

The exploratory needle may assist in locating the cavity, but it should only be used when means are at hand to operate for the relief of the condition, on account of the danger of serious extension of the infection along the path of the needle. If a cannula be thrust into the abscess, its contents are expelled in inspiration more forcibly than in expiration—contrary to that which occurs when the pus is above the diaphragm (Pfehl). This sign may be absent when the diaphragm is paralyzed as a result of long existing inflammation, or if the diaphragm and lung are perforated. In subphrenic abscess the upper line of dulness usually follows the convex curve of the diaphragm, and the lateral line of dulness runs from before backward and from above downward, quite contrary to the usual outlines of an empyema. In pyopneumothorax there is usually an antecedent history of disease of the lung, the whole chest is enlarged, vesicular murmur is entirely lost, and the heart is displaced laterally, while in subphrenic abscess with gas, the chest is enlarged only in its lower portion, vesicular murmur continues over the upper portion of the chest, and the displacement of the heart is upward.

Surgical interference is the only treatment which promises a successful outcome. Opening and drainage are indicated as soon as the diagnosis is made, it being contra-indicated only when a natural opening with efficient drainage has been established. An early operation often prevents that serious complication, perforation of the diaphragm, with its attendant dangers. The site for the incision is chosen by the physical signs and the exploratory puncture; the abdominal route and entrance by means of a resected rib have been about equally employed. If the abscess is situated high up, one or more ribs should be resected, the pleura raised and closed off by a line of sutures, and then the abscess should be opened by an incision through the diaphragm. The abdominal route avoids injury to the diaphragm. The general peritoneal cavity is usually well walled off by adhesions. The subsequent treatment consists of irrigation or dry dressings, according to the demands of the individual case. Uncomplicated subphrenic abscesses heal in from sixteen to twenty-four days after their evacuation by incision (Maydl). Of 76 cases operated upon, 39 recovered. Failure after operation is usually due to pre-existing complications.

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**DIARRHOEA.**—This is a general designation for a class of symptoms among the most formidable of all the manifestations of sickness. It means the occurrence of evacuations from the bowels, either unusually often or abnormally fluid in character. The term is also used to designate certain pathological states of the intestines, which induce or are supposed to induce it; but it is not applied to such diseases as dysentery and cholera, except to characterize a symptom.

In describing diarrhoea, it is customary to divide it into two forms, the acute and the chronic; but the terms are arbitrary, as the disorder varies in duration, from the brief moment of a solitary passage to a continuous stretch of many years. The line is usually drawn, however, at the limit of a few weeks; cases continuing longer are chronic, those of shorter duration are acute. In degree of severity, diarrhoea presents all shades of variations. It arises under a great variety of circumstances, and in conjunction with many different diseases. Nor is this surprising when we consider the extensive mucous surface of the alimentary

canal, the indispensable functions of the organs which compose it, and the manifold influences on which they depend, and by which they are disturbed. The wonder is rather that diarrhoea is not more varied and frequent than it is.

The occurrence of diarrhoea is made possible by increased irritability of the bowels—inflammatory, catarrhal, or otherwise—whereby they become intolerant of the presence of their contents, and expel them with abnormal force and frequency, or by the presence of abnormal and irritating substances that provoke the intestine to expel them with undue haste. And, since this intolerance may be caused by many different pathological states of various degrees, and the irritating influences are numerous, and since various incidental events also may ensue from the conditions named, diarrhoea has multifarious forms and varies greatly in its symptomatic behavior.

**SYMPTOMS.**—The discharges are nearly always more or less fluid. Frequently at the beginning of an attack only normal faecal matter is voided, but soon the passages become loose and continue so to the end, their character changing as the disorder progresses. Sometimes during a seizure little besides faecal matter is passed, this being made semi-fluid by the admixture of serum and mucus. Occasionally, and more often in chronic than in acute cases, the faecal matter appears in scybalous masses, often hard, and sometimes dark-colored and mingled with semi-fluid, slimy, mucoid, or puriform material. In such cases the scybala rarely appear in every passage, but only occasionally, while the fluid material originating in the lower colon and rectum may be passed at short intervals.

The stools present every degree of fluidity, from that of water to thin paste. They may be frothy, or mucilaginous in any degree, from that of slippery-elm water to a slimy mass of trembling jelly. *Mucus*, next to watery serum, is the most common and constant admixture with the feces in diarrhoea. *Food*, undigested, partially digested, and variously changed, is found at times in the dejections. Most common are the skins and seeds of fruits and vegetables, as apples, cucumbers, and pickles, but articles of food of easy digestibility may be unexpectedly passed. Thus, tender meats and well-cooked and finely comminuted vegetables are found in the passages of both children and adults in diarrhoea, while curds of milk, often green in color, are common in the passages of infants. Certain persons are unable to digest particular articles of a usual diet, and invariably void such undigested. Meat is sometimes voided in a half-digested state, bearing some resemblance to dead intestinal worms, for which it is occasionally mistaken. *Blood* often appears in the dejections of diarrhoea. It may be either fluid or in clots, bright red or dark and venous, chocolate-colored or even black, from long residence or wide journeying in the intestinal canal. It may streak the discharges, be mixed intimately with them, or appear independently. *Pus* is accidentally passed with the stools, either in small quantity and mixed with mucus, or, less often, in large amount and nearly pure. *Fat* forms a part of the dejections in many diarrhoeas, although usually it would not be discovered by a casual inspection. *Membranes* and pseudo-membranes are sometimes voided in diarrhoea. False membranes of various sizes and shapes are exfoliated, even at times strips a foot or two in length, while shreds of the superficial layer of the mucous membrane itself may be cast off. Shreds of undigested meat found in the discharges are sometimes mistaken for membrane. *Foreign bodies* of unexpected character often appear in the dejections of acute diarrhoea, especially in children—for example, strings, sticks, pins, pieces of leather, and small coins. In *color* the passages vary. Usually yellow, they may have various shades of red, brown, chocolate color, black or blackish and green, or be opalescent, like milky water.

*Flatulence* is a more or less common symptom in diarrhoea, and the flatus may be odorless or fetid.

In severe diarrhoea the appearance of the patient always betokens illness. The countenance becomes haggard and shrunken if the attack is continued or severe, general

weakness and mental despondency may ensue, loss of appetite usually takes place, although, for a brief period in certain cases, and continuously in others, the very opposite may obtain.

In diarrhoea unattended by inflammation *fever* is a rare symptom; it does not occur in all the inflammatory forms, and does occur to a high degree even in some acute attacks without inflammation. Usually in adults—less often in children—in the acute attacks fever is absent, and the temperature may be subnormal, the surface and extremities particularly being cold and possibly moist with perspiration. *Pain* is seldom wholly absent; it is often experienced in the back, and in bad cases with large, watery stools, painful cramps may occur in the muscles, chiefly of the lower extremities. The pain in the bowels occurs in different localities in the abdomen, and assumes many different forms and relations to the act of defecation. It is seldom constant, usually interrupted, and recurs at varying intervals, often as a colicky suffering, and may be quite independent of an evacuation. Audible evidence of movements of gas in the intestines may mark the recurrences of pain. In relation to the movements of the bowels the pain may occur (1) before a movement, the time before varying from a moment to half an hour, the longer the period the higher in the intestinal tract the seat of pain. The pain may occur (2) at the time of the evacuation, being usually in the rectum and anus, or (3) after the passage, being located in the anus, rectum, or descending colon, and in tissues deeper than the mucous membrane. It may persist for from a few minutes to half an hour after the passage. Pain may be present only in the anus, and that of a burning, scalding character, and mostly after a number of watery passages. The suffering exists during and immediately after an evacuation, and is confined to the mucous membrane of the anus, the cause being mainly the irritating character of the stools, but partly the rough use of improper closet paper or worse substitutes for it.

The abdomen is occasionally tender, particularly over the colon, or throughout, and the patient may bend the body forward in walking or moving, to avoid aggravation of the suffering, or in the recumbent posture the thighs and legs may be flexed to the same end.

Tympanites may be present in varying degree, depending on the extent of inflammatory action and of nervous involvement. Pain may occur in the bladder, in the back, deep in the sacral region, and in the thighs and legs. There may be tenesmus, an involuntary and irresistible straining at stool, with pain in the rectum if this part is particularly involved. Faintness, nausea, vertigo, or a sense of great prostration, or all together, may occur in diarrhoea, and perspiration, more or less profuse, may break forth at the time of an evacuation in an attack of only moderate severity. These symptoms differ according to personal idiosyncrasy and degree of involvement of the tissues of the intestines.

*Varieties of Diarrhoea.*—The most frequent form of diarrhoea is that which occurs in connection with *indigestion*, which itself has many shapes and symptoms. Occurring suddenly after over-eating it may be associated with vomiting (cholera morbus). One or more free, feculent evacuations are followed by a number that are semi-fluid, and finally by mucous or watery ones. Diarrhoea occurs after partaking of certain articles of food or drink that, for the occasion, at least, if not habitually, are indigestible or disturbing to the bowels. What affects one person may not affect another, and one is made sick to-day by what he may to-morrow take with impunity. From eating large-seeded berries, salads, nuts, cheese, fruits, and vegetables, drinking beer, and even milk, certain persons experience diarrhoea occasionally or invariably. Eating in a hurry may cause certain foods, usually easily digested, to disagree and bring on diarrhoea. There is a diarrhoea of indigestion in which several loose passages follow one after the other in rapid succession during the morning and then none again, or at most only one or two, till the succeeding morning—this being repeated daily, sometimes for months. The intestinal canal in a condi-

tion of atony or catarrh, or nervous irritability, or all, and wearied by undigested food and irritating substances, expels them and is quiet; the morning diarrhoea evacuates the noxious refuse of the meals of the previous day and the disturbed organs rest. In temporary debility from any cause, diarrhoea from indigestion may come on without dietetic irregularities; it may assume the form just described, or some other. The patient is suddenly liable to derangements of the bowels. In persons nervously sensitive, diarrhoea, with possibly sick headache, may arise from indigestion incident to sudden strong emotion. The experience rarely exceeds one or two loose passages, unless the emotional shock is often repeated, when the diarrhoea may become chronic.

*Cholera morbus*, so called, is still another form of diarrhoea. It occurs most often after some days of biliousness, mental dulness, headache, and coated tongue. Sometimes the attack is precipitated by a final error in diet, a chill or an emotion; sometimes it occurs without any discoverable exciting cause. It is usually brief, lasting only a few hours or a day, its force being spent by a free evacuation of the bowels. As in other sudden diarrhoeas, the first passages are feculent, and the later ones, if the seizure is prolonged, are watery and mucoid. Vomiting may or may not attend the diarrhoea. Bad cases are more prolonged and severe, and may even reach a fatal termination. In such, the dejections, after the bowel is once evacuated of faecal matter, are copious, watery, and odorless; cramps and collapse take place; there is a rapid and appalling shrinking of the tissues; the eyes sink in; the extremities become cold, and even the temperature of the body is lowered; and finally there are cold perspiration and huskiness of the voice, as in Asiatic cholera. This form of diarrhoea in infants is true *cholera infantum*, a term often improperly applied to slowly progressing catarrhal inflammation of the colon and ileum. Choleric diarrhoea, in the absence of an epidemic, is usually recovered from promptly by vigorous adults; less promptly by infants, children, weakly and aged people. Diarrhoea may follow *chill* of the surface of the body, with or without other influences. This occurs most often on the approach of cold weather, when people are insufficiently clad, and internal congestions are easily induced. The attacks are sometimes severe; a catarrh of the colon follows the first passive congestion; blood (bloody flux) and much mucus are voided with tenesmus. Diarrhoea in *epidemic form* appears occasionally when it is quite impossible to discover any adequate cause for it. Such epidemics may be general within circumscribed limits, visiting all ages and conditions of life, and may appear suddenly, and, after a few days, as suddenly disappear. Nearly all forms of diarrhoea may characterize such epidemics, but the cases are rarely fatal. The so-called winter cholera, which has prevailed in the winter season in several Northern cities, is an example of this form of diarrhoea. Another form is that associated with some disturbing *emotion*, and which occurs without the additional etiological element of indigestion. Fright, fear, timidity, bashfulness, and suspense are capable of causing sudden diarrhoea. Sometimes, however, they induce the opposite condition of constipation. In either case the phenomenon is a purely nervous one. The diarrhoea of emotion is usually trivial and brief, but in states of prolonged mental and emotional excitement the looseness may be chronic. There are other forms of nervous diarrhoea. Some persons with sensitive abdominal nervous organizations must run to stool immediately after eating or drinking. This trouble is to some extent imaginary—the desire can usually be resisted. But in other cases there is a nervous hyperperistalsis that results in diarrhoea, and prevents either efficient digestion or absorption. Cases of this kind are liable to be persistent, recurring many times, and from the most trivial causes, but always chiefly from those that affect the nervous system, and at times of nervous perturbations. In some persons, this form of diarrhoea is substantially constant and persists for years.

*Cathartic medicines* produce diarrhoea in one of three



ways or by a combination of them: either by increasing the fluid contents of the intestines, or by increasing the peristalsis without irritation, or by irritation of the mucous membrane. Severe catharsis produces pain, tenesmus, and a catarrh of the intestines which prolongs the diarrhoea sometimes for a number of days, the dejections being watery and mucoid; but moderate catharsis, especially after a period of constipation or biliousness, is followed by buoyancy of spirits and a sense of refreshment.

Diarrhoea, with or without vomiting, occasionally occurs from the poisonous action of certain articles of food (see *Food Poisons*, and *Ptomaines*) usually bland and harmless, but which happen to be out of condition or in a state of fermentation, such as puddings, custards, pies, sauces, ice-creams, and canned meats. The symptoms usually come on suddenly, and from one to three hours after eating the offending substance. Vomiting is generally simultaneous with the purging, but may cease before the latter. The diarrhoea may continue after the digestive tube is apparently completely evacuated of all fecal matter and food, and may even lead to a fatal termination. In the severe cases the later passages are mucous and watery, with possibly an admixture of blood, and pains, cramps, great prostration, and profuse sweating occur in varying degrees. In mild cases all symptoms cease after the evacuation of the stomach and bowels.

Diarrhoea is a prominent symptom of many cases of *typhoid fever*. The stools are generally yellowish, ochre-colored, and semi-fluid in character, and may contain blood. Frequently not more than one such passage, rarely five or six, occur daily, while sometimes a loose stool may be passed only once in two or three days. In cases in which only a few glands of the intestine are inflamed or ulcerated, and these confined to the ileum, the colon is tolerant of the products of the ulcers as well as of fecal matter, and constipation may exist; but where the glandular involvement extends to the large intestine diarrhoea is almost certain to occur.

Diarrhoea is a frequent symptom in pulmonary consumption. It has most of the characteristics of the diarrhoea of indigestion, which it mainly is. Food is passed undigested, evidences of fermentation exist, the stools are thin and watery. Several passages may occur in rapid succession, especially after eating heartily. In an advanced stage of phthisis a defecation often follows so closely upon even a small, bland meal as to suggest the complete intolerance of the whole alimentary canal to the presence of food, as well as its incapacity for digestion and absorption; moreover, the food is much of it passed with slight evidence of having undergone any digestive change. In a certain proportion of such cases there is secondary tuberculous ulceration of the intestines, but this alone does not necessarily nor frequently produce diarrhoea, unless the colon is involved. Numerous tuberculous ulcerations of considerable size may exist in the small intestine without announcing their presence by any symptom during life.

A form of diarrhoea results from chronic *ulcer of the rectum*. It consists in frequent discharges of small quantities of a slimy mixture of mucus, pus, and blood, with little fecal matter, and this little in the form of scybalous masses which are voided at varying intervals. Tenesmus may be present, but frequently is not, and often there is little or no pain, unless the ulceration reaches the anus, when pain is always present at the time of defecation, and for a few moments afterward.

Diarrhoea of *constipation* is a designation justified by clinical observation. Faecal matter accumulates in the colon, distends it, becomes hard and dry, and finally lights up, at the lowest point, an irritation which announces itself by frequent small discharges of mucus, serum, and fragments of the fecal mass, possibly with pain and tenesmus. It is not necessary in these cases to suppose a complete blocking up of the large intestine; faeces may accumulate and remain for months, and repeatedly allow small soft feculent passages to escape by the side of the indurated mass or through a hole in its centre.

After the discharge of a large mass of long-retained

faeces, the colon is not infrequently left in a condition of catarrh which may prolong a diarrhoea for several days. In most of these cases, as in many cases of diarrhoea in general, there is failure of free drainage of the large intestine in some part, mostly below the central point of the transverse colon.

In general *peritonitis*, contrary to a nearly invariable rule, diarrhoea is occasionally present at some stage of the disease. Vomiting nearly always attends it, and not infrequently hiccough. In *metropertonitis*, on the other hand, diarrhoea is frequent, owing presumably to the involvement of the lower bowel in the inflammation, as a result of which there is developed a catarrh of the mucous membrane of this part. Diarrhoea is an occasional event in several diseases of the kidneys (e.g., in Bright's disease). In desquamative nephritis the intestinal mucous membrane appears to become oedematous with the rest of the body, and a free effusion of serum brings on occasional paroxysms of diarrhoea. In *uraemia* from any renal disease, urea may be discharged into the intestine and cause diarrhoea, perhaps principally by its conversion into carbonate of ammonium after its entrance into the canal. Diarrhoea is a rare event late in *contracting disease* of the kidneys, due presumably to *uraemia*. In *amyloid degeneration* it is more common, is liable to be irregular, and may be protracted, is occasionally hemorrhagic, and always rebellious to all treatment. *Tuberculosis* and *cancer* of the kidneys may be attended by diarrhoea probably from *uraemia*, and possibly in the case of the former by the concurrent existence of tuberculosis of the colon.

In *intussusception* diarrhoea is usually present in some degree at some stage of the case. The stools are few in number and composed of mucus and blood to a considerable extent, and there is frequently tenesmus, especially if the invagination is at the ileocecal region or below it. In *constriction of the intestine* constipation is the rule, but diarrhoea may alternate with it or be a nearly constant symptom. Two theories of this phenomenon are advanced, one referring it to the increased peristalsis provoked by the constriction, the other to ulceration which sometimes supervenes below the point of stricture.

Diarrhoea occurs rarely in *cancer of the pancreas*, and nearly invariably in *cirrhosis* of this organ. In the former, secondary deposits are sometimes found in the intestinal walls, which may account for the symptoms. In leukæmic enlargement of the *spleen* diarrhoea sometimes occurs, the motions being bloody and most of them purulent; they may, however, be profuse and watery.

Recurring diarrhoea may attend degeneration of the *suprarenal capsules*, brought on probably to some degree by the debility which characterizes the disease, but also by the disturbance of the semilunar ganglia and the sympathetic which must ensue from the marked lesion which occurs in them in many cases of Addison's disease.

Diarrhoea makes a part of the pathological picture of the *teething* of infants (see *Diarrhoea, Infantile*). In *cirrhosis* and other diseases of the *liver* constipation is the rule, yet it may be varied by an occasional sharp attack of diarrhoea, which for the time depletes the distended vessels of the portal system.

*Intestinal catarrh* has been charged with producing diarrhoea with some constancy, as though this symptom might result wherever the catarrhal process was located. It cannot be doubted that catarrh attacks all the different portions of the alimentary mucous membrane. Of course, catarrh of any part in some measure interferes with digestion, and in this way may indirectly be a cause of diarrhoea. In chronic catarrh of the small intestine constipation is almost constant; in the catarrh of the colon, acute or chronic, diarrhoea is rarely absent. The tendency to chronicity is particularly noticeable in the diarrhoea of chronic dysentery and of general anaemia from any cause, but especially from dyspepsia, phthisis, and other diseases capable of inducing general cachexia.

**ETIOLOGY.**—Many of the general causes of diarrhoea have been referred to already. Often, indeed generally, several influences, direct and remote, act together as causes. The remote, the predisposing causes are any

and all influences that lessen the vital tone of the intestinal canal and depress the powers of digestion, and that increase the irritability of the nervous apparatus of the intestines. To this class belong the depressing influence of hot weather, especially on infants and children; of cold, overwork, bad ventilation, starvation, worry and grief of mind, and all the long list of depressing emotions.

The immediate pathological conditions that produce diarrhoea may be named under a few general heads; the circumstances under which they occur are numerous. The following is believed to be a logical classification of the causative conditions:

1. *Solution of Continuity and other Structural Damage to the Intestinal Walls.*—Ulceration, and the catarrh in adjacent tissue which it entails, occur in different parts of the intestinal tract and under different circumstances: in the rectum and colon, for example, in chronic dysentery; in any part of the intestine, as in tuberculosis, in amyloid and perhaps other degenerations of the intestinal walls, in typhoid fever and in intussusception and constriction of the intestines. Intestinal ulcers also develop as a result of extensive scalds and burns of the surface of the body.

2. *Inflammation*, of the colon and rectum mainly: proctitis, colitis (dysentery); the inflammation associated with intussusception, with cholera, with peritonitis, and with cancer and tuberculosis of the intestine.

3. *Congestion*, otherwise catarrh of the mucous membrane of the intestine, mainly below the ileum, without actual inflammation: the catarrh of cholera, cholera morbus, cold-catching, chilling of the surface of the body in whole or in part, invagination, obstruction to the portal circulation in cirrhosis of the liver and cardiac disease, peritonitis, leukæmia, zymotic poisons, the eruptive fevers, a long list of general diseases, and of irritations of foreign bodies, especially drastic drugs.

4. *Increased irritability* of the intestine with hyperperistalsis. This arises from depressing emotions: debility, systemic or nervous; bad hygiene in its multiple shapes; the reflex effect of teething and manifold other influences capable of reflex action in this direction, especially diseases in other organs; constriction of the intestine, and personal idiosyncrasy.

5. *Irritating Intestinal Contents.*—The results of (a) gastric dyspepsia, over-eating, improper or improperly masticated foods. The result of (b) intestinal indigestion, from abnormality of the liver or pancreas, from loss of secreting substance by previous or existing ulceration, from atony, catarrh, or inflammation. (c) Cathartics and other irritating substances, either swallowed or developed in the intestines: as, for example, cathartic medicines; impure or strongly saline drinking-water; various poisons, including foods undergoing fermentation; excessive transudation of serum into the canal, as in choleraic disorders and in the colliquative diarrhoea of depressing diseases; pus, blood, or mucus in quantity; the rinds, hulls, and seeds of fruits, grains, and vegetables; retained faeces, the entozoa, the entophyta, urea, as in renal affections, and finally the special micro-organisms of disease. Microbes characteristic of diarrhoea, as *amœba coli* and *bacillus dysenteriae*, have been found to be present in the intestine in severe cases of this disorder, and to disappear with its subsidence; but whether they are the cause or consequence, is not established. Excess of bile thrown into the duodenum after the removal of an obstruction may cause diarrhoea, but it is not known, as alleged, that so-called vitiated bile is capable of doing it. Ptomaines developing in the digestive tube from decomposition of ill-conditioned foods may cause sudden violent purging, as in cases due to old ice-cream. Ptomaines probably also sometimes develop from decomposition of retained substance in extreme constipation, and cause occasional explosions of diarrhoea.

**DIAGNOSIS.**—The simple diagnosis of diarrhoea is easy enough; the important and often difficult thing is to learn the cause and nature of the disorder. The dejections should be inspected for foreign bodies, undigested food, products of fermentation, pus, blood, mucus, etc.

(See *Faeces*.) As diarrhoea is often due to indigestion, it is important, when this is present, to determine what part of the alimentary canal or what other organ, if any, is at fault. A consideration of the physiological functions of the different parts and of the symptoms of the case will usually lead to the discovery of the region or organ involved. It is equally important to learn what articles of food fail of digestion, and in what quantities and under what circumstances as to times of eating, methods of preparation, etc., they have been ingested. By careful observation and by exclusion this may be done, and so the first step in successful treatment may be attained. If the attack is not due to indigestion, irritation, or catarrh, inflammation or ulceration of some part of the alimentary canal should be looked for. A considerable degree of inflammation of the mucous membrane may exist without fever; the absence of this, therefore, does not exclude inflammatory action. In a majority of cases caused by the lesions referred to, the trouble is in the rectum or colon; for inflammation, catarrh, indigestion to a moderate degree rarely cause diarrhoea, provided the bowel below the ileo-caecal valve is normal. The seat of the irritation may often be known by the location and characteristics of the pain. Pain in the region of the umbilicus, just before and disappearing immediately after a passage and without tenesmus or pain in the rectum, locates the trouble, with fair accuracy, in the transverse colon. If tenesmus exists, with pain in the region of the rectum, that part is involved. Tenesmus is a reflex effect of irritation of the mucous membrane of the rectum—nature's effort to be relieved,—a symptom having a very narrow signification. Pain, on the other hand, while it may be purely neuralgic, may indicate inflammation in any of the tissues of the rectum or outside of it in the pelvis. The colicky pain often experienced in diarrhoea is usually in the large intestine, as in dysentery. Inflammation—even extensive ulceration—of the small intestine is not ordinarily attended with diarrhoea, nor with colicky pains. Pain in the anus in the act of defecation and following it points strongly to hemorrhoids, fissure, or abscess in the adjacent tissues.

The significance of blood in the stools differs with its appearance and with other symptoms. Bright, fresh blood indicates a lesion of some part near the extremity of the bowel—the anus (fissure, hemorrhoids), rectum (ulcer, hemorrhoids), or colon (ulceration, or deep congestion, or inflammation). When the blood simply streaks the faeces, it comes generally from small vessels inside the sphincter. Fresh clots seldom appear if the blood comes from a point high up in the intestine. In typhoid fever the blood of a hemorrhage is usually fluid and mixed with the fecal matter. Very dark or blackish blood usually comes from the upper portions of the intestine or stomach; a copious bleeding from an ulcer of the latter, or from the duodenum, as in cutaneous burns, may easily produce such an appearance. Dysenteric stools of true dysentery, of intussusception, and of ulcer and hemorrhoidal troubles, often bear a close resemblance to each other; the distinction between them must be made by other symptoms. Intussusception usually announces itself by the suddenness with which the symptoms develop, of which colicky pains and vomiting are seldom omitted, and after a time the vomiting is apt to be stercoraceous. In dysentery the vomiting is not so marked a feature,—indeed it is often absent,—and the colic is less violent, but colicky pains are rarely absent. Ulcerations and hemorrhoidal projections into the rectum do not induce either colic or vomiting, nor, at first, much disturbance of the health. The sudden discharge of pus in large quantity indicates the bursting of an abscess, and is rarely unaccompanied by symptoms and signs indicating the character and location of the latter. Small quantities of pus mixed with the faeces point to ulceration in the lower part of the canal. Large watery stools are usually the product of both the large and small intestines. Mucus in the stools always means catarrh somewhere in the bowel: the purer and clearer the mucus the nearer is the area of the catarrhal process to the anus. Scybala



besmeared with mucus or muco-pus point to catarrh, possibly to ulceration in the rectum, and certainly to the retention of the fecal matter for some time in a given part of the canal.

Dark, blackish, or chocolate-colored stools suggest the presence of the coloring matter of blood,—blood arising from a point high up in the canal and changed by the secretions of the stomach and bowels,—or the effect of some medicament, as bismuth, hæmatoxylin, mercury, or iron.

Green stools are not always nor usually produced by excess of bile, as is often supposed, but by biliverdin, an oxidation product of bilirubin, and developed in the intestinal canal. When diarrhoea arises from disease of the kidneys, liver, spleen, pancreas, suprarenal capsules, or from some general disease capable of inducing it, the symptoms of the causative disease usually predominate and identify it. But diarrhoea in tuberculosis is not evidence of a tuberculous process in the small intestines, nor proof of its existence in the colon. In chronic diarrhoea the urine should always be examined for evidence of disease of the kidneys, the urine for twenty-four hours being secured, if possible, and an accurate determination made of the urea and total solids. The diagnosis of lardaceous change in the intestines cannot be made from the intestinal symptoms alone. Chronic dysentery and chronic catarrh of the colon of a severe type are indistinguishable by the symptoms, as in many cases they are pathologically identical. Dysentery and proctitis are occasionally mistaken for each other. But the distinction is not difficult usually, since in dysentery there are some constitutional symptoms—colicky pains, borborygmi, fever,—while in proctitis the symptoms are confined more to the rectum.

In typhoid fever of sufficient severity to cause diarrhoea there are always continued fever, cephalalgia, pain in the back and extremities, or other typhoid symptoms, as well as the typhoid Widal reaction. But an acute catarrh of the upper part of the colon may at first be attended with fever and other constitutional symptoms that, by their resemblance to typhoid fever, justify hesitation in adopting a diagnosis.

**TREATMENT.**—The majority of acute diarrhoeas are due to indigestion of some sort and are of short duration. Their treatment is simple; they are often corrective and remedial in themselves, expelling offending materials and subsiding promptly without any treatment. The restoration is more prompt if, after its contents have been evacuated, the intestine can have a brief period of rest. Hence, a low diet and fasting are among the best of remedial measures. Absolute fasting is not necessary, but till convalescence is established the diet should be low. Important as this is for slight attacks, it is much more urgent in prolonged and severe ones, especially in weakly people and in children. The patient may be nourished by gastric digestion as far as possible, and thus the intestine may be given rest. Stale bread and light crackers are the best farinaceous foods; corn starch, rice, tapioca, and arrow root are less eligible. Milk is the best fluid food. If fresh, it may be taken raw; otherwise it is better pasteurized (heated to from 160° to 170° F.; it should never be boiled, as thereby its digestibility is reduced.) Beef-tea is admissible only if largely composed of fine particles of muscular fibre; beef-tea that is transparent throughout is not good. Beef juice is highly nutritious and easily assimilated; scraped raw beef is one of the best possible foods for diarrhoea in any age or condition, and may be eaten almost *ad libitum*. It is rarely objected to by the patient, and if it is it can be easily made palatable by the addition of sugar, salt, pepper, and spices. Eggs, raw or slightly cooked, are always allowable; very slight cooking adds to their digestibility. Uncooked white of egg may be mixed with water and taken as a drink, or in any other way that the patient may prefer. Six to ten eggs may thus be used by an adult each day. Oysters, slightly cooked, or preferably raw, are digested easily and rapidly by the stomach, as are also tripe and pigs' feet. Liquid foods, especially

milk, may with great advantage be peptonized. Peptonizing of foods is an excellent procedure in any diarrhoea in child or adult. The time and frequency of eating should be regulated carefully, especially in severe and protracted cases. By trial of small portions of food the dose should be found which can be taken without disturbing the intestine, and this should not be exceeded. Next, by trial, the greatest frequency with which this small meal can be repeated without harm is to be determined and adhered to rigidly, whether the daily number be three or ten.

In the simple cases due to indigestion, beyond the regulation of the diet, rest and warmth of the body, very little treatment is called for. A slight stomachic stimulant or an opiate, to check pain and nervous perturbation, may be needed at first, or later if the attack is prolonged. If pain is sharp and purging severe, opiates should be given promptly, and by the hypodermic method, if vomiting renders absorption by the stomach uncertain. One of the best combinations of opium for internal administration is the camphorated tincture; the deodorized tincture is an ideal fluid opiate; but the best preparation of all is morphine. Chloroform, ether, tincture of capsicum, aromatic spirit of ammonia, and other aromatics are frequently used alone, or added to the opiate with happy effect; but the opiate alone is nearly or quite as useful, and has the advantage of simplicity. The subnitrate and salicylate of bismuth are good adjuvants to the opiate.

For the diarrhoea of indigestion and biliousness, it is a good plan of treatment to give repeated small doses, or a single large dose, of some laxative, like castor oil, rhubarb, or the salines, with, or followed by, a few drops of tincture of opium. Much of the good effect of this plan of treatment is probably due to the free expulsion of offending material, including micro-organisms and ptomaines. For the diarrhoea of indigestion—especially the more chronic cases—nothing will take the place of measures to improve the digestion. Alcoholic liquors, tobacco, and coffee, as well as stimulating condiments, if they have been used, should be abstained from as far as possible.

Tonics are indicated for the general health and for digestion, and the patient should rest from labor and have the best of hygienic influences. Of the general tonics the most useful are quinine, iron, strychnine, arsenic, and mineral acids. One tonic that deserves to be more employed for diarrhoea than heretofore is the solution of nitrate of iron. Sulphate and phosphate of sodium, ipecacuanha and euonymin exercise a tonic influence upon the digestive function of the intestine, liver, and possibly the pancreas. Diarrhoea produced by fermenting and poisonous food tends to be severe, and treatment should be prompt. It is usually best to give morphine hypodermically, as it is unsafe to trust to slow absorption by the stomach. A dose of gr. ½, repeated in thirty minutes if necessary, will usually stop the diarrhoea as well as the vomiting. Rest and warmth to the extremities must be enjoined.

Acute diarrhoea in children is usually susceptible of prompt improvement by an early regulation and lowering of the diet. But first the alimentary canal must be thoroughly evacuated of all undigested food and irritants. A slight diarrhoea, even for a day or two, is no proof of such evacuation. A laxative like oil or calomel should be given whenever it is suspected to be necessary. A cathartic has not infrequently removed undigested food taken several days before, with prompt relief of the diarrhoea. The diet should at once be reduced to one-third the usual allowance, and it should be taken in the form of numerous meals; this course should be pursued, if possible, till some improvement takes place in the symptoms, even if it requires a day or two. Then, as the conditions improve, the quantity of food may be gradually increased. Food in the slightest excess of the powers of digestion is generally harmful and aggravates the diarrhoea. If regulation of the regimen is not followed by prompt improvement, or if a catarrh of the

## Diarrhoea.

- I. Acute.
  1. Non-infectious.
    - (a) Mechanical.
    - (b) Irritative (drugs, etc.).
    - (c) Nervous.
    - (d) Eliminative.
  2. Infectious.
    - (a) Acute mycotic.
    - (b) Cholera infantum.
    - (c) Ileocolitis.
- II. Chronic.

## I. ACUTE DIARRHOEA.

1. NON-INFECTIOUS.—(a) The *mechanical diarrhoeas* result from the ingestion of foreign bodies or of foodstuffs which, from their character or their unsuitability to the feeble digestion of the infant, act as mere foreign bodies. By directing blood and nervous energy to the intestine in the absence of absorption, this material then produces diarrhoea until nature or a purgative empties the intestines. The commonest materials leading to this diarrhoea are partly cooked cereals, the coarser vegetables, unripe fruit, nuts, etc. The symptoms are those of acute indigestion. Following vomiting perhaps, come colic, some distention, and diarrhoea. An uncomplicated case shows no pathological changes.

(b) The above merges imperceptibly into the *irritative diarrhoea* where such irritating substances as the organic acids of fruit, or their seeds, or various drugs are added to the offending material. The various drugs, which in adults produce diarrhoea, do not frequently come into question, but too drastic purgatives often leave a hyperæsthesia which produces abnormal peristalsis and secretion until soothed by suitable treatment. Congestion and catarrh are rapidly produced, and steadily proceed to ulceration in the lower bowels if treatment is not prompt. The symptoms are those of the previous group intensified.

(c) *Nervous diarrhoeas* form a large and important group of cases. The process of dentition is probably an irritation which leads to diarrhoea by reflex action. There certainly are diarrhoeas which appear with the onset of dentition, persist in spite of ordinary treatment, and cease on the eruption of the teeth. These cases drag on longer than the above, the symptoms vary in intensity irrespective of careful regular diet, and the child remains irritable, restless, and sleepless.

Fright and surprise may cause slight temporary diarrhoea. Fatigue arrests digestion, and so causes diarrhoea. Cold, especially a sudden drop in the temperature, is a fruitful source of diarrhoea in infants as in adults, acting probably through nervous and vaso-motor mechanism. In the same way and by general depression, extreme heat is the all-important cause of summer diarrhoeas.

(d) *Eliminative diarrhoea* occurs in cases having an inefficiency of excretory organs other than the intestines, or toxæmias of any kind. Renal inefficiency provides the commonest example so far as we know, and Holt suggests that the diarrhoea met in acute infectious fevers is of this nature. In this entire group of non-infectious diarrhoeas, if the condition is promptly cured by nature or by treatment, and no complications are added, there is nothing typical in the stools. The bacteria found are those of the normal intestine. If the irritation is of moderate degree and of short duration, one may find only increased frequency of fairly well-digested stools, *i.e.*, the only result is increased peristalsis. Greater or longer irritation will produce more fluid in the stools—increased secretion. If the disturbance lasts many hours the liver's functions are affected, and one finds dark brown, greenish, or grass-green stools, on the one hand, or motions suggesting clay or chalk on the other, as the biliary functions are variously perverted or inhibited. Foods in various stages of digestion are recognized.

2. INFECTIOUS DIARRHOEAS.—(a) *Acute Mycotic* (Acute Gastro-enteric Infection).—This is the great summer trou-

bowels supervenes, minute doses of hydrargyrum cum cretâ, or of calomel, often repeated, may be efficacious. A tenth of a grain of calomel or an equivalent dose of the other preparation may be given every two hours, till some improvement shows itself in the stools. Next to this in value—perhaps superior to it, for children as well as for adults—is the subnitrate of bismuth, which, if pure, may be taken in large doses. A child of two years may take from gr. v. to gr. x. every two to four hours, although smaller doses are valuable. This medication should not be continued for a period of many days, for fear of the effects of retained insoluble bismuth salts.

If the diarrhoea persists, in spite of the bismuth, and if the discharges are of a watery character, the milder astringents, in small doses, may be tried, although they are not very useful medicines. The best of them are, perhaps, kino, catechu, and logwood.

To check a bloody flux, or a sudden attack of diarrhoea as it occurs in epidemics, the best course is the opiate treatment, with fasting. A hypodermic injection of morphine is probably the most potent remedy extant for checking an internal bleeding of any kind. In cases of hemorrhage from the lower bowel astringents are of little consequence, and ergot is harmful.

Chronic diarrhoea in adults, when apparently due to atony, debility, tuberculosis, or other constitutional disorders, and not to demonstrable ulceration, may be treated with mild astringents; these will do some good, but little in comparison with regimen. Probably a diet of scraped raw beef, of egg, or of peptonized milk, in minute portions, promises more than all the astringents combined. But in some of these cases, even after the most careful regulation of the diet, and after a certain amount of improvement in the digestion has taken place, the diarrhoea continues to a slight extent. Such patients sometimes feel better, are more comfortable, and improve faster if they are continually taking mild astringents or astringent tonics in small doses.

When fermentation occurs in the intestinal contents, anti-fermentatives are indicated. Perhaps the most valuable of these are the salicylates, the sulphites, the naphthols, the carbolates, and salol. Salicylate and subgallate of bismuth are rational remedies for fermentation in connection with diarrhoea, and they may be taken in doses of from gr. v. to gr. xx. every two to four hours.

In all cases of diarrhoea that are severe or persistent the body should be kept constantly and consciously warm, thus lessening internal congestion. The body should be in a horizontal posture as many hours as possible every day, since this favors recovery from intestinal diseases.

The treatment of many of the more chronic forms of diarrhoea by enteroclysis or by injections of sterilized water containing various medicaments is very proper.

Norman Bridge.

**DIARRHOEA, INFANTILE.**—**DEFINITION.**—Diarrhoea is a term used to designate all conditions arising from an increased motor and secretory activity of the intestinal tract. It is thus but a symptom, and may be met with in every degree of severity, from a mere looseness of the bowels to a profuse watery drain, exhausting the patient and resulting in death within a few hours. Infants are peculiarly susceptible to diarrhoeal disorders, which tend in them to run a more severe course, and to terminate more often fatally, than is the case in older children or in adults.

**CLASSIFICATION.**—It is very difficult and probably, in our present state of knowledge, impossible to give a satisfactory and scientific classification of the diarrhoeas of infants. All do not fall into any grouping according to pathological anatomy, for some are functional and leave no lesion. Booker has made an attempt at a scientific classification based on the bacteriology of the discharges. But our present knowledge of bacteriology, and the fact that all diarrhoeas are not of bacterial origin, render this incomplete. One is forced, then, to make use of an enumeration rather than a classification. For convenience of study we would offer the following: