juice and ferment one-half what it was for milk. 106. Separated milk was better than ordinary milk. 106.

The chemical excitant for the gastric glands not carried through the blood. 107.

Sooner or later after taking food the influence of reflex excitation comes into play while the automatic psychic effort gradually dies out. 110.

Pancreatic secretion is richer in ferment than the stomach. 112.

Carbon dioxide water energetic pancreatic stimulant. 113.

Acids are powerful pancreatic stimulants. 113.

No particular difference in various acids. 114.

But found that HCl when weaker than five percent not effective stimulant. 114.

Pepper and mustard have no effect. 115.
Gastric contents are normal natural pancreatic stimulant. 115.
Sugar peptone, egg albumen no excitant unless acid. 115;
Alkaline solution stopped pancreatic secretion. 115,116.
Saliva excites a chemical gastric secretion because of its waters,
moistening the food it continues the work of the psychic secretion. The
acid of the gastric juice excites pancreatic glands.

Do not act on pancreas as long as stays in stomach. 117, 118.
The pancreas ferment not active in acid juice from the stomach.116-119
The acid of sodium chloride is taken up by peptic glands while sodium
is used in the preparation of the pancreatic fluid. They meet in the intestines and again reproduce the salt. So reaction of blood remains constant.119.

When much acid from stomach large amount of alkaline fluid, or
larger amount of alkaline but no greater amount of ferment. 119.

Fat increases the fat splitting ferments and starch probably
amyloolytic ferments. 130.

Secretion of pancreas juice takes place with fat even when not a
trace of acid is present. 121-122.
A duodenal cavity where fat stays for several hours. 122.
Sleep seems to have no effect upon the pancreas. 123.
Psychic influence probably effects the pancreas and even the
movements of the intestines. 124-125. Also water and fat.

Alkalies have an inhibiting action. 128.
Systematic investigation of food elements will lead to the discovery
of many unexpected relationship between food stuff on one hand and digestive
glands on the other. 128.

Systematic investigation of food elements will lead to the
discovery of many unexpected relationship between food stuff on one hand
and digestive glands on the other. 123.
Investigations of the bile has shown the same exact and intimate relation between it and the food stuff as is seen in the gastric and the pancreatic. 129.

The alimentary canal is a skilled mechanism which proves itself to be adapted with the utmost delicacy and the most suitable manner to the work which it has to perform. 129.

The psychic juice digests enough food to allow the chemical constituents to be set free to act directly upon the nerve end organs. 129.

The working out of all the problems of organs physiologically will take a long series of generations. 129.

The important question is to settle how the end apparatus of the nerve perceives the face of the excitation. 130.

Scientific and ideal medicine can never take its proper position until the addition of experimental physiology and pathology there has also been built up experimental therapeutics. 132.

In gastric catarrh after local excitant have completely failed psychic stimulation is still effective. 132.

A rational reason for the present meal hour arrangement. 132 (f)

Use of alcohol beverage by removing distraction from the mind may serve to develop better psychic juice. 133.

Why spices are so generally used to develop taste. 134-137.

In a convalescing patient duty to restore appetite. The reason the question of appetite is given so little attention is modern works on dietic is because there study has been made in the laboratory. 135.

In some cases a food is prescribed in small portions produce a larger amount of appetite juice than if eaten at once. 136.

Inattention to eating prepares the way for indigestion. 137.

Certain class of patients will be abundantly benefited by going out of the cities to some hydropathic establishment. 137.
Bitters are of value because they increase the appetite by contrast. Start a meal with something which awakens appetite, and which promotes gastric juice and finish it up with something tasty when the appetite is waning. 140-141.

Acidity enjoys a special preference in human taste. Acids are of great importance in bringing about various pancreatic digestion. A combination of fats and protein food is particularly difficult to digest. 142.

Fat and starchy food is not a bad combination. 142.

When too much gastric acidity prescribe emulsion of fat. 142.

Milk is an independent chemical excitant to both stomach and pancreas and produces no psychic juice. 143.

Milk requires less effort of the digestive apparatus than any other food. 144.

Can not settle the nutritive value of food until we determine how much energy is required to digest it. 144.

Alkalies restrain saliva, gastric and pancreatic secretions. 146.

In one and the same illness different patients react to the same diet in wholly different ways. 147.

The golden rule in dietetics is to give as directed in regard to food till the inclination and habits of the patient have been inquired into. Certain long continued dietaries produce certain types of digestion which can only slowly be altered. 147.

The strong digestive power of gastric juice poured out on bread is determined by the fact that the starch is mixed with the protein. 150.

We may expect that every organ of the body is capable of adapting itself to the requirements put upon it. 150.

Small pebbles, cold water, or snow produce no saliva, but sand does, because it can not be gotten rid of without a free stream of fluid. 151.
Substances which are rejected as acid, salts, bitter and caustic substances saliva is poured out to neutralize, dilute or wash out the mouth. 151.

A thin watery saliva poured out upon all substances which require to be moved, while a slimy mucus holding saliva is poured out upon eatable substances. 152.

The drier the food the more the saliva. 152.

What the salivary gland does in physiological conditions, they also do under psychological conditions. 152.

No reason why the same principle does not apply to every organ of the body. 153.

Deep sorrow reacts upon the body and renders it an easy prey to every form of disease, while cheerful digestion develops and strengthens the body. 153.

Cavity of the large stomach connected with the duodenal fistulae showed that chemical period of gastric secretion is determined by reflex from the inner surface of the stomach. 153-154.

The inhibiting effect of fat upon the starch originates chiefly from their duodenal mucous membrane instead of the stomach. 154.

A certain amount of hydrochloric inhibit a further secretion of gastric juice, while other acids do not have this action. 154.

In a fasting animal, no bile enters the intestines. 156.

Water, acid, raw eggs albumen and boiled starch caused no flow of bile. 157.

The most important function of the bile is its favoring action upon the activity of the pancreatic ferments. It troubles the activity of fat splitting ferment, and doubtless doubles the others. 157.

There is a definite relationship between pancreatic curve and bile curve. 156.
Chief duty of bile is to facilitate transition from gastric to intestinal digestion, arresting the action of pepsin which is injurious to the pancreatic ferments, at the same time it favors the activity of the pancreatic, particularly of fat splitting. 159.

The intestinal juices increase the activity of an astonishing degree of the pancreatic ferments, particularly the proteolytic. 159.

Two vessels, one containing pancreatic and the other a mixture of pancreatic and intestinal juice. In the second vessel pieces of fibron are digested before it has scarcely begun in the other. So the intestinal juices contains a ferment of other ferments. 159-160.
PRACTICAL POINTS ON APPETITE AND TASTE (Pavlov)

Acid in the mouth, bitters, pepper, mustard, pieces of sponge, stones, administered in sham feeding no gastric juice. 70.

Chewing and swallowing does not necessarily mean stimulation of gastric secretion; it requires eager desire for food.

Feeling of satisfaction and contentment derived from its enjoyment. 71

Five minutes after showing dog pieces of flesh abundant flow of gastric juice begins.

The keener and more eager desire on the part of the dog the more certain and intense is the secretory effect. 71.

If the dog discovered only being teased with food becomes annoyed and no gastric juice. 73.

If dog fasts two or three days, intense secretion of gastric juice.

In sham feeding no matter what is given it to eat. 73. Value of no breakfast idea.

The more eagerly the dog eats the more juice and greater digestive power. 74.

Some dogs like bread better than meat. In these cases more and stronger juice with bread than with flesh. 74. Respect taste. Importance of eating the kind of food one relishes.

Give the dog boiled meat which he does not relish, very little or no gastric secretion.

Give it raw flesh and gastric secretion in just five minutes. 74.

Simultaneous excitation of sight, hearing, smell, taste, especially the latter two is the first and strongest impulse toward gastric activity. 75.

A good appetite is equivalent to bigger secretion and stronger juice.

To restore appetite means to secure a larger stock of gastric juice. 75.
Milk which in sham feeding calls forth no appetite juice, in normal feeding as the greatest quantity of juice comes late.

Flesh put directly into the stomach require 15 to 45 minutes to secure even a scanty digestive juice. 81.

Would be same if eating without any taste, for previous experiment already showed that mechanical contact of substances in the mouth produced no appetite juice.

One hundred grams of meat put on a thread and put directly into one stomach and same quantity put into another dog's stomach while sham feeding was kept up. In hour and half first bits of meat lost only 6 grams, the difference between 6 and 30 represents digestive value of appetite. 83.

Without eager desire for food many forms of food stuff which gain entry to the stomach will remain wholly devoid of gastric juice. 83.

Appetite juice continues to flow for three or four hours. In normal feeding, however, the quelling of the longing for food would naturally bring the secretary effect to an end. 84,85.

Pancreatic juice responds to psychic influence the same as the stomach and the motor functions of intestines stimulate in similar way. 124,125.

So good tasting food should help constipation.

Instinctive craving for food strongest excitor of several digestive glands.

Under its action part of food so acted on as to allow chemical constituents to take effect. 129.

The relation of this question to constipation.

Old empirical requirement that food should be eaten with interest and enjoyment is most imperatively emphasized and strengthened. 133.

What people to bring this about. 133.
The benefit of certain food accessories. 134.

Certain kind of spice is a general requirement. 134.

Care should be taken of the appetite. 134.

Remarkable how little attention is paid to the appetite. 135.

No laboratory work has been able to take into account the subject of appetite, hence been overlooked. 135.

Many empiric therapeutic measures are based on the promotion of appetite. 136.

Appetite juice may be secreted when stomach in no condition to respond to chemical stimuli. This is foundation for repeated small feedings. 136

Overstrained individual can not distract his thought from daily work, eats without noticing it, or living within incessant turmoil of great cities. Systematic inattention to eating produces digestive disturbances.

No medical treatment can help him, must get out to hydropathic institution in the country. 137.

Not simply enough that food shall be nourishing, but also tasty. 137.

Value of condiments.

Bitters will increase the taste for food just as the light appears brighter after darkness and enjoyment of health more intense after illness. 138, 139.

Starting the meal with broth is an excellent chemical excitant. 140.

Russians use liquor to start appetite juice and meat broth to start chemical juice.

When a person has no appetite they can partly make up for it by beginning the meal with strong chemical excitant as pap-septogen.

The finishing up of food with something sweet after hunger has been stilled is physiological, in other words start the meal with chemical excitant, finish with psychic juice excitant.
Acid not only increases activity of the pepsin but is strongest excitant of pancreatic gland.

Undoubtedly for this purpose nature always makes lactic acid. 141.

After a meal rich in proteins the leucocyte count rises about thirty-three per cent in most sound people. There will be greater leucocytosis in proportion as food is novelty in stomach. Cabot, 97,98.

When fed at intervals less juice than when fed all at once.
Stimulation not so intense. 52,53.

Gastric juice continues as long as sham feeding kept up, prolonged churning, 50.

Food which tastes equally good produce equal quantities and qualities of juice during first hour. 77.

Give something does not like, this initial rise absent. 78.

Dogs when sham fed under distracting circumstances less psychic juice. 83.

Appetite reaches down the esophagus and into the stomach. 90,91.
Introducing food into the stomach may awaken an appetite. 91.
Real appetite often set up by eating. 91.
Appetite juice acts the part of an ignitor in digestion of bread.101
Psychic stimuli stimulate the motor nerves of the intestines.124,125
PRACTICAL POINTS ON STOMACH (Pavlov)

Chemical excitants may be arranged in this order: 1st, flesh, 2nd, milk, 3rd, water. 140.

A combination of fat and proteid holding food particularly difficult of digestion. 142.

In hyperpepsia give emulsified fats and pan-peptogen. 142.

Milk requires least quantity of digestive fluid, is independent chemical excitant, and system receives more nourishment for the least amount of work of any food. 143.

The use of alkalies and common salt lessen salivary, gastric, and pancreatic secretion, therefore only in hypersecretion it secures rest for the glands. 146.

Must not over look idiosyncrasy. Golden rule in dietetics give no direction with regard to food until understand inclinations and habits of patients.

We have convinced ourselves that special nature of gastric juice poured out on bread is determined that starch is mixed with the proteid.150.

No amount of mechanical irritation to inside of stomach will produce a single drop of gastric juice. 86.

It may stimulate the motor functions. 87.

When acid is weaker than 5% not effective stimulant to pancreas.114.

Gastric contents normal stimulant to pancreas. 115,116.

HCl secreted greatest possible strength. 118. This makes excess of alkali in blood. 118.

Egg albumen is not a chemical excitant.

Certain peptones, meat broth, meat juice, are constant exciters of secretory process in the stomach. 96,97.
The exact stimulation not yet discovered. 97.

Milk, solution of gelatin, etc., also stimulate the gastric secretion. Possibly the secretion excited by water alters food substances enough to make them capable of exciting the gastric glands. 97.

A mixture of meat extract with starch solution produces as much juice as same quantity of meat extract. 98.

If food is eaten without appetite, meat broth may be made to take the place of psychic juice. 101.

All psychic juice is the same digestive strength. Therefore variations with different foods depend upon their ability to develop chemical (action).

It is found that starch and meat produce a gastric juice similar to that of ordinary bread.

As entire chemical secretion is of reflex origin, it is very easy to see how hypopepsia would accompany a condition of lessened nerve reflexes in the body generally. 109.

Dog gastric catarrh spread all over. Psychic juice still effective when chemical was absent. 132.

Chemical or mechanical stimulation of mouth, excitement of chewing and swallowing does not imply minimal simultaneous action of gastric secretory centers. 71.

Vagus when cut no gastric juice in sham feeding. 50.
Latent period to allow starch digestion to begin. 38.
Dog gastric juice 5 & 6 %. 87.
Water a weak chemical excitant to the stomach. Why? 95.
Perhaps the water has to start it. 97.

Meat and starch jelly very effective. 98.
PRACTICAL POINTS ON PANCREAS.

CO₂ water energetic stimulants.

Acids effective stimulant. 113. Even when put into stomach.

Even ferment acids have this effect, lactic acid, etc. 114.

When acid is weaker than 5% then not effective stimulant. 114.

Spices not stimulant to pancreas. 115.

Acids do not act on pancreas if they remain in the stomach. 117,118.

Alkali stop pancreas' secretion. 116.

When very acid stomach fluid then pancreas juice more alkali but no greater quantity of ferment. 119.

Juice always for digestive purposes never for simply neutralization of acid. 119.

With bread pancreatic juice contains greater quantity of amylolytic action than when fed with flesh. 120. Also less fat splitting ferment.

Fat causes flow of pancreatic juice even if no juice in stomach.121,122

If cream separated from milk then not so much fat splitting ferment.122

Vague statements regarding duodenal cavity where food stays several hours. 122.

The latent period for pancreas is 2.3 min. for that pancreas is excited by psychic influence, water, acid and fat. 24, 25.

Solution of alkali inhibit pancreatic secretion. 126. Even when given an hour before eating. 126.

Continued action markedly depressed the action of the pancreas. 126.

May be that starch increases the amylolytic ferment. 120.

Its ferments gradually change to accomodate themselves to changes in diet. 39.

Vagus its secretory nerve.

Extremely sensitive to circulatory disturbances.

Pressure on aorta secretion stops for some time (tight clothing) 58.

Both vasoconstrictor and secretory fibers run to it in sympathetic.
Unerring and untiring nature has linked the seeking and finding of food with the commencement of digestive work. 75.

Saliva by virtue of the water that it contains acts as chemical excitor to continue work of psychic juice, gastric juice, stimulate pancreatic juice. 116, 120.

Pancreatic ferments not act in acid therefore alkali pancreatic juice poured out in intestine to protect the ferment. 118.

Important that there should be no variation in alkalies of blood, no acidity of stomach causes secretion of alkaline pancreatic juice in direct proportion to it. 119.

When large amount of stomach acid juice then more alkaline pancreatic juice, but no greater quantity of ferment. 119.

The ferments adapt themselves to the kind of food injected.119.

For fat 122.

Digestive system is a skilled mechanic which proves itself to be adapted with the utmost delicacy to the work to be done. 129.

Psychic juice lessens when food sufficiently altered to act on neuro secret apparatus. 129.

A species of contest for the needed digestive element fought out between each food element. 124.

How does the nerve perceive this or that form of excitant, etc. 130.

Physiologically carries out the precepts of instinct. 133.

Milk is good illustration of how admirable food prepared by nature distinguishes itself when compared with all other.

Each part of digestive apparatus assists the next. 116.

When very acid stomach contents then large quantity alkali pancreatic poured out but weak in ferment. 119.
Gastric and pancreatic glands have what might be called a form of instinct. 45.

Body governed by mutual help and defense by several organs. 48.

Digestive glands seem aware of their purpose and conscious of their duty. 64.

PRACTICAL POINTS ON DIET.

Starch which is itself a chemical excitant when combined with flesh becomes decidedly so.

Fat mixed with flesh inhibits as markedly gastric secretion as starch increases it.

Even when oil was allowed to run out of the stomach before sham feeding there was a marked diminution of the psychic juice. 105.

In this case there would not be any more fat in the stomach than ordinary butter on bread would produce.

The slow progress of secretion after taking milk is due to the weak psychic effect and the weak influence of the fat.

PRACTICAL POINTS ON HYPERPEPSIA.

Don't give meat.

Don't let patient get too hungry, for in that case there is too much psychic juice.

Fat inhibits not only chemical action but also psychic juice.102,103

Cream inhibits twice as much as milk. 106.

It sometimes increases pancreatic juice. 121.

Cream inhibits gastric activity. 106.

Oil enema decrease gastric secretion.

Soda bicarbonate inhibits gastric secretion 95, but inhibits also pancreatic secretion. 115.
But little acid is present in the stomach at any time when eating bread. 38.

Meat broth directly put into the stomach would insure a good digestion of other foods directly put in. 102.

Starch and meat mixed gave a secretion similar to bread. 102.

PRACTICAL POINTS ON DRINKING.

If a dry meal is eaten without appetite the satisfaction of the thirst afterwards will suffice to insure the beginning and continuation of gastric juice. 95.

PRACTICAL POINTS ON SALIVA.

Submaxillary glands respond to sight of food, flesh, sand, acid, number of other substances.

Parotid only respond to dry substances.

Moist bread no response. 68, 69.

Saliva on account of water acts as excitor for gastric chemical juice of stomach to continue action of psychic juice. 115.

Dryness stimulate the parotid gland. 69.

Disgust stimulates the flow of saliva. 67.

Two processes production of watery constituency and preparation of fement. 46.

No well marked inhibitory effects. 65.

Eager longing for food must be accepted as an excitant for salivary glands. 66.

Mouth sorting room of the organism. 66.

May act as a washing out fluid. 67.
PRACTICAL POINT ON TABLE SERVICE.

Every little triviality and appearance of attendant who ordinarily fed dogs may give rise to excitation of digestive glands. 73.

PRACTICAL POINTS ON PURPOSIVENESS.

The neutralization of the acidity of the gastric juice by mucous. The strongest juice is poured out at the beginning when most needed. 32.

Pancreatic ferments vary as to nature of food. 39.

PRACTICAL POINTS ON RILE.

No flow in fasting. Definite fluctuations in quantity and quality dependent on nature of the food. 156.

Neither water, acid, raw egg albumen or boiled starch cause flow. 156.

Fat extract of meat produces digestion of egg albumen set up free discharge. 157.

Has favoring action on ferments of pancreatic juice. 157.

Most pronounced on fat splitting increased 2 or 3 fold.

Chief use favor transition from gastric to intestinal digestion. 59.

PRACTICAL POINTS ON INTESTINAL JUICE.

Main use favor action of pancreatic ferment especially the proteolytics. 159.

The proteid ferment is most increased by duodenal secretion. 160.

Only secreted where the food is. 160.

Put a tube in there and only produced fluid and not ferment required pancreatic juice ferment to excite genuine flow. More sensitive than any other. 161.
In severe diarrhea fluid not fermented. 161.

When starchy fatty food fermented secreted in latent form. 162.

NEW PRACTICAL POINTS ON PAWLLOW.

Injection of meat broth per rectum does not increase gland activity.

A duodenal cavity for food for several hours. 122.

In ten years we'll have as good a knowledge of chemical work of stomach as we now have of the physical appearance of the eye. 129.

Same principles probably apply to bile and intestinal juice. 128.

Need to study in precise and detailed manner alterations in secretion, action, properties of fluids, etc.

Under pathological conditions and the effect of therapeutic remedies. 132.

Medicine must ultimately become the art of repairing damaged machinery, based upon exact knowledge. 133.

We are not to think that an event is mere imagination because we cannot bring it about by certain experiments. 135.

Before we settle the real nutritive value of food must determine how much energy it took to digest it. 144.

When a given dietary is long continued definite types of glandular activity are set up which are only altered slowly and with difficulty. 147.

Any sen. disturbance inhibited digestion. 53.

In the working of abdominal glands inhibitory processes play a large part.

Quantity of juice produced by sham feeding added to that from direct feeding about equal normal feeding. 32.

Secretion could be set up whether the stimulus was in the stomach or intestine. 110.

Salts and alkali restrain saliva, gastric and pancreatic. 146.
COMMENTS ON PROFESSOR METCHNIKOFF'S PAPER

entitled

"CONCERNING SOME ATTEMPTS TO DISINTOXICATE THE INTESTINE."

Proceeding

Stereopticon Lecture at the Sanitarium Gymnasium, Battle Creek, Mich., Thurs., August 15, at 8 P.M.

by

J. H. Kellogg, M.D.

I have here a very interesting letter I think you would like to hear. Some of you saw in the newspapers, some time ago, an announcement that Professor Metchnikoff had discovered a new germ, a new germ known as glucobacter, a germ that makes sugar. Of course, this germ that makes sugar does not make sugar out of beefsteak. It doesn't make sugar out of hare.

This discovery, which was announced in the newspaper, created a good deal of interest, and I began to get letters from all over the United States about this new bacillus Professor Metchnikoff has discovered, so I immediately wrote to Professor Tissier, who is a colleague of Professor Metchnikoff at the Pasteur Institute, and has a laboratory adjoining next door to his, and who is our consulting bacteriologist, and asked him to give me full information.

In response, he sent me a copy of Professor Metchnikoff's communication that he made to the Academy of Science, Paris. It seems to be a very rare document, as Professor Tissier asked me to kindly return it to him after I had read it. So I have dictated a translation of this to my stenographer, and had it written out. I will not read the whole of it, but such parts as I am sure you will be glad to hear and will be most interested in. It is a scientific paper, communicated to a scientific body, and, of course, somewhat technical.

First, Professor Metchnikoff speaks of the poisons of the intestinal
flora. I ought to say that the bacteriologists always speak of bacteria in the intestine as flowers. He does not speak of them as germs, but as flowers. The germs growing in the intestine are known to the bacteriologist as flora. The bacteriologist considers every one of these little mites as a very beautiful thing. "Among the poisons of our intestinal flora, the bodies of the aromatic series merit especial attention." By "aromatic series" Professor Metchnikoff means those poisons that have a bad smell. That is, those that are volatile and produce bad odors in the intestine as the result of putrefaction. "Incapable of giving rise to the formation of antitoxins in the body, they undergo a transformation into sulpho-conjugate combinations." These aromatic bodies, Professor Metchnikoff says, are not capable of forming antitoxins. Some poisons are. When a man smokes his first pipe, when a boy smokes his first pipe, it makes him very sick, and the next time it doesn't make him so sick, and the next time not quite so sick. By and by, it doesn't make him sick at all, and the reason why is the body manufactures antidote for these poisons, for the poisons of tobacco. I am afraid it is rather dangerous to tell you that, but a scientist, on the witness stand, is expected to tell the truth, the whole truth and nothing but the truth so far as he knows it.

It is a fact that these poisons are antidoted to some degree by antidotes which the body learns to produce, and there are many poisons that have this effect when introduced into the body. The body is trained, by degrees, to tolerate the poison.

Professor Metchnikoff tells us that these poisons that are created in the intestines do not have the power to create in the body antibodies, because poison and that is a very important fact, when a body stimulates the body to make antidotes, then the body by degrees accustoms itself to the presence of these poisons and makes more and more and more of the antidote so the effect of the poison is very much less than it otherwise would be. A boy would not have to
smoke more than three pipes of tobacco to kill him, if it were not for that fact, but the body manufactures antidote for the nicotine, but these poisons which are produced in the small intestine, the large intestine, the colon, by putrefaction, are poisons for which the body makes no antidote, and consequently the awful effects are continued upon the body. The body never becomes accustomed to their use, but, as a matter of fact, as has been recently shown, the body becomes more and more sensitive to their actions, so that it never becomes accustomed to them but becomes more and more sensitive and less and less able to endure the effects of these poisons. That is the reason why a person who has had inactive bowels for years, perhaps the bowels have been very inactive and enormous quantities of poisons poured into the body, after years and years begins to suffer headaches, and by and by begins to suffer headaches to such an extent that the very smallest interruption of the normal rhythm of the bowels, just the slightest delay, a delay of a few hours, will bring on a terrible attack of headache. This is because of what is known as anaphylaxis. The body becomes sensitized to certain poisons and these are the poisons of that class to which the body becomes sensitized, instead of becoming accustomed and becoming able to create antidotes against them.

The body, however, does defend itself through the action of the liver. The liver converts these awful poisons, indican or rather indol and skatol, those horribly smelling poisons, that give to the bowel contents their terrible odor and to decomposing flesh its horrible odors, these poisons are acted upon by the liver and converted into less harmful poisons. So in this way the body is able to defend itself to some degree and these poisons are, to some degree, acted upon by the liver and rendered less toxic than they otherwise would be and less damaging, but as the body receives these poisons continually, year after year, the liver becomes less and less able to deal with the poisons. The liver is gradually worn out and when a man has a billious attack, it simply means his liver has got a bigger dose of poisons than it was able to deal with, a larger dose than it was able to convert. For instance, we have at
one of our factories here, a smoke consumer. We have to have furnaces to furnish heat for this building and to make electric lights. We have a smoke consumer, connected with our furnaces, and when the amount of coal put into the furnaces is proper, there is no smoke to be seen coming out of the chimney, but if the fireman puts in too large a quantity of coal, more coal than the furnace is able to burn up, to deal with, then out of the chimney will come a great cloud of smoke. Then we get after the fireman right away quick and tell him we can not stand that kind of business and he must reform or we will have another man in his place right away quick.

Now the liver is in the same situation. The liver can convert a certain amount of these intestinal poisons, but when it gets more than it can deal with, then the poisons pass on right into the blood and pass out through the kidneys, poisoning the brain and nerves and causing headaches, sciatic, neuritis, hardening of the arteries and a whole series of troubles which result from the action of these terrible poisons. These poisons, into which the original poisons have been converted by the liver, this indigene, or indolenec acid, or what the Professor calls here "sulpho-conjugate combinations", these poisons, while less toxic than the phenols, and indole themselves—carbonic acid gas is one of the things produced in the intestine, and cresols, and these poisons, while less poisonous than the original poisons, are, nevertheless capable of producing acute and fatal poisoning in laboratory animals, such as rabbits, guinea pigs, rats and mice. We know that by actual experiment. "We have been able to verify this result, obtained at first with phenylsulphate of potash, in relation to paranitrophenylsulphate of potash".

"The most important role of these poisons produced by the intestinal flora is their power to produce chronic lesions of the most important organs of the body." That is, of the heart, the brain, the liver, the spinal cord, the spleen, the pancreas and other important organs. "One of us" that is, either Professor Metchnikoff or Professor Wollmann", they have written this paper together, Mr. Wollmann is Professor Metchnikoff's assistant "One of us",
Professor Katschikoff says "One of us has demonstrated as much as three years ago that the ingestion of small doses of para- cresol" which is one of the last of these poisons produced in the colon, of which there are 25 or 30 different poisons, para- cresol is one of the least poisons of them all. "One of us has demonstrated as much as three years ago that the ingestion of small doses of para- cresol continued during some months produces in animals, the subject of experiment, aortic atheroma." That is, the walls of the arteries were changed to lime, they underwent a degeneration in which there was a large deposit of lime in the walls, and that is weakening of the walls, of course. "Cirrhosis of the liver" that is hardening of the liver, so that the liver becomes like a mass of scar tissue "and chronic interstitial nephritis". That means simply chronic Bright's disease. "Two workers in our laboratory, the lamented Japanese Okefou, and especially M. Dratchinsky, have established that indol administered in small doses by the mouth to rabbits, guinea pigs and monkeys produces in them very pronounced organic lesion." This is a very important statement. What is particularly remarkable, is that indol is the common poison. Look up your laboratory reports. Many of you will find marked "indican plus, indican double plus". A patient was brought to my office this afternoon with a indican 68, and the patient was brought to my attention a while ago with indican 210. Think of it. This means an enormous amount of this horrible poison that produces hardening of the arteries and Bright's disease, when its influence is continued only for a few months. Now just think of a person going on in that condition for years.

A man said to me some time ago, when he showed me his tongue, which was very filthy, I spoke to him about it and he said "Oh, I have had that for thirty years," and he thought as long as he had had it for thirty years, it must be perfectly harmless. I suppose he really felt he might be rather lonesome without it. He gave the impression that he was quite content to have that coated tongue. If he didn't actually enjoy it, at any rate he didn't have any particular objection to it, and had been all that thirty years exposed to the influence of
these horrible poisons and had finally got into such a reduced state that the germs were growing in his mouth and producing indol there, as well as in his colon. His whole body was occupied by these horrible, poison-forming germs. Yet he lived, but he hadn't very many more years to live, because his body was pretty well spoiled. The kidneys, liver and every other organ of the body were pretty much damaged by these poisons.

"The invasion of the noble elements of the body by lymphatic cells occurs in both cases." "What is particularly remarkable is the analogy of these lesions with those which are observed in aged persons." That is, these changes which occur in the liver and the kidneys are just the same as the changes which naturally occur in old age by the infection of the important organs of the body by the macrophages which I have shown you on the screen here. "The vascular system, the kidneys, liver and the brain are the seat of these chronic lesions". These are exceedingly important facts, because they show us that when a man has a cirrhotic liver, a liver that has been exposed for a long time to these poisons, coming in from his colon, that man simply has an old liver, that is all. The man may not be more than 25 years old. I met a case just the other day of a lady, not a very old woman, whose liver was twice as large as it ought to be. She simply had got an old liver, although she is a young woman, she has an old liver. Her liver is very, very aged. I should say her liver was 150 years old, at least, although she is scarcely 50. So you see the body can live so long as that important organ keeps young, but when the organs of the body get old, when one important vital organ of the body, gets old, that person has to die, the same as though the whole body got old. If a man's kidneys are old, then the man is old. If a man's heart is old, the man is old. If a man's liver is old, the man is old because the body is like a chain. The strength of a chain is only the strength of the weakest link, you see. You can readily see that. Here is a chain. One end is attached, the other end has a weight on it. Now the weight
which that chain will support is simply measured by the weight which the weakest link of the chain will support, because when the weight reaches the point where it will break the weakest link, the breaking of that link breaks the whole chain. It is exactly so with the body. If the kidneys fail, the whole body fails, because the kidneys are essential to life; if the liver fails, the whole body fails; if the heart fails, the whole body fails; if the brain fails, or the blood vessels become universally diseased, the whole body fails and collapses in death, because one essential organ has suffered, one link in the chain has broken.

Now these poisons, Professor Botchnikoff has proven, are the cause of old age, in our vital organs, and of old age in general. "According to the numerous facts established by these observations, it can no longer be doubted that senility may be in large part caused by the poisons produced by the intestinal flora, notably by poisons of the aromatic series, indol and phenol. In view of this fact, the question naturally arises: By what means can we avoid the formation of these poisons in our intestines?" That is a very important, practical question. That is a question that every person in this audience ought to ask themselves, this minute. How can I keep myself free from these poisons in my system? I was talking to a lady tonight who has headaches and suffers from dreadful headaches, because of these poisons. I told her, among other things, that she must drink two quarts of water a day to rinse these poisons out. "Oh, I never could do it in the world", she said, "I never could do it." "Why", she said, "I don't feel a bit like drinking. I never feel like drinking." "Well", I said, "Do you wait until your hands suffer before you wash them?" I thought that was the best way to impress her. Do you never wash your hands unless you feel you have got to wash them in order to relieve your pain? Don't you wash your hands in order to keep them clean?"

That is what you must drink water for, is to keep our livers clean, to keep the interior of the body clean, just as we wash our hands and faces for the same purpose. We must drink water. We have lost the drinking habit. The reason is we do not sweat enough. Now, the Lord told Adam to earn his bread
by the sweat of his brow. When Adam stopped working to earn his bread, then he stopped sweating. It isn't fashionable in these days to sweat. A man sees another man working hard, sees him sweating for his living and he says "I am glad I am not in his place. I am awfully glad I don't have to do that. I am glad I don't have to dig for a living." But the man that digs gets the best of it, my friends. The man that digs and sweats is the man that is comfortable, and has a chance to keep his blood clean, to keep his tissues clean, to keep his liver clean, because when he sweats, he drinks, he must drink, and the drinking washes out the poison, and the man that doesn't sweat gets into a horrible state. You know that old family horse, when you brought him out to take a ride the first time in the spring, you noticed, when he got to sweating his back was all covered over with a kind of frost, when it dried off. That frost on that horses back was the extract of sedentary horse. That horse had been loafing. He had been leading a sedentary life, and it was extract of sedentary horse. When a man is loafing, leading a sedentary life, he is in the same situation. That moisture on the horse's back has a bad smell, it is sticky and gummy, like pitch. Give the horse a good sweat every day for a month, drive him out every day, and the sweat is so limpid it doesn't leave that frost or pitch or gluey substance on his back, because the horse's tissues are cleansed out, that is, the sweat now is the extract of a clean, active horse. That is just the difference between the active laboring man, the man that works and exercises and the man that sits down in an office and simply sits down in his office and pours over his business and books, the sedentary or professional man, and the man perhaps makes things worse by smoking. He sweats something so poisonous that it will actually kill flies. I expect it would kill snakes if we could collect enough of it.

"Formerly, in the clinical study of patients, a high degree of importance was attached to the termination of the urinary indican or indoxyl, derived from indol." That has been the custom for some years with the
medical profession, and is still the custom here, but some have dropped it out recently. "These observations have been neglected under the influence of the assertion that indol is an inoffensive substance." A man took a large dose of indol and it didn't kill him right off, so he said it was harmless, so the doctors all over the country have been saying "Why, indol is no account," but these experiments were inconclusive. Professor Metchnikoff has proven that this idea is wrong and that is why I think it important to call your attention to these facts that he has brought out here.

"Nevertheless, there has accumulated in literature a number of interesting facts in relation to the indoxyl of the urine. The general conclusion has been reached that animal food increases the quantity of this substance, while vegetable foods, or a lacto-vegetarian diet diminishes it to a considerable degree." Now, it is very important to know that. The experiments have shown that an animal diet increases the quantity of this substance, while a lacto-vegetarian diet, that is, a diet of milk and vegetables, cereals, etc., diminishes indol to a considerable degree. "It has been established, on the other hand, that there are vegetarian animals, notably the horse, which produce large quantities of indican. Among men there are persons who, notwithstanding that they have adhered rigorously for some years to a vegetarian diet (with the exclusion not only of meat but also of eggs and even milk), nevertheless excrete a large amount of this microbic poison." It is important to note this and Professor Metchnikoff is not the only one who has made this discovery.

"On the contrary, among persons who take a mixed diet, into which meat and eggs enter in large proportion, there are found those who produce only small quantities of indoxyl and small quantities of phenols." This has been a very perplexing question why this was.

"Facts of this nature greatly complicate the problems relating to the secretion of intestinal poisons. For the purpose of clearing up this
question, we have undertaken a series of experiments upon white rats, choosing these animals because they adapt themselves the best to changes of regimen and prolonged feeding with all sorts of nourishment. They present further the great advantage that they are contented during weeks and months with a single and identical food substance drawn either from the vegetable or the animal kingdom. Foods of animal origin furnish aromatic poisons in the largest amount. The largest quantities are produced by a diet of meat and of entire eggs, the white of egg in particular. White cheese gives even less than these are good points to remember. Meat and white of eggs produce more of these poisons than any other foods.

"White cheese gives even less than certain vegetable foods. Among the latter, the first place is occupied by bananas and potatoes. Even certain vegetable elements rich in albuminoid substances, such as the purees of peas and of white bread furnish much less indol and phenol than do bananas and potatoes. The minimum quantities of these substances are produced by vegetables rich in sugar, such as beets, carrots and dates. Since on the one hand, poisons of the aromatic series are produced by the putrefaction of albuminoids, while on the other hand the production of these poisons is prevented by acids formed at the expense of sugars, it was perfectly natural to eliminate the production of indol and of phenols by associating with these foods which produced much of these poisons other foods rich in saccharine matters. In fact, the urine of rats nourished with a mixture of potatoes and dates is very poor in o-Anoxy. So dates and potatoes encourage the suppression of indol because the dates carry sugar into the colon to feed these poison-forming germs which antagonize the poison-forming germs and potatoes because potatoes carry starch down into the colon more than any other vegetable.

"The structure and function of the human digestive tube is such that albuminoid matters, which give place to the production of intestinal poisons are much less easily absorbed than are the sugars". Sugars are absorbed
Professor Metchnikoff and his pupil, Dr. Tissier, both former members of the staff of the Pasteur Institute, of Paris, felt that life would be greatly prolonged if the putrefactive germs could be driven out of the body, or exterminated, and replaced by friendly germs, that is, acid-formers. They claimed that putrefactive organisms generated poisons, a certain proportion of which found their way into the blood stream and produced self-poisoning, or auto-intoxication, some of the symptoms of which are bad breath or halitosis, which we are informed on the radio may be cured by using the right tooth paste, and B. C., which we are asked to believe may be removed by using the proper soap in the daily bath.

Dr. Kellogg demonstrated that these claims represent wishful thinking on both counts. Foul breath very rarely has its origin in the mouth and the B. C. comes from poisons in the blood which even the best soap can not reach. In other words, here is a case where a person is literally a stinker. In many instances, the colon is filled with food residues which have been stagnating there for days, sometimes weeks, until they have become a loathsome, putrescible mass from which emanate nauseating odors and sickening toxins.

An interesting incident occurred when William Jennings Bryan came to the sanitarium to speak at a great jubilee celebration. Dr. Kellogg drove down
to the depot to pick up Mr. Bryan, and, as the silver tongued orator's breath was very bad, he tactfully introduced the word *autointoxication* into the conversation. Mr. Bryan picked it up at once. "Autointoxication? What's that? Is it something that you get from riding too fast in an automobile?"
all sources of vegetable alkalies which are needed to neutralize
the excretory acids of the body. This last item is highly im-
portant. Numerous studies have been made in recent years which
also show that a chance for controversy that a bread and meat diet
tends to hasten the changes which constitute senility and which
end in high blood pressure and Bright's disease. A study of
foods from this standpoint and especially in relation to their
influence upon the body content of acids and alkalies many years
ago was begun by Blatherwick in the laboratories of the Battle
Creek Sanitarium for the purpose of determining by actual experi-
ence upon human beings, the practical importance of the facts
first brought out by Bunge, of Biele, Switzerland, nearly twenty
years ago, and further developed by Sherman of Columbia University,
New York, in this country, as well as by others. The facts to
which these investigators have called attention may be simply
stated as follows:

The living cells of the body are immersed in the blood
and tissue fluids. These fluids are slightly alkaline—a con-
dition which is absolutely necessary to life. The reason for
this is interesting. All animal cells produce acids as the re-
sult of their activity. The acid is produced inside the cell
and is excreted as rapidly as possible. The acid which the cell
produces, if allowed to accumulate, will destroy it just as smoke
produced in a stove will put out the fire unless carried away
through the chimney. The acids of the cells are taken up by the
alkaline fluids which surround them and then passed on to the
alkaline blood, which carries them on to the kidneys, to be passed
The character of the intestinal flora is chiefly influenced by two factors: 

1. the character of the food and 

2. the length of time the food resides and bloody waste which constitute constituents which remain in the colon.

Foods rich in animal proteins, such as meats, fish, eggs, and not only readily undergo putrefaction in the presence of waste, and moisture, but when eaten are already in a state of more or less
advanced decomposition because they become well inoculated with intestinal bacteria in the act of killing or in the case of game, they begin the destruction of the tissues which form the intestines which begins immediately after death. Probably the bacteria very readily attack animal proteins but according to the absorption of milk, sour milk, milk and other vegetable proteins strongly are much more resistant to these bacteria. Carrion found that vegetable proteins in many
Caries exert a distinct acid- refractive effect.

Carbohydrates encourage the development of the acid-forming flora, especially in the mouth of a healthy person. This is especially true for lactose and dextrose.
The morning milk affords a good illustration of the difference in the effects of proteins and carbohydrates. Wheat and eggs readily undergo putrefaction. Milk is "liquid flesh." It contains protein and is made up of proteins and fat, the same as does meat, but has another element, lactose, a carbohydrate. But this is not the fact, and to this it is due the fact that it goes instead of undergoing decay. Putrid meat is poisonous; while raw milk is wholesome.
Thanks to the fact that quick-souring bacteria are not pathogenetic, while the same bacteria that cause intoxication may cause various infections, lactobacilli in milk readily dominate the field, because of the presence of lactose. A milk sample placed by the writer in a jar of pasteurized intact acid-free from count of decay for 17 years (the sour milk was changed weekly).
A careful bacteriological examination reveals no more bacteria or protozoa to organicics present. When proper conditions are maintained, the desired effects can be obtained and maintained in the lactic acid. For this it is necessary for the organism to possess a lactobacillus, that is capable of living in the colon. Ordinary raw milk germ do not
even reach the colon where ingested. They cannot exist without oxygen. Nor do acidophilius lactobacillus which thrive in the colon, being a facultative anaerobe, and provided it is supplied with an abundance of the lactose, which it needs, ordernuic which it needs.
While the intestinal flora may be greatly improved by simple modifications of the diet, nuclear the omission of creas, or in cases of constipation the free use of bulking, for a radical cleanse, it is necessary that a more comprehensive and thoroughgoing plan should be adopted. An examination of the stools of the average mixed feeder will usually reveal a flora showing...
oprobrium varying from 0 to 2
0 to 20 or 30 percent acidophilus
in quite a number of cases
the number of acidophilus
increased will be so small
that they can be discovered
by a special refined methods.
The organism has been cut off
become so attenuated that it
rarely survives and is rarely
during little comes service as
a protection against the
invasion of the protozoa the
organisms which cause
Infractions and give rise to various pathogenic effects, such as colitis, appendicitis, ulcers, as well as general weakness, lowering of vital resistance, and the development of tissues. Infection of neighboring organs (B. coli infections of the genito-urinary tract and the gall-bladder and bile ducts), to correct such conditions which are often diminished by...
Internists are incurable and turned to perfumes whose best efforts are frequently unsuccessful. It is necessary to change the flora to such an extent as to secure a condition of 95% and to maintain this condition. This may be accomplished by conscientiously simple régime if thoroughly applied, and with the patient's complete cooperation.
The proliferation plaques have been found efficient in the treatment of hundreds of cases.

1. Liberal carbohydrate feeding.

2. Discarding of flesh meats of all sorts, and eggs also for a time at least.

3. Increasing the acidity and efficiency of the colon so as to secure complete emptying, clearance of the intestinal tract at least once a day, 2-4 hours.

4. Liberal feeding of a protein culture of L. acidophilus.
As careful attention to detail is necessary to secure necessary definite and dependable results, further consideration must be given to carrying the above measures.

1. Carbohydrate feeding is so essential that in some cases it will effect a very marked change in the fever almost immediately. This is most likely to occur in cases in which the ileal thermal activity is unusually low, so that the carbohydrate quickly reaches the colon in ample quantities (see).
and in which a good strain of L. acidophilus is present in the intestinal flora although in two or all members to prevent the development of motolytic bacteria and their formation of mutarrefaction products.
The nature of the carbohydrate is another crucial factor. Cane sugar, raw sugar, maple, molasses, honey, fructose, and glucose all have value. Fruits all have value, but none are being utilized by the lactobacilli, and these are insufficient. All are really efficient, all are absorbed so quickly that they do not reach the colon in sufficient amount to stimulate the Le. acidophilus dominantly. The rapid absorption of the sugars in large quantities raises the blood sugar so high that sugar is likely to appear in the urine and harm
may be done in early insulin diabetes. Cane sugar in more than small amounts is irritating to the stomach and duodenum and delays gastric digestion (lactase). Cane sugar also encourages the growth of streptococci. It is nevertheless decidedly bad and in Holland is used by NOPV cine effects to counteract of the effects of a meat diet and thus prevent the appearance of "the dreaded symptoms of overcooking."
With sugar or lactose and levuline are found to be far superior to other sugars. That they are the only ones employed in laboratory tests and their superiority of these two carbohydrates is probably due to the fact that they are absorbed much more slowly than any other carbohydrates. Amylase is usually formed slowly by action of the digestive juices upon starch gelatinized juices when starch and is absorbed as it is produced. The actual nutritive
must be converted by lactase to form glucose, which cannot be absorbed by the intestine before it can be converted into dextrinose and lactose, before it can be absorbed. Lactase is present only in small amounts in most adults, whereas milk contains a large amount of lactase, which is absorbed in the small intestine, followed by the colon. Lactase is either present in sufficient amounts to ferment lactose or acidophilus growth to acidophilus growth.
The lack of palatability gives to ordinary lactose a chalky appearance and ordinary lactose in milk sugar cannot readily dissolve. There is little sweetness. In efforts to render it more soluble the writer discovered a practical method changing the ordinary, alpha, lactose into its isomer, beta lactose, which is three times as soluble and more than three times as sweet had been previously known to chemical experts.
Theochar usual to the author) and laboratory西红is. It is now available for use as a table sugar in place of cane sugar products, under the commercial name of \( D - \text{Lacto} \) (beta lactose). It has been, in fact, extensively used for more than ten years in lacto-dextran, of which it is the essential ingredient.

The dextrose of the drug stores is made by the reaction of a mineral acid when reaches a very crude
product and so disagreeable in flavor that few patients will persevere in its use for any length of time. For use in cheques, the dextrose especially prepared for use in cheques is desirable. The dextrose is desirable and is now available and is used advantage. Dextrose has the advantage that it does not so readily affect the blood sugar and hence may be used more freely. For this and other reasons, lactose dextrose...
The author was led some years ago to con-
sume lactose and lactulose for the best
possible results to mitigate the ill
qualities of both while
avoiding danger of raising
the blood sugar. The
combination, known as lact-
ulose, has come into wide
use and has proved an ef-
fective measure of alleviating
decline of the intestinal flora in many
thousands of cases.
The quantity of lactose under these required varies with individual cases. The essential thing is that a sufficient amount of the carbohydrate which reach the colon to enable the few lactobacilli that may be present to develop so rapidly that they may secrete

27th 1871
hypersecretion of acid is a rather rare condition. If the pylorus
closes too tightly and if the gastric contents are too long retained, the
result will naturally be an accumulation of acid in the stomach and hyper-
acidity. On the other hand, very rapid emptying of the stomach might
cause hyperacidity because of the rapidly diminishing amount of material
in the stomach to mix with and dilute the gastric juice continually forming.

Numerous investigators have demonstrated another important factor
in gastric acid regulation; namely, the secretion of an alkaline diluting
juice by the glands of the pyloric portion of the stomach. This diluting
secretion is by some considered to be the dominant factor in acid regulation.
It at any rate plays an active and important role in this function.

In gastric hyperacidity there may be an interruption of either one
or both of these neutralizing functions.

Now that we know the physiology of gastric acid regulation we are
better prepared to undertake a search for rational means of relief. Evidently,
measures which lessen pyloric tonus are indicated.
October days must come.
Each season follows an past
October leaves so bright and golden are not displayed in summer light, but they are the colors' days
Of autumn when old rolly hot day strikes us as last and chillis with early posts and New Bedford will
His quaker bad regiment has gone and done days are gone and dead.
October

Day 2

Leaves colors

Clouds

Buds

October days, fall the rest

In gayest. Brightest blue are crisp

A compensation this may be

For loss of merry chieftain

And mighty birds which take their

Flights. The white clothes the fields

Andthesize clouds which deck the sky

And make us fancy to quarterback
GOOD HEALTH EDITORIALS:

70 YEARS

THE KIDNEY BURDEN

12-7-42: EDITORIAL FOR GOOD HEALTH 2,000 words

PEANUTS MIAMI 186

LIVER AV.130 MICROGRAMS

UNCERTAINTY %

12-8042

USE ARTICLE "DEVELOPMENT OF PEANUT BUTTER INDUSTRY."

AMERICAN FOOD JOURNAL, NOV. 1920

MR. ELOESE HAS THIS ARTICLE 12-10-42

WRITE EDITORIAL ON ENEMA HABIT
"Bacillus coli was at first regarded purely as a parasite. Later, because of post-mortem invasion and the great ease of growth of the colon bacillus on ordinary media, the other extreme of attributing too much to it was taken." Park and Williams
The colon bacillus is a parasite and not a normal resident of the human colon. When first discovered B. Coli was regarded as a parasite. Of this much, the latest edition of Park and Williams' great work on bacteriology speaks as follows: Quote from page 479:

B. Coli has never established its claim to be a normal resident of the colon. There are many reasons for believing it to be a parasite as it was considered by its first discoverer. The fact that it is so frequently found in the alimentary canal of men and animals almost universally is no proof that it is a normal member of the family of bacteria which constitutes the natural intestinal flora in either man or other mammals. There are, on the other hand, many reasons for believing it to be an invader. Here are some of them: The alimentary canal, particularly the colon, presents conditions_________________________________________________________

In other words, it is a_________ incubator for micro-organisms. On account of its vulnerability to attract_________organisms ___________natural residue__________ should be prepared to act as a protector, able to defend the________________________ against invasion by harmful organisms and of course__________________________

The colon bacillus and the conditions which frequently develop in the body_________ becomes highly active as a_________ agent. In fact, it may easily be seen that its presence in the body is a constant
menace to health. This ______ is always accompanied by the production of a number of highly active _____________________.

Through other conditions which are constantly arising in the animal body the colon becomes the source of highly destructive pathogenic processes. It is to be noted also that the colon bacillus is not only harmful through its own pathogenic activities but through_________________ which____________, such as Welch's bacillus or ________________.

On the other hand, as pointed out by Tissier, Moro and other observers there is a group of organisms which are implanted in the intestines of all nurslings during the act of suckling, which drive out the colon bacillus and various other pathogenic organisms from the alimentary canal and produce conditions which prevent invasion by pathogenic organisms of any sort so long as the proper conditions are supplied for their development. (Here tell the story of Tissier's discovery and Moro's discovery.)

WRONG IDEAS ABOUT IMPLANTATION

The protective organism is not implanted. Its residence in the intestines depends entirely upon the food supply. It depends upon carbohydrates for its support. Two special carbohydrates, lactose and achroödextrin, especially favor its development. This is especially true as regards the colon for the reason that lactose and achroödextrin are not readily absorbed in the small intestine as are other carbohydrates and so find their way into the colon in larger quantity where they are needed for the sustenance of the lactic acid-forming bacilli, bifidus acidophilus and exilis. Normally no micro-organisms of any kind are implanted in the intestinal
tract. The fact that an organism is implanted there is evidence of infection. The fact that the colon bacillus is driven out from the infant colon by bifidus and acidophilus is evidence that it is not a normal resident.

Tissier showed that the colon bacillus is driven out of the colon by bifidus in the case of young infants so long as they continue to nurse their mothers, that is, so long as they receive an abundant supply of lactose. Moro showed that acidophilus performs the same protective function, and Torrey has shown that when animals and adult human beings are fed on a diet containing an abundance of lactose and vegetable proteins are eaten instead of animal, especially flesh protein, the dominating organism of the intestines is acidophilus and not B. Coli. The mere fact of permanent residence in the colon without relation to diet is evidence of infection.

MEMO: Make deadly parallel between B. Coli and acidophilus.
Doctor:

I am not able to find the name Escherich anywhere but in the Medical Dictionary:

"Escherich's bacillus (Theodor Escherich, German physician, 1857-1911). The **Bacilli coli**."
"Finally, brethren, whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report; if there be any virtue, and if there be any praise, think on these things."—Philippians, 4:8.
Escherich, even before the discoveries by Metchnikoff, recognized the necessity for changing the flora of the intestine.

"Escherich's bacillus (Theodor Escherich, German physician, 1857-1911). The *Bacilli coli*.

---Medical Dictionary

Escherich, even before the discovery of the streptococcus found in milk, and attributed to this organism a large part of the infant mortality which occurs in the summer time.

Escherich, Kaiser, Petroschy and others have called special attention to the dangerous character of the streptococcus found in milk, and attributed to this organism a large part of the infant mortality which occurs in the summer time.

"The New Dietetics." p. 514

Escherich made an interesting study of the bacteria of the intestine in infants. His observation showed the intestinal contents of an unborn child to be absolutely sterile.

"Charrin of Paris, Combe of Lausanne, Tissier, Escherich and numerous other European bacteriologists, as well as Herter in this country, have made exhaustive studies of the different species of bacteria which are produced in the intestine and of the toxins which they generate and the effects they produce upon animal organisms.
Escherich, even before the discoveries by Metchnikoff, recognized the necessity for changing the flora of the intestine, suggesting, "It is necessary to employ the 'acid fermentations' (putrefactions), either by adding to the diet carbohydrates, such as lactose, or by giving cultures of acid-producing bacteria." This, so far as the writer knows, was the first suggestion of the desirability or possibility of changing the intestinal flora. Escherich was one of the ablest bacteriologists of his time. He made important pioneer studies of the stools of infants, and started fruitful lines of inquiry that his premature death left others to carry on.- "The Crippled Colon," p. 207.

p. 514, "The New Dietetics." Escherich, Kaiser, Petroschy and others have called special attention to the dangerous character of the streptococcus found in milk, and attributed to this organism a large part of the infant mortality which occurs in the summer time.

p. 547 - Escherich made an interesting study of the bacteria of the intestine in infants. His observation showed the intestinal contents of an unborn child to be absolutely sterile.

p. 548 - Charrin of Paris, Combe of Lausanne, Tissier, Escherich and numerous other European bacteriologists, as well as Herter in this country, have made exhaustive studies of the different species of bacteria which are produced in the intestine and of the toxins which they generate and the effects they produce upon animal organisms.
Battle Creek, Inc.

Miami Springs, (Miami) Fla.

To my dear Dr. Kellogg.

The one day a pleasant smile
Then that no more about it.
It cheered my heart that was sad the whole
And would have been worse without it.
And so for the smile and its fruitage fair
You'll reap joy—sometime, somewhere.

You spoke one day a cheering word
Then pressed on to other duties,
It warmed my heart, new courage stirred,
And fraught my life with beauties.
And so for the word you spoke there
You'll reap a palm—sometime, somewhere.

You gave a hand to a discouraged one
A life to much sacrifice given,
It saved my health when other help seemed
And brought me closer to heaven
And so for the help you gave me there
You'll reap a crown—sometime, somewhere.

Mrs. R. E. Osborn
To all the assistants,

Battle Creek, Inc.

Miami Springs, (Miami) Fla.

Words can not express my appreciation for all that was done for me by all of Dr. Kellogg’s assistants. All the sweet nurses so kind and patient. The kind boys and girls who trot the delicious food and health-giving foods and the fresh drinks of water. The cook who prepared the food and who baked that delicious birthday cake.

The cleaning and gentlemanly young men at the office.

The girl who cleaned my room and the very fine and encouraging Drs. Norman and Norton who did so much for me. To all of these I can only say, “I thank you” and God Bless you.

Mrs. R. E. Osborn

624 N. W. 47th St.
THE EFFECT UPON STRENGTH AND ENDURANCE BY A CHANGE OF THE INTESTINAL FLORA THROUGH THE USE OF SOY BEAN ACIDOPHILUS.

CONCLUSIONS OF THE PROBLEM CONDUCTED AT MIAMI-BATTLE CREEK FROM JANUARY 27 NOON TO FEBRUARY 24 NOON.

FOUR SUBJECTS—WEEKLY REPETITION OF FOLLOWING TESTS: BLOOD COUNT, HEMOGLOBIN, URINE, STOOLS, METABOLISM, STRENGTH TEST, ELECTROCARDIAGRAPH, FISHER ENDURANCE TEST, AND DAILY WEIGHT, PULSE AND TEMPERATURE TWICE DAILY.

1. The test conclusively proved that there was a decided relationship between the strength and endurance of the subjects and their diet.

2. In all subjects the following general things were noted:
   1. An increase in strength and endurance as the number of acidophilus bacilli increased in the intestinal flora.
   2. An increase in weight in all the subjects.
   3. A slight decrease in the subjects in number of red cells and hemoglobin, probably due to the great amount of liquids that were consumed during the course of the experiment.
   4. The greatest amount of strength increase was during the 3rd and 4th week when the system was thoroughly inoculated with the acidophilus bacilli.
   5. The increase in endurance ranged from 33% to 78% in the deep knee bends, and from 25% to 212% in holding the arms horizontally.

Pauline G. Brown
Diet and suggestions for test diet.

Flesh meats of all sorts must be avoided, also tea and coffee, laxative drugs and alcohol and tobacco.

Each subject must take daily one quart of soy acidophilus milk and four to eight ounces of Lacto-Dextrin.

The subjects should also take an abundance of vitamins and to insure this should take the following special foods: For vitamin A, one half ounce for daily use, of parsley or one ounce of spinach, escarole, turnip leaves, dock leaves, kale or broccoli leaves, or 3 or 4 ounces of carrots, or dried apricots.

The subjects should also take one ounce of wheat germ, one half ounce of Savita Yeast or 2 or 3 drams of Savita extract.

The subjects should also take 2 or 3 glasses of orange juice, strawberry juice, yellow turnip juice, twice as much raspberry, tomato, apple or turnip juice.

Each subject should also take at each meal one or two teaspoonfuls of Trippe-Lax. This is best taken by putting into a glass and adding half a glass of orange juice or cold water and stirring quickly before it has time to swell.

The bowels must be moved at least twice daily, including a large enema at night. If necessary to make the enema return add one teaspoonful of lactic acid to each quart of water or instead use the juice of one or two lemons.

Use no other protein except soy bean acidophilus milk, that is, omitting eggs, nuts, cheese. Use bananas, cereals, all fruits and vegetables, dried fruie, citrus fruits; for dessert fruits and jello may be used.

Weight, height and total strength, urine, blood count, hemoglobin, stool, metabolism, night and morning temperature, pulse, and electrocardiograph are the tests to be taken. All tests are to be repeated once a week. Take pulse before and after exercise.

Write daily kinds of food eaten so a complete record may be kept.

If diet broken for any reason, be sure to note in record book.
### SUMMARY CHART

#### MISS GABRIEL

**Blood:**

<table>
<thead>
<tr>
<th></th>
<th>TEST I 1/17/77</th>
<th>TEST II 2/5/77</th>
<th>TEST III 2/12/77</th>
<th>TEST IV 2/22/77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cells</td>
<td>5,250,000</td>
<td>4,960,000</td>
<td>4,450,000</td>
<td>4,300,000</td>
</tr>
<tr>
<td>White Cells</td>
<td>6750</td>
<td>6300</td>
<td>8500</td>
<td>6800</td>
</tr>
<tr>
<td>Color Index</td>
<td>80</td>
<td>86</td>
<td>85</td>
<td>88</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>80</td>
<td>85</td>
<td>84</td>
<td>80</td>
</tr>
<tr>
<td>Grams</td>
<td>13.5</td>
<td>14.1</td>
<td>14.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Dure</td>
<td>97.4</td>
<td>106</td>
<td>105.2</td>
<td>97.8</td>
</tr>
</tbody>
</table>

**Urine:**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH reaction</td>
<td>6.4</td>
<td>7.0</td>
<td>6.8</td>
<td>7.2</td>
</tr>
<tr>
<td>Nex normal</td>
<td>0.39</td>
<td>0.65</td>
<td>0.26</td>
<td>0.39</td>
</tr>
</tbody>
</table>

**Stools:**

<table>
<thead>
<tr>
<th></th>
<th>Putrefactive</th>
<th>Putrefactive</th>
<th>Semi-putrefactive</th>
<th>Semi-acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flora Type</td>
<td>Bad</td>
<td>Poor</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>10%</td>
<td>25%</td>
<td>40%</td>
<td>75%</td>
</tr>
<tr>
<td>Odor</td>
<td>Putrid</td>
<td>St. Putrid</td>
<td>Putrid</td>
<td>Sour</td>
</tr>
<tr>
<td>Reaction</td>
<td>Alkaline</td>
<td>Alkaline</td>
<td>Alkaline</td>
<td>Acid</td>
</tr>
</tbody>
</table>

**Metabolism:**

|       | -6 | -2  | -5  | -3  |

**Strength:**

|       | 2710 | 2300 | 2305 | 3227 |

**Electrocardiograph:**

Slight conduction deformity; minimal cardiac change.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse A.M.</td>
<td>74</td>
<td>74</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Pulse P.M.</td>
<td>78</td>
<td>78</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Temp A.M.</td>
<td>97.7</td>
<td>97.7</td>
<td>98</td>
<td>97.6</td>
</tr>
<tr>
<td>Temp P.M.</td>
<td>97.6</td>
<td>97.6</td>
<td>97.6</td>
<td>97.6</td>
</tr>
<tr>
<td>Weight</td>
<td>126</td>
<td>129</td>
<td>129</td>
<td>131</td>
</tr>
</tbody>
</table>

**Endurance:**

<table>
<thead>
<tr>
<th></th>
<th>Arms at Horizontal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>8 minutes</td>
</tr>
<tr>
<td>Pulse (before-after)</td>
<td>74-78</td>
</tr>
<tr>
<td>Deep Knee Bends</td>
<td>81</td>
</tr>
<tr>
<td>Pulse (before-after)</td>
<td>76-100</td>
</tr>
</tbody>
</table>

NOTE: The Sahli' method of computing the hemoglobin and grams was used.

# Urinalysis--Albumin, Sugar, Indican--negative in all specimens.
**SUMMARY CHART**

**Mrs. Eddy**

<table>
<thead>
<tr>
<th><strong>BLOOD:</strong></th>
<th><strong>TEST I-1/27/37</strong></th>
<th><strong>TEST II-2/5/37</strong></th>
<th><strong>TEST III-2/12/37</strong></th>
<th><strong>TEST IV-2/23/37</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cells</td>
<td>4,130,000</td>
<td>4,510,000</td>
<td>4,250,000</td>
<td>4,350,000</td>
</tr>
<tr>
<td>White Cells</td>
<td>9250</td>
<td>6950</td>
<td>6000</td>
<td>6600</td>
</tr>
<tr>
<td>Color Index</td>
<td>98</td>
<td>87</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>80</td>
<td>79</td>
<td>76</td>
<td>70</td>
</tr>
<tr>
<td>Grams</td>
<td>17.5</td>
<td>17.6</td>
<td>13.8</td>
<td>12.1</td>
</tr>
<tr>
<td>Darn</td>
<td>97.4</td>
<td>98</td>
<td>92.7</td>
<td>87.8</td>
</tr>
</tbody>
</table>

**# URINE:**

| pH Reaction | 5.4 | 7.5 | 5.6 | 5.4 |
| NoX Normal  | 20  | 0   | 12  | 20  |
| Chlorids    | 0.26% | 0.52% | 0.26% | 0.26% |

**STOOLS:**

- Flora: Putrefactive, Putrefactive, Semi-putrefactive, Semi-acid
- Acidophilus: 5%, 25%, Poor, Good
- Odor: Putrid, Putrid, St. Putrid, Sour
- Reaction: Alkaline, Alkaline, Alkaline, Acid

**METABOLISM:**

<table>
<thead>
<tr>
<th>STRENGTH TEST</th>
<th>Total Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1755</td>
</tr>
<tr>
<td></td>
<td>1675</td>
</tr>
<tr>
<td></td>
<td>1840</td>
</tr>
<tr>
<td></td>
<td>2002</td>
</tr>
</tbody>
</table>

**ELECTROCARDIOGRAPHY:**

Results: Normal, no serious size. Some cardiac disturbance.

- Sinus Tachycardia

**PULSE: Av. A.M.**

<table>
<thead>
<tr>
<th></th>
<th>68</th>
<th>72</th>
<th>70</th>
<th>72</th>
</tr>
</thead>
</table>

**AV. P.M.**

<table>
<thead>
<tr>
<th></th>
<th>80</th>
<th>74</th>
<th>75</th>
<th>76</th>
</tr>
</thead>
</table>

**TEMP: Av. A.M.**

<table>
<thead>
<tr>
<th></th>
<th>97.6</th>
<th>97</th>
<th>97</th>
<th>97.3</th>
</tr>
</thead>
</table>

**Av. P.M.**

<table>
<thead>
<tr>
<th></th>
<th>98</th>
<th>98</th>
<th>98</th>
<th>98.2</th>
</tr>
</thead>
</table>

**WEIGHT:**

<table>
<thead>
<tr>
<th></th>
<th>96</th>
<th>97</th>
<th>92.5</th>
<th>100</th>
</tr>
</thead>
</table>

**ENDURANCE:**

- Arms at horizontal:
  - Time: 4 minutes, 5 minutes, 5 minutes, 5 minutes
  - Pulse (Before-After): 76-80, 74-80, 70-80, 72-83
  - Knee Bends: Number of times 30, 40, 40
  - Pulse (Before-After): 80-86, 80-80, 82-94, 84-95

**Note:** The Sahli's method of computing the hemoglobin and grams was used.

- Albumin: negative
- Sugar: negative
- Indican: negative

in all Urine Specimens.
SUMMARY CHART

MR. PECK

BLOOD:

<table>
<thead>
<tr>
<th></th>
<th>TEST 1-1/27/77</th>
<th>TEST II-2/5/77</th>
<th>TEST III-2/12/77</th>
<th>TEST IV-2/23/77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cells</td>
<td>4,870,000</td>
<td>4,870,000</td>
<td>4,500,000</td>
<td>4,850,000</td>
</tr>
<tr>
<td>White Cells</td>
<td>7,450</td>
<td>7,150</td>
<td>6,500</td>
<td>7,000</td>
</tr>
<tr>
<td>Color Index</td>
<td>90</td>
<td>80</td>
<td>87</td>
<td>94</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>82</td>
<td>82</td>
<td>79</td>
<td>90</td>
</tr>
<tr>
<td>D蒯e</td>
<td>99.2</td>
<td>103.8</td>
<td>92.0</td>
<td>112.4</td>
</tr>
<tr>
<td>Grams</td>
<td>13.3</td>
<td>14.7</td>
<td>17.6</td>
<td>15.5</td>
</tr>
</tbody>
</table>

# URINE:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pH reaction</td>
<td>7.1</td>
<td>6.7</td>
<td>5.6</td>
<td>6.3</td>
</tr>
<tr>
<td>No x normal</td>
<td>0</td>
<td>2</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Chlorides</td>
<td>0.52</td>
<td>0.39</td>
<td>0.32</td>
<td>0.39</td>
</tr>
</tbody>
</table>

STOOLS:

<table>
<thead>
<tr>
<th></th>
<th>Putrefactive</th>
<th>Semi-purifac.</th>
<th>Mixed</th>
<th>Semi-acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Bad</td>
<td>Poor</td>
<td>Fair</td>
<td>Very Good</td>
</tr>
<tr>
<td>Acidolch.</td>
<td>10%</td>
<td>35%</td>
<td>50%</td>
<td>80%</td>
</tr>
<tr>
<td>Odo#</td>
<td>Putrid</td>
<td>St.Putrid</td>
<td>St. Sour</td>
<td>Sour</td>
</tr>
<tr>
<td>Reaction</td>
<td>Alkaline</td>
<td>Alkaline</td>
<td>Acid</td>
<td>Acid</td>
</tr>
</tbody>
</table>

METABOLISM:

|                      | -17           | -17           | -27              | -17             |

STRENGTH:

|                      | 3085          | 3360          | 3655             | 3911            |

ELECTROCARDIOGRAPH:

Regular rhythm; conduction deformity, suggests definite myocardial damage.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PULSE: A.M. Average</td>
<td>66.7</td>
<td>70</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>P.M. Average</td>
<td>72.4</td>
<td>72</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>TEMP: A.M. Average</td>
<td>96.7</td>
<td>97</td>
<td>96.8</td>
<td>96.7</td>
</tr>
<tr>
<td>P.M. Average</td>
<td>98.7</td>
<td>98.2</td>
<td>98.4</td>
<td>98.4</td>
</tr>
<tr>
<td>WEIGHT:</td>
<td>153.7</td>
<td>156</td>
<td>159</td>
<td>160</td>
</tr>
</tbody>
</table>

ENDURANCE: Arms at Horizontal

<table>
<thead>
<tr>
<th>Time</th>
<th>Pulse (before-after)</th>
<th>Pulse (before-after)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 1/2 minutes</td>
<td>8 minutes</td>
</tr>
<tr>
<td></td>
<td>66-74</td>
<td>67-72</td>
</tr>
<tr>
<td>Number</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>Deep Knee Bends</td>
<td>66-100</td>
<td>70-90</td>
</tr>
</tbody>
</table>

NOTE: The Sahli' method of computing the hemoglobin and grams was used.

# Urinalysis: Albumin and Sugar- negative in all specimens.
Indican 31 in first test, faint trace in second test, 0 in third and very faint trace in the fourth test.
## Surgical Chart

**MR. WESTBROOK**

### Blood

<table>
<thead>
<tr>
<th>Test</th>
<th>1/27/37</th>
<th>2/5/37</th>
<th>2/12/37</th>
<th>2/27/37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Cells</td>
<td>5,000,000</td>
<td>4,950,000</td>
<td>4,790,000</td>
<td>4,730,000</td>
</tr>
<tr>
<td>White Cells</td>
<td>6,000</td>
<td>5,250</td>
<td>10,000</td>
<td>8400</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>92</td>
<td>97</td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td>Dace</td>
<td>108.6</td>
<td>119</td>
<td>94</td>
<td>112.4</td>
</tr>
<tr>
<td>Grams</td>
<td>15.1</td>
<td>16.4</td>
<td>16.2</td>
<td>15.5</td>
</tr>
</tbody>
</table>

### Urine

| pH Reaction | 7.1 | 6.8 | 6.2 | 7.3 |
| No x normal | 0 | 1 | 3 | 0 |
| Chlorids | 0.52 | 0.52 | 0.39 | 0.26 |

### Stools

<table>
<thead>
<tr>
<th>Flora Type Acidoph. Other Reaction</th>
<th>Putrefactive</th>
<th>Very Bad 10%</th>
<th>Putrid Alkaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-putrefact.</td>
<td>Bad 25%</td>
<td>Poor 40%</td>
<td>Semi-putrid Alkaline</td>
</tr>
<tr>
<td>Semi-putrefact.</td>
<td>Bad 25%</td>
<td>Poor 40%</td>
<td>Semi-putrid Alkaline</td>
</tr>
<tr>
<td>Sour</td>
<td>Acid 70°</td>
<td>Sour 70°</td>
<td>Acid 70°</td>
</tr>
</tbody>
</table>

### Metabolism

|  | -17 | -3 | +1 | +5 |

### Strength

|  | 5215 | 5265 | 5632 | 5822 |

### Electrocardiograph

Minimal conduction deformity, though not abnormal heart, normal rhythm.

### Pulse

| A.M. Average | 86 | 78.4 | 84 | 80 |
| P.M. Average | 74 | 81 | 80 | 85 |

### Temperature

| A.M. | 97.5 | 98.7 | 93.4 | 97.7 |
| F.M. | 97.8 | 98.2 | 93.6 | 93.6 |

### Weight

| 150 | 160 | 160 | 161 |

### Endurance: Arms at Horizontal

<table>
<thead>
<tr>
<th>Time</th>
<th>8 minutes</th>
<th>10 minutes</th>
<th>13 minutes</th>
<th>25 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse (before-after)</td>
<td>80-84</td>
<td>78-82</td>
<td>76-80</td>
<td>80-90</td>
</tr>
<tr>
<td>Drop Knee Bands</td>
<td>100</td>
<td>121</td>
<td>140</td>
<td>173</td>
</tr>
<tr>
<td>Pulse (before-after)</td>
<td>84-100</td>
<td>85-106</td>
<td>80-115</td>
<td>82-120</td>
</tr>
</tbody>
</table>

### Note:
The Sahli' method of computing the hemoglobin and grams was used.

### Urinalysis

- Albumin, Sugar- negative in all specimens
- Trace of Indican in first test-others negative
"During digestion of protein the liver does not appear to wait until the other tissues have become saturated with amino acids (digested protein) before it begins to destroy the unnecessary excess by conversion into urea (to be eliminated by the kidneys); on the contrary, this process sets in with the very first installment of amino acid that reaches the liver by the portal blood. This conclusion is in harmony with the well-established fact that, when protein is given to a starving animal, the greater part of its nitrogen is soon excreted as urea, leaving only a small fraction to be used for rebuilding the wasted tissues."

Note that the putrefaction of protein before gastric or pancreatic digestion before removal of amino acids results in highly poisonous amines such as histamine and epinephrine. The products of putrefaction of protein after the amino acids have been removed, or after gastric and intestinal digestion, are said to be much less toxic than those formed by putrefaction of undigested protein.

This is another natural protection against the bad effects of putrefaction.

STUDY THE REST OF THE CHAPTER AND LOOK UP THE WHOLE SUBJECT OF THE DIGESTION OF PROTEINS IN LATEST BIOCHEMISTRIES.
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.
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ordinary amount. According to Penrose, indol is formed in the intestine by the putrefaction of flesh foods. The formation of indol begins in the lower part of the small intestine. Indol usually makes its appearance twenty-four hours after stasis ensues. It is derived from tryptothan which is broken up by bacteriological action into equal quantities of of skatol and indol. The presence of indol is always a sign of putrefaction, as it has been plainly shown by numerous investigators that indol is never formed by the normal body processes. It does not make its appearance in the upper part of the small intestine for the reason that digestion is carried on in this portion of the alimentary canal without putrefaction. Indican is produced in abnormal quantity in cases of diabetes and is by some regarded as a grave indication in this disease. Its appearance in unusual quantities may, however, be due to the fact that diabetic patients are often placed upon an almost exclusive meat diet. Indol and skatol always increase with the amount of putrefaction. Benzocatechin, hydrochimon and alkapton are three curious coloring matters of a toxic character which are formed by putrefaction of the protein and which sometimes are found in the urine in such quantities as to produce a brownish or even a blackish color.

Of the various poisons which are produced by putrefaction processes in the intestine, by no means all appear in the urine. Through the action of the intestinal mucous membranes, the liver and various antitoxic glands, a considerable
DIGESTIBILITY OF LEGUMES.

The comparative undigestibility of the protein of vegetables has been urged as an argument in favor of flesh foods and as an objection to the use of vegetable foods. The evidence is accumulating, however, that the discrimination against vegetables in this regard has been unfair and based upon inaccurate observations. Lean meat consists of the soft pulp of the muscle tissue proper held together by a framework of connected tissue. The connective tissue is completely digested and dissolved by normal gastric juice. This meat is readily rendered liquid in the stomach by gastric digestion, even though it may be swallowed in masses and without sufficient mastication. The nutritive substance of vegetable foods is imprisoned in a meshwork of cellulose which is not acted upon by either the saliva or the gastric juice and hence cannot be dissolved in the stomach. The consequence is that if vegetable food is not thoroughly reduced to a paste in the mouth but instead through hasty eating is swallowed in masses, which is quite a common practice, the necessary result is imperfect digestion. Only that portion of the starch will be digested with which the saliva can come in contact, and only such portions of protein will be dissolved as are brought in contact with the gastric juice, so a considerable portion will escape digestion altogether.
THE RAMPANT INCREASE OF IDIOCY AND IMBECILITY IN THE UNITED STATES.

The Medical Record called attention to the fact that every five hundredth individual in the United States is an idiot, and cites the statistics of the United States Census Bureau in proof of the fact that idiocy is increasing in this country at the rate of two thousand a year, a rate of increase amounting to 2 2-3% annually. Other statistics show an increase of 300% in fifty years. At this rate, the time cannot be far distant when idiots and imbeciles will constitute a very considerable portion of the population. This evidence of brain decay is only one of the stigmata of degeneracy which the civilized races are manifesting in a great variety of ways.
young rabbits or injected under the skin of guinea pigs, the animal falls promptly into a state of cachexia and marasmus. The experiments of Pasq. de Michele show that such milk contains poisons which are not destroyed by boiling or by digestion. Under certain conditions milk undergoes a peculiar form of fermentation which develops a ptomaine discovered by Vaughan to which he gave the name tyrotoxicle. Tyrotoxicle is probably found in small quantities in nearly cheese. When taken in large quantities it gives rise to cheese poisoning. It very frequently develops in ice cream and has been also found in oysters.
cases in which persons suffering from chronic renal disease have by a single
indiscretion in eating a hearty meat meal brought on a fatal relapse.

"Sausage often contains great numbers of ptomaines and microbes, hence if
not well cooked it is very likely to cause serious poisoning. Sausage contains
all forms of noxious substances." (Roger).

If sausage does not always contain great numbers of bacteria and great
quantities of bacterial poisons, it is only because antiseptics of some sort
have been used. Miller reports 265 cases of poisoning from sausage, in which the
symptoms generally began after an incubation period of about eighteen hours.
The first symptoms were weakness, exhaustion, nausea, vomiting, diarrhea, dryness
and burning of the throat. Two or three days later worse symptoms appeared; as
fear vertigo, staggering gait, difficult respiration, double vision, difficulty
in swallowing, heaviness, clammy skin, paralysis of the legs, collapse and
death. In some epidemics one-third of the cases are fatal.

"Decomposing meats are full of toxins and find in the intestines excellent
conditions for their development." (Roger).

The poison produced by the bacillus botulinus is extremely deadly. Less
than one ten-thousandth part of a drop of a culture of this germ was found suf-
ficient to kill a mouse.

"For efficient destruction of the bacteria found in them, "meats must be
part of these toxic substances are either destroyed or so changed that their
toxicity is very considerably decreased.
GOOD POINTS.

---ooOoo---

Certain poisons may be absorbed by the liver, thrown back into the intestines, and keep going this round for weeks at a time; and this is what nature does largely with the bile.

Page 28.

This shows how difficult it is sometimes to get substances eliminated that have gotten into the body.

Page 31.

The pancreas has a double function; pours into the intestines a juice that digests starch, and pours into the lymphatics a juice which decomposes sugar for the use of the muscles.

Page 49.

For each of these organs there is possibly a similar internal secretion that is as important as the external secretion. Hydrochloric acid is poured into the stomach and sodium alkali is poured back into the blood. This accounts for the so-called "alkaline tides" shortly after eating.

Pages 49 and 50.

A little cellulose envelope surrounds every particle of starch in the grain, thus keeping it apart from the diastase so that it cannot act upon it, but in the germinating grain there is a special ferment which dissolves this envelope.

Page 63.
There is a constant struggle going on in the body to see which will get the upperhand, the germs or the cells.

The reason aseptic surgery is better than anti-septic surgery is that those drugs which destroy the microbes tend also to destroy the living tissues of the body, and thus weaken their resisting power.

One way to start germs at the alimentary canal is to keep constantly changing the food. Germs have only small power of constantly adapting themselves to new surroundings and they will be starved out.

How to demonstrate oxidation which takes place in the living protoplasm by means of the potato.

How nature cures by the formation of pus, and by rise of temperature. Inflammation without fever is more serious than when fever is present.

Demonstration that inflammation is a beneficial re-action.

The reason a man feels warmed up after eating a good meal on a cold day is because all the glands become functionally active. This increased heat is given off to the blood and carried to every part of the body.
The most efficient way of reducing temperature is that afforded by sweating.

In case of fever can lower the temperature by having the bed-clothes kept away from the patient by means of an ordinary cradle.

Bleeding is really a form of serum therapeutics. Why the temperature rises in bleeding.

Every nerve center acts upon the center below it as a coachman does upon his horses. He can stimulate them to increased action, or restrain them from over-action.

The Biblical and Darwinian accounts both agree that the original ancestor of mankind lived upon fruits.

Different schemes men have for stimulating their brains, so as to do more hard mental work.

One of our best known writers who is very tall and thin has to lay down in order to get enough blood to his head to do his work.
How ignorant people hit on ways of causing local dilatation of the vessels of the brain.

Page 163.

Impulses that act on one part of the body to a certain extent radiate to different parts of the brain. When a child begins to learn to write it will move the corner of its mouth at the same time.

Page 175.

Cold feet and chilling of the abdominal viscera tend to keep people awake, that is why all animals have a way of covering up their abdomens when they go to sleep.

Page 178.

The sphincter centre of the pupil is most affected by stimuli from the eye itself; the dilator responds more to stimuli from the body, whether painful or otherwise.

Page 239.

The significance of this fact when the pupil dilates suddenly in giving anaesthetic.

Page 240.

Whenever you have a case of unconsciousness with pin-point pupils do not send the patient away in the care of the police, but take good care of him.

Page 241.
The amount of respiratory work done depends upon the condition of 
blood in the medulla, but the way in which it is done depends upon reflex 
stimulation of various nerves.

Page 243.

Cough primarily is intended for the good of the organism, but if the 
irritation remains it may really become injurious to the patient. 

Page 251.

When the nerves in the upper part of the respiratory tract are 
irritated they tend to cause violent expiratory effort, while those in 
the deep-seated portion when irritated cause inspiratory effort. So if 
patient is breathing fast you may be sure that irritation is in the lung 
itself; if patient is breathing slow you will think of irritation in the 
bronchi. 

Pages 252 and 253.

How the patient is benefited by sitting up in abdominal dropsy. 

Page 254.

Should remember passage in Genesis: "God breathed into man's 
nasal trills the breath of life, and man became a living soul." Man very often 
forgets this; he begins to breathe through his mouth, and he dies. 

Page 260.

Why the mucous membrane is attached to the turbinated bones by loose 
connective tissue.

Page 261.
A good way to teach a man to breathe through his nose is to have him carry a shilling in his mouth, or better still a sovereign as he will be more afraid of losing it.

Page 262.

The whole philosophy of hay fever, and why greasing the inside of the nose is beneficial.

Page 263.

Brunton forgets every time how to make a 6/10 of one per cent salt solution, so has to remember that an ounce is about 500 minims, and so would want 1/2 grain for every one hundred minims.

Page 264.

A person might not cough because of mere irritation in the trachea bronchi or lungs, but if he has irritation in the throat and stomach as well perhaps cough is produced, and if you can relieve the irritation in either of the latter two places the cough may be relieved.

Page 265.

Irritation of the gastric nerves tend to produce vomiting instead of coughing; but if the larynx and pharynx are irritated a slight stimulation of the gastric nerves, not enough to produce vomiting, may set up coughing, thus giving rise to what the patient calls "stomach cough." In such cases a little bicarbonate of soda will generally act like magic.

Pages 279 and 280.

Just as you can recover the frog's heart from the effect of high
temperature, so in many cases you can recover the hearts of your patients from the effects of high temperature in fever by cooling down with cold water.

The diastole of the heart takes place sixteen hours out of the twenty-four, and during that time the circulation is kept up in the tissues by the tension of the blood inside the arteries.

A man may die by simply bleeding into his own veins. The feeblest the heart the emptier will be the arteries and the fuller the veins; the more vigorous the heart the emptier will be the veins and the fuller the arteries.

When a patient faints we have to remember that there are three large channels through which the blood finds its way from the arteries to the veins: the skin, the muscles, and the intestines. The vessels in the muscles will allow as much blood to pass through in a given time as those of the skin and intestines together.

How a compensation is maintained between the tension within the vessels and the heart's action.

The logical results following a bad case of mitral regurgitation.
It is not really known why our arterial tension is so much increased in chronic disease of the kidneys, but it is supposed to be because there is present in the blood some organic substance which produces this condition.

Page 327.

In case of heart disease do not have a man sleep on a feather bed. It sinks down so it will be more difficult for him to breathe.

Page 352.

If you simply advise people to take exercise they look upon it as a waste of time, but if you prescribe a course of Swedish movements they will take it as a mental prescription.

Page 358.

Any string, however frail, stands a steady strain much better than a jerk, so it is the jerks, rather than the steady strain, that breaks the arteries.

Page 359.

Applications of liniments is simply another form of massage. It is not so much what you rub in as how you rub it in, although many people who scorn massage believe implicitly in the efficacy of liniments.

Page 360.

How to manage leeches.

Page 363.
Do not put them where the ugly scar which they leave can be seen.

Page 364.

Profuse sweating in a child when it is asleep is a sign of rickets.

Page 370.

Too many people treat their stomachs as a gizzard, and it resents "being put upon." Such should remember that "the time spent in meat and mass is never lost."

Page 371.

Old age does not affect all of the organs at the same time. Many people get old in their teeth sooner than elsewhere, and if you can supply the missing function you will increase the time during which the whole organism will go on. Dentists have been responsible for the increase of longevity.

Page 373.

You can relieve thirst by simply washing out the mouth and gargling the throat with water.

Page 374.

Why oatmeal in water helps to quench thirst.

Page 375.

Sometimes find that simple oatmeal and water will help to quench the thirst of a feverish patient.
The salivary glands can eliminate some substances besides potassium iodide. They may eliminate poisons which have been absorbed from the alimentary canal as well.

The only basis for the truth that cheese digests everything but itself is from the fact that it will remain entirely undigested when everything else is digested, and forms exceedingly acid gases and acids.

When a dilated stomach once gets infected it will reinoculate every meal. In order to prevent this you must either wash out the stomach or kill the microbes.

The organic acids formed by fermentation hinder instead of favor digestion. Can neutralize them by giving bicarbonate of soda, but this tends rather to increase the difficulty than prevent it.

It is always advisable for a medical man to try and swallow a stomach tube himself, and then he knows how the patient feels.

Emetics should not be used during pregnancy, nor when there is a tendency to hernia in elderly people with brittle arteries.
Vomiting may be due to irritation in the throat, stomach, or liver as in passing a gallstone; irritation of ureter as passing a renal calculus; or irritation or obstructions of the intestines as in hernia. Irritation of the bladder or the uterus are all frequent causes of vomiting.

Page 401.

Sometimes hot things can be kept in the stomach when cold has failed in obstinate vomiting.

Page 403.

The philosophy of sea-sickness.

Page 404.

The reason ordinary people suffer from constipation is because their food has little or none of the stimulating qualities of the ordinary diet in uncivilized countries.

Page 413.

When people complain that it is not natural to have to take pills, just remind them that neither is it natural for them to keep a cook who softens all the hard things, and carefully takes away all the indigestible parts which would otherwise act as a stimulant to the intestines.

Page 424.

Lots of people who have a great dread of sewer gas often carry a cesspool inside of them.

Page 429.
The way to cure diarrhoea is to avoid the things that are good for constipation; thus the rule,

"Avoid all skins and bones,
Strings and stones."

Three kinds of worms: small thread worms; large, round worms; and tape worms. Treat the first kind by enemata of salt and water or strong infusion of quassia; use santonin for the round worms; and oil of male fern for tape worms.

Pages 457 and 459.

Bile bears the same relationship to the activity of the liver that the dust heap outside of the factory does to the amount of work done inside. But many factories sift their dust heap, and in the same way a good share of the bile is reabsorbed again. Bile may be poured into the duodenum and re-absorbed again and passed out again within half a minute. How Brunton proved this.

Pages 462 and 463.

How nature cures sick-headache by causing vomiting and making patient starve.

Page 468.

At the same time that the pancreas is pouring into the duodenum a secretion for converting starch into sugar, it is pouring into the circulation another ferment to break up the sugar so that the organism can utilize the sugar that is being absorbed from the intestines.

Page 477.
The fat that is produced by eating cod liver oil can very soon be run off again.

Why the administration of fat is good in bronchitis.

Sodium is chiefly present in the liquids of the body, while potash salts are chiefly present in the solid parts of the body. Easy way to remember this is to compare the body to the earth, then remember that the water in the sea is salt, while potash salts prevail on land, plants, etc.

You will find that the same man who cannot utilize carbohydrates in his system at one time would probably be unable to utilize proteids at other times.

Living exclusively on a meat diet leads to the accumulation in the body of products of proteid waste. How Salisbury improved on this.

We do not give meat soup in Bright's disease because it simply contains the extract of meat, and has very little nutritive power.

Some people feel out of tone frequently for the same reason that fire burns low, not so much because it lacks coal as because it is choked...
up with ashes. In nine cases out of ten among your wealthier patients it is not so much the coal scuttle that is wanted as the poker to clear out the excess waste products.

Page 490.

Gouty people are liable to suffer from various forms of disease, yet all due to gout. One may have eczema, another dyspepsia, another neuralgia, another asthma, another jaundice, another uric acid gravel, and another gout in his toes.

Page 502.

The waste products which are formed in the muscles if allowed to accumulate are poisons to the muscles, but if passed on to other parts of the body they have a stimulating action. This is why we give fever patients extract of muscle in the form of beef tea, so as to get its action.

Page 508.

It is not the sweating in consumption that is weakening to the patient but the condition that leads to the sweating.

Pages 517--519.

How the skin and the kidneys are complementary to each other.

Pages 523 and 524.

Some excellent points in reference to the kidneys.

Page 525.
The renal artery under ordinary circumstances takes a good deal more blood to the kidney than it requires. It can be clamped down to 1/16 of its ordinary diameter and still maintain the secretion of the urine.

Page 529.

How extensive abdominal pressure interferes with the action of the kidneys.

Pages 533 and 534.

Why it is dangerous to cut away the albumin in the food entirely in extensive albuminuria.

Page 535.

It is easy to make the urine alkaline, but by no means so easy to render it acid.

Page 540--542.

The different disturbances of the bladder.

Pages 544 and 545.

Incontinence of urine has been supposed by some to be really a form of epilepsy.

Page 548.

The benefits which the athletes of ancient Greece received from their severe physical training.

Page 557.
How excessive exercise of the lower part of the body may do harm.

Page 558.

How lime water prevents milk from forming large curds.

Page 596.

When people object and say they cannot drink water, just salt their food well and they will drink without urging.

Page 599.

The patient who habitually takes beef tea will take more potassium salts that way than if he took them as a regular drug.

Page 602.

The way to remember that sodium is not very irritating is to bear in mind that the blood is full of it all the time.

Page 603.

When cauterizing a child's throat be careful that a bit of silver and nitrate do not break off and get swallowed. But if it does better have the child swallow a lot of gruel than a lot of salt solution.

Page 606.

Patient can get rid of the disagreeable taste in the throat after Nitrate of Silver has been applied by gargling with common salt.

Pages 606 and 607.

Raw eggs are about the best antidote you can apply for mercury, chloride of zinc, or sulphate of copper.

Page 609.
It is very curious when considering groups of medicine how the same thread runs, as it were, through them.

Pages 632 and 633.

Do not apply blisters over the affected part if there is only a little tissue between the skin and that part.

Page 660.

Remember that blisters do not heal rapidly, so do not put them over the back of the patient who is confined to his bed.

Page 661.

In administering filix mas for tape worm remember that it is the tape worm that is to be dosed and not the patient.

Page 662.

How to treat tape worm.

Page 666.
THE NEW WAY

NOT GLUTTON BUT?

THE SCIENTIFIC OR BIOLOGIC WAY

FOR AGES THE WORLD HAS BEEN ACCUMULATING KNOWLEDGE AND INFORMATION BUT HAS NOT FOLLOWED IT

MAN'S APPETITES AND Passions HAVE BEEN EXPLOITED

MEAT BOARD PROPAGANDA

HOW MAN ought TO LIVE

WHAT SHOULD HE EAT, ETC.

SOME DutIES WE NEGLECT

KNOWLEDGE WE NEGLECT

THE RESERVE

LOOK UP THE METABOLISM OF PROTEIN

HAVE SEARCH MADE FOR LOW PROTEIN ARTICLES IN YALE LIBRARY

ADVANTAGES OF LOW PROTEIN
THE TWO MINDS:

THE MARVELOUS PHENOMENA OF HUMAN INTELLIGENCE.

THE UNSOLVABLE RIDDLES WHICH EVEN THE SIMPLEST OF PROBLEMS OF HUMAN DIGESTION AND NUTRITION PRESENT.
Dr. __________________________, writing in the Journal of the Canadian Medical Association, states that the colon often contains "enough histamine to kill a regiment."

In a symposium on alimentary toxemia at a meeting of the British Royal Society of Medicine, the evil effects of retention of colon residues long enough to permit putrefaction was pointed out by numerous eminent authorities of which we mention only a few. Dr. W. E. Dickson, Professor of Materia Medica in King's College, London, enumerated among other highly poisonous substances produced in the colon by the putrefaction of food residues, ammonia, which causes hardening and degeneration of the liver; tyramin, a very highly poisonous product; indol, skatol and cholin; sepsin (of which a small dose killed a large dog), a ptomain which is always found in the colon of meat-eaters, and which is decomposed into pressure-raising poisons (Barger and Walpole).

Dr. Langdon Brown of St. Bartholomew's Hospital, London, attributed the rise of blood pressure in later lift to colon poisons, which as he observed, "do not give rise to antibodies," so that, "the only way to secure immunity is to create a normal intestinal flora."

Doctor Beazly Thorne of Grace Hospital held that "the great majority of cardiovascular troubles are associated with an alimentary toxemia."

Doctor Boltentuit of Plombieres noted that "practically all subjects of long-standing colitis present myocardial weakness, generally with dilatation."

As Hertz and other roentgenologists have shown, the motility period of the alimentary tract, that is, the length of time the food residues remain in the body, is 53 to 54 hours, or 2\(\frac{1}{4}\) days; that is, the residues of a meal taken at eight o'clock tomorrow morning will be evacuated on the second day following after dinner. In the meantime 7
other meals have been taken and the residues of these meals are still retained so that the colon, which at the most should never contain the residues of more than three meals, contains the residues of six, or more than twice as many meals, and naturally becomes packed and distended with putrefying residues and it is almost invariably over-distended still farther by gases, the result of putrefaction and fermentation. This over distension of the intestinal walls causes redundancy, atrophy and paralysis.

Persons who move the bowels frequently are remarkably free from bowel troubles and other disorders associated with intestinal infections and intoxications. For example of 112 physicians in the following countries, 43 reported that they had never seen cancer of the bowels: Mexico, Palestine, Arabia, Turkey, Egypt, South Africa, East Africa, Central Africa, Nigeria, Japan, Syria, Korea, Persia, Siam, India, Asia Minor, New Hebrides.

The long retention of fecal residues in the colon gives opportunity for extensive absorption of these poisons which gives rise to the following picture drawn by Lord Dawson of Penn of London, physician to King George: "The sallow, dirty complexion, the inelastic skin, the dusky lips and nails, the dirty tongue, evil-smelling breath, constant abdominal discomfort of one kind and other, doughy, inelastic abdomen, cold extremities, the physical and mental depression, are among the prominent features."

Harvey showed that intestinal poisons cause nephritis and fatty degeneration of the heart.
Dr. Jordan, roentgenologist of Guy's Hospital, had often found atheroma of the aorta at an unusually early stage in subjects of intestinal stasis.

Dr. Mummery of St. Mark's Hospital said, "I believe that many of the cases of crippling arthritis that we see from time to time are due to poisons formed in the large bowel."

Dr. W. Knowsley Sigley stated, "The treatment of a large number of general skin eruptions resolves itself into the scientific treatment of chronic constipation.

"It is not the frequency of the evacuation that is important, but the quantity, that is to say, that the contents of the large bowel be systematically completely removed, and that there be not an ever-increasing residue left behind."

Dr. James Galloway, senior physician of Charing Cross Hospital, held that intestinal toxemia is capable of producing nearly all forms of skin disease.
histamine (Journal of the Canadian Medical Association. Give the
reference) of which the colon often contains a sufficient amount,
according to _______________ "to destroy a regiment."

At a discussion of intestinal toxemia by the Royal Society of
Medicine of Great Britain ( ),
the following statements were made:
stomach, to undergo the preliminary digestion which takes place there. As a rule, those foods which digest quickly are those which also ferment quickly, either in the stomach or out of it.

From these facts it is easily seen that certain of the foods mentioned must agree much better in the digestive process than others. The following are the best combinations: 1. Milk and grains. 2. Grains and lean meats or eggs. 3. Grains and vegetables or fruits. 4. Meats and vegetables.

The relative excellence of the above combinations is that indicated by the order in which they are named.

The following are bad combinations: 1. Fruits and vegetables. 2. Milk and vegetables. 3. Milk and meats. 4. Sugar and milk, meats or vegetables. 5. Fats with meats or vegetables, or cooked with grains.

The reason why milk does not agree with vegetables, although both are chiefly digested in the small intestines, is that the preliminary digestion of milk occupies but a short time, while the digestion of vegetables in the stomach occupies several hours. Sugar disagrees with vegetables and with milk, because of the readiness with which it undergoes fermentation, while delayed in the stomach. Fats disagree with nearly all foods, because of the delay which they occasion in the digestive process.
excess of food will be likely to tire the patient. These little things should be attended to even though it takes a great deal of trouble. If the food is to be served hot, it should be hot; if it is to be served cold, it should be cold. It is convenient to have a little alcohol lamp in the sick room with which to keep the food hot. An oil stove or lamp is not suitable as it gives off an unpleasant odor. So far as possible the food served for the sick person should be a surprise. If fruit or any other food is brought in by a friend, it may remain in the sick room for awhile, but should not be left there until the eye has become tired.

Among the most simple foods which can be prepared for the sick are gruels. The grains should form the base of all gruels. There is a general opinion that a gruel is an article of food which can be prepared in a few minutes, but this is a mistake. It is quite as necessary to have the long cooking of grains for gruels as for any other purpose. The object is that the grains should be thoroughly disintegrated and that the starch should be changed into dextrine which will make it more digestible. A gruel should be the very essence of the food from which it is prepared, minus the meat part.

In the preparation of gruels the first essential is a clean dish. It is better that the dish be used for no other purpose. If it has been used to cook some strong vegetable, even if it is carefully scoured, it will be likely to retain some of the odor, and the sick have very acute senses.

Grains should be cooked in the ordinary way. For gruels a larger proportion of water should be used than for afterwards diluting with fluid. It is a good plan to have a hair sieve for straining gruels.

As to the material which is best for making gruels, much depends upon the disease of the patient. It is the province of the physician to determine. If no physician is at hand it is well for us to remember
material it is necessary that our food should contain a variety of elements, perhaps this will be easier to bear in mind if we give a first consideration to the food elements. There are three classes of food elements, nitrogenous, carbonaceous, and inorganic, some or all of which are to be found in all foods. Besides these, most foods contain more or less water and more or less indigestible material, to the nitrogenous class belong albumen, fibrine, gluten, and caseine. The carbonaceous includes starch, sugar and fats while to the inorganic elements belong potash, carbonate of lime and such other salts. Each of these different classes of elements have a special particular work to perform in the maintenance of perfect health consequently it is necessary that our food should contain some of each one of these different classes. If the system is deprived of any one of them it suffers in some way for the lack. It is also true that the system can replace only what it has lost consequently it can use only a limited quantity of each of the different elements. If more than needed is taken it can not be used but has to be gotten rid of in some way thus often proving a great hindrance to health. Much more of the carbonaceous elements are required than of the nitrogenous.
The proper proportion as determined by science being 7 to 1, not all foods contain all the various food element, while most of those which do contain some of each of the different elements do not contain them in the correct proportion and need to be combined with other articles in order to make them proportionately good. Here let me call your attention to this chart which will perhaps emphasize what I have said regarding the points to be considered
in the selection of food. A knowledge of the analysis of food ought to form part of the education of every woman in the land, especially of every woman who in any capacity has the responsibility of arranging the bills of fare or preparing the food for the household.

But the proper selection of material is not all the food, after being well selected must be properly cooked so as to make it easily digestible and readily assimilated. The evils of bad cookery are manifold so many indeed that it has been calculated that they far exceed the evils resulting from strong drink. Much of the peevishness, hot temper, weak will with which humanity is affected has been attributed, no doubt justly to the badly cooked foods which so frequently grace or rather disgrace the tables of our land.

The proper preparation of food is of the greatest importance, but it is one of the curious things of our ethics that this most important subject is one which receives but little thought and study. Cookery is too generally looked upon as a menial service and its performance relegated to persons who have not the first conception of what constitutes healthful food although they can go through the mechanical process of mixing ingredients. But the mere putting together of certain materials is by no means all. The proper preparation of food involves both chemical and physical processes which necessitates careful study and a thorough understanding of scientific principles to insure success. Life holds no more responsible position than the one upon which depends in
so great a measure the health and happiness of the family circle. What higher mission can one conceive than to intelligently prepare the wherewithal to make shoulders strong to bear life's burdens and heads clear to solve its intricate problems, what worthier work than the building up of bodies into pure temples fit for grand guests of thought and purpose and surely no one should undertake such responsible work in ignorance of the laws that govern health and nutrition. There is a trite saying about plain living and high thinking and I believe the reverse is equally true. It is just as easy to furnish our tables with well cooked easily digested food as to supply it with any other if we only have the knowledge and the will and indeed—

We cook food for several reasons to make it more palatable, more pleasing to the eye, to facilitate mastication and principally to make it more digestible, one of the food elements and one which enters very largely into the composition of many foods is quite indigestible in an uncooked state. Cookery indeed should be a partial preliminary digestion of the food elements when properly done it changes the various elements except fat in much the same manner as do the digestive juices.

Heat applied in some form is the agent by which the cookery of food is accomplished. The methods usually employed are boiling, simmering, stewing, steaming, roasting, broiling, baking. This class of foods includes wheat, oats, barley, maize, rye, rice, and their various mill products.

The grains resemble each other in composition varying only in the relative amount of their proximate elements, all contain
nitrogenous elements in the form of gluten, albumen. Comparing them with other foods, wheat and oats contain more than double the amount in the same quantity of beef or mutton.

Proper proportion approaches more nearly perfect foods.

How prepared by milling, Barley considered oldest of all cultivated grains. Oatmeal justly ranks high, as a nutritive food, the grain simply because they are grains should not be considered meritorious articles because unless well cooked they may be exceedingly objectionable. Have seen oatmeal and other grains upon the table which were far from being healthful foods. Prolonged cooking eaten without attempt at mastication, excess of sugar boiling water, trouble to cook, measure latent heat, stirring meals, grains for breakfast.
used rather than olive or linseed oil for the reason that it is non-absorbable, has no effect upon the digestive processes, and does not undergo either fermentation or putrefaction.

Less injury, perhaps, is likely to follow from an excessive intake of starch than from any other quantitative error in diet, as it taxes the digestive process less than any other food principle and produces less disturbance of metabolism. This cannot be said, however, of the carbohydrate, cane sugar, the excessive use of which induces disorders of digestion, particularly hyperacidity, and is very probably one cause of diabetes.

Eating an excess of protein is one of the most grievous of all dietary faults. It may be rightfully regarded as one of the leading causes of chronic disease, through the intestinal toxemia which results from the putrefaction of undigested residues of meat and other proteins in the colon and the absorption of indol, phenol, and other putrefaction products of

The researches of Rubner, Chittenden, Sherman, Folin and others supply a scientific basis for the view that one and one-third calories of protein for each pound of normal body weight is sufficient to supply all the nutritive needs of the average individual. There will be no deficiency of protein even without meat or eggs if a sufficient amount of food is eaten and supplemented by a pint of milk daily. If the bill of fare includes eggs and milk, there will be no danger of a protein deficiency. A few ounces daily of soy beans, almonds, or other nuts, may take the place of milk if for any reason this is necessary or desirable.

Injury may result, as shown by Bunge and as pointed out elsewhere in this work, by making the bill of fare consist too largely of cereals, such as are supplied by ordinary breakfast
foods. Cereals introduce into the body an excess of mineral acids, and when used in excess may lead to a preponderance of acids in the body, inducing a mild form of acidosis with lowered vital resistance and impaired nutrition. If the cereal intake of the average individual were reduced one-half by substituting an equivalent amount of farinaceus material in the form of potatoes and other vegetables and fruits, the results would be a great improvement in our national health.

UNDERFEEDING.

Food deficiency as well as food excess may relate to the total food intake or to one or more dietary factors.

Underfeeding is most frequently observed among the women and children of the poorer classes. Invalids, also, through lack of appetite or ignorance of food values, frequently suffer from lack of nourishment. An adult person of average size who is taking less than 1,200 calories daily is almost certain to be underfed, unless confined to bed.

Underfeeding is naturally accompanied by a loss in weight, the degree of which is a fairly accurate means of determining the measure of the food deficiency.

The underfed individual suffers from a deficiency of vitamins, and of food vitamins and it usually present fashionable demand for feminine slimness has in many instances led unwise women to starve themselves into a state of low resistance which makes them easy prey to tuberculosis or other infections and consequent disturbances of metabolism and of every bodily function. Famine is almost universally accompanied by scurvy and other deficiency disorders, also grave epidemic outbreaks.
The Chittenden formula—protein 1, fat 3, carbohydrate 6—would yield 60 more calories. If
protein, with 20 less fat and 10 less carbohydrate, and no less carbohydrate, the above formula is believed by
the writer to be more in agreement with the results of modern metabolic studies. It is con-
vincing because based upon the greatest intake which
is determined from the body weight, one and one-third calories for
each pound of body weight (normal).
Canned foods, particularly canned meats and vegetables, as well as dried fruits, are likely to be deficient in vitamins. Canned tomatoes and canned fruits are processed at a sufficiently low temperature largely to prevent the destruction of the vitamins, which are also preserved to a notable extent by fruit acids.

The reducing diets recommended for combating obesity, are always deficient in certain vitamins and food minerals. A deficiency of vitamins and food minerals in the so-called light diet of hospital wards and the fever diets in common use has no doubt been responsible for delayed convalescence and various untoward symptoms and disappointing failures in many cases in public and private medical practice.

IRREGULAR MEALS.

Irregularity in the times of eating is highly injurious. The stomach empties itself normally in about four hours. When an interval of five hours is allowed between meals, it has an hour in which to completely empty and disinfect itself, as well as to recruit the energies of its gland cells in preparation for the work of digesting the next meal. This is essential for good digestion.

There is a close relation between the taking of food and the normal rhythmic activity of the colon. During the taking of a meal the food residues are moved forward in the colon four times as far as during the hour preceding the meal (Hurst). When a meal is omitted, this physiologic stimulation of the colon is lacking, and the result may be failure of the colon to evacuate its contents at the normal time, leading to distention of the colon and stasis or stagnation, which may become the starting point for chronic constipation. Thus regularity of meals is necessary in order to secure
Modern studies of metabolism have shown that at least two or three ounces of carbohydrates (starch and sugar) must be taken daily to insure the proper utilization of other foodstuffs, especially fats, and to prevent acidosis. In general, the carbohydrates should constitute nearly two-thirds the total food intake.

The amount of protein eaten is rarely too small, although a dietary of exclusively vegetable origin may easily be deficient in complete proteins unless very carefully selected. The addition to a dietary of ordinary cereals or other vegetable foodstuffs of a pint of milk will always insure an ample amount of complete proteins to meet the needs of the body.

A convenient formula for an average man (150 lbs.) is

<table>
<thead>
<tr>
<th></th>
<th>Calories</th>
<th>Grams</th>
<th>(Ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>200</td>
<td>50</td>
<td>1 2/3</td>
</tr>
<tr>
<td>Fat</td>
<td>800</td>
<td>90</td>
<td>3</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>1,600</td>
<td>400</td>
<td>13 1/3</td>
</tr>
<tr>
<td></td>
<td>2,600</td>
<td>540</td>
<td>18</td>
</tr>
</tbody>
</table>

DEFEICIENCY DIET.

Bills of fare notably lacking in vitamins are very commonly found in prisons, almshouses, hospitals for the insane and feebleminded, college dormitories and boarding-houses, as well as in many private homes. A breakfast consisting of toast and coffee, bacon, griddle cakes and syrup, a very common menu, is almost altogether lacking not only in vitamins but in iron, lime, and cellulose—elements highly essential to a complete dietary.
normal rhythmical action of the colon in the evacuation of food residues and other body wastes.

When the interval between meals is shortened, which is likely to occur when meals are taken at irregular hours, the result will be the reception of fresh food into the stomach before the digestion of the previous meal is completed.

If the food intake consists of stewed or fresh fruit or other foods which require only a short stay in the stomach, no particular harm will be done, as the stomach will empty at the usual time; but a regular meal eaten when the previous meal is only half digested is a gross insult to the stomach which is certain to be resented.

Late suppers are particularly injurious. They not only lead to disturbed sleep, but impair the appetite for breakfast the next morning. The late diner usually suffers from heaviness, headache, and a feeling of malaise and inefficiency the next morning, and his tongue is usually heavily coated.

If food is taken late in the evening or shortly before retiring, it should consist only of fresh or stewed fruit or liquid food of a sort which does not excite gastric activity.

HASTY EATING

Insufficient mastication is a fault which has become almost universal because of the general use by civilized people of foods which by cooking have been rendered soft or semi-liquid, and hence receive little or no chewing to prepare them for swallowing.
All foods, whether solid or liquid, should be chewed, and it is important to take at each meal a sufficient amount of dry/hard food, not only to exercise the teeth but to stimulate the salivary glands to produce an adequate amount of saliva, which when thoroughly mixed with the food by mastication, renders material aid in its digestion.

Burton, in his famous "Anatomy of Melancholy" gives the following excellent suggestions:

"Crato adviseth his patient to eat but twice a day, and that at his set meals ... and to put seven hours' difference between dinner and supper. Which rule, if we did observe in our colleges, it would be much better for our healths, but custom, that tyrant, so prevails that, contrary to all good order and rules of physic, we scarce admit of five. Moreover, that which he doth eat must be well chewed, and not hastily gobbled, and by all means to eat no more than he can well digest."

Crato's advice to put seven hours between the meals may be advantageously followed by many sufferers from gastric disorders. Some stomachs need even more time for rest and clearance.

**DRINKING AT MEALS**

The general custom of drinking several glasses of water or several cups of tea or coffee or other beverages with meals is a common cause of indigestion. One glassful of water or other ordinary liquid at a meal is quite sufficient to supply all dietary needs. Water/drinking does not interfere with digestion by diluting the gastric juice, but by overstimulating the glands of the stomach, causing them to produce an excess of gastric acid.
may be taken either hot or cold. Ice water does no harm if taken in small sips. Cold water refreshes the mouth and increases the acuteness of the sense of taste and so adds to the pleasure of eating and to gastric efficiency.

BAD FOOD COMBINATIONS —

Much stress was formerly laid upon the making of proper combinations of foods. The mixing of fruits with vegetables and of acids with milk was particularly considered to be highly productive of indigestion. Later experience, however, has shown that while some attention should be given to food combinations there is comparatively little ground for anxiety upon this point, provided the foodstuffs eaten are wholesome in character and are thoroughly masticated and suited to the body needs. Wholesome foods harmonize with one another in the liquid state or when reduced to a smooth pulp by thorough chewing.

It is, of course, essential that the foodstuffs which enter into a menu should be so selected as to secure a balanced bill of fare; that is, one would not combine eggs with beans because both are rich in protein, or olive oil with nuts for the reason that nuts are rich in fat. Neither is there any occasion for the addition of cane sugar to oatmeal and other breakfast cereals or syrup to griddle cakes, because these foodstuffs consist chiefly of starch, which, by the process of digestion, is converted into sugar. Cream or milk, fresh fruit or fats are the proper accessories for cereal foodstuffs rather than sugar, the too free use of which with breakfast foods is a very common cause of indigestion, especially of chronic duodenitis.
There are certain unphysiologic combinations which should be specially noted, such as the addition of cream to pastry. Meat and milk is an objectionable combination, because both are highly nitrogenous foods and because the highly acid gastric juice evoked by meats produces hard, indigestible curds which remain long in the stomach.

A most unphysiologic combination is the popular breakfast dish, poached egg on toast, usually accompanied by coffee. The ingredients of such a meal are all of the acid-ash class and encourage acidosis and so lessen endurance.

**HIGHLY SEASONED FOODS**.

Foods which are highly seasoned are overstimulating to the appetite and lead not only to overeating but to overstimulation of the digestive organs, the result of which is hyperacidity, which is later followed by degeneration of the secreting glands and a deficiency of gastric acid. Gourmands are certain to suffer sooner or later from their gastronomic abuses, being especially subject to gastric ulcer and cancer.

Mustard, pepper, pepper-sauce, horse-radish, cayenne, capsicum, and other hot and irritating substances have no proper place in the bill of fare. These substances all owe their properties to highly poisonous essential oils which in the pure state readily raise blisters upon the skin, and when taken internally produce irritation of the delicate structures with which they come in contact. Though certain condiments may at first stimulate the stomach to increased activity, the ultimate result of their use is lessened gastric activity and irreparable injury to the stomach, liver, kidneys, and other vital organs, including the heart and blood vessels.
In many, perhaps most cases, the duodenum suffers even more than does the stomach from the use of irritating condiments. These unwholesome chemical agents give rise to a chronic congestion of the duodenal mucous membrane, which leads to infection and the chronic duodenitis which doubtless precedes and always accompanies duodenal ulcer and gallbladder disease.

**INSIPID FOODS**

Foods which are lacking in flavor, while much less positively injurious to the body than those which are highly seasoned, are nevertheless objectionable for the reason that they are deficient in the flavoring substances which Nature places in normal foods to render them attractive to the palate, and which through the nerves of taste call forth the glandular and other activities concerned in the various processes of digestion. To be well digested, food must be attractive. It should please not only the sense of taste but the sense of smell and the sense of sight. This has been clearly shown by the classical experiments of Pavlov.

**A MONOTONOUS DIET**

A monotonous diet is objectionable, not simply because it fails to gratify the sense of taste but because it is likely to be deficient in some of the elements essential to good nutrition. To make sure that the body is abundantly supplied with all the subtle principles which it needs to repair its tissues and sustain its varied activities, a considerable variety in the bill of fare is required. The number of kinds taken at any one meal need not be great, but the bill of fare should be varied from day to day.
INDIGESTIBLE FOODS.

Such indigestibles as pickles, green olives, rich pastry, preserves, and fried foods present to the digestive organs a difficult, often impossible, task. They remain long in the stomach irritating its walls and exhausting its secreting glands and sometimes causing injury through mechanical irritation.

COLD FOODS.

Very cold foods, such as ices, ice cream, and ice water are questionable as elements of a meal. If taken at all, they should be in limited quantity and so slowly swallowed that before reaching the stomach they will acquire a temperature near that of the body.

HOT FOODS.

Very hot foods are objectionable for the reason that excessive heat produces the same injurious effects upon the mucous membrane of the stomach as upon the skin. The mucous membrane, in fact, appears to be less able to endure high temperatures than the skin, being more delicate in structure and less accustomed to such contacts although, lacking sensibility, it may give no warning of injury. Dr. William Mayo, the eminent surgeon, has for years maintained that the taking of hot foods and liquids into the stomach is a cause of gastric cancer.

EATING WHEN EXHAUSTED.

When the nerves or muscles are in a state of exhaustion as the result of effort, all the bodily activities are slowed down. The taking of a hearty meal under such conditions is often attended
by bad results. Digestion fails for lack of a sufficient amount of active gastric juice, and acute indigestion is a frequent consequence. Rest, especially sleep, is indicated rather than food, unless the exhausted person has been fasting for some time. In such cases the most suitable nourishment will be found in a hot solution of honey or malt sugar in water or diluted fruit juice, vegetable bouillon, Savita broth, or tomato or orange juice. Nutriment of this sort is quickly absorbed and immediately appropriated, requiring little or no action of the digestive organs. After resting for an hour or two, simple food in more liberal quantity may be given.

Eating heartily when one is tired out by either mental or muscular effort is likely to be followed by indigestion, malaise, and incapacity for work.

MISINFORMATION AND PSEUDO-SCIENTIFIC TEACHING

The popular newspaper and magazine literature of the day is filled with dangerous misinformation about diet and other matters pertaining to health. Articles by a Philadelphia chemist, claiming to be based upon scientific experiments, have been particularly misleading. This writer would have us believe that he has demonstrated that bolting food is harmless, that drinking freely of water at meals aids digestion instead of hindering it, and that drinking large quantities of ice water at meals does not involve risk of indigestion.

The experimenter draws his conclusions from the fact that he was able to subject the stomachs of healthy men to these various abuses without immediate apparent injury. This is the same old argument with which we are so familiar. It has been brought
forward in support of liquor drinking and tobacco using, the tea and coffee habit, the breathing of bad air, neglect of exercise, neglect to breathe properly, neglect of the bowels, and any number of other unhygienic practices that might be mentioned. Within a week of this writing the writer received a letter from a man who maintained that infrequent movement of the bowels is conducive to health, and offered as proof the fact that he enjoys good health though moving his bowels but once in two weeks.  

These experiments simply demonstrated how much abuse a healthy stomach is able to endure before it surrenders to disease. Fortunately, we are all born with a certain margin of safety. The first violations of biologic law may not give rise to any tangible ill effects; the bodily functions are performed as usual. The individual therefore thinks himself invulnerable, perhaps priding himself upon the fact that he can do with impunity things which are considered harmful. He is unaware of the fact that a hidden damage is being done, the effects of which may be irreparable. His margin of safety is being consumed and when it is wholly exhausted, he will begin to realize the harm which has been done; but it will then probably be too late to repair the injury.

Because it seems to make very little difference to a healthy stomach whether bread is stale, and hence quickly digested, or new and slowly digested, it cannot be assumed that it makes no difference to any stomach. The new bread, which only causes the healthy stomach to empty a little more slowly, when taken into a stomach which always empties slowly, even when supplied with the
very best of food, may upset the stomach altogether and harmfully lengthen the time required for digestion. This principle applies to all sorts of unhygienic practices. Infractions of the laws of good digestion which are apparently followed by no ill effects whatever in healthy persons make the difference between comfort and discomfort, good digestion and no digestion at all in persons whose digestive powers are im-
paired.

It is true that husky lumberjacks "bolt their three square meals each day," along with bad whiskey, besides doing many other equally unwholesome things. But it must not be imagined that even the lumberjacks can go on doing this forever with immunity from stomach and other troubles. Some of the worst cases of gastric disorder the writer has ever encountered were those of men who had spent a few years of their lives in lumber camps and whose stomachs had been subjected to the sort of treatment described above as innocent. Cancer, gastritis, ulcer of the stomach, and other gastric disorders are common among these men, notwithstanding the great advantages which they derive from their out-of-door life and vigorous bodily exercise, which should give them supreme health and high resistance.

Professor Pavlov showed that taking a quantity of water into the stomach gives rise to the production of an increased amount of gastric acid. The increase is not so great as to cause any serious disturbance in a healthy stomach, but in the case of a stomach which is already making an excess of gastric acid the drinking of a quantity of water may be the means of greatly increasing the difficulty. Thus it is a reasonable inference that the
habitual use of liberal quantities of water in connection with meals may in time produce pronounced hyperacidity, even in healthy persons.

In the feeding of milk to many hundreds of patients subjected to the milk regimen experience has shown that taking of milk slowly to be so important that the patients is invariably required to draw it through a straw or a small glass tube. In this way a person may take as much as six quarts of milk a day without difficulty, and often with extraordinary excellent results.
transit of foodstuffs through the alimentary canal is much shorter. Results of experimental researches published by the United States Government show that the time elapsing between the taking of food and the discharge of the unused residues is, in the barnyard fowl, only three and one-half hours. In the fruit-eating bat of South America the time is only one hour, and the feces have the odor of bananas, upon which these bats feed, and are practically sterile.

In healthy infants, the bowels usually move soon after feeding. The same is true of healthy animals and active, healthy boys and girls who are fed upon a natural diet.

The savage moves his bowels three times a day, as does also the Turk. Said a Bushman to a missionary doctor whom he consulted for relief: "Doctor, I am horribly constipated; my bowels move only once a day."

The chimpanzees and other big apes in zoological gardens move their bowels four to six times a day.

The colon must be thoroughly cleared of its residues daily. This is important for the reason that the considerable amounts of undigested protein and unabsorbed products of protein digestion, together with nitrogenized wastes of various sorts are always present in the colon even when the diet is a strictly meatless regimen. All these products are more or less putrescible and all become inoculated with putrescible organisms which soon develop a pernicious and dominant activity when the normal protective mechanism breaks down.
where the bowels are evacuated, but are a
place, the time required for
food through the intestinal
tract from mouth to anus is
truly 24 hours (Harvey). Of this long
period, two days and a
quarter, only some hours
are required for the digestion
and absorption of the food (Cannon).
During the remaining 14
hours, the food residues are
delaying in the colon under-
going the process of change
that would occur in the
Presence of warmth and moisture outside of the body. Nothing is gained by this long retention of the fecal residues, and much diarrhea is done. By the long continued contact of irritating material with the mucous membrane of the colon, its epithelial covering is damaged, and its protective functions are impaired. It becomes less efficient as a filter and permits not only bacterial toxins to enter the blood-
Stream, but also bacteria which, carried in the blood to the liver, and other viscera, became a grave menace to the health and even life. These dangers are easily escaped by taking care to see that the body wastes and food residues are evacuated with such frequency that there is no time for refraction. The habit of evacuating after each meal is readily acquired by persons in average health.
whose bowels have not been entirely filled up, and because the adhesions on other organs and damage it is only necessary to first entirely adjust the diet so as to merely supply a visit to the local physician. A visit to the local physician be made very soon after each meal and before retiring. If an attempt to relieve the bowels is made in their made regularly, the colon will in short time begin to "call" for evacuation. If ever in slight and if the "call" is not responded to with promptness and un-
failure regularly, it will soon become an imperative demand for colon clearance and with the acquisition of
this new health habit there will be experienced such an uplifting sense of physical, mental, and emotional buoyancy and endurance as will be more than ample compensation for the little effort required to
normal colon habits as the change of diet progressed, the bowel
function recover and return normally, because the
In most cases, beneficial effects from the lacto-dextrin feeding are experienced almost from the first dose; but in many cases there is at first a marked increase of gas production. This is chiefly due to the presence of the Welch's bacillus. This may be somewhat annoying but need cause no alarm. It is simply an indication that the change is taking place. The B. Welchii are making a harmless gas instead of virulent poisons and are helping in their own destruction by creating acids. As the flora is changed, the gas will diminish, disappearing when the Welch's bacillus and the colon bacillus have been greatly reduced in numbers. The disappearance of putridity of the stools and of gas are an indication that the change of flora has taken place, and with this change the production of colon poisons and the mischief which they produced will have ceased.
The gas distension is due to a gastric state of ulcer with a scar which prevents evacuation. A heat enema (3 pintation) well afford relief. Repeat at 110°F will afford relief. Repeat of the enema if necessary. If the enema is unsuccessful, add half a teaspoonful of lactate acid to each pint of water. More effective is a pint of soy acetobates mixed with one cup of electriocitric acid with a pint of hot water (150°F). The dose of lacto-dehydrine should be increased as a part of the food intake.
To insure complete evacuation of the colon, an enema at bedtime (three or four pints, 110° to 115° F.), at least three times a week, is a wise precaution. In cases of extreme toxemia, it is well to employ the enema daily for several weeks.

Not infrequently the taking of a large dose of this concentrated food lessens the appetite for other food. This need not give alarm, for it is to be remembered that lacto-dextrin is a highly concentrated food. A heaping dessert-spoonful represents about 100 calories, and the full day's dose represents fully half the amount of food required by the average individual engaged in light employment.

Persons who are thin in flesh and desire to add to their weight should take the lacto-dextrin about three hours after meals. When taken at this time lacto-dextrin does not so much affect the appetite for other food and so may be taken in addition to the regular full diet and will thus insure a decided and usually a rapid gain in flesh.

Persons who are overfat or of average weight and hence do not desire to add to their weight must necessarily reduce the amount of food eaten while taking lacto-dextrin. Such persons should make the diet consist chiefly of coarse vegetables such as cabbage, cauliflower, green peas, string beans, lettuce, celery, brussels sprouts, asparagus and fresh fruits of all sorts with a moderate allowance of bread, potatoes, cereals, milk, buttermilk, etc.
The best time for taking the enema is just before retiring at night. The bowels should be trained to move three times a day. An enema at bedtime will be of benefit whenever the colon has failed to empty itself without assistance during the day. A sense of fullness or heaviness or other abdominal discomfort is usually an indication of stasis or retention of residues which can never be beneficial in any way and may be the source of great mischief, since putrescible residues in the colon undergo the same putrefactive changes as similar refuse elsewhere in the presence of warmth and moisture.

With lactose feeding, as with the milk regimen, there is not infrequently at first a very marked looseness of the bowels, due, possibly, to the temporarily increased development of the Welch's bacillus. A lessening of the dose to one ounce three times a day will usually correct the looseness at once; then the smaller dose may be taken and as the flora is changed the tendency to diarrhea will disappear.

When the cecum is adherent, the descending colon spastic, the pelvic colon prolapsed and adherent or impacted, the change of flora is more difficult of accomplishment because of the delay of residues whereby opportunity is given for the absorption of the lactose, permitting the development of the putrefactive organisms. In such cases, the colon must be emptied thoroughly by an enema daily, or even twice a day. By a persevering effort and the use of larger quantities of lactose or dextrin (4 ounces three times daily) the change will finally be accomplished, although the time required may be sometimes so long as two or three weeks.
Corrects this difficulty in part, but when the acidophilus percentage is excessive, the intestinal ferment is increased to 80 or 90, gas formation ceases and the peristaltic activity of the intestine is increased to peristalsis and reflex does not occur and retroaction is not pressed. There is no occasion for surgery.
while very offensive odors are indicative of a very bad flora, the absence of pronounced odor such as often may be noted in cases of chronic obstinate constipation with dry, hard stools, does not indicate a good flora, but simply an extreme degree of stasis. The fecal residues have been so long retained that those offensive products of putrefaction, indol, skatol, ammonia, etc., have been absorbed and eliminated through the lungs and kidneys. A dose of castor oil or an enema will demonstrate this by bringing down from the upper colon quantities of most offensive material.
the odor of the stools. A nonputrefactive flora has little or no odor. Sometimes a faint acid odor is perceptible. There should be no trace of putrefaction. An ammoniacal or rancid butyric putrefaction odor signifies putrefaction. As the flora becomes changed for the worse, these offensive odors become pronounced. By noting the odor of the stool from day to day the state of the flora may be judged with considerable accuracy.

It is necessary to form the habit of doing this. It is more important to keep well informed about his color than about his bank account.

A normal stool with a normal aciduric flora is most likely to have a slightly acid odor and will have the consistency of rather stiff mush, not fluid, but of such consistency as to show some degree of form; but the so-called "well-formed stool" should never be seen. This is the ocular proof of chronic constipation.

The color of the stool will depend upon that of the foods eaten. Unless the foods are highly colored it will be yellowish brown. The volume of the food intake should be such as to insure at least three ample evacuations daily.

An examination by an expert who is familiar with methods of studying the intestinal flora should be secured when possible. Although this is in general not necessary for demonstrating the change, such examinations are essential for scientific research and for accurately checking clinical results. The following scale is used for designating the character of the stools in the clinical
bacteriological laboratory of the Battle Creek Sanatorium.

The stools of healthy breast-fed infants show Deidophillus present to the extent of 60 to 100 per cent. An earnest effort should be made to reach as near as possible the level of infancy, at least 50 to 70 per cent.

Maintain a Non-Putrefactive Flora

Even when the flora has been completely changed, a return to old habits of eating will cause the old putrefactive flora to flourish in a few weeks, persisting as negligibly and perniciously as before. Like causes are naturally productive like results.
In case of colitis avoid when the colon is very sensitive, care must be taken to choose the food eaten thoroughly, feed coarse veal, spinach and foods, use fresh vegetables, especially fresh vegetables. In extreme cases, the stomach and intestines contain a large amount of air and this may cause abdominal pain. It is better to use mechanical injury, but be careful they may cause injury to sensitive parts. Work when sensitive parts are highly hygroscopic, and ...
its granular particles are not cohesive and as soon as the vacuum becomes 
impacted, Percussion seed is also excellent as well as a powder. Any of these 
may be used with good results. On the other hand, lentils, beans, 
and lent accessory aid will be necessary.
Day acidophilus milk should be used regularly. One or two spoons a day, if usually insufficient to keep the flora in good condition, if the diet is right, and if lacto-dextrin is included. One or two spoons of lacto-dextrin should be buried at each meal to improve development of the protective acidophilus.

Nutrition: carbohydrates, nourishing carbohydrates.
Attempts to suppress intestinal maldigestion by means of vaccines, serums, and quinolae seem have wholly failed. The specific bacteria which must be combated are outside of the living tissues. Although in the intestine, they are not really outside the living organism as though they were upon the body surface. The only rational method of combating intestinal maldigestion is by a radical change of the intestinal food.
The Paratonic diet.

To maintain a good flora, the colon must receive as much roughage as possible. Too many mechanized, factory-made cereals and breads are lacking in fiber. Leaves of oats, wheat, and barley should be included in your diet. To get rid of the seeds, to get out of the seeds, to get rid of the seeds—ultimately in a compost or a mulch. The great Ecologist Keith, the great Ecologist and author of "The Great Ecologist," very aptly redefined the word "ecologist" as "one who studies the environment, the processes of nature, and the role of humans within that environment."
We apply an abundance of fertilizer and occupy the ground so completely with strong-growing grasses that there is no room for weeds.

The character of vegetation is dominated by the soil. Weeds will grow on the poorest soil. Grass requires an abundance of the right sort of plant food; with this, it will.

There are plant antagonisms. Certain plants leave behind in the soil products which are poisonous to certain other plants and prevent their growth. Such an antagonism exists between the acid-forming germs, *B. acidophilus* (acid lover) and *B. bifidus*, and the putrefactive and disease-producing organisms which produce ammonia and other alkaline substances, such as indol, skatol and other offensive and poisonous products. The chief among which is the well known gas-forming bacillus, *B. Welchii*. The chief antagonists are *B. acidophilus* and *B. Welchii* (Burnet). The former thrives in a one per cent acid solution, while the latter cannot tolerate one-sixth of one per cent.

It is interesting to note how admirably Nature in accord with this principle has provided for the protection of the human interior.

The first food of the young infant is made non-putrescible. Milk sours, while meat putrefies. This is due to lactose, which is always found in milk and nowhere else.

When the infant is weaned, it loses the protecting influence of lactose; but Nature supplies in its place, dextrin, a substance which in the intestine encourages the growth of *B. acidophilus* equally as well as does lactose.
Regimen for Chancing Out Internal Fist

The intestinal contents is a culture medium for bacteria and the body itself. Conditions which self of some collector in a membrane of the tree juice destroy most vegetative bacteria when in the vegetative state with the exception of Pseudocell and acetic acid. The acts of the purple bearers. The facts if the purple bearers are acid and so readily pass through the stomach to the overall intestines where they feed.
slightly alkaline need
not well suited to their
requirements except that
it is deficient in oxygen.
Ordinary milk souring or
fermented milk very did. The
Bacillus B. vulgaris
persists in the upper part of the
small intestine. The Leuks-
Bacillus acidophilus reaches
the colon and thrives there
in spite of the absence of
oxygen if it is supplied with
the carbohydrates needed
for its nutrition. This fact
gives to the Lactobacillus
bifidus. 

Lactobacillus re-

sented over all other acidity
bacteria as an means of pro-

tection the intestine against
activating various bacteria
which require nitrogenous
nutrients. The cancerous
alive in a 3% acid medium.

An acidity of 1% of one percent
inhibits the development
of Lactobacillus Melchii,

The pernicious gas bacillus
of meat refuse. B. coli is

likely more tolerant of acids.
than Clostridium but died in a medium in which L. acidophilus maintained vigorous growth. These characteristics of Lactobacillus acidophilus gave it preeminence over all other acidophilic organisms and enabled it to closely dominate the field in the intestine where abundantly applied with appropriate nutrient, which has been shown to be lactose (Leogen), dextrose, and is good for a mixture of the two (Kellogg). Carbohydrates.
When a meal is omitted, the intellectual rhythm may be maintained by eating fresh fruit, a handful of nuts, or some other reliable and relishable food.
An excessive intake of weakly food may cause temporary dehydration from an excess of water, but the injury compared with small compared with the injurious effects of eating more excess of carbohydrate, fat, or protein. An excess of carbohydrate is converted into fat and stored in the tissues. A considerable amount of water is at once......
with it so that an ounce except carbohydrate may cause an increase of weight from muscle. It is important to keep this fact in mind in the feeding of obesity patients.

Carbohydrates which are quickly absorbed, such as lactose and dextrose, are likely to cause a considerable increase of gas when freely used because the reach the colon before being absorbed and then.
in contact with the C. welchi and B. coli, where gas forming organisms
release their product.

The gas may be toxic and sometimes so

cause pain and inconvenience, and may

prove dangerous in certain cases of disease.
The soy bean supplies a superior \textit{port of protein} which in China has maintained for thousands of years a robust and vigorous population, without meat (fish, flesh, fowl and shellfish), milk or eggs. It is entitled to a prominent place among the food staples of this country and in time will become one of our chief sources of protein.
Diathermy applied over the stomach and liver region is an excellent means of combating chronic duodenitis. Application may be made once a day, at bedtime, or both night and morning, when pain, heaviness, or soreness are felt in the region of the liver.

Another symptom often present is pain back of the stomach, in the shoulder, or under the right shoulder-blade.

Duration of the application should be fifteen to twenty minutes. It should be followed by an application of the umschlag, to be worn during the night or both day and night when the hot application is made twice a day.
In severe cases, this regimen with modifications as indicated in individual cases, must be continued for several weeks, and should be repeated at intervals of a few months, or at least twice a year. Of course, it is of utmost importance that a restricted regimen shall be constantly and closely adhered to.
ENGINE TROUBLE

WHAT CAN BE DONE FOR HYPERTENSION?

Fifth Article

Since nothing can be done, then why bother? Why not accept the situation and make the best of it? That's the old attitude. But modern medical progress has changed the outlook. Accurate means of diagnosis and summarized clinical experience have pointed the way to such wonderful amelioration of conditions and symptoms as amounts in many cases almost to a cure; and several eminent European authorities have reported "complete cures of even severe and advanced arteriosclerosis." (Anitschkow and Wolkow).
In severe cases this regimen with modifications as indicated in individual cases must be continued for several weeks and should be repeated at intervals of a few weeks, not less than twice a year. Of course it is of utmost importance that a restricted regimen shall be constantly and closely adhered to.
I wonder if you have noticed a report recently made by
Professor Bunting of the Dental Department of the University of Mich-
igan who has been experimenting on the cause of dental decay in an
orphan asylum. The gist of his discovery is that the real cause of
decay of the teeth is the loss of immunity against bacterial infection.
in other words, that it is a general rather than a local condition.
He maintains that 7 per cent of the people have and maintain through-
cout life a high degree of immunity, 10 per cent have little or no
immunity, and 83 per cent have a sufficient degree of immunity to main-
tain the teeth in good condition provided they make proper use of them
and adhere to a proper diet.

He thinks the acidophilus germ, which is present in the
alimentary canal from one end to the other, damages the teeth only when
the immunity falls below the normal. This seems quite a plausible
theory because the lactic acid which is produced by the bacillus
acidophilus might readily attack the enamel of teeth which are de-
fenseless because of a general loss of immunity. The immunizing power
is in the blood.

Dr. Bunting's views fit in perfectly with my own views re-
specting dental decay which I formulated some 40 years ago in a paper
read before the Michigan Dental Association. I insisted that decay
of the teeth was due to general bodily conditions and not to merely
neglect of the teeth. I was much laughed at. Dr. Bunting and his
associates ridiculed my ideas for many years. Finally, about 15 years
ago, Dr. Bunting and one of his leading associates made me a visit at
Battle Creek and told me that they had come to apologize for ridiculing
my ideas with reference to the cause of dental decay, for their in-
vestigations had led them to the conclusion that I was right and they
were wrong. Dr. Bunting made a public statement of his new views in a
lecture to the patients. Some years ago he announced that the bacillus
acidophilus was the cause of dental decay, but it is only recently that
he has reached the conclusion that the real cause is loss of immunity
and that the acidophilus becomes harmful only when the immunity has been

MEDICINE

Why Teeth Decay

Three hundred orphans in an asylum near Ann Arbor, Mich., raised a tumult of delight last week when they learned that Professor Russell Welford Bunting, University of Michigan oral pathologist, had decided that acidophilus bacilli make teeth decay. That meant that Professor Bunting probably was through fussing with the mouths, meals, appetites and digestions of the 300 orphans, whom he has had under close dietary supervision for the past five years.

Acidophilus bacilli are the germs which the late great Russian Biologist Elie Metchnikoff recommended as an aid to digestion and longevity. They live and reproduce in every person’s mouth, as well as in his bowels. But they do not attack the teeth of a masticator until his natural immunity to them drops below a certain level. Seven out of every hundred people retain such immunity throughout life; ten are born lacking it entirely; and 83 retain it only if they eat sensibly. Gist of Dentist Bunting’s remarks last week before the Michican Academy of Science, Arts & Letters:

“The thing that seems to foster the heavy growth and activity of the bacillus in the mouth is a diet rich in carbohydrates, especially sugar. A high bacillary count, in turn, is almost always found to be associated with a high rate of decay. At the orphanage it was found that caries [decay] could be practically eliminated, except in the over-susceptible group, by the feeding of a uniform, fairly adequate, low sugar diet.”
The great causes of lowering of immunity in civilized people are, in my opinion, lack of sunlight and intestinal putrefaction.

Dr. Bunting finds that sugar is particularly harmful to the teeth because it encourages the growth of acid-forming bacteria in the mouth; but it is not the cause of the loss of immunity, without which the teeth do not suffer from the acidity.

Dr. Bunting made a careful study of the teeth of Dr. Richard Kellogg, the dentist at the Sanitarium, during four years while he was a student in the college. He found his mouth highly acid all the time yet his teeth were the most perfect teeth he had ever seen. I have heard him make this same statement publicly before the State Dental Association. His teeth were so remarkable that the faculty had a bronze model made of them and placed it in the university museum. His teeth are still perfect.

If Dr. Bunting's views are confirmed, and I think it entirely probable that they will be, the dental decay problem will seem at last to be pretty well solved. Of course it must not be forgotten that a deficiency of vitamins and food minerals and various other causes may influence immunity as well as diet, such as intestinal stasis and lack of sunlight.