THE DIAGNOSTIC IMPORTANCE OF EXAMINATION OF THE FECES *

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INTRODUCTION

At the present time when the medical laboratory men are following Ehrlich and Wright into the fourth dimension of medical science, when clinicians cry for a "dead-sure" test and when all demand nice, "new," clean work, it would seem a thankless task to spend fifteen minutes in talking about stool examination. I also would much prefer as subject the "complement fixation of this," "or the opsonic index of that," etc.; but a varied experience in clinical laboratories has taught me the importance of stool examination, and its growing importance now that functional diagnosis is rightly demanding more and more attention. While I was in charge of a clinical laboratory to which specimens were sent from all directions, many mistakes by physicians came to my notice, of which the following are a few illustrations: a strip of mucus was mistaken for a "decomposed tapeworm"; normal meconium was called blood; a roundworm six inches long was diagnosed as hookworm because it resembled a much-enlarged picture of uncinaria; solid fat was not recognized at all; soap globules and vegetable cells were called eggs, and eggs of harmless saprophytes were considered those of pathogenic parasites. But stool examination is fast assuming a new and very practical importance. Functional diagnosis is the subject of the future. We now no longer ask merely, "What is the matter?" but also, "How much is it the matter?" and to gain any idea of the functional ability of the stomach, bowel, pancreas and liver, the stools must be studied.

My paper is not so much for the general practitioner who is willing to remain ignorant of the difference between an antigen-ambceptor combination and a thermostable immune opsonin, but who does know mucus when he sees it, as it is for those younger than I who lose the valuable information which stool examination might give them.

In the following paper I shall speak only of those findings which are of value to the busy general practitioner, omitting those methods of investigation which are reserved for the clinical laboratory.

At the onset permit me to emphasize one test which is very important; in fact, is the basis of all stool-work; the determination of the number of hours required for food to pass from mouth to rectum. This is easily determined by giving the patient with breakfast about one dram of charcoal or a little carmine. These are easily recognized in the stool. In some groups of cases it is well to use this test as a routine, and the results are often interesting.

This test may be used to test the presence of the so-called "latent constipation." In this condition it is supposed that while there is a normal-appearing stool every day and, therefore, no suspicion of constipation, yet the intestine contains always the feces of two or three days instead of but one, and each stool is, therefore, the refuse of the third or fourth day before instead of the second. While I would not try to be positive I do not believe in this idea.

MACROSCOPIC EXAMINATION OF STOOLS

It is from the inspection of a stool that one gets the most information. How few physicians ever look at the stools of their patients! How many are content with the nurse's stereotyped description, e. g., "a moderately large, fairly well-formed stool."

In certain conditions the appearance alone of some (but not all) of the stools of some (but not all) patients suffering from these diseases is at certain stages (but not all) of these diseases sufficient for diagnosis. But because the appearance of all the stools is not diagnostic one should not refuse the aid occasionally given.

As a rule the patient needs no aid in making this diagnosis of constipation, but it is otherwise with those who think their periods of constipation normal and who complain of the brief periods of diarrhea. These persons illustrate the old and very true, if not strictly medical, French adage that "diarrhea is one of the best symptoms of constipation." The stools in this condition are rather characteristic, since in the fluid stool are seen flecks of mucus and small, hard fecal masses which are evidently broken off from impacted masses higher up which cause irritation and so the diarrhea.

In mucous colitis, mucus is passed with the stools, sometimes a few shreds, sometimes many and in some cases the stool consists of nothing but mucus. One patient recently passed nearly a pint of mucus in one stool. Some think that they have passed pieces of bowel. These strings of mucus should be searched for in all doubtful cases with abdominal pain. Unfortunately general practitioners too often fail to look for them, or do not appreciate their significance. The nature and the differences between mucous colitis and membranous enteritis, if differences there be, cannot be discussed here, but even the most conservative will admit that the nervous element in both is of great importance, while the most radical will maintain that, except in a few cases due to pelvic tumor, mucous colitis is always a purely functional neurosis. Over 95 per cent. of the patients are nervous women and should be treated as such and the local bowel condition left alone. Were their stools examined for mucus, very many of these women would escape operations for appendicitis, renal colic, floating kidney, gallstones, and ovarian troubles, one or each in succession, since the colic of mucous colitis can stimulate each of these troubles. During the past year there have come under my personal observation roughly two thousand nervous women, and the history some give is very sad. They have had from one to ten operations performed on their abdominal and pelvic organs, and yet give clear histories of mucous colitis antedating their first operation. I feel this so strongly that in all doubtful cases suggesting any one of the above conditions I question carefully for the history of mucous stools, and in case these are or have been present will consent to operation only when the indications of a local trouble demanding operation are very conclusive.

The rare and interesting condition of intestinal sand does not attract nearly as much attention as it deserves. Intestinal sand is the name given to the sediment of fine granules which sometimes settle in a fresh liquid stool. These granules are from 1 to 2 mm. in diameter, are dark red, green or black in color, are spherical or slightly irregular in outline, and very hard. They are often present in great abundance, even half an ounce in one stool. Examined chemically, they have been found to consist of the phosphates and carbonates of calcium especially, but also of magnesium, iron, etc. A little

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organic matter, fat, cholesterin, and also bacteria are present in them. In one case they consisted of calcium sulphate. Those I have examined chemically consisted of a little plug of epithelial cells impregnated with carbonate salts. When but a few granules are present there is often a question as to the correctness of the diagnosis. Pseudosand is common. This may be the seeds of small fruits, various food adulterations, and various vegetable structures. The lower power of the microscope would easily detect the difference, and yet raspberry and similar seeds (perhaps timothy-grass seeds) have been sent to use for diagnosis. Intestinal sand appears intermittently in the liquid stools of some nervous persons. It may or may not be associated with mucus. It is perhaps due to a secretory neurosis and has the same significance as mucus.

A definite colitis is usually indicated by the presence in the stools of pus- and blood-containing mucus. Whether or not there is increased frequency of evacuation will depend on the portion of the colon involved. Rosenheim has recently emphasized the relation between the portion of bowel involved and the symptoms. There is a form of colitis of the descending colon and sigmoid flexure especially, in which the stools are almost characteristic. Food is evacuated in from five to eight hours after ingestion. Its color, the test for bilirubin and the appearance of the muscle fibers and vegetable tissues on microscopic examination show that digestion in the small bowel is practically normal. The stools are soupy in consistency and contain many small masses of blood-stained mucus. On microscopic examination the red cells and leucocytes in the mucus cells are found to be in almost perfect condition. The stools are not very frequent, perhaps four or five a day, which is evidence of a normal rectum. This condition in one case now under observation has continued for over twenty years, without any periods of constipation, which differentiate it from the amebic colitis, and with little influence on the general health.¹

In cases of rectal carcinoma the stools are very frequent and contain much blood and some mucus.

In all cases the feces of mucus should be studied for amebæ.

In the case of children the stools of blood-stained mucus should always suggest the possibility of intussusception.

Acholic stools are usually betrayed by their clay color, soft consistency and foul odor. They mean obstruction of the common duct. But somewhat similar-appearing stools are passed by persons on a milk diet, or other diet rich in fat. The stools in a case of violent diarrhea may be colorless. In some cases the putty-like stools are due to bacterial fermentation which have changed the bile pigments to leucourobilin. In the latter case the color will return if the stool stand in the open air. Bile in abundance can often be extracted by alcohol and ether from a stool the appearance of which would suggest its absence. When a common duct obstruction is suddenly relieved the stool sometimes has a bright orange color, due to bilirubin which normally is never present in any amount.

Fatty stools may indicate several possibilities. Large amounts of fat are present in acholic stools and in those of a person on a milk diet or a diet including much cod-

liver-oil or olive-oil. The fatty stools of patients with diseases of the intestinal wall which prevent absorption, as tuberculosis or malignant diseases of the retroperitoneal lymph glands which blocks the flow of lymph are often of great aid in diagnosis. But true steatorrhea is present practically only in cases with total destruction of the pancreas and not always then. The fat of these stools resembles melted butter and hardens at once on cooling. The stools most characteristic of pancreatic disease are those described by Ury and Alexander. These are fairly solid and contain a great deal of visible fat, much muscle fiber, and are the stools of patients who are not jaundiced. But the large bulky, fetid, greasy stools, the volume of which seems out of all proportion to the amount of food eaten, which show signs of active fermentation and which contain gross masses of undigested meat and vegetables, are also very characteristic of deficient pancreatic fluid, and should be looked for in cases of malnutrition.

In pancreatic disease the inspection of the stools often gives very important information. In acute hemorrhagic pancreatitis an intractable constipation usually obtains at first; then, if the patient lives, a diarrhea which is just as intractable. The stools may or may not be acholic. In five cases from literature fat was grossly visible. In gangrenous pancreatitis a persistent diarrhea, sometimes with involuntary stools, is the rule. The movements are thin, copious, very fetid and in one case green, much resembling vomitus. In three cases abundant blood was present.

In abscess of the pancreas the diarrhea is very severe. The movements are profuse, watery, fetid, although in some cases they are solid and very offensive. In one fatal case there were over twenty movements a day. In one case there occurred a profuse hemorrhage, about 1,000 c.c., from the bowel. In only one case was fat recorded, while in several cases pus was grossly visible. In cases of pancreatic cyst the stools will depend on the injury the pancreas has suffered. The stools are usually normal, but in five a definite steatorrhea was present. The diarrhea pancreatica which accompanies the evacuation of the cyst through the bowel is especially interesting. Late in a case of chronic pancreatitis, diarrhea is the rule. The stools are pale in color, of offensive odor, contain much undigested food and sometimes rather large lumps of fat. Blood is sometimes present in the stools. In cancer of the pancreas the stools may be normal, but steatorrhea and azotorrhea often are present near the end. In 13 cases of calculus of the pancreas with subsequent atrophy, blood was present in the stools of 4, and fat in those of 3.

The tarry stools in cases of gastric and duodenal ulcer are characteristic of severe hemorrhage in the upper alimentary tract. One practically never sees really tarry stools in typhoid fever; in the most of these cases the blood is fairly bright. But the stools may be fairly black when the patient is taking bismuth subnitrate or after they have stood for a time in the air, if he is taking iron.

Gall-stones should always be searched for in the stools of a case of suspected gall-stone colic. The stool should be mixed with water and strained through a coarse mesh. Failure to find the stone may mean that the right stool was not examined, that the stone was soft and disintegrated in the bowel, or—and this is most important—that the colic is due to some other cause. In this connection should be mentioned pseudogall-stones. Of these the fat concretions are most important. These may be from a pea to a hazelnut in size and consist of fat of

1. At autopsy the colon from just above the cecum to the sigmoid was uniformly small, scarcely admitting the finger. Its mucosa seemed in the main replaced by scar tissue in which were innumerable small bleeding points. The patient died of carcinoma of the cecum. There was no evidence of tuberculosis or amebic dysentery.

high melting-point. They may follow a meal rich in pork fat, mutton-fat, tallow, etc., but the most are seen in the stools of a person taking much olive-oil. It is these pseudostones which give this oil its undeserved reputation as of value in helping the gall-stone to pass. Also masses of vegetable and especially of fruit tissue may appear as concretions and they are sometimes harder than gall-stones. It is well to split open a suspected gall-stone and to examine its fractured surface, or to dissolve a little of it in boiling alcohol and to obtain cholesterin crystals when the alcohol cools.

The curds seen in the stools of infants and of adults on the milk diet are usually said to consist of casein and are interpreted as evidence that milk is not well borne. But these "casein-curds" often consist of almost pure fat.

One never in a normal stool finds gross particles of meat, bread or potato. These may be present in diarrhea due to any cause, but if they are seen in a firm stool the evidence is in favor of pancreatic disease.

The normal stool may contain visible masses of soaps—the yellow masses of calcium soaps, and masses of colorless soaps.

The study of intestinal worms is of growing importance. The ordinary roundworm and links of the tapeworm are readily recognized. It is well to remember that decomposing tapeworm-links are practically never found in a fresh stool. That which suggests this diagnosis is almost invariably a string of mucus. To find the head of the worm it is best to shake up the stool in water and allow it to settle. All fragments of the worm will promptly sink to the bottom.

Tænia solium is in this country an exceedingly rare worm. I know of but one certain case. But one is often tempted to make this diagnosis, since the over-ripe segments of the *Tænia saginata* would appear to have a uterus with few coarse branches. An expert recently visiting the museums of some of our medical schools was able to find no specimen of *Tænia solium*. Of thirteen specimens thus labeled, eleven labels were certainly incorrect and the other two worms were too decomposed for identification.

To find the smaller worms, the stool should be well spread on a porcelain plate. *Oxyuris*, contrary to popular belief, does inhabit the intestine as high as the cecum or even higher, and may be found in the body of the stool. *Uncinaria americana* and *duodenalis* can easily be differentiated under a dissecting microscope if one take trouble to examine the head and caudal bursa. The reason why adult trichinas and whipworms have not been found oftener is that they have seldom been looked for.

THE MICROSCOPIC EXAMINATION OF THE STOOL

This is really the only method which the clinician can use to judge of the functional ability of the digestive organs, since accurate metabolism work is impossible for him. But to form a correct estimate the patient must be on a special test diet. That to be recommended is the Strasburger and Schmidt diet. To examine the stool microscopically the particles to be examined should be selected with care. If the stools are mixed with water and spread on a plate the choice often is easily made. If not, the stool may be mixed with water in a glass jar. The mucus will tend to rise to the surface together with some of the vegetable tissue. Parasites' eggs will sink together with fragments of food, meat especially. From this water suspension may easily be selected particles for further study. The variety of

objects which may be found on microscopic examination of the stool is unlimited. It will depend on the food eaten, on extraneous matter eaten with the food, on substances contributed by the digestive organs, on the flora and fauna of the alimentary canal, and lastly on the extraneous matter which adds itself to the stool after it is evacuated. This means that the microscopist may run across almost anything. He should be able to recognize vegetable tissue in general, especially the common forms of fiber. Especially should he be able to recognize chlorophyll-containing cells. The spiral cells are easy to recognize; the guard cells of leaves have been taken for fragments of carcinoma. The thorns of the down on some fruits are often diagnosed as worm embryos, while single cells, spores, pollen, etc., are often mistaken for eggs. Unfertilized eggs often do look very much like vegetable cells. Muscle fibers with the cross-striation well preserved are easy to recognize, but those partially digested are more difficult. It is important to be able to judge roughly whether an unusual number of fibers have appeared in the stool and if they show signs of insufficient digestion, for the condition known as azotorrhea is important in the diagnosis of pancreatic disease. By this we mean the presence in a firm stool of an unusual amount of undigested muscle.

One who systematically examines stools will surely find many eggs and larvæ which he cannot recognize. The great wonder is he does not find these oftener. Two easy mistakes are thinking that the eggs of *Tyroglyphus siro*, or the flour mite, are those of *Bothriocephalus latus* and mistaking the larvæ of many dipteræ for the rather serious screw-worm. The number of dipteræ and other insects which have access to food and to the raw materials of which food is made is great. Here they lay their eggs or add their bodies to the dish. In the stool one finds eggs, larvæ, perfect insects, and fragments of these. But the insect contaminations of greatest importance are those which are added to the fresh stool if it is not carefully covered as soon as evacuated. Fortunately we can usually recognize these as accidental findings. If in doubt one can always refer the specimen to the experts at Washington. In general these extraneous saprophytes' eggs are larger than those of pathogenic parasites. But just as serious is the danger of interpreting vegetable cells and even some soap masses for eggs.

The work of careful men has shown what a large number of persons are the hosts of animal parasites. *Ascaris lumbricoides* was found in about 0.4 per cent. of all examined, *Oxyuris vermicularis* in 0.8 per cent., stronglyloid worms in 0.6 per cent., *Trichocephalus trichiurus* in 10.3 per cent., and *Uncinaria* in even 3 per cent. of all examined in some portions of the South. The eggs of *Ascaris lumbricoides* occur in large numbers in the stools of infected persons. When fertilized they are very characteristic, but the unfertilized eggs are often mistaken for vegetable cells. The eggs of *Oxyuris vermicularis* may be found in the stools, but more often in shreds of mucus on the surface of the stool and still more often in the scrapings from the margins of the anus. The eggs of *Uncinaria duodenalis* and *Uncinaria americana* are exceedingly important, since the anemia these worms produce is now recognized as a disease of national importance.

In searching for eggs the temptation is to pick out for examination a fragment of feces at random. But when in doubt the stool should be mixed with water, sedimented or centrifugalized and the sediment examined. It is often wise to give a dose of santonin or

thymol to aid in the search for worms. If an infection with *Strongyloides intestinalis* is suspected the stool should be placed in a dish, a small depression made on its surface, this filled with water and the stool left in a thermostat over night. If embryos are present they are easily found as eel-like worms actively swimming in this water. The eggs of these worms are seldom found in the stools. Of the protozoan parasites the various flagellata and ciliata are usually easy to find because of the commotion they make. *Amoeba coli* is an exception to this. The stools, or better still the mucus which the eye of a rectal tube scrapes from the rectal wall should be examined while very fresh and, during the winter, before it has chilled. One examines the flecks of blood-stained mucus, if such there are; if not, the liquid portions of the stool. Definite ameboid motion, by which we mean the extension of a hyalin pseudopod from a granular endosarc, should be demanded. If in doubt the safest rule is always to discard the doubtful cell. One learns much now of the non-pathogenic *Entamoeba coli* and the pathogenic *Entamoeba dysenteriae*, and of the encysted stages of the latter; but for the clinician these terms are only interesting reading. If he finds a small ameba, without hyalin ectosarc, in the fluid part of the stool, not associated with blood and mucus, and in a case the symptoms of which are not those suggesting amebic dysentery, he may possibly be safe in calling it the harmless *Entamoeba coli*. Fortunately, however, during acute exacerbations the amebas are often numerous, are found in flecks of blood-stained mucus and themselves often contain one or more red blood cells. Clinically cases of amebic dysentery are characterized by chronicity and the tendency to relapse. The cases of great importance are those of amebic abscess of the liver and yet in patients who give no history of dysentery. The stools of all cases of suspected liver abscess should be carefully examined.

Pus in the stools is seldom recognized grossly, but the mucus flakes clouded with pus cells are helpful in the diagnosis of ulcers low in the small bowel and colon. Red blood cells are usually seen in the mucus. From the condition of these red cells and the conditions of the leucocytes one can easily get an idea as to the source of the mucus. Charcot-Leyden crystals, if numerous, are important as suggesting an animal parasite.

Those who cling to the possibility of an autointoxication from the intestine are still making cultures of the stools for bacteria. As is well known, bacteria may make up even one-third of the dried stool. Many of these are dead and most cannot be demonstrated as alive by any of the common methods of investigation. These bacteria of the bowel contents may be classified as the normal flora, the harmless organisms accidentally swallowed with food, and those causing disease. Among the flora are *Bacillus lactis aerogenes* from the upper bowel, and *Bacillus coli communis* from the lower, *Bacillus subtilis*, *Bacillus alkaligenes*, and, for the suckling, *Bacillus bifidus*. Various thermophilic and acidophilic organisms may occur in great numbers.

Among the interesting pathogenic organisms which are frequently found are *Bacillus pyocyaneus*, the various staphylococci, streptococci, *Bacillus tetani*, *Bacillus aerogenes capsulatus* and *Bacillus tuberculosis*. That many of these pathogenic organisms, especially the streptococci and staphylococci, are almost normal flora, is seen by their almost constant presence in appendix abscesses and in the peritoneal pus in cases of perforation of the bowel. *Bacillus tetani*, *Bacillus aerogenes*

capsulatus, *Bacillus bifidus* and *Bacillus subtilis* are some of the important Gram-positive organisms which have attracted attention recently in cases of pernicious anemia. In cases of suspected tuberculous enteritis it is important to search for the tubercle bacillus. To fail to find it has but little value. In cases of pulmonary tuberculosis, bacilli may often be found in the stools. To search for this bacillus it is well to examine any particles of mucus which may be present, but to digest a stool is seldom profitable work. If one wishes to examine a solid stool, a small fragment is mixed with 1.5 c.c. of distilled water. To this is added 54 c.c. of a mixture of equal parts alcohol and ether, and it is centrifugalized for ten minutes. A smear is made from the sediment. Of course, one should test the bacillus as to its alcohol-fast as well as acid-fast properties.

In certain cases of intestinal fermentation it may be well to examine for *Bacillus bifidus*. The search for *Bacillus typhosus* by the use of the Drigalski-Conradi medium is seldom of practical importance in the diagnosis of typhoid fever.

CHEMICAL ANALYSIS

The chemical analysis of the stool is seldom of any practical importance in the hands of clinicians, but the detection of occult blood in the stools is a marked exception and should always be tested for in doubtful gastrointestinal cases. Even the fresh blood accompanying a firm stool and ascribed to hemorrhoids is of importance, since there is evidence that these repeated small bleedings may lead to severe anemia. Blood in any amount from the cecal region or colon is discharged red and fluid, but blood in small quantities from even the colon, or from the small intestine, is usually mixed with the feces and can be detected only on chemical or spectroscopic examination. A great deal of interest, and rightly, is now centered on the minute traces of digested blood found in the stools in malignant disease or ulcer of the stomach. The idea is that a constant trace is suggestive of cancer, while in ulcer there are periods with much blood present and then periods with none. Since tests are also given by all hemoglobin-containing and some by chlorophyll-containing foods, and all by some medicines, the patient should be on a diet of milk, bread and eggs, the limits of which diet-period are sharply marked by charcoal. The turpentine-guaiac test is given positively by too many foods, and so the aloin test is preferred because of its delicacy and because it is not given by chlorophyll or urobilin. This test too often fails to show blood with tuberculous ulcers of the bowel, while in chronic passive congestion blood is usually present. This test has proved of greatest value in the diagnosis of gastric carcinoma and in the differential diagnosis between ulcer of the stomach and nervous gastralgia. But in the case of gastric carcinoma I do not think it is as important as the test for blood in the gastric contents.

I believe that the bilirubin tests also have practical clinical value in the diagnosis of the location of a bowel trouble, whether in the colon alone, in which bilirubin cannot be detected in the stools or in the small bowel also, in which cases it will be formed. Schmidt's test is easy and satisfactory.

Microscope-stage chemistry is often valuable, and is easy for one practiced in that technic. One forms an idea as to the amount of muscle fibers digested, and readily distinguishes between mucus and vegetable tissue. Fatty acid crystals are seen as short, delicate curved needles which are clustered in thick masses. These are dissolved on warming and in ether. Soap may

be present in yellow masses of calcium soaps, in colorless masses and in long needles in clusters or fans, or as short, plump crystals or scales. The most of the crystals one sees are soaps. Soaps are not soluble in ether but are in water. One of the best tests for soaps is to warm the stool on the slide with a drop of acetic acid and watch the crystals of fatty acid crystallize out. The droplets of neutral fat are soluble in ether and give the Sudan III test. But droplets are seldom seen unless there is a great increase in the stool. Hawes² has shown that an increase of visible fat under the microscope will certainly mean an increase of fat in the stool, but there may be an increase of the total fat without any visible evidence of it. An easy way to test the presence of fat in the stool is to press a portion under a cover-glass. If the portion selected be mucus or vegetable tissue the glass, when released, will spring back and air will rush in under the cover from all sides. If fat, the glass will stay down.

Starch granules are easily recognized by running a drop of Lugol's solution under the cover-glass.

Both pepsin and trypsin may be demonstrated in the stools in a case of diarrhea. The detection of trypsin has again recently attracted attention.

ABSTRACT OF DISCUSSION

DR. HENRY F. HEWES, Boston: Many men turn away from work on the feces because they claim the new methods of examination are so difficult. As a matter of fact, it is a very simple matter to make an examination of feces if time is taken and ordinary apparatus be at hand. It is much easier to obtain feces than it is to obtain the gastric contents. It is a common thing to have referred to me patients with intestinal trouble of a year's duration who have never had their feces examined. I think I have saved at least ten such individuals from the surgeon's knife, from an operation for appendicitis by examining the feces and finding mucus. There should be more study of the food elements and a determination of the functional conditions. A common objection to this is that it entails the giving of a test diet and patients will not take the test diet because it means from two to three days' deprivation of their ordinary meals. Of course, when we want to be accurate the test diet must be used. But if the observer has much experience of feces examination he can draw his conclusions from the feces of any simple diet and need not keep to the strict test diet. For example, if a sufficient amount of fat is taken and if there is much disturbance in digestion or absorption of that fat there will be some evidence of it whatever the diet and one can judge pretty accurately whether there is a disturbance of fat digestion or absorption causing a failure of nutrition. I do not think that any difficulty in giving the test diet should stand in the way if one takes a little trouble. Take a microscope and examine the feces and learn what food has been taken; if one is familiar with the feces one can soon learn to note variations from the normal for the amount and character of the food taken in any given case. Certain methods should be used in a routine way in all cases in which there is any question, and these methods can be carried out perfectly well by the general practitioner in his office. It is easy to obtain feces and it is easy to learn without special instruction how to examine the feces and to recognize elements as they appear normally or in pathologic conditions; but the physician must stick to his work for a month or two until he familiarizes himself with the normal forces and learns to recognize abnormal elements.

DR. GEORGE DOCK, New Orleans: I have practiced the same methods for a long time and I can confirm every thing that has been said about the value and practicability of such an examination. There are one or two practical difficulties in the examination of stools that I have encountered which may be worth mentioning. As Dr. Hewes has just stated, the exam-

inations are best made in the office; the more recent the stools the better. It is surprising how many persons can produce a stool at command. One can get a stool almost as easy as he can get a sample of urine in many cases. By placing a flat dish or a developing tray under the seat of a closet one can get a stool without urine. If the patient cannot have a stool at command give him a glycerin suppository. But in some cases stools must be sent. It is as important that the patient should be told how to prepare and send the stool as it is to tell him how to send a specimen of sputum. The ordinary method of obtaining a stool in an ordinary chamber and then decanting it is open to criticism. The stool should be brought to the physician in as natural condition as possible; the best thing to use is a so-called granite custard dish. Formerly I used a photographic developing tray, but the dish is cheaper and better and the stools can be kept fresh with a lid. Next to that is the ordinary fruit jar. Another point I wish to speak about is the great objection many have to examine stools; the general practitioner speaks of the disagreeableness of this sort of work. That is an individual's opinion of course. I have found, as a general thing, that the examination of a pathologic stool is no more disagreeable than the examination of sputum or stomach contents. An examination of a normal stool, however, is more disagreeable. The more pathologic the stool is the less repulsive is it. If one will practice examinations of stools, doing the actual work, not only will he find out much diagnostic information, but will be surprised to see how easy a matter it is and how few real technical difficulties there are.

DR. DAVID L. EDSALL, Philadelphia: A point of importance in regard to the test diet is its value in comparing one case with another; but to use the test diet as the only method of examination overlooks another very important point. What we want to know is how the patient digests the food taken in his ordinary diet; hence I think the most important thing in determining the condition of a patient so far as examining the stools is concerned, is to examine the stools when he is on his ordinary diet. It is easy in this way, as a rule, to determine whether fat, protein or carbohydrate is causing disturbance in the amount and kind of food that the individual has been taking. If we simply use the standard test diet which ordinarily differs very much from what the patient has been in the habit of taking, we often do not determine what is wrong in his manner of life. Another thing which has not been mentioned I have found extremely helpful, namely, observing the extent to which the stools ferment. It is easy to do this by simply keeping a stool in a closed jar at room temperature for from twelve to twenty-four hours and observing what degree of fermentation occurs, and the result often helps clearly in determining whether the symptoms of fermentation are due actually to abnormal degrees of fermentation in the bowels or whether the flatus and other similar symptoms are due to neurotic disorders of peristalsis, etc. It helps also in outlining the diet and in determining the degree to which improvement is taking place. As to the question of mucus I feel positive that there is a strong tendency to make too much of this unless very abnormal amounts are present. Patients readily get terribly hipped about the presence of a small amount of mucus in the stools. Small amounts usually mean nothing except that there is some slight source of irritation and, probably, that Nature is making an effort to limit this irritation by protecting the bowel wall with mucus. One common and important cause of the persistent presence of mucus in the stools is the more or less excessive use of purgatives; many cases of so-called mucus colitis are merely purgative colitis and not a disease. In a large proportion of instances getting the patient to stop the use of purgatives by means of diet and other normal measures will cause the mucus to disappear from the stools entirely.

SIR JAMES ALEXANDER GRANT, M.D., Ottawa, Canada: I have listened with pleasure to the paper and discussion on the diagnostic importance of examining the contents of the alimentary canal. A neurotic condition has just been referred to. For nearly fifty years, since graduation at McGill University, I have carefully observed varied conditions of the alimentary canal, and years ago was convinced that a neurotic state of this canal had more to do with its troubles than is

2. Hawes: Boston Med. and Surg. Jour., 1909, clx, 429.

general credited. My first effort on this subject was fully twenty years ago ("The Alimentary Canal and Human Decay, With Reference to the Neurons") and recently in the *New York Medical Journal* in a brief paper on "The Clefts of The Axis Cylinder, The Cable of the Nervous System." Prof. Walter Foster in his last great work (page 122) adverts to the axis cylinder having clefts, which have been observed during life and after death, but no reference whatever to the results of such an abnormal condition. Professor Sherrington of Manchester and McDonald of Sheffield, England, have carefully defined the saline constituents in the axis cylinder. Imperfect assimilation of food products, animal and vegetable, generates poisonous gaseous material, which acting directly on these very axis cylinder salines produces the clefts in question and hence the telling systemic results. There are troublesome digestion, inability to move about with usual activity, ordinary business duties most troublesome, the heart's action feeble and imperfect, frequently approaching heart failure. Why all these indications of constitutional debility? They are entirely the result of defective power in the elaboration of blood, the outcome of these very clefts, so disturbing to the histogenetic process, in Nature's greatest laboratory, where the chief pabulum of life, blood, is generated. To counteract this there should be strict attention to diet, massage over the abdomen with antiseptic liquid soap for ten minutes daily and continued for two or three weeks, and after each massage application of electricity by means of a neurotone and dry electric cell for ten minutes at each application. Much benefit is also derived from application of electricity to the moistened extremities for a few moments daily, thus calling into action the terminals of the crural and sciatic nerves—to the pelvis, spinal cord and abdominal ganglionic system. Beyond a doubt electricity removes the clefts and reestablishes digestive power to a remarkable degree. We are but in the initial stage in this investigation, which I have briefly presented on the present occasion, feeling confident years can thus be added to any ordinary life in middle age entirely free from organic disease.

DR. WOODS HUTCHINSON, New York: There seems to be a healthy recognition of the limitations of modern methods of diagnosis; as yet we have not come to know just how far they can be depended on. One must consider both the sample of feces and the clinical history and, in case of doubt, the latter should dominate in our decision. One point in particular in an examination of the feces should be emphasized and that is: Of what do the feces actually consist? Two-thirds of the feces consists of the secretions of the glands of the lower half of the remaining third of bacteria intestines. The 85 and 95 per cent. of the food that is properly digested does not appear in the stools. Only the 5 per cent. of husks, bran, fibers, seeds, etc. No wonder we gaze perplexedly at the odoriferous mass, trying vainly this, that or the other food substance. Our surgical friends called attention to experiments made in the Columbia University laboratory two years ago on the various forms of intestinal suture and closure. They cut off and sutured the ends of a loop of the small intestines in such a way that it was still connected with its blood vessels, but cut off from the lumen of the food canal. In four or five days this loop of intestine was found to be packed with apparently normal feces secreted by the glands in its mucous lining. A large part of the feces in a normal individual bears no distinct or definite relation to the food at all, only such parts of it as have escaped digestion. The recognition of mucus in the stools is most important, it is a secretion always abnormal in appreciable amounts and indicative of some neurotic disturbance in the individual. I have seen four patients with mucoenteritis who had been operated on for appendicitis; one woman was about to be operated on a second time and was only saved when the surgeon saw the scar of the previous operation. Colica mucosa is an urticaria of the bowels, as asthma is an urticaria of the bronchi. Mucus in strings, flakes and spirals and the intestinal sand, so-called, may be compared with Curschmann's spirals and Leyden's crystals found in asthma. In both diseases relief is best obtained by attention to the nervous system, especially the vasomotor. Place a patient with a mucoenteritis in bed, feed liberally and leave the bowels alone, especially avoiding cathartics, and more will recover than if any intestinal treatment be employed.

OPERATIVE TREATMENT FOR CIRRHOSIS OF THE LIVER *

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NEW ORLEANS

Operative treatment for cirrhosis of the liver has engaged the interest of many physicians and surgeons since Talma proposed it twenty years ago. If it is not more frequently carried out, the reason may partly at least be found in the high mortality immediately following the operation or within the next two months. I shall not attempt a new statistical study, since this has been done well by several others within a recent period, but shall point out certain facts that need to be considered in connection with all novel operations and especially for those in diseases inevitably fatal, for alleviation of symptoms, and not with a view to radical cure.

The statistics of the Talma-Morison operation and its modifications and substitutes are unfavorable partly because many patients have been operated on too late to do good, and when the risk of failure was excessively great on account of other organic disease. Such a thing happens in all new operations, but, instead of stopping operative treatment altogether, it should, if the operation has a single thing in its favor, lead only to more careful selection, earlier diagnosis, and greater care in the operation and after-treatment. Moreover, the death-rate and the shortening of life must not be compared with similar incidents in persons previously healthy, or persons with trivial diseases. As in so many other border-line diseases, we should think chiefly of the pain and disability, and the inevitable death within a time not very long, under the usual methods of treatment. From that standpoint, a single patient made comfortable for a time beyond the usual expectation outweighs many others whose days may have been lessened, though they lost nothing they ever could have gained in function. In such a case, it seems only fair to put the matter as plainly as possible before the patient, and to let him decide. Many, in the particular case now before us, will prefer the cathartic and the trocar, just as many others will refuse to stop the injurious habits against which they are warned. Some, however, will prefer a definite risk with the hope of relief, and it is in order to show what may be done even under many disadvantages that I bring the subject up at this time.

I have long been interested in the subject, but in most cases could not get the patient and surgeon to coincide. In some cases the one, in others the other, demurred. In one case I found what seemed an ideal subject, a man with recently developed ascites and distinct but not severe symptoms of cirrhosis, no cachexia, and no anomalies in the urine. Paracentesis gave a characteristic fluid and showed the liver not enlarged. After the situation was explained to the patient, he chose an operation, which was performed by an experienced surgeon with every appearance of technical accuracy. The liver was moderately cirrhotic, the spleen enlarged, the veins in the omentum and under the parietal peritoneum distended. Death occurred on the third day from septic peritonitis. Such an event is always discouraging; and it gives me all the greater pleasure to report another case in which the duration of life and maintenance of function seem unmistakably lengthened, notwithstanding many adverse circumstances. I cannot claim any credit for the result, which the patient owes to Dr.

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