Psychogenic abdomen

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PSYCHOGENIC ABDOMEN

by

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The fathers of medicine regarded three structures, the lungs, the heart and the brain, as the tripod of life: if any one of these structures fails, the whole elaborate and intricate organization of the body goes to pieces. Supporting the activities of the lungs, the heart and the brain, however, as well as the great bulk of skeletal muscle, is the digestive system. Its basic value for life has long been recognized. The folk mind, through language itself, called attention to the psychological significance of the gastrointestinal tract. As a matter of fact, this tract is one of the first organ systems in relation to which the significance of psychic factors in illness was brought home to the physicians.

"He that desireth helthe of bodye must eschew and avoid great charges of thought and care. For thought dryeth up man's bodye, hurting and leavying ye spirites in desolation and comfortless.

To eschew anger, for anger in like manner drieth up the bodye and excessive chaufeth and inflameth the membres.

Here are taught three generall remedies to conserve in helthe all creatures and especially noble men: The fyrste is to live joyfully; for joye and myrth causeth
man to be yonge and lustye."

"Regimen Sanitatis Salerni" (88)

From the earliest times in history progress in the medical sciences has been directed towards the ultimate explanation and prevention of disease in terms of the external environment. This thesis reached its culmination with the discoveries of Pasteur and the concepts of cellular pathology as developed by Virchow. Closely following these basic discoveries came rapid developments in the knowledge of the external agents of disease and the tissue changes caused by them. Naturally, this knowledge, which led to such brilliant applications in the fields of medicine and especially surgery, was interpolated into the field of mental diseases, and it was assumed that it was merely a question of time until the brain lesions and etiological agents of dementia paralytica, schizophrenia, manic-depressive insanity and the lesser mental disturbances such as hysteria could be demonstrated.

However, the expected results were not immediately forthcoming. As a matter of fact, the continued absence of positive identification initiated the beginning of a series of numerous speculations, theories and arguments on other possible etiological agents, of which Dunbar (40)
has recently afforded an excellent review. The possibility of a psychogenic role in gastro-intestinal disturbances was early proposed and he quotes Dreyfuss of an interesting view on the development of the concept of nervous dyspepsia first described as a disease entity by Leube in 1879. Ewald (1884) and others did not accept the concept of nervous dyspepsia as a clinical entity. They stressed instead the concept of nervous dyspepsia as a symptom complex constituting a part of neurasthenia or hysteria, often even the only expression of such a neurosis. Stiller (1884) first pointed out the frequency with which psychogenic dyspepsias were considered as "nervous". Giving examples, he says among other things: "That people develop gastric disturbances after financial losses and suffer from them until their financial conditions turn to the better, is an everyday experience."

At this time it was firmly believed that the causative factor for gastric disturbances rested on an organic basis, for the 1880's brought ample clinical evidence for disturbances in motility and secretion, not only in the various mental diseases, but in "nervous dyspepsia" also. Dunbar continues his review by stating that it was about this time that Glenard's enteroptosis came into vogue, and today, more than 50 years later, it still plays an
important role as rationalization of neurotic complaints, both with physicians and patients. In opposition, however, he quotes Bouveret as saying: "The tendency to localize the point of inception for neurasthenia (i.e. of nervous dyspepsia also) in the sick stomach, reminds one of the old error of the pathologists who for a long time ascribed hysteria to disturbances in the uterus or the ovaries." Bouveret counted dyspeptic symptoms among the stigmata of neurasthenia, as did Charcot.

It had been known for a long time that gastric disorders go with certain psychic changes. Flemming, as early as 1845, called attention to the frequency of gastro-intestinal disturbances occurring in the course of numerous psychic disturbances. He and others were inclined to consider gastro-intestinal disturbances as causative factors in hypochondria. Schroeder van der Kolk (64) even described melancholias as originating from the colon. Griesinger (49), in 1861, "would in no way deny that insanity may arise from diseases of the lower abdomen." Robertson (89), in 1902, among others, offered the theory of melancholia as "gastro-intestinal auto-intoxication". Especially under the influence of Alt, various psychoses and neuroses were considered as of gastric origin. "One wonders," comments Dreyfuss (37), "how an innocent gastric catarrh or dilatation
could produce psychic turmoils (such as anxiety, depression, suicide) whereas they are never found in much more serious gastric conditions such as ulcus or carcinoma."

"As far as stomach and neurosis go, cause and effect have been arbitrarily interchanged. On the basis of an unfounded hypothesis the most audacious conclusions were drawn!"

Furthermore the habit was established of seeing in psychic changes nothing but a "natural consequence" of the complaints: the psychic disturbance was only natural, even if it looked exactly like a melancholia; suicide was understandable, because the patient did not want to suffer any longer from the stomach.

Cannon (25), reviewing instances in literature going as far back as Burton's Anatomy of Melancholy, writes:

"An emotional disturbance affecting the alimentary canal is capable of starting a vicious circle; the stagnant food, unprotected by abundant juice, naturally undergoes bacterial decomposition products. These in turn may produce mild inflammation or be absorbed as substances disturbing to metabolism, and thus effect the mental state...."

"The importance of avoiding so far as possible the initial states of worry and anxiety, and of not permitting grief and anger and other violent emotions to prevail unduly, is not commonly understood, for the subtle changes wrought
by these emotional disturbances are not brought to consciousness, and are clearly known solely through physiological studies...." "Just as feelings of comfort and peace of mind are fundamental to normal digestion, so discomfort and mental discord may be fundamental to disturbed digestion."

However, there were a number of authors who emphasized and studied the role played by psychic factors in the genesis of nervous dyspepsia. Accordingly, Rosenbach (91), in 1879, separated from "constitutional dyspepsia" cases of dyspepsia following an emotional shock, labeling them "Emotionsdyspepsie." Strumpell (97), in 1902, called attention to what he termed "psychogene Dyspepsien". He believed that the vast majority of cases of nervous dyspepsia had their source in primary changes in the mental life of the patient. He proved his assertion by exact anamnesis and psychological observation. He called special attention to anxiety and experiences productive of anxiety, stressing anxiety as the primary factor, and not, as previously thought, a secondary result of the gastric disturbance. He said: "It is not the gastric trouble that makes the patient a hypochondriac, but hypochondriasis causes the gastric trouble." He sees the proof for his concept in the success of pure psychotherapy in all these cases.
Dreyfuss (37) corroborated these concessions quite emphatically and adds that it is obviously impossible to arrive at a clear conception of the nosological position of nervous dyspepsia on the basis of gastric symptomatology. He comments on the amazingly little attention that had been paid to the psychic alterations in the nervous dyspeptic being probably due to the fact that physicians unwittingly followed the descriptions given by the patients, who were only too willing to relate their somatic complaints, but very reticent about their psychic alterations. He concludes that in a majority of cases nervous dyspepsia is not a gastric disease, but that the gastric symptoms, which may entirely dominate the picture, are of a secondary nature.

Following these repeated disappointments in the search for organic pathology (35), it remained for Charcot to definitely propose that some, at least, of the mental diseases might be caused by a mere idea, or an emotion. This was fully developed by Freud in his theories of the unconscious and its relation to neurotic symptoms and very soon led to the concept of the "psychic and somatic", the "functional and organic" as mutually exclusive antitheses.

Although the falsity of this tenet was recognized by Plato (114), who wrote: "for this is the error of our day
in the treatment of the human body, that physicians separate the soul from the body," it has been only in the last two decades that progress has been made in uniting these two essential aspects of the human being. It is pointed out by Sprunt (94) that the review of literature reveals three distinctly different attitudes among practitioners toward the relationship of psyche and soma in acute and chronic disease. There is the organistic bias, the psychic bias (equally fallacious) and the organismal point of view of psycho-somatic unity. This latter point of view has been preached for many years by the Meyer school of psychiatrists, by the psychoanalysis, and by Barker among the internists. Sprunt continues by quoting various authorities, including Meyer, who says; "What is of importance to us is the activity and behavior of the total organism or individual as opposed to the activity of single detachable organs. Bleuler thinks that the question "physical or psychic?" is in many cases wrongly put and should be replaced by the question, "To what extent physical and to what extent psychic?" Mehr is thus quoted; "There is no such thing as a purely psychic illness or purely physical one, but only a living event taking place in a living organism which is itself alive only by virtue of the fact that in it the psyche and somatic are united in a unity."
Furthermore, contributions from the fields of physiology, endocrinology, neurosurgery and psychiatry have so amplified our knowledge of the relationships existing between the higher cortical functions, the autonomic nervous system and visceral functioning that a distinction between "psychic and somatic" is no longer justifiable and it is now possible to say, as does Ziegler (114): "the trend of a patient's thoughts or feelings is as much a part of him as blood, urine, heat production or metabolism and should receive no less consideration in the diagnosis of disability or disease."

The relative evaluation, however, of the psychic and somatic components in a given patient is of vital importance in both the diagnosis and treatment of the disordered state which the patient presents, whether it be a neurosis or a chronic gall bladder. For that reason a knowledge of the "psychogenic abdomen", the mechanisms by which it is produced, the means by which it is recognized and its differential diagnosis is of prime importance to both the surgeon and the psychiatrist and even more so to the general practitioner.
For the proper understanding of the mechanisms by which mental and emotional disorders are able to produce symptoms simulating organic disease of the abdomen, it is essential to have a knowledge of the autonomic nervous control of the gastro-intestinal tract, its relation to the higher nervous centers, and particularly the disturbances in physiology which result from disorders of this nervous control in any of its levels, from its intrinsic nerve supply to the cerebral cortex itself.

The tenth or vagus nerve, containing a large number of parasympathetic fibers, supplies some sensory fibers to the stomach, motor fibers to the unstriped musculature, and special fibers to the abdominal viscera. Each nerve is connected with the seventh, ninth, eleventh and twelfth cerebral nerves; with the first and second cervical spinal nerves; and with the sympathetic system. In other words, the vagus supplies the whole of the alimentary canal from the esophagus to the cecum. Some authorities believe that vagus control ends at the ileocolic sphincter; others, that it may extend further.

The stomach nerves are derived from the two vagus nerves and the celiac ganglia of the sympathetic system. The vagus nerves pass through the diaphragm with the esophagus as two branches, the left lying on its anterior and the right on its posterior aspect. Thus they reach
the anterior and posterior surfaces of the stomach respectively; each contains filaments from both the right and left vagus nerves. They unite with sympathetic fibers from the celiac plexus and pass to the stomach, with the branches of the celiac artery. The nerve fibers form two ganglionic plexuses, those of the myenteric plexus and the submucosa plexus in the muscular and submucous coats. Secretory fibers in the vagus to the glands of the stomach and the pancreas—both alveoli and islets—have been conclusively demonstrated by Wright (62). In addition, vagus nerves have been traced to the excitor cells lying in the gall bladder, the liver, and the kidney.

The intestine has a large supply of nerves from the sympathetic and parasympathetic systems. The sympathetic nerves, derived from the celiac and mesenteric plexuses, are connected with the parasympathetic from the vagi and from the second and third sacral nerves. They first mingle in the subserous tissue, traverse the outer muscular coat, and between the muscle coats form an extensive plexus of interlacing fibers and ganglion cells, the myenteric plexus of Auerbach. From the plexus, branches pierce the inner muscular coat and pass to the tela submucosa, again forming a plexus, known as the plexus of Meissner, from which branches pass to the lamina, the muscularis mucosae, the muscle tissue of the villi, and
the mucosa.

In general, the vagus is motor to the muscle of the alimentary canal and relaxes the sphincters. According to Gaskell (62), Auerbach's plexus (which lies between the circular and longitudinal coats) acts as the excitor neurons of the vagus in the intestine. A definite plexus containing nerve cells is found on the surface of the esophagus and the excitor cells lie there.

The involuntary (autonomic) system, which innervates the stomach and intestine, is constructed on certain broad principles. In the somatic spinal reflex arc three neurons may be involved: (1) the afferent or receptor neuron with its nutrient cell in the posterior root ganglion; (2) the cell in the posterior horn of gray matter which, through its axon, transmits the impulse to the anterior horn (the connector neuron); (3) the anterior horn cell and its axon - the excitor neuron - which transmits the afferent impulses to an involuntary muscle.

From the excitor cells, fibers arise which seek out the various organs to which they are accredited.

Connector fibers leave the cerebral nervous system in three out-flowing systems: The cranial, thoracolumbar and sacral. The connector cells in the thoracolumbar region, their fibers, anterior roots, all their ramifications, and their excitor neurons constitute the
sympathetic nervous system proper. The cranial and sacral divisions, having complimentary physiologic actions, constitute the parasympathetic system.

For practical purposes the extrinsic nerve supply may be described as consisting of four connecting motor neurons, the first arising in some portion of the cerebral cortex and passing by routes yet unknown to the diencephalic centers. The second, or suprasegmental fibers, arise in the floor of the third ventricle and pass to the cranial and spinal segmental systems. Running up and down between the various levels of the cord and brain stem are numerous connecting fibers constituting an inter-segmental system. The third neuron arises in the segmental visceral system of the spinal cord and, as preganglionic fibers, extends to the sympathetic and parasympathetic ganglia, the former lying close to the spinal cord, the latter adjacent to the organs which they supply. The fourth neuron extends as post-ganglionic fibers to the intrinsic plexuses and to the motor cells and mucosa directly.

These various divisions may be considered as functioning in a series of widening super-imposed reflex arcs. The most primitive is a direct stimulation of the intrinsic plexuses by a bolus of food, producing a local muscular or secretory response.
As the fourth, post-ganglionic neuron, is involved a similar stimulus results in a more generalized coordinated effect as a peristaltic wave associated with the opening of a sphincter, the so-called ganglionic reflex.

A spinal reflex, in which the third neuron is concerned may be illustrated by the act of defecation, which is controlled by segmental centers in the sacral, coccygeal and lumbar divisions of the cord. The suprasegmental reflex involves the second neuron and the hypothalamic region, and is the mechanism by which all the visceral reflexes are integrated. The diencephalon is of particular interest here in that, to quote Fetterman (45): "it is the center through which emotions are physiologized."

The diencephalon, or interbrain, is that region at the base of the brain which surrounds the fourth ventricle, extending from the optic chiasma anteriorly to the pineal gland posteriorly and from the thalamus to the tuber cinereum and the corpora mamillaria below. Embryologically, the diencephalon is one of the oldest parts of the brain. It is closely related to the pituitary gland, the thalamic centers and to the centers of respiration and vasomotor control in the medulla, and it may be conceived as the center for the vegetative control of the body. According to the newest investigations, both nervous sys-
tems are thought to have centers which are located in the diencephalon. The center for the parasympathetic division is located in the hypothalamus, in the floor and anterior wall of the third ventricle, and is controlled, according to Cushing (32), by the pituitary gland. The center for the sympathetic division is situated in the posterior hypothalamus in the walls of the third ventricle (17,60) and is controlled by the adrenal medulla.

Most important, however, is the cortical control over these centers. The first neural connection, between the cortex and the vegetative centers of the interbrain, is the least understood and its specific pathways are still hypothetical. That it possesses both an efferent and an afferent limb is easily demonstrated by the increased secretory and motor activity occasioned by the sight and smell of food, and the sensations which reach the cortex from hunger contractions of the stomach. It is by these neural pathways that the emotional activities of the brain are manifested by visceral reactions.
From the earliest days, when the process of digestion was regarded as a sort of cooking, down to recent times, knowledge of the service of the digestive system to the rest of the organism has been slowly acquired. We now know that the nicely interrelated processes which take place after food has been chewed and swallowed are directed towards altering the food so that it becomes soluble and therefore capable of passing through the intestinal wall. The various juices poured out by the digestive glands are able to render the food soluble, even when they act in a warm glass vessel. Since the essential digestive changes proceed if the requisite factors are present, the question then arises as to how to account for the disturbances of digestion which are so often the source of abdominal discomfort.

There are two ways in which circumstances in the body may profoundly disturb the normal processes which take place in the alimentary tract. The state of the body may interfere with the normal quantity and quality of the secretions which these glands pour out and thereby may fundamentally lessen the possibilities of properly dissolving what we eat. Again, in order that the food may be brought to the regions where the various digestive secretions are discharged and there thoroughly mixed with these secretions, it is necessary that the muscular
walls of the digestive tract shall act in a propulsive manner. And again, the state of the body may interfere with the motions of the tract and thereby seriously upset digestion.

The essential digestive glands, as well as the muscles of the digestive tract, are under control of two sets of nerves, as was mentioned previously. One set, represented mainly by the widely-effective vagus nerves, acts in the main to exert a positive influence on the digestive process. When active these nerves not only cause the glands to secrete, but they also have a positive action on the muscle of the whole alimentary canal down to the large intestine. The second set of nerves, represented by the sympathetic system, has mainly an inhibitory or checking action on the digestive secretions and is capable of stopping the movements of the stomach and intestines. In fact, they are capable of bringing the digestive process to a complete standstill.

Recent work has shown that the vagus effects to the stomach and small intestine are achieved through a chemical transmitter. As a matter of fact all nerve impulses outside the central nervous system seem to require such intermediary for their expression. The sympathetic post-ganglionic fibers liberate peripherally a substance which physiologically, and probably chemically,
is identical with adrenalin. The parasympathetic post-ganglionic fibers liberate acetylcholine at their terminals. Dale (62) found that stimulation of the thoracic vagi, adequate to cause contractions of the stomach wall, produces a manifold increase in this nerve terminal acetylcholine. And experimentally, Bunting and his colleagues (62) were able to produce an acetylcholine-like substance arising in the splanchnic area during vagal stimulation.

The pioneer work of Cannon (22,23) demonstrated that cats enraged by dogs responded with an increased output of epinephrine, a rise in blood sugar and an elevation in blood pressure, increase in heart and respiratory rate, dilatation of the pupil, constriction of the peripheral blood vessels, and inhibition of the secretory and motor activities of the gastro-intestinal tract. He further demonstrated that these responses may be duplicated by artificial stimulation of the sympathetic nervous system or by injection of epinephrine.

The parasympathetic nervous system, on the other hand, results in the exact opposite physiological reactions. This response can be duplicated by the injection of acetylcholine and certain related substances. These two nervous pathways of the autonomic nervous system check each other; the sympathetic speeding certain functions, that is,
catabolic; and the parasympathetic system slowing these same functions as an anabolic control. Thus given these two opposing nervous influences on the gastro-intestinal tract, we are now in a position to understand how general bodily conditions may effect digestion and absorption of food.

The excitatory nerves—chiefly the vagi—are those promoting the digestive secretions, and the propulsive and churning actions carried on by the muscular coat of the alimentary tube. In certain conditions, these stimulatory nerves may not be active and thus digestion suffers for absence of secretions, ferments required to dissolve the ingested nutriment and indolent muscles which do not perform their functions. On the other hand, the general bodily condition may be such as to cause discharge of impulses along the nerves which check secretions from the glands and stop the gastro-intestinal movements. Cannon (26) has noted the total absence of motion in that part of the esophagus composed of non-striated muscle of the digestive tube if vagal impulses are interrupted. Food remained stagnant many hours in esophagus and stomach, and only gradually recovered ability to carry on. When that state was recovered, however, the presence of food resulted in the usual activities. It seems that the recovery of functional powers in both
esophagus and stomach is due to the development of a moderate state of contraction so that the muscle exerts pressure when it is stretched. Ordinarily this tone is established by vagal influences, and the primary effect of excluding these influences is a loss of this state. Thus, we can conclude that the vagi are not motor nerves, but more properly designated "tonic nerves". The tonic state of the smooth muscle of the digestive tract is a basic condition for activity; the various parts of the tract can carry out effectively their functions, if only that condition is present.

These stimulatory nerves are related in an important way to bodily vigor. The evidence on which that statement is based is that these nerves participate with the rest of the body in any debilitation due to illness. For example, while the vagal connections between the central nervous system and the alimentary canal are intact, the general bodily weakness which is associated with a serious infection is characterized by a soft toneless state of the muscles of stomach and intestine. This observation has been corroborated many times by roentgen ray studies of animals very sick. Furthermore, Beaumont (24), the pioneer American physiologist, who made careful observations on Alexis St. Martin, the man with a hole in his stomach, reported on
one occasion that his patient complained of headache, lassitude, dull pains in the left side, had a furred tongue inclined to dryness, and a generally sallow countenance. In these circumstances, Beaumont noted that St. Martin's stomach was still full of food six hours after a small breakfast. Here again is evidence that symptoms of general indisposition were associated with striking disturbances of the processes in the stomach and we may assume that the indolence or total inactivity of these organs is due to lack of moderate contraction or tone necessary for peristalsis.

Inactivity of the digestive organs may also be interfered with by severe and exhausting labor. It seems possible that the central nervous system is depressed by exhausting activity and that consequently a tonic state is lacking in the whole gastro-intestinal tract, accompanied by absence of normal secretions from the digestive glands. Alvarez (26) has remarked, on the basis of large experience that a man who sits down to a hearty meal after an exhausting physical effort will occasionally suffer afterwards for several days with abdominal pain, flatulence and diarrhea. Again we note, in human cases, that the digestive tract participates with the rest of the body in depressing conditions.

Besides the influence of vagi on muscles of alimentary
canal there is the influence of these nerves, and the associated nerves governing the salivary glands, in calling forth the digestive secretions. Many years ago the great Russian physiologist Pavlov (85), reported that besides the well known watering of the mouth, i.e. the psychic secretion of saliva when pleasant food is smelled or tasted, there is also a watering of the stomach, i.e. a secretion of the gastric juice. It has been discovered, furthermore, that there is a psychic secretion of the pancreatic juice. The discharge of digestive fluids from the glands of the stomach and from the pancreas depends upon the vagal nerve supply to these organs. These so called "psychic secretions", occurring at the first appreciation of the pleasures of appetite, are highly useful in starting the process of digestion in a satisfactory manner. It might be very interesting to relate how Heyer (53) went about to establish this concept of "psychic secretions":

Individuals having been carefully examined and found to have healthy gastro-intestinal tracts were hypnotized. In deep hypnosis a fine sound was introduced into the stomach of these subjects, they knowing nothing about the experiment. The "empty" stomach content was first pumped out. If after this, no secretion occurred for ten minutes, the subject was given the suggestion of
taking a cup of bouillon, a slice of bread or a glass of milk. Swallowing was prevented by hypnotic command, and the saliva flowed out of the mouth. After a latency period of two to ten minutes, there was always a plentiful flow of juice through the sound. The juice was collected every five minutes and examined as to quantity, acidity, and albumin digestive potency. The absolute quantity seemed to correspond to the vividness of the suggestion as it was received. The curve was entirely different according to which food had been suggested, just as in Pavlov's findings with dogs. Similar changes specifically different for the different foods suggested were found in the albumin digestive potency.

In the course of these experiments, i.e., at a time when the gastric secretion was well under way, these subjects were subjected to vivid affects: fear, fright, and worry on the one hand; joyful expectation on the other. These affects regularly disturbed the flow, irrespective of their euphoric or dysphoric nature. (It must be remembered that euphoric sensations become effective more slowly than dysphoric; the idea of danger of life, for example, takes possession of a subject suddenly and more compellingly than, for example, that of winning a lottery.) Accordingly, secretion stopped more slowly with euphoric ideas, whereas dysphoric
ideas stopped it instantaneously. When the disturbing sensation was retracted in time the secretion usually began again. Similar results were reported about the same time by Bennett and Venables (10). As an interesting finding Heyer mentions the observation that the flow once started could not be stopped with eumydrin; paralysis of the vagus by the drug was efficient only when it was injected at the latest before the beginning of secretion. Finally, the observations indicate that in the human stomach the hydrochloric acid may be secreted in varying concentrations. Hypersecretion and hyperchlorhydria then would not be identical, and this certainly is not without significance for nervous gastric disturbances.

Cannon (26) has further suggested that there might also be a psychic increase of muscular tone in the stomach and intestines - a state resulting from nervous impulses when food is relished either in anticipation or at the time it is eaten. This suggestion and the evidence for a psychic tonus of the gastro-intestinal tract has received support from clinical observations. It has been noted in patients with large abdominal hernias in which the contractions of the intestinal coils could be easily seen that whenever a nurse approached bringing food, peristaltic waves could be seen as they moved along the small bowel. It has been noted, further-
more, by means of the roentgen rays, that food will advance more rapidly in the intestines if a second meal is given a short time after the first. It is an observation of considerable importance that digestion progresses more rapidly if the viands which are eaten are palatable than if they are not.

All this testimony indicates the intimate relations between the proper functioning of the digestive tract and the general state of the organism. If the tract functions satisfactorily the energy-yielding food becomes the means of supporting all the activities of our body in a highly efficient manner. If there is debilitation or weakness, as a consequence of exhaustion, whether from excessive labor or prolonged disease or acute infection, so that the normal moderate degree of nervous activity or tone is greatly reduced, the muscles of the gastro-intestinal tract show the tonelessness of the muscles of other parts of the body, and in consequence the digestive organs are not able to carry on vigorously their normal functions. In these circumstances it is clear that a vicious circle may be established such that the debilitated organism does not receive the nutriment which is necessary for its upbuilding and thereby the debilitated state becomes accentuated. When this condition prevails food must be served deli-
cately and temptingly and in small amounts. It must be food easily digested and must appeal to the appetite by agreeable aroma and flavor. If these precautions are respected the vicious sequence may be broken by exciting to some degree the fundamentally important tonic nervous impulses.

As implied, the sympathetic nervous system has an inhibitory or checking action on the digestive secretions and the movements of the gastro-intestinal canal. These nerves are especially brought into action by worries and anxieties and other forms of emotional upset. The extreme sensitiveness of the stomach and intestines when emotions are involved has long been recognized. The Bible refers to "bowels of compression", a phrase which points to a belief, centuries old, that the intestines participate in the expression of deep feelings. Observations (26) on lower animals have fully justified the ancient belief. When a loop of dog's intestine was arranged so that it would be observed under the skin, its tone and activity were seen to be constantly changing, as some one approached the dog, or there was a patting of his head, or a look of reproof, or the mew of a cat. Innumerable cases could be cited to illustrate the abolition of the movements of the stomach and intestines in human beings because of the influence of strong
emotions. Alvarez (26) has described a patient—an excitable young man—who, as the roentgen rays revealed, still had in the stomach the meal eaten six hours before. Examination showed that no organic fault existed. Then inquiry brought out the fact that the patient had been greatly distressed by a quarrel in a society to which he belonged, a quarrel which was to reach its climax within a few hours.

Strong emotions may bring to a standstill not only movements of the stomach and small intestine but also movements of the large intestine. A victim of a bad railroad accident has been reported by Hertz (24), a man who for more than half an hour was buried in the wreckage of the cars. Although having normally the most regular habits, he was so deeply affected by the horror of his experience that through several days his bowels could not be made to act in spite of the use of all of the agents to stimulate them.

Coincident with an interference with the muscular activities of the alimentary canal induced by strong feelings is the interference with the secretions of the digestive glands. The ancient Saxon "trial by ordeal", by which an innocent suspect was distinguished from the guilty one according to the difference in their capacities to swallow dry meal always seemed to postulate
improperly a more than natural phlegm and salivation in the suspect with a clear conscience. Most of our mouths go dry on suspicion! We are however familiar in our daily experience with manifestations resulting from emotions, such as lacrimation, dryness of the throat, failure of appetite and disturbances of the heart. The dry mouth of the anxious person called upon to speak in public is a common instance. A like observation has been proved true also of the secretion of gastric juice. Opportunity for such observations on human beings is offered when surgeons have to make an artificial opening into the stomach because of closure of the esophagus. In these circumstances the patient must chew his food as usual and then let it be carried to the stomach in a tube inserted through the artificial opening through the abdominal and gastric walls. In one case of this character which was carefully studied by Cannon (26), the boy chewed agreeable food and was seen to have, as a consequence, an outpouring of gastric juice. If he became vexed, however, and began to cry, the chewing of agreeable food shortly thereafter was not attended by the usual appearance of the gastric secretion. The interesting point in this case and in other similar cases is that the effect of a passion lasted for a considerable period after serenity had been restored. In lower
animals it is possible to study quantitatively the degree of interference with the digestive secretions produced by emotional excitement. Thus a dog, excited for five minutes by the presence of a cat and then fed in the usual manner, secreted during the twenty minutes only a few drops of gastric juice; the routine amount produced during that time was nearly two teaspoonfuls. The pancreatic juice likewise may not be secreted if excitement prevails; merely bringing a cat into the room where there is a dog may completely stop the dog's pancreatic secretion. Obviously the digestive glands are as readily deranged as are the digestive muscles when sympathetic impulses are discharged in excited states.

One of the great disturbing emotions, fear, may be regarded as anticipated pain. On this basis we might expect that pain would produce the same effects as fear. This, indeed, is found to be true. Painful stimulation brings the sympathetic system into action much as great excitement does, and consequently has a similar influence on alimentary functions. By means of roentgen rays, Cannon (26) has many times noted that the gastric movements in experimental animals were completely stopped in any condition which was accompanied by signs of worry or anxiety. This fact has been substantiated many times in human cases, and it was afterward learned that these
states of mind were associated with a depression of the activities of the digestive glands. However, the interference with the digestive process by excitement is only an incidental part of the total picture. The sympathetic nervous system is made up of a series of ganglia at either side of the midline at the back of the chest and abdomen and of nerves which connect these ganglia with the spinal cord. The fibers of these connecting nerves are distributed up and down the chain of ganglia so as to produce an interlocking control. In each ganglion which these fibers touch there are connections with the ganglion cells. This organization provides for a widespread distribution of nerve impulses discharged from the ganglia to the various viscera - heart, liver, spleen and gastro-intestinal tract. The sympathetic nervous system, furthermore, is connected with the adrenal medulla; it causes that internally secreting gland to discharge adrenaline into the blood stream. This powerful substance has almost everywhere the same effects as the sympathetic nerve impulses. It is clear that excitement is accompanied by discharge of adrenaline into the circulating blood in experimental animals (11) and there is evidence that the same change occurs in human beings.

The familiar increase of heart rate and of blood
pressure which attends emotional excitement need not be stressed. Accompanying these changes, however, there is a redistribution of the blood in the body so that it is delivered in much less volume to the digestive organs and in much greater volume to the heart, to the brain and to active muscles. The other effect of adrenaline is an abolition of the effects of muscular fatigue.
Whereas fatigued muscle much less responsive than before its activity, will recover its responsiveness in the course of an hour, a small injection of adrenaline into the blood stream will restore its original sensitiveness in a few minutes. Possibly the great feats of strength and endurance which are reported when men are laboring under great excitement may be explained by this defatiguing effect of adrenal secretion.

These various changes accompanying deep emotional disturbance seem disconnected and independent facts. By considering them in relation to the natural accompaniments of great fear or great rage, however, we find a clue which gives them all a common explanation. In wild life and in the primitive existence of man the necessity of a struggle for existence was a common factor. Foes were on every hand, and only by being alert could life be preserved. Fear has long been recognized as the accompaniment of the instinct to run
away or to escape. Rage is the accompaniment of the impulse to fight or attack. Fear and rage are closely related. The necessity for struggle, either fighting or running, calls into action all of the great muscles of the body, perhaps in a supreme effort. Then an increase of sugar in the blood, would be advantageous in supplying the energy for prolonged muscular exertion. The abolition of muscular fatigue by adrenaline would allow the muscles to continue acting for a longer time. The rapid heart, the increased blood pressure, the higher concentration of red corpuscles in the blood would bring to the laboring muscles the oxygen which is needed to burn their acid waste products. The dilation of the bronchioles would allow the faster breathing to occur without greatly increased friction. And the more rapid clotting of the blood would help to preserve that precious fluid if there should be injury. These changes all fit together as rendering the bodily forces more effective in struggle.

Note that the readjustments in the circulation call for a contraction of the blood vessels of the abdominal area and a shifting of the blood so that there is a greater volume flow per minute through the vessels of the brain and heart and the active muscles. In these circumstances digestion is impossible because of lack
of proper blood supply to the digestive organs. When there is a great emergency, when life is at stake, the digestive process has a minor importance.
ETIOLOGICAL ASPECTS

The morphologists of last century found it helpful to visualize the structure of vertebrates, and indeed of all coelomate animals, as based on a tube within a tube. From without inwards there is first a stratified epithelial covering, next a layer of striped muscle, then the space of the coelom or body cavity and finally the inner tube composed externally of plain muscle and lined by an epithelium which is usually columnar. The segmental arrangement of the nerve supply to the outer tube had long been recognized, but it was only towards the end of that century that the researches made it possible to realize the segmental character of the nerve supply to the inner tube. Thus arose the classification into somatic motor and sensory nerves and splanchnic or visceral motor and sensory. It was, moreover, clear that the visceral type of neuromuscular mechanism was not confined to the inner tube and its annexes, but spread as far afield as the peripheral blood vessels and even the pilo-motor muscles of the skin.

Clinicians were not slow to grasp the import of this doubly segmental arrangement. As long ago as 1887, Ross (69) showed that unexplained sensations from a diseased viscus would be perceived by the individual as cutaneous or subcutaneous sensations. His observations laid the foundation for the modern conception of re-
ferred pain, but in addition he recognized existence of deep visceral pain. Langdon-Brown (69) reports other opinions, for Head regarded the zone of cutaneous pain or hyperesthesia referred from the skin falling into a segment of the spinal cord already irritated through its splanchnic supply. This has been recently confirmed by Jones in an ingenious way. He injected novocain into the hyperesthetic skin area and found that while this abolished the superficial pain it left the deeper pain unaltered. But if the sympathetic does not carry painful sensations what is the channel by which such pains assert their existence? Edgeworth working under Gaskell's direction concluded that the large medullated fibers scantily present in the sympathetic did, unlike the non-medullated ones, convey sensation. The matter took a fresh turn when Sir Arthur Hurst (57) explained that the observations on the apparent comparative insensitivity of visceral structures were due to the application of an inappropriate stimulus. For tubes containing plain muscle, he mentioned, the effective stimulus was tension. The balloon method of expanding different portions of the alimentary tract revealed that subjective localization of the pain was most accurate when the structure involved was most fixed, e.g. in the intestine over the appendix or at the hepatic or splenic
The next step was the localization both of emotional effects and of sympathetic centers in the basal region of the diencephalon. This established a connection between between emotional expression and the visceral nervous system. It is necessary, however, to be cautious before regarding this as establishing a contrast between organic self of the diencephalon with the cognitive self of the cortex, for, as has been pointed out, the evidence is merely that the diencephalon is the apparatus through which emotions are expressed. It is not justifiable to say that they originate there. Indeed, there has been much debate as to whether emotions originate centrally or peripherally. This has chiefly resulted from a misunderstanding of the nature of the problem. Mental activity naturally largely depends on the stream of afferent impulses pouring in on all sides. As Michael Foster (69) remarked; "We can hardly doubt but that volitional and other psychical processes would soon come to a standstill and consciousness vanish" in their absence. It is not irrelevant to mention here Pavlov's dogs (85) which went to sleep when the inhibitions begotten of conditioned reflexes piled up sufficiently. But such inhibitions, whether in man or dog, are exerted cortically, so that the stream of afferent impulses is
still reaching the basal ganglia, and may there evoke a violent response with all the outward expression of emotion as in the "sham rage" evinced by Sherrington's decerebrate dogs. Thus in man the afferent impulse might be such as to rouse an unpleasant memory which is repressed by the cortex of the brain, but does not fail to evoke at a lower level appropriate emotional reactions. Hence the patient's distress and fear, for he experiences a discomfort, the cause of which is uncomprehended because it has been forgotten. This, however, is different from asserting the peripheral origin of the emotions, a theory which in its most uncompromising form was stated thus by William James (70): "The bodily changes follow directly the perception of the exciting fact and our feeling of the same changes as they occur is the emotion." But surely apart from direct painful stimuli, it is the association of ideas linked, to the perception of the exciting fact which produces the emotion, even though that association remains in the unconscious.

Sherrington (69) holds the opposite view to James, believing that the visceral functions only reinforce the emotional state and are secondary to cerebral activities. Michael Foster seems to reconcile the two extremes in his statement that psychical processes are "functions of the connection of the cortex with other parts of the
central nervous system... and of the connections of the several parts of the cortex with each other." McGregor (69), however has strongly argued against what is known as the James-Lange theory, and he says of emotion, it "is an activity which may take place not only consciously but unconsciously, is capable of manifesting itself without the quality of awareness... Just as the cortex cannot cause, so likewise it cannot prevent, those stormy processes of the hypothalamus that increase the blood sugar, accelerate the heart, and stop digestion. An inhibited emotion, therefore, is inhibited only in its external manifestations; its internal manifestations may be very intense not withstanding the absence of outward show."

Although it may be assumed by many that the mental appreciation of emotions follows and is the result of visceral changes induced by the vegetative nervous system, as does the James-Lange theory of emotions, the majority of psychologists and physiologists believe that emotional reactions are primarily psychic and through the cortical dominance over the diencephalon produce visceral changes which are fundamentally of a protective nature. As expressed by Hunt (54): "The nervous system then is composed of a closely related series of ascending functional levels in which the vegetative system is the oldest
and the cerebral cortex the most recent in its development. Between these two lie the various reflex centers of the interbrain and the forebrain. These various systems are united by numerous association systems and each higher functional level exerts a controlling and inhibiting influence on the lower level. And the psychological level is the highest in functional importance; it has a supreme power of control and guidance over all the other levels of the nervous system. This being true, it is not difficult to understand why mental states associated with anxiety, fear, depression, despair and prolonged conflict cause disorder in other portions of the nervous system controlling visceral and somatic function."

This close neuro-endocrine relationship existing between the cortical and vegetative functions and their somatic and visceral expression is illustrated by the following diagram of Fetterman (45), "Forming a vicious cycle forged by fear."

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Physiologic Change

Autonomic Nerves          Physical Disease
                        ↓ FEAR
Diencephalon               Toxemia
                        ↓ Emotional Disorders
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It is by such a mechanism that the disordered mental and emotional states are able to express themselves in pathological changes and symptoms. The more pronounced the emotional content of a mental disorder the more profound are the somatic changes produced thereby, and Fetterman (45) says: "The essence of a neurotic illness is some emotional disturbances, often fear, and the viscera are the voice and vocabulary of the emotions. Conflict causes dizziness; discouragement, disturbances of the cardiac cycle; despair deranges digestion; shame alters the skin color; tension induces tremor; indecision brings about insomnia; fear spreads through the autonomic system to upset any and all of its functions."

The autonomic nervous system should normally act as a whole. It is hoped to try to establish the hypothesis that many of the manifestations of functional visceral disorders are due to dissociation and perseveration within that unit. By perseveration is meant that persistence of the affect long after cessation of the stimulus. But it must be remembered that although the stimulus may have ceased in its original form it may be maintained by fear; fear in animals is generally restricted to the immediate present. Man is apt to project this fear into the future and thus the visceral effect continues. It may be that both dissociation and
perseveration assert themselves in a particular organ because it is, in Adler's phrase, the seat of a structural inferiority.

Broadly speaking, we can say that the somatic nervous system is concerned with adaptation to the environment, the life of external relation, while the splanchnic nervous system occupies itself with the life of internal relation. Man enters life with the former much less advanced than the latter. Every infant has to learn to stand and to walk, whereas his visceral musculature normally acts as if by instinct, so that a visceral muscular incoordination such as so-called congenital pyloric stenosis is rare whereas a toddling gait is a normal stage. On the other hand, the perceptive capacity of the outer tube is much greater than that of the inner tube, due to presence of special sensory end organs, which, as has been pointed out, while lowering the threshold for the reception of their specific stimulus, raises it against others, thus allowing a discrimination which is lacking in the visceral system. Indeed the power of localization is so indifferent in the inner tube that the pain may be referred to the outer tube. In this process, the cutaneous reference of visceral sensations may play a useful part.

The practitioner has opportunity to observe human nature
from the time it is born in the new baby. It is not at all difficult for him to observe in a small infant a triad of primitive symptoms - manifestations of the autonomic nervous system: Love (of self), anger and fear.

As time goes on under reasonably normal family environment, one begins to see various gradations of the primitive emotions, as well as a synthesis of two or three of them at the same time. The love of self begins to expand until it takes in other objects such as the mother, but always for selfish survival or pleasure reasons. The child is then able to experience such emotions as jealousy, resentment and disappointment, all "synthetic" in character.

At first glance this combination of emotions would seem incapable of analysis. But consider jealousy, for example, in its principles and it will be discovered that there must always be a love object, an interfering object and the child itself. In other words, the child loves or feels possessed of something but fears that something will be removed. It is angered at the person who is interfering. This is jealousy and has elements of all three of the primitive emotions.

With the development of the infant to adulthood, however, psychologists recognize a more complete list of primary emotions. Sadler (67) enumerates the following:
Fear, disgust, wonder, elation, subjection, tenderness, sex hunger, food hunger, security, hoarding, pride of creation, anger.

According to this author these are combined to form fifteen secondary emotions and these again combined to make ten "sentiments". The sentiments are again combined to produce seven "controlling convictions".

In turning our attention to the extrinsic agencies for explanation of gastro-intestinal misbehavior which result from emotional disturbances, our task is more difficult. If for no other reason than the length of the gastro-intestinal tract, its functional disorders probably constitute the largest single group of organ misfunctioning in medicine. Next to the skin, the gastro-intestinal system has more contact with the outside world than any part of the personality. It receives more direct demands for adjustment and accommodation, more insults and abuses, and a greater variety of opportunities for gratification than any other set of organs suffers or enjoys. Herein are to be found the greatest professional successes, and on the other hand the most dismal diagnostic failures. There is no ailment, either acute or chronic which may beset mankind that does not either directly or indirectly overthrow the normal processes and behavior of the gastro-intestinal tract to a
greater or lesser degree. For example, early tuberculosis, unrecognized oncoming pneumonia confused with appendicitis, metabolic deficiency disorders, syphilis, allergic manifestations and many more. Thus we may follow on and on through the category of man's many ailments in an endless repetition.

The most subtle and vicious extrinsic disorganizing agency of the gastro-intestinal tract is found among the fundamental psychopathic inferiors, using this term in its broadest sense, which carries with it gradations ad infinitum. Since the behaviour of all living organisms depends on the nature of the biological material, the most important single factor is surely the quality of the germ plasm inherited from the ancestors. You must not expect to gather grapes of thorns or figs of thistles. A great percentage of gastro-intestinal disorders originated from this group. It is a reasonable sequence when the normal poise in such patients is disturbed. Their illness is definite, just as much so as a patient with a true peptic ulcer, and it may display clinically all the usual signs, and likewise simulate any true disease of the gastro-intestinal tract.

Alvarez (2) has recently offered the comment that a large percentage of a gastro-enterologist's practise is made up of those persons who were born with a frail type
of body into which "poor materials" seem to have entered. It is his opinion that the most defective and troublesome of all the organs in the bodies of these people is the nervous system. Furthermore, congenital defects or disturbances arising in the glands of internal secretion can and do affect secondarily the efficiency of the nervous system. It is because of this defect that they cannot stand the ordinary strains of life. Any little break in routine, any conflict with other human beings, any hurry, or any prolonged effort leaves them worn out.

In addition, it is his opinion that careful questioning will in many cases reveal that the constitutionally inadequate person with sensations of extreme fatigue is a relative of the insane. These people often suffer from symptoms which are best explained by assuming that the autonomic part of the nervous system is unstable, and that the poor victim is constantly being upset and tortured by unnecessary outpourings into the tissues of powerful substances such as acetylcholine, sympathin, epinephrine and histamine which we now know are formed as a result of activity in nerves or in smooth muscle. It is believed also that recurrences correspond closely with those that are seen in manic depressive insanity, and are timed perhaps by one or more of the cycles which we know occur in the various phases of bodily metabolism.
If we were to assume that the physical and mental make up of each one of us was dependent on the particular assortment of genes, it would seem inevitable that many of the relatives of the insane must be afflicted with curious nervous abnormalities and inadequacies; with feeling of weakness, fatigue, and mental depression which stop short of actual melancholia; with insomnia, mental overactivity, excitability, and irritability which stop short of mania or epilepsy, and with curious sensations in different parts of the body which stop short of being hallucinations. Similarly, upsets in the functions of the involuntary nervous system which stop short of producing Raynaud's disease, hyperidrosis, paroxysmal tachycardia, nervous vomiting, asthma, giant urticaria, or possibly exophthalmic goiter or migraine are commonly severe enough to give the patient much uneasiness and distress, and a most disconcerting awareness of something decidedly wrong with various parts of the body.

Moreover, these statements, not conjectures, certainly have not been made without some basis. In the last chapter of his book, "Nervous Indigestion", Alvarez (5) vividly described a severe and unexplained asthenia found in the "Life and Letters of Charles Darwin". He described a well-to-do young man without any known strain,
recently home from four years of exploration, happily married, with life all to his liking, found himself so weak and nervous that for the sake of quiet he had to retire to a little country village. There, in spite of much rest and greatly limited hours of labor, his nervousness, weakness and vomiting persisted almost unchanged throughout a long life.

What could have been the cause? It could hardly have been serious organic disease anywhere in the thorax or abdomen because then Darwin could hardly have lived until he was seventy three. On reading the four volumes of his letters, one gets the impression of a most sane, sensible, kindly and uncomplaining man. Alvarez and others state that they feel sure it came from family inheritance. An uncle committed suicide simply because a client pressed him a little for some legal papers, and another uncle suffered terribly from a combination of melancholia and mucous colitis. In one of his letters, Darwin wrote regretfully of the fact that he had passed on his defective nervous system to some of his children.

Nixon (3) has also called attention to a letter of Charles Lamb in which he described vividly the feelings of asthenia and uselessness that accompanied a cold. Lamb wrote: "Dear B.B.: Do you know what it is to succumb under an insurmountable day-mare - "A whorsome
lethargy", Falstaff calls it - an indisposition to do anything, or to be anything; a total deadness and dis-
taste; a suspension of vitality; an indifference to lo-
cality; a numb, soporific, good-for-nothingness; an
ossification all over; an oyster-like insensibility of
passing events; a mind-stupor, a brawny defiance to the
needles of a thrusting-in conscience? Did you ever have
a very bad cold, with a total irresolution to submit to
water gruel processes? I have not volition enough left
to dot my 'i's', much less to comb by eyebrows; my eyes
are set in my head; my brains are gone out to see a poor
relation in Moorfields, and they did not say when they'll
come back again!"

Musing as to the cause, we all recall the touching
story of Lamb's tender care for his insane sister, and
some of us will remember that not only did he have, per-
haps as an insanity equivalent, a miserable impediment
in his speech, but for a short period in his life his
mind actually was deranged.

The evaluation of constitutional inadequacy might be
more completely promulgated by the fact that many phys-
icians commonly fail to recognize the earlier and milder
stages of insanity in patients, and fail to see that
many of those who consult them about their stomach should
really be in the office of a psychiatrist complaining
about mental depression, phobias, fears of suicide, and the inability to live comfortably and easily with their fellows.

On the other hand, it appears to be a fact that people are born into the world with some imbalance in their primitive emotions, for even infants as well as adults have personalities which may be predisposed to a predominance of any or several of the emotional elements. Parents and homes have powerful influences either in correcting this imbalance or in actually causing such imbalances to become more manifest which are frequently attributed to heredity.

But there are many other elements which should be reckoned with, either as entities or jointly associated with the psychopath. There are factors of social maladjustment which reciprocate cause and effect with emotional problems. Ages ago when a man's life depended on his ability to beat a tiger to a tree, the autonomic nervous system, particularly the sympathetic portion, mobilized him for action. These nerves helped him by pouring into his blood powerful drugs, such as epinephrine, which helped him to run or to fight. But under modern conditions, the primitive reaction is repressed. Today when a man fights for his life in our economic jungle, he telephones or writes a letter. He
does not enter into that physical combat which would use up the chemicals that, with emotion, still paw into his blood. Figuratively speaking, the stream of energy is spent internally and not externally, although some may "let off steam" by purposeless pacings or other inappropriate violent actions. This will hardly appease a chronic distress, however. Striped muscle becomes fatigued, while plain muscle can keep up tension almost indefinitely. Therefore on two counts the tendency is for an emotional distress to turn inwards and set up irregular tensions there. Eve (21) says; "I have come to beleive that this......system carries out its constant duties with an animal-like perfection unless it is interfered with by impulses from the central nervous system, mainly of anxiety in those of a sensitive, striving, idealistic temperament." He further states, "The frustrated subconscious uses the autonomic system as its secret avenger, and spasm is commonly it's sword." As he rightly points out, the method by which the subconscious obtains its ends is so subtle that physicians never suspected its machinations until recently.

As already inferred, an emotional complex in any individual's life is essentially a social problem. These cases are found in every social level. No walk of life is exempt. The domestic, the social leader, the laborer,
or the merchant each has representatives in the conference room. Each case requires its own yardstick to measure its true dimensions and proper consideration must be given to the fundamental stock, environment, and the relative susceptibility to emotional overthrow under strain.

Emotions depend upon and are conditioned by our relation with others. When an individual experiences an emotional shock he is involved in a changing relationship with at least one other person; he experiences a change in his social status. Changes of social status occur normally when the developing personality extends its field of social activity from familial to extra-familial relationships, from infancy to childhood, childhood to adolescence, adolescence to maturity with its problems of occupation, friendship, and love, from maturity to decrescence. These changes normally involve the production of emotional tension in the personality. Some of these changes are physiological in character, such as those of adolescence and decrescence, but recent studies have amply shown that the social factors involved at these periods far outweigh the physiological factors in the production of emotional reactions. This emotional shock or reaction may vary in quantity or quality, from the emotional liability of infancy and childhood to the
cataclysmic explosions of pent up emotion consequent upon social upheavals. This is why the incidence of neurotic illness has accelerated since the onset of the economic depression, for the social status of vast numbers of individuals was violently altered, or at least threatened, resulting in the production of strong emotional tensions.

A change in the social status of an individual is a change in his personal worth - his worth in his own eyes or in the eyes of others, in a word, his prestige. Although physical factors may be involved, such as from deprivation consequent upon financial losses, it must be admitted that in most such changes of social status no physical factors whatsoever are involved. Yet, biologically speaking, a change in the relationship of the individual to his environment has occurred, or may be about to occur. Intangible though it may be, this change of relationship between the individual and his social milieu must be added to our list of "causes" of human disease; it is the "efficient" cause of neurotic illness.

The proper evaluation of the life of external relation would by incomplete without due consideration to the subtle effect of noise upon the psyche, the specific response of the mind per se to the external stimulus of noise. In the existence of primitive man, the cave-
dweller of old, noise must have played a tremendous part. He relied far more than we do upon his ears. The beasts he preyed upon by day in turn were wont to prey upon him by night. So that the snapping of a twig, the soft pad of a foot, the distant cry of a jackal, any and all filled him first with an emotion of fear; that in turn induced the endocrine secretions, the physiological effects of which you all know. But it was fear, the emotion of fear, that was the first idea associated with any strange noise.

Most of us have no doubt noted that one of the instinctive reactions of the very young child to a loud noise is one of fear. It was through the work of Watson (104) on the conditioned reflexes in infants that placed this observation on a scientific basis. He maintains that the elemental stimuli which will bring out fear responses in infants are sudden removal of support and sudden loud sounds. For a subject he used a child eleven months old that had lived in a sheltered environment. On repeated tests this child was found not afraid of a black cat, a white cat, a pigeon, a rabbit, or any of these including a dog presented in a very dark room. Then a white rat was presented to the child at the same time as a bar of steel was struck a loud blow behind its head. This was repeated several times. Later the
child showed typical fear reactions when the rat alone was presented. In subsequent trials, it was found that the child showed fear reactions to a rabbit, a dog, a fur coat, cotton wool, and a man's hairy head.

The natural result of fear is flight, but in the present day and age, we have to repress this natural tendency, for Freud (47) says there is a fundamental tendency in the mind to suppress every experience that is associated with a painful emotion. However, we cannot break the threads that bind us to the past as easily as all that. In the subconscious minds of every one of us there are the associated fears and memories of the past.

Professor Bain (47) said in his law of conservation: "A pleasant experience exalts the vitality and tends to remain in the memory, while painful experiences depress the vitality and tend to disappear". But if it disappears from conscious memory, it does not cease to exist. The lumbar rooms of our subconscious are full of the painful experiences of the past, and they are added to day and night by the clamor and clangour of our city life. Many persons cannot stand up to it; they fly from reality by means of dope, by phantasy formation, by the adoption of a hundred and one fears, imperative ideas, anxiety states, and all the rest of it, which we meet every day. Mayhaps he takes the greatest flight of all into the dreamland
of dementia.

Although the current literature is quite scant on this etiological aspect of the genesis of emotions, Foster Kennedy (63) has recently quoted Smith and Laird of experiments on loudness of auditory stimuli in relation to the gastro-intestinal tract. They found that in four healthy human beings there was a decrease in thirty-seven per-cent of the stomach contractions per minute from the result of eighty to ninety decibel stimulation. In some subjects there was complete change in the type of contractions, and the size of the major contractions was considerably diminished.

Human reactions to noise are manifold, and involve many aspects of the human body. Archambault (8) has quoted Professor Portier of Paris, an authority in physiology, who has stated that "noise diminishes the recuperative value of sleep even though sleep is not interrupted for the brain continues to receive auditory impressions even though it does not analyze them." He has also experimentally proven that there is an increase in brain pressure, acceleration of pulse, increase in blood pressure, decrease in mental effort and concentration, and detrimental effect on normal development of infants and children due to loud and incoordinate noises.
Furthermore, this definite hazard has recently been investigated by the public health authorities. Warren (103) has quoted a recent work, called "City Noise", published by the City Health Department of New York in which this matter has been fully gone into from all points of view. Among other things, they maintain that the continual pressure of strident sounds to which people are subjected, tends to produce impairment of hearing and induce harmful strain upon the nervous system leading to neurasthenia. Street noises are most injurious because they are non-rhythmical and the ear cannot be adjusted to them or may cause tensions generating angry emotions. It is also believed that neuroses may be attributable to noises just as in the case of shell shock.

The establishment of visceral neuroses (82) has been a matter of much study and research. In one method involving the less violent forms of emotion the excitement may be long continued or be repeated at short intervals. This would apply to a state of indecision or vascillation between two or more possible courses of action, discontent, feeling of insecurity of financial or social status, frequently repeated erotic excitement and many other similar conditions.

On the other hand, we have seen that, while emotional excitement as a whole was not attended to by the subject,
separate elements of such excitement might force themselves on his attention on account of their extremely obtrusive nature. This obtrusiveness arises from the painful and arresting character of the visceral disturbance or from urgent call for evacuation. Such symptoms may be recognized by the subject at their true value as part of his emotional upset, but in other instances on account of the operation of other factors, such emotional disturbances become the starting point of long and disabling illnesses.

The power of suggestion plays a predominant role in this respect. We live in a health-conscious age of cancer campaigns, infantile paralysis campaigns, health weeks and so forth. The truth of the adage, "a little knowledge is a dangerous thing", is borne out again and again. While such education of the public is necessary, if we are to avoid the tragic consequences, it is the duty of the medical adviser to be constantly watchful not to permit any doubts to linger in his own mind which prevent him reassuring his patient courageously and decisively.

We are assaulted on all sides - in trains, in trams, in theaters and in newspapers - by advertisements of patent medicines. Most subtle of all are broadcast advertisements, the announcers of which know just how to catch hold of functional symptoms and exploit them as
the harbingers of disease. We now have superadded fear and apprehension with their train of visceral disturbances and so an ever-widening vicious circle.

To stress the power of suggestion, it might be worthy to quote Elkin (42) who maintains that the medicine man, while exercising many useful functions in primitive societies, may sometimes abuse his powers and cause illness and even death by suggestion. Similarly, in civilized communities advertisers abuse powers that they have stolen from legitimate medicine to produce illness and death. They constantly build up false concepts of disease and inculcate the grossest superstition. Whether we call it spirit or devil with the primitive, or whether we call it catarrh or uric acid or blood pressure with the sophisticated, for the one as for the other, it means possession by an evil intelligence intent on working his destruction.

The facts of observation of animal behaviour and of experimentation under laboratory conditions demonstrate that, in accordance with method of trial and error, chance movements or behaviour which produce satisfaction in the development of conative process, become, as it is expressed, "stamped in"; while those that produce no satisfaction are "stamped out". While this principle is well recognized with regard to bodily movements and general be-
haviour, observation of pathological material points to the conclusion that the same holds good of visceral movements and visceral behaviour. Thus, a blushing, a nausea or a tachycardia that accompanies some emotional excitement may by chance produce satisfaction in the development of a quite unrelated conative process. It becomes "stamped in" just as an appropriate external movement does and will appear again as a means to the end that it previously forwarded.

Going further, some conflicts are so disagreeable, so shameful, that they are put out of consciousness. A craving is met by refusal to recognize it, which means a continued stirring up of the appropriate autonomic path. "Repressed effect," says Kempf (61), "seems to be stored (like a coiled spring) in a heightened postural tension of the autonomic apparatus."

Circus movement from internal causes arises very readily in the highly complex environment of the present day. The individual, as it were, becomes entrapped by his sophistication and acts in a manner that can never give him adequate self-expression. He has misconceived his own nature. External causes of circus movement are usually more obvious and include conditions such as bereavement, poverty, unemployment, isolation and imprisonment. A large group, in which internal and external causes co-
operate in preventing the individual from finding self expression, is represented in the recipients of compensation, pensions and benefits of social services, who avoid an active life on account of the danger of so losing these benefits.

The aspect of special training depends on one aspect of the laws of mental retentiveness, namely, that when objects of any special order are habitually attended to, perceptual discrimination for such objects becomes enhanced through the acquirement of new mental dispositions.

The thesis is here put forward that special discrimination of organic sensations develop in exactly the same way. It may be argued that organic sensations are of a different order and that in the cases mentioned the special discrimination affords the individual greater control over his outside environment. This is true when the sensations are regarded from an objective biological point of view, but when they are regarded subjectively many advantages are obtained in a sophisticated environment by the acquirement of special discrimination in the domain of organic sensations, a large measure of control being exercised thereby over the immediate social milieu. In any case, it is by the habitual direction of the attention that the special power of discrimination is acquired. Undoubtedly there are parents and others who
unwittingly train children from an early age to direct their attention to visceral sensations. This is what Hutchison (55) describes as vicarious hypochondria. As Bodman (14) says, often undue emphasis is placed on the bowel function in early life: "The child is told he is a good child or a bad child in accordance with the bowel function at that particular time." A moral issue is made of a physiological function. As the child grows older his attention is called to the greatest necessity of this regular reflex.

The idea of elimination of poison from the colon is more and more emphasized, finally becoming a bug-a-boo, until because of a developed fear complex, this physiologic action is over-stimulated in a desire to conserve health. If the individual is exposed to a cold or other disease he rushes to take a cathartic. Unfortunately physicians, more often, doubtless, in the past than of recent years, have been heavy contributors to this false philosophy, introducing treatment of any situation with heavy catharsis. "Keep the bowels open" has become a popular slogan, and the laity has become so conscious of the abdomen as to suggest it as the source of all symptoms from whatever disease may be present. If to this there is added the pain produced by taking a cathartic pill it is easy to understand why the first symptom men-
tioned by any patient on consulting his physician is abdominal discomfort which he usually attributes to "gas".

And again, this propensity is well understood by the patent medicine manufacturers and venders of faddist foods. It is evidenced by the fact that most of their propaganda stresses elimination, hence contributes much to increase attention of the abdomen. The patient, whether he be tired or suffering from any sort of disease, after reading a magazine or listening to the radio, promptly resorts to one of the much vaunted laxatives, thereby producing abdominal symptoms and strengthening the foundation for development of disease. The practical test of clinical observation also shows that special discrimination of organic sensations is in fact acquired in varying degrees.

Psychological theory has good grounds for holding that every experience produces some modification in neural structure, that this modification is confirmed and established by repetition of the same or similar experience, but tends to fade and die out in the absence of such repetition. We must assume that the special aptitudes in the trades and professions, of musicians, athletes, wine-tasters and so on depend on the acquirement of special neural patterns in the association areas of the cerebral cortex. It is the thesis put forward that the special
skill exhibited by hypochondriasis in appreciating their internal sensations is of the same order and depends on the acquisition of neural patterns in just the same areas of the nervous system.

Emotion is experienced by an individual as "affect" or "mood" - a so called psychic experience; or as "emotional reaction", which is a physiological experience involving various sectors of the effector apparatus. The essence of an "emotional reaction" is a postural change of smooth or striated muscle. In the striated effector system changes in tonus can produce well known signs and symptoms, and in terms of the body as a whole an individual's posture, when it is an emotional reaction, may express elation or depression, the overtension of strained ambitiousness, or the tremulousness of impending disaster, etc. In the smooth muscle effector apparatus postural variations consequent upon emotion may give rise to the dramatic picture of the gasping asthmatic, the fearful anxiety of cardiac arrhythmia, the agonizing pain of enterospasm, the embarrassment of dysuria, and the humiliation of sexual incompetence, etc. Thus it is apparent that emotion can express itself just as vividly and certainly more painfully through smooth muscle or visceral behavior. Realizing this fact, we should look for the emotional tensions in the patient which are
consequent upon some actual or impending, real or imaginary, change in social status in his life in order to comprehend the smooth muscle reaction which accounts for the symptoms and signs of his illness.

That emotional expression is a physiological process has been known empirically for a long time. Alfred Adler (21) has applied the term "organ jargon" to such physiological processes which are more eloquent than the spoken word, if rightly understood. Inasmuch as this type of visceral behavior is an effector response of the individual to his notion of his environment, it is a kind of language by which a patient expresses his attitude to some problem of social adjustment confronting him.

It is important, however, to bear in mind that the individual reacts as a unity to the unity of his environment. It is artificial and schematic to split the individual into departments of body and mind, or the environment into physical and socio-physiological parts, except for temporary purposes of analysis. The whole is not a sum of its parts; it is something more: a new function has appeared, a function characteristic of unity. It is a matter of the organism-as-a-whole responding to the environment-as-a-whole.
FUNCTIONAL DISORDERS OF THE NERVOUS SYSTEM

Functional mental disturbances may produce a myriad of abdominal symptoms, none of which are characteristic of any particular mental disease or emotional state, but of any organic disease, be it acute or chronic appendicitis, gall bladder disease, peptic ulcer, renal colic or calculi, carcinoma of the stomach or bowel, or a vast number of gynecological conditions may be simulated by them. Theoretically the symptoms may be divided into categories: those that are purely psychic and are projected or referred to a particular organ or region of the body, as, for example, the anesthesias and hyperesthesias of hysteria; and those that are an expression of disturbed physiology resulting from disorders of autonomic control, as, for example, the gastric pain and discomfort of "nervous indigestion". The former do not usually give rise to serious diagnostic problems for even though the reality of the symptoms cannot be questioned, they must necessarily correspond to what the patient knows about anatomy and medicine and particularly what he has observed in other persons. However, those symptoms which arise from local disturbances in physiology as a result of prolonged mental and emotional conflict must, because of their essential similarity to those produced by similar physiologic disturbances from organic lesions, often tax the diagnostic power of the
physician to its limits, and mistakes in diagnosis are inevitable.

Although the neuro-endocrine mechanism described above shows that the necessary apparatus is present for the production of local organ symptoms by cortical processes, and a consideration of the neurological lesions at the various levels of control shows how the local disturbance may be projected downward to the lower levels resulting in symptoms referable to the viscus, (symptoms identical with those arise from disease processes localized to that viscus) there is not yet available a wholly adequate explanation of why an emotional conflict will in one case result in symptoms of peptic ulcer and in another case, symptoms of gall bladder disease. That it, while it can be reasonably predicted that a lesion in a post-ganglionic fiber will produce certain definite symptoms referred to the organ which it serves, a similar prediction of symptoms cannot, as yet, be made for the symptoms which will result from cortical disorders.

In this regard, attention must be called to the description of Hess (52) of the sympatheticotonic and vagotonic individual. These two terms refer to the general hereditary and constitutional imbalance of the autonomic nervous system with predominance of either the sympathetic
or parasympathetic side. They may be roughly correlated to the types of physical habitus as outlined by Kretschmer, and are associated with a predisposition towards certain mental and physical diseases. The sympatheticotonic person or "gall bladder type" of Draper (36), tends toward activity, and a more or less gynandromorphic mental pattern. The vagotonic, on the other hand, or the "ulcer" type, is characterized by an asthenic habitus, lability of mood, a rapid expenditure of emotional energy and quick adjustments to environmental changes.

It is the opinion of Hess that the psychoneuroses and psychoses are founded upon similar, but more extreme autonomic instability. Hence, the functional symptoms as well as those from organic disease which these types are likely to acquire will be conditioned by their fundamental constitutional type. Draper carries this still further and postulates that the vagotonic will have spastic colon, hyperacidity and peptic ulcer, while the sympatheticotonic will have functional dyspepsia, "bilious spells" and gall bladder disease.

But even with this contention, despite the tremendous amount of research and experimentation, authoritative opinions differ. It is the opinion of Dunbar (40) that either psychic factors may manifest themselves in a "deranged vegetative system", or, more likely, the
psychic manifestations of the psychoses on the one hand, and the changes in the vegetative system on the other, may be coordinated expressions of the same underlying factor or factors. She further states that fruitful as was the original conception of vagotonia and sympathicotonia (Hess), just so fruitless does it become when these terms are used (1) as opposites, whereas in reality they are complimentary processes, (2) as diagnostic labels with an implication they do not possess, or even as disease entities. Even if it be true that anxiety is caused by a vagotonia, the question arises as to what causes the vagotonia. Perhaps the anxiety? No one doubts that vegetative factors are involved in involutional melancholia (just as in any psychic process). This, however, does not mean that they "originate" the psychosis; in this particular instance it is even more than probable that the psychic factors are primary and the vegetative changes not merely concomitant, but even secondary. In every individual the primary vegetative changes in involution are essentially the same, and yet only a small percentage develops involutional melancholia; and in this group one finds as a rule that not the vegetative changes but emotional factors play an etiological role. That perversions are the result of a pathological emotional development, and not of vegetative (endocrine)
factors is contested by few and then on the basis of particular, i.e., rather personal than scientific, arguments.

Such explanation, however, which are upon an autonomic and constitutional basis, do not present the entire picture, for the work of Freud on unconscious conflicts and organ symbolism as well as the theories of organ inferiority of Adler indicate that the problem is infinitely more complicated. Unfortunately, space and the nature of this paper do not permit a discussion of these most important methods of attack.

The functional conditions in which diagnostic problems of interest to the physician and surgeon may present themselves vary from the simple "nervous" type of patient who exaggerates his symptoms or who is afflicted with nervous indigestion, through the neurasthenic and hysterical types to the psychoses. But it is mainly the psychoneurotics who provide the more difficult diagnostic problems.

Owing to the complexity and multiplicity of the clinical and theoretical views, it is difficult to define and classify the psychoneuroses in a manner acceptable to all schools of thought. For practical purposes, a psychoneurosis may be defined as a minor functional mental disease with no demonstrable organic changes. A
psychoneurosis is distinguished from a psychosis in that the neurotic keeps in touch with his environment, realizes that he is sick, suffers from his symptoms and generally makes some effort to get well. In contradiction, the psychotic has no insight into his condition, does not realize he is sick, therefore, sees no reason for seeking medical care and has broken with his environment.

The word neurosis has several meanings among psychiatrists, but of late the term is used by practically all as synonymous with psychoneurosis, and, as inferred above, to designate partial personality disturbances in contrast to complete personality disorders as found in the psychoses. Thus, in the beginning, we have the picture of a personality, a unit structure, composed of many actions and reactions; yet, at all times, presenting a complete behavior pattern by which it is judged, catalogued and identified. This composite reaction to environment may be partially disturbed so that, although crippled, it continues to function and does not lose its identity; or it may be completely changed so that the reaction is not the same and, therefore, it must be reclassified and placed in another category. The former partial disturbance is the neurosis; the latter the more complete, the psychosis. The psychiatrist then, when
considering a gastric neurosis, has the personality in mind, he knows the normal and abnormal reactions of this structure, how the normal reactions may be exaggerated or perverted to produce a disorder, how abnormal reactions assert themselves and what the causes and results of such disorders are likely to be.

It is well, however, to add here that there is no dividing line between a psychotic and a neurotic reaction; but, as the difference is one of degree, many of the reactions found among those that have minor changes. Often among the unquestioned psychotic are found the identical complaints and functional changes that are brought to the internist and surgeons by persons apparently well adjusted to reality. The same basis is behind the symptoms in one case as in the other. The same mental mechanisms are at work and the purpose of the somatic expression is the same, except in one case more fantastic, symbolic and primitive methods are used, while in the other signs and symptoms compatible with an adjusted personality and to the demands of society are employed.

The cause of the neurosis and, therefore, of the abdominal disturbance, lies in intrapsychic conflict. This is the fundamental concept and signifies that within the patient's personality there are many strivings, desires and trends which cannot be satisfied in their
existing form, so must be gratified by other means.

This internal unrest arises from instinct pressure, or from habits formed in childhood which cannot be accepted by the more civilized adult, so must be gratified either in some round-about manner, or some type of defense must be constructed to hold the powerful stirrings in abeyance. The abdominal symptoms then, are, on the one hand, unrecognized means of gratification or, on the other, efforts made to defend the personality from attack. It follows that if the complaint is removed it is essential that another be established if the happiness of the individual is to be maintained.

The types of reaction used can be divided as indicated above into: first, normal reactions which are exaggerated or perverted, and, second, abnormal psychic mechanisms. A universal method of escaping difficulty used by normals is called the old army game, passing the buck, or the alibi racket. The doctor says: I would have been on time, but I was too busy. Constantly we use some excuse to our friends, to our enemies, or to ourselves to smooth over our shortcomings. The personality throws out the irritating conflict, says: it isn't my fault, or: it must be something I ate. This is called externalizing the conflict. When it is remembered that in many ways the gastro-intestinal tract can be properly considered
outside the body, is it any wonder that this projecting phenomenon so frequently involves the stomach or bowels? Then again, the abdominal pain is socially so well accepted. A good abdominal disorder, especially if operated on, puts one immediately among the upper classes.

The method is most often used by those whose opinion of themselves is in danger; in other words, it responds mainly to the instinct of self-preservation, not so much in the eyes of the world as in consideration of ourselves by ourselves! The projection mechanism most often is expressed as a pain. Very frequently it is not consistent with any organic syndrome, but is constant and, regardless of what is done, remains unless the conflict it represents is solved. The similarity of the complaint to a delusion should impress the observer.

Another reaction pattern which frequently involves the abdomen is that of conversion. Here the process is much the same, but the complaint is more of a substitution and frequently has some symbolic connection with the conflict. The complaint is more obviously connected with its cause. This reaction often reminds one of what we do when we procrastinate. We put the difficulty off, we block it from our mind, we forget it, but lo and behold! it appears in a perverted form far worse than when first approached. This is the condition found in
hysterics. They attempt to lock the difficulty in a sealed compartment as it were. If you can imagine that this patient is sure she locked the difficulty up in a desk drawer, so is no longer concerned with it, you can see that she cannot be expected to recognize as related these presenting symptoms. You can understand the air of indifference to the condition and the anger which greets any suggestion on your part that the symptoms might be psychogenic. This reaction type occurs most frequently in persons of an immature type. They have not grown and in many ways are facing life on an infantile level. Especially is this true of their sexual life, not so much in their ability to maintain a normal sexual life, but their attitude toward it.

In the classification of the neuroses or psychoneuroses there is general agreement on four control symptom complexes, namely: neurasthenia, hysteria, psychathenia and the anxiety states. It is unusual, however, for a patient to present such a distinct entity as this classification may imply, but in the majority of cases one of the four groups will dominate the picture.

Neurasthenia is characterized by marked mental and physical fatigue; weakness in all activities; lack of mental concentration; pessimistic, discouraged mood; and is usually accompanied by anxiety and fears. The
neurasthenic is preoccupied with physical ailments, complaining of pressure on the top of his head, paresthesias of all kinds, pain in the spine, dizziness, weakness of the eyes and especially a variety of gastro-intestinal symptoms.

Hysteria is extremely varied in its manifestations and is accompanied by motor and sensory symptoms, often bizarre and spectacular. Hysteria is distinctly episodic in character, the symptoms are very precise and there is little mixture with the other reaction types. The physical symptoms commonly offer no difficulty in the differential diagnosis from organic disease, as they are usually acute and correspond to the patient's idea of what a physical symptom should be like. They are nevertheless quite as genuine as the symptoms of an organic disease. For example, an hysterical anesthesia of an arm or is as complete and real as that following nerve section; however, the area of anesthesia corresponds to the anatomical knowledge of the patient, rather than to the distribution of the sensory nerves.

The anxiety states most closely resemble a continued high emotional state with all of the physiological changes associated with emotions. There is intense anxiety and extreme fear, definitely connected with a particular idea. This continued state of emotional tension is ex-
pressed in terms of varying cardiac, respiratory, vaso-
motor and gastro-intestinal disturbances. These symp-
toms are usually very acute and may be confused with
acute abdominal conditions.

Anxiety states are based on fear. This fear is fre-
quently based on a deeper conflict than is at first ap-
parent. Here the reaction is again a normal one exag-
gerated. A fear of self exposure produces a gastro-
intestinal disorder, just as any fear affects these
structures. Fear of the disorder then follows and a
vicious cycle is precipitated. This condition then is
maintained until the underlying fear is relieved. Re-
assurance is not enough, the presence of a real person-
ality disorder must be accepted and explained to the
patient, and the patient shown how to act on this new
information.

This condition is found especially in those who are
sensitive, shy and introspective. Their feelings are
easily hurt and they are much concerned over their dis-
order. Indeed these are the self-worshipers who can
describe their symptoms in minute detail. This fear
here again seems to arise from ego-insecurity. They
fear the future, they are afraid to get well to face
life.

Daniels (34) found at the Columbia Medical Center
that gastro-intestinal neuroses arose from ego-defense mechanisms, from sexual conflicts, or from direct conversions from the conflict to the soma. He felt that many anxiety states more truly arose from sexual strivings. This is especially true when with the hypochondriacal complaint we find the agitation as well as the mental and physical fatigue of the so-called neurasthenic reaction. Frequently here then is an underlying homosexual trend which troubles, and the anxiety is only a superficial manifestation of it.

Again, as Daniels suggests, there are still more direct reactions. In response to a shock, especially if there is a shameful connection, some seem to have formed the habit of pushing things down and out of sight. They are unable to face the difficulty directly, so habitually express it by immediately developing an abdominal complaint. This condition is very close to the conversion phenomenon but is not symbolic, apparently does not gratify, but is more of a defense reaction. It is accompanied by a good deal of agitation and is closely akin to an obsession.

Often the normal individual when worried develops little hammerisms to drive the unpleasant thought from his consciousness. He says "Oh! pshaw," he snaps his fingers, shrugs his shoulders or perhaps kicks his foot.
These are defense mechanisms which momentarily relieve and drive the idea back into forgetfulness. Suppose the idea is more powerful, is constantly irritating, so that he must be constantly on guard. He must keep his defense; so he develops a tic, or a spasm. This spasm may be of the face; or it may be of the ureter or the pylorus. Again the personality is using a well known mechanism, one which if persisted in becomes pathological. The phobias and obsessions are built of this material. The constant washing of the hands and the fear of cancer are some of the best known examples.

The characteristic type to develop this abnormal reaction is the meticulous, over conscientious, very careful individual. The reaction can be recognized by the terrific emotional upset that accompanies it. The complaint or the functional change found in no way explains the terrific preoccupation of the patients. They "chew the cud" over it; their whole personality is primarily concerned with what seems to be a painful, but is really a very simple, disorder.

This latter picture is especially seen in those cases of ureteral spasm or of periurethral pain. These persons suffer the tortures of the damned, apparently, from a simple trigonitis with some ureteral spasm. Physicians are often led by their severe discomfort to carry out
very radical procedures, thus firmly fixing the obsession.

Some psychiatrists maintain that many patients carry on into adult life the ability to enjoy oral, anal, or urethral stimulation beyond the normal, and explain this phenomenon by a process known as fixation. They hold that as the child develops toward sexual maturity one of these orifices may receive too much emphasis, and from then on be more sexually alive than it normally should. This abnormal reaction seems to be especially pronounced among those with bowel complaints; frequently they have incurable disturbances about the rectum. Indiscriminate cystoscopic examinations often emphasize a urethral fixation, while enemas and rectal dilatations continue the anal strivings. One should look with suspicion on a patient who insists on giving a moving picture of each fecal extraction and can describe—yes, almost name—each bolus, as it is born.

It is not necessary to emphasize that pain is the most important of all symptoms associated with both functional and organic disease. It is usually the presenting symptom in both the "psychogenic abdomen" and the surgical abdomen. It is, however, important to remember that pain as a symptom cannot be correlated with its source. It helps if the patient can charact-
erize the pain as to location, time of occurrence, kind and degree of pain, regularity and consistency of its recurrence, and relation to meals, defecation and urination, and by what it is relieved. The finger will point out the pain in ulcer, gall bladder and appendicitis, while in colonic pain the hand is usually drawn across the abdomen. In colitis there is often a burning along the course of the colon tract in addition to the colic. The most detailed description of the pain, however, will often be misleading until careful scrutiny of the laboratory findings and X-ray localizes the real cause. Further, pain is as real to the psychoneurotic as to the patient suffering from actual organic disease, for the sensation is the same whether it arises from local tissue changes or from psychological changes, and is localized back to a particular organ. This is well illustrated by referred pain. Essentially psychoneurotic pain is the result of the same neural mechanism as referred pain, except that the former is conducted over a longer neural pathway. As Critchley (29) states; "When an individual says he feels pain we are almost entirely dependent upon his descriptions if we wish to learn about its site, nature and intensity; indeed when we accept its actual existence we rely upon his word alone." There is also considerable evidence that pain, as a sensation,
varies with age, sex, race, constitution and psychological pattern. Furthermore, persons vary from time to time in sensitivity under special circumstances; under the stress of emotion one may become almost insensitive to pain. The grossest examples of insensitivity are to be found in the low-grade feebleminded and in the advanced psychotics who will often mutilate themselves with no expression of discomfort.

Hypersensitivity to pain is a common phenomenon. Local hyperalgesias occur in numerous acute surgical conditions and many persons retain a generalized hyperalgesia following a painful affliction. Pottenger (87) states that chronic pain may be on the basis of a permanent lowering of the threshold for stimuli, or even permanent injury to the sensory neurons, allowing them to show pain on a minimal stimulation. The psychoneurotic is particularly sensitive to pain, probably on a basis of a generalized lowered threshold, and common experience tells us that the intellectual or artistic person is more sensitive than the uneducated, hardier workman type. These facts are usually recognized instinctively by the physician and are taken into consideration in making a diagnosis. Libman (71) has attempted to estimate the sensitivity to pain, especially in regard to abdominal diagnosis, by judging the general sensibility by the pain...
elicited by pressure over the styloid process, but so far results are not very reliable.

The true psychoses may present any of the symptom complexes of the psychoneuroses, but they are usually accompanied by definite mental aberrations of a pronounced form and hence do not present as confusing a problem in differential diagnosis as do the psychoneuroses. They may, however, in the prodromal stages present a very difficult problem in this respect.

In the psychoses there is profound disorganization of the subject's affective life. We find violent emotions surging up without apparent cause or with only very inadequate cause - fear, anger, rage, despair and so on. These carry with them severe visceral disturbances. It is especially in the incipient stages and in larval conditions that the patient runs grave risk of surgical interference with innocent organs. The risk is the greater because the patient and his relatives are only too ready to grasp at any straw in order to avoid acceptance of the fact that the illness is mental and often are more willing to permit surgical intervention than if a grave surgical emergency were present.

In the psychoses, and also psychoneuroses, in which mental depression is an outstanding symptom, constipation is almost universally present. In the more severe cases,
according to Kantor (58), ileus has been diagnosed and surgical intervention not infrequently practised. Such constipation may be associated with alternate spells of diarrhea, or, less commonly, diarrhea may be present alone. The reverse peristalsis syndrome of Alvarez; vomiting, regurgitation, heart burn, belching, nausea, a feeling of fullness as soon as the patient starts to eat and a feeling of back pressure against the abdomen; valuable as it is in enterological diagnosis, it is not infrequently the presenting symptom of a psychoneurosis. McLester (75) has observed a remarkable case of hysteria, in which barium was introduced into the rectum and could be seen by fluoroscopy to travel in fifteen minutes, by reverse peristalsis, to the stomach.

Henry (51) has shown that there are roentgenologically demonstrable changes in the gastro-intestinal tract somewhat characteristic of the different types of psychoses. The more acute the psychoses, the more abnormal were the deformities. He concludes: "As far as the relationship of changes in gastro-intestinal functions to psychoses is concerned it is doubtful whether there is sufficient evidence at the present time for considering either as a cause or effect of the other. It is probable that such relationship varies in individual cases. It would appear also that the results of this study might be con-
considered as evidence of definite changes in functions of the vegetative nervous system accompanying psychoses, and also as additional evidence that psychoses represent changes in the entire individual rather than abnormal functioning of the brain or central nervous system as was formerly believed....it seems evident that certain physiological visceral changes accompany and are intimately associated with different types of psychoses, and furthermore that it seems probable that the so-called normal variation and even some conditions believed to be pathological may be due in part to mood variations or other tendencies towards psychotic states in the normal individual."
"What is spoken of as a 'clinical picture' is not just a photograph of a man sick in bed; it is an impressionistic painting of the patient surrounded by his home, his work, his relations, his friends, his joys, sorrows, hopes and fears.

Francis W. Peabody (86)

Most internists have been trained from medical infancy to think in terms of somatic pathology. Clinical observations of organic diseases and experimental procedures based on them are often capable of justification by proof. The results of psychic manifestations are very difficult of proof. Through the work of many physiologists, however (Beaumont, Cannon, Pavlov), we know and accept the demonstration that through the vegetative apparatus (the autonomic nervous system and the endocrine system) emotions can produce bodily changes in function including chemical changes in the blood. We are more or less familiar with the idea of the internal environment of the body or homeostasis as outlined by Cannon in contradistinction to the external environment so important in the social aspects of medicine. How much do we utilize these ideas that we have heard and accepted, or are they pigeon-holed as merely academic ideas as far as our general concepts of disease are concerned?
Furthermore, many other authorities have realized the vital importance of this question. R.S. Boles (15) writes: "Unfortunately scientific progress has been so dramatic that the study of disease overshadows the study of the patient. The student, the surgeon, and the clinician of today concentrate their endeavors on the search for something organically wrong, and if their best efforts are not rewarded, interest in the patient lags; he is simply labeled as a neurotic, and ipso facto becomes a candidate for Christian Science or some medical fad..."

"It has been stated that more sick persons seek help each year at the Shrine of St. Anne de Beaupre in the province of Quebec than at all the hospitals in the Dominion of Canada."

G.S. Stevenson (96) writes: "So much has been written about dealing with the patient as a whole that it would be impossible here to review the literature on the subject. Most of this has been inspirational rather than factual. So much has this been the case that the idea of dealing with the patient as a whole has come to be a platitude and to have a corresponding lack of force. Scientific case reports which show that the idea has taken root are rarely seen. How to translate the idea of the patient as a whole into everyday practise has not been evident."
"It is recognized that there is a close relationship between the handling of the patient as a whole and what is often spoken of as the art of medicine. However, practically all medical progress has come through a better understanding of the patient in parts - his blood, his pancreas, his brain, his metabolism, his immunity. Can the art of medicine in dealing with the patient as a whole be made effective so that it can be incorporated into everyday practice and not left so frequently for the chiropractor, the Christian Scientist and other cultists to capitalize?

"In this connection there are two sets of facts about the patient which seem susceptible of isolation and study: the motive of the patient involved in seeking help and the emotional problems of the patient involved in his complaint and disease. It is these two things that the cultist seizes on as his only hold in the absence of scientific medical training. Likewise it was these which gave the family physician of old his firm and deserved footing. Neglect of the patient's motive and emotional problems is today lending aid and comfort to the cultist and wasting a powerful instrument of treatment." Thus, it is not difficult to see that the whole question of emotions and bodily changes, or psychosomatic inter-relationships, is of great interest to
many physicians and of great importance to all.

"Diagnosis," said Galen (21), "is the understanding of all things present," in the patient. And the purpose, for the physician who studies parts of organisms, is to take an interest in the total function of the person. Instead of probing at once into the sex life when we suspect "mental factors", it should be emphasized that practically every fundamental function can take a lead in the personality constitution. For instance, the gastro-intestinal function may have just as much of a tendency to express the personality and to be the personality as the sex function can in its way, be the main representative of the personality in certain situations and in certain periods of life. It is the opinion of Adolf Meyer (79) that the gastro-intestinal receptive, digestive and eliminative functions can become that which expresses, and leads the government of the person for certain periods of the day or throughout life as a dominant and leading concern. Also worth while to recognize that so much of our actual existence is given over to the intake of food, digestion and reaction thereto and to the elimination, especially in certain individuals, that it will form a matter of concern, a matter that offers possibilities of becoming dominant and of playing a very definite role when anything goes
A patient coming to a gastro-enterologist, the physician is confronted with possibilities of local disturbances, reflex activity from other organs, general metabolic or vitamin deficiency or neurological involvement of vago-sympathetic balance. From there we pass into the field where more or less conscious processes become participants, until we get into those functions where the same activity, also seen autonomously or reflexly as activity of special parts, becomes quite definitely part of the personality reaction, i.e. consciously emotional, or actually more or less voluntary functioning. Seeing before us, in each patient a psychobiological study, with the interrelated processes of the psychological, best expressed as emotional factors and responses, exerting their effects on the physiological processes of digestion, assimilation and metabolism, then we must look for the underlying cause of the emotional disturbances. This leads us to a study of the patient's social situation or environment in its broadest sense, an investigation of the psychological factors or a search for the totally integrated personality factors conditioned as they are by heredity or instinctual components and environmental circumstances or the sociological factors. Such a study and total evaluation in present day psychiatry or medicine
is spoken of as the psychobiological approach and likewise as a genetic-dynamic evaluation of the patient.

Then, of course, one not only has to deal with psychic and emotional factors as a primary cause of the disorder but with the psychic disturbances that are secondary to organic disease of the tract. It is in this latter group that special emphasis should be placed, since many patients have or have had definite organic pathology—a definite ulcer or colitis, etc. These patients have been given the customary medical and, in some instances, surgical treatment; nevertheless their clinical progress, in so far as their clinical picture and symptomatology are concerned, still remains unsatisfactory. It has been found in many patients that psychic factors, possibly instinctual in origin and manifested as a subtle complication of the personality, in addition to the above, must be dealt with before real clinical improvement can take place.

Thus, not only can there be a more complete evaluation of the patient from a psycho-somatic standpoint, but the results of psychotherapy of a psychodynamic type, in conjunction with the medical regime of the internist and the surgical procedures and observations, aid materially in dealing more adequately with the patient as a whole. Furthermore, aid is rendered as well with the specific
patient's complaints which are, in most instances, found to be a complicated milieu of organic and physiological, psychic or emotional disturbances, rather than such simply defined symptoms as pain, nausea, diarrhea, discomfort or constipation.

The magnitude of the problem, and its quality, can better be grasped if one were to enumerate the variety of conditions, their protean manifestations and the diversity of their clinical pictures. Nervous esophageal spasm or true cardiospasm (achalasia); merycism or rumination; gastric atony, pylorospasm or duodenal stasis; spastic constipation, intestinal atony with flatulence, nervous diarrhea; one mentions as the more common of the motor imbalances. Anorexia nervosa, bulimia or disordered or abnormal appetite; gastric anacidity or hyperacidity and hypersecretion; mucous colitis, comprise some of the secretory disturbances. Alvarez (5) describes many forms of intestinal disorders: pseudo-ulcer, pseudo-appendicitis, fatigue neurosis, temperamental indigestion, nervous vomiting, enteroptosis, diarrhea and auto-intoxication. To these, Wilson (109) has added pseudo-kidney colic, bladder disturbances, ureteral pain, rectal pain, pains in the flank and groin, as well as superficial disturbances in the abdominal wall, sometimes indescribable, sometimes shooting in character and sometimes localized.
and never shifting from place to place. We are actually confronted with a diverse group of motor, secretory and blood supply disorders that bespeak, all of them, a throwing out of balance, an incoordination, of the smooth normal counterplay of vagotonic and sympathicotonic factors in the control of the alimentary tract. Secretion, its volume and quantity; motility, delay, the control of the various sphincters, peristalsis, antiperistalsis, absorption, these innumerable functions take place normally, rhythmically, with unerring exactness as the result of the superb interplay of the stimulatory vagus or the parasympathetic system and the inhibitory activity of the sympathetic ganglionated cord. This even balance may be, in the neuroses, upset by a psychic shock (affecting a sub-normal mental or emotional system), a suppression of desires, an anxiety, an unfulfilled want. The obvious manifestation is frequently a functional disturbance of the alimentary tract, or, as one more euphemistically styles the condition, "an autonomic nervous system imbalance". Back of the disorder is, however, the psychic factor, for the autonomic nervous system is automatic in its daily activity, but it is not within the conscious control of the cerebrum or the higher centers. Yet it is not impervious and is far from being uninfluenced by those same psychic factors that lead to
the pure neuroses.

Gastro-intestinal neuroses are gastric and intestinal and abdominal only in their mode of manifestation; they are anxieties, hysterias, somatic neuroses, neurasthenias and hypochondriases in the truest sense of the word as known to every psycho-neurologist.

Be the manifestation a motor or a sensory disorder, call it autonomic imbalance, or a gastric neurosis, the mechanism is essentially the same, the inferior mental make up usually handicapped by an impoverished heredity, meeting in conflict an insurmountable obstacle offered by his or her environment. The abdomen is truly "the sounding-box of the emotions."

With what kind of an individual are we dealing? Usually timid, afraid, lacking in self-confidence; subject to emotional instability; or, reticent and suppressed, unable to grasp the hard facts of life or unwilling to accept them, uncertain about the conduct of the past, worried and harried about future events, unable to fit himself into the harsh inequalities of life, out of sympathy with his fellowship, with family or domestic relations, unequal to cope with his love life or solve his sex problems. Such is the psychic or mental anatomy of the individual likely to be a prey to a neurosis.

Physically he is usually underbuilt, only fairly well
nourished, often of the so-called enterotoxic constitution of Glenard, with cold moist palms, rapid pulse, anxious mien; with a spastic colon, exaggerated peripheral reflexes, often complicated by a hypersensitivity to pain - such is his physical status. He enters the room anxiously or distrustfully, he produces a ream of paper covered with closely written notes, plus a list of questions; he is repetitious, vague, unable to express himself clearly, confused as to facts; he always feels that he is not given sufficient time and attention, and suspects always that he is being misunderstood or unsympathetically handled.

Such an individual comes through childhood and adolescence with few nervous manifestations, for the neuroses in the school age are few and far between, and adolescence is a period of protection and parental affection. With the advent of adult life, the individual first faces his stark environment, and between the ages of eighteen and twenty-eight years one sees the beginning of the greatest number of neuroses. As woman is happy and well, married with love, and bears her first-born. The child takes sick and sleepless nights are followed by convalescence. Soon one sees the onset of neurotic symptoms in the mother, a furtive hunger, belching, constipation, pains or insomnia. The men, facing the hard economic
conditions of the depression, the women worrying over the financial straits of their men-folk or their own living problems, the complicated disharmonies of family life, the care of children, the dependent parents; the sex problems of the young, the frustrations of the adults; the boredom of marriage, the late awakenings of love in women, and the innumerable and varied problem of the individual in conflict with his material and emotional environment. These are the factors which must be acquired by the physician for basic diagnostic application.

It will now be convenient to begin a consideration of the clinical applications of these principles for two reasons: as feeding is of necessity the most primitive of all conscious impulses, emotional disturbances occurring in the more primitive levels of the brain notably affects its mechanisms, and, secondly, it is possible clearly to visualize alterations of these mechanisms by aid of X-rays.

Achalasia of the cardia is a good example of a condition which may be initiated psychologically, leading to functional disturbances which terminate in structural change, a sequence of events more common than is always recognized. When the patient complains of "lump in the throat" or difficulty in swallowing, all or part of the esophagus is in spasm. A complaint of pressure or fullness
of the epigastrium may mean spasm of the cardia or the pylorus. Indigestion is the term generally used by patients in describing their abdominal distress and they feel that the doctor must know what they mean. An attempt to get a more specific description of their suffering usually brings out a list of symptoms which are common to most gastro-intestinal complaints. These are: bad taste, bad breath, coated tongue, belching, sour eructation, heart burn, and some form of abdominal discomfort; this last symptom may be of any degree of severity and its intensity, from a sense of fullness to severe pain, is best judged by the manner in which the patient describes it, rather than the adjectives used.

Bad breath is often ascribed to the condition of the gastro-intestinal tract when diseased teeth or tonsils, or naso-pharyngitis is the cause. Bad taste and coated tongue accompany this symptom, although a bad taste in the mouth is frequently met with as a persistent symptom without ascertainable cause. In these cases it has often been thought by many that there was some change in the chemistry of the saliva. A coated tongue occurs when not sufficient coarse food has been taken to mechanically cleanse it. The tongue is not the mirror of the stomach as was once believed.

Gas is a common complaint of patients and often a
convenient word for the doctor in explaining away the
mystery of abdominal pathology or dysfunction. Belching,
epigastric distress, distention, flatulence, borborygmi,
peristaltic unrest and actual peristaltic contractions
have been attributed to "gas". Let us analyze these sym-
ptoms which are grouped under this general term.

Belching is popularly supposed to indicate an excess
of gas in the stomach, caused by fermentation. Many ab-
dominal complaints are attributed to gas and many foods
are said to gassy simply because belching is part of the
symptomatology. Gas generation rarely takes place in the
stomach, for this organ usually empties itself over night
and the presence of acid chyme prevents bacterial growth.
In stenosis with retention, some fermentation may take
place but, with this exception, gas brought up by belching
is usually swallowed air. It is beleived that aerophagia
is a reflex symptom caused by some distress in the ab-
domen which the patient is trying to relieve and has found,
by experience, can be releived by swallowing air and
belching it. The whole mechanics of the affair can be
watched under the fluoroscope, the "Magen Blase" becoming
gradually larger with each gulp until sufficient dis-
tention has occurred to bring about belching with the col-
lapse of the stomach proportionately. This symptom is
met with in gall bladder disease, cardio-circulatory
disease with hypertension, gastroptosis, chronic appendicitis, and sometimes in cancer and ulcer. Tight clothing may also cause it. Aerophagia is met with in the emotionally excitable, and they complain of the belching and not of the symptom they are trying to relieve. It is noisy and designed to attract attention. Such a patient will sit at the side of the desk, rubbing his stomach and gulping meanwhile to show immediately, with much gusto, how much gas he has. The epigastric distress in cases of cardiac embarrassment, nephritis, angina, and hypertension are often described by the patient as gas. Bloating is another term used by patients to describe this distress in the epigastrium, particularly in gall bladder disease or other chronic diseases of the biliary passages, constipation, and chronic appendicitis.

Flatulence is the accumulation of gas in the intestinal tract and is caused by faulty diet, such as an excess of carbohydrates; fast eating and digestive failure from other causes; bacterial infection, as occurs in dysentery. It occurs as a result of failure of absorption, as in pneumonia and typhoid, due to the atonic condition of the intestinal walls in these conditions. Fecal stasis, from whatever cause, will prevent the proper expulsion of gases and, when the accumulation is excessive, distention is the result. Often other conditions are mistaken for dis-
tension, such as ascites, tumor, or any abdominal condition attributed by the patient to gas. Peristaltic abnormalities such as peristaltic unrest which occurs in the neuroses, are apt to be mistaken for flatulence.

Pyrosis or heart burn, is a burning distress in the epigastrium and substernal region popularly supposed to be due to too much acid in the stomach. It has been proven that esophageal and gastric mucosa are insensitive to gastric juice which makes it doubtful that increased acidity can cause a sensation of burning. It is a symptom which may occur in achylia and carcinoma of the stomach. It has been said to be due to mild esophagitis and is induced by excessive smoking, swallowing large quantities of saliva, and indiscretions in diet. The intensity of the symptom is no index to the degree of acidity. It is relieved by alkalies, food and belching.

Patients are often accepted at their word when they state that they have a sour stomach, their belief being based on the fact that they have sour eructations; these eructations are regurgitation of chyme from the stomach and it may be high or low in acidity. It is a reflex symptom and suggests hypersecretion, which again is not an entity but a signal indication some pathology disturbing the function of the stomach. Regurgitation of food in mouthfuls is similarly caused and invariably
called vomiting by the patient. It is not accompanied by nausea, salivation, and sudden contraction of the diaphragm and abdominal muscles, as in true vomiting. The real nature of regurgitation is emphasized by its ready control by bromide and atropine.

Nausea has been called dilute vomiting and many of the conditions causing it will eventually cause vomiting. Owing to the fact that the stomach tube so constantly finds bile in patients complaining of nausea, authorities have come to connect this symptom with regurgitation through the pylorus. Eye strain, starvation, and chronic appendicitis are common causes of nausea; when it is a reflex symptom of chronic appendicitis it is apt to occur during or directly after a meal and may be associated with epigastric pain due to pylorospasm. Unlike ulcer, the onset is soon after the ingestion of food, often forcing the patient to leave the table.

Vomiting is a symptom and not a disease, and it occurs in a large variety of conditions. The causes of vomiting have been classified by Hurst (56) as local, reflex, toxic, and central. As he has pointed out, under appropriate circumstances, any variety of such non-hysterical vomiting may be perpetuated and exaggerated by suggestion after its original cause has disappeared. Such vomiting of central origin may occur in the course of cerebral disease.
or as an expression of extreme emotional disturbance or anxiety. If vomiting occurs as a result of one of these abnormalities in the case of an individual who is unstable nervously or neurotic, it is quite possible that it may continue and become a nervous habit. As time passes the original exciting factor may be forgotten or completely overshadowed and the patient may present a neurosis, one somatic expression of which is vomiting.

In other words, the mechanism of production of this type of vomiting is similar to that in many other neuroses and this has led to the use of a variety of terms such as "hysterical", "nervous", "functional", "habit" or "psychoneurotic" vomiting.

A review of 140 cases of functional vomiting revealed (101) that in most cases there are characteristic clinical and diagnostic features. Continued vomiting which is usually without effort, nausea or significant abdominal symptoms and which occurs within an hour after meals is typically functional. Most patients are women between ages of 20 and 40 years and while they are relatively healthy in appearance, they present evidence of instability of the nervous system. There are a large variety of inciting factors, including nervousness, fatigue and ingestion of food with or without transient indigestion. Because of the large variety of underlying
or precipitating factors, patients suffering from hysterical vomiting may consult specialists in almost all fields of medicine as well as general practitioners.

Consideration must next be given to another gastric disorder, which is clearly increasing in frequency, namely peptic ulcer. It is not merely that modern methods make it possible to diagnose it more frequently, for untreated ulcers may be expected to perforate and the careful pathological examinations of the last century showed that perforated ulcers were comparatively rare. The etiology of peptic ulcer has always offered difficulty, but the subject took a new turn in 1932 when Cushing (32) recalled Rokitansky's observation made in 1841, and added cases of his own in which gastric ulcer had resulted from the physiological disturbances produced by neoplasms at the base of the brain. This association between organic disease of the brain and the viscera is also seen in Kinnear Wilson's disease. Then certain areas of the hypothalamus can produce disturbances in the stomach which lead to acute ulcers there. Evidently an organic brain lesion is not necessary - a functional perturbation can also act as an important etiological factor. It has been concluded that peptic ulcer, if it occurs at all, is extremely rare in placid individuals. It is largely restricted to hard-working
persons who are chronically tense and experience unusual degrees of tensions from causes which would disturb the lives of others to a comparatively slight extent.

Wilson, as quoted by Langdon-Brown (69), characterizes the psychological outlook of the candidate for peptic ulcer as feeling a great need for security, which may be expressed in two ways; either by active striving or by dependence. This latter type tends to make use of his illness to maintain the status quo and to evade responsibility, at least until he loses his job or his parents. The striving type may regress to the dependent type later on, usually as the result of some psychological upheaval. The Freudians may be interested to discover that their problems are rarely sexual in character.

In order to control these conclusions, Davies and Wilson, as quoted by Langdon-Brown (69), compared the psychological factors in patients suffering from peptic ulcer with a series of patients with hernia; after making all the allowances and corrections they could, there was a significant preponderance of such factors in the ulcer patients. The simultaneous occurrence of sympathetic vasoconstriction and vagal over-secretion are the probable nervous channels through which the psychogenic factors express themselves, though, in view of the close association of the hypothalamus and the pituitary, the work
of Dodds and Noble (69) on the damage wrought by excess of pituitrin on the gastric mucosa must not be forgotten as any possible route. In any case, recognition of the psychogenic factor must not be allowed to minimize the importance of looking for contributory factors such as oral sepsis, reflexes from organic lesions lower down in the alimentary tract, improper dietary and excessive smoking.

In turning our attention next to the region of the pylorus, we find some diversity of opinions regarding the psychogenic affections. Schindler (93) states; "Certain as it is that there are frequent spastic pains of psychogenic origin in the upper abdomen, genuine psychogenic pylorospasm is rare. Genuine pyloric spasm as observed roentgenologically and fluoroscopically is in most cases a symptom of ulcer."

In contradistinction, Alkan (1) states that psychogenic pylorospasm is more often found than psychogenic cardiospasm. The pylorus being more accessible surgically than the cardia, the functional nature of pylorospasm is more frequently recognized in vivo by the astonished physician than that of cardiospasm. Its duration varies from that of a fleeting spasm to obstruction lasting several days. This disorder may be very deceptive in its simulation of all the various single symptoms of organic
pyloric obstruction. But on operation, the pylorus, relaxed in narcosis, fails to show any stenosis. A humiliating finding! But it is even more humiliating when the patient, fearing operation, refuses it, and is cured by a quack.

How easily pyloric motility is influenced psychically is illustrated by Ruggles (92), who writes: "There is a practical application of mental control of the pylorus. Frequently when the duodenal cap is slow in appearing, a short conversation with the patient on the subject of favorite foods will produce a prompt relaxation of the pyloric sphincter."

Apparently, psychogenic affection in the form of spasm has even been promulgated in the small intestine. "There are a number of interesting reports on psychogenic disturbances of the function of the small intestine," writes Heyer (53). Brunzel operated on an hysterical nurse with a diagnosis of iliac strangulation. Nothing was found except rings of contraction about 1 cm. wide, with complete constriction of the lumen in different parts of the intestine. After the abdomen was sewed up, there having been no further surgical procedure, the patient was free from complaints. Heyer also quotes Schloffer who reported a case in a twenty-five year old hysterical patient who had had three operations already, and a
surgeon very nearly performed a fourth laparotomy because the patient was said to have vomited fecal matter; the findings were entirely negative. Such disturbances in innervation of the small intestine, comments Heyer, seem to be not infrequent, because, unfortunately, only a small fraction of erroneous diagnoses and operative findings are published. Schindler (93) calls attention to the fact that thus far no attention has been paid to the possibility of psychogenesis of spastic ileus. Most cases are brought to operation. It would be of more than theoretical interest to find out whether psychotherapy, especially suggestion, would cure the condition.

After the acid-secreting area of the duodenum is passed there seems little to say about the association between emotional states and visceral symptoms until the ileo-caecal sphincter is reached. But the picture changes on entering what Sir Arthur Hurst has aptly termed the "unhappy colon". Unhappy because it responds so vividly to the unhappiness of its owner, unhappy because its functions are often misinterpreted, and unhappy because its symptoms are consequently wrongly treated. The happy colon is the one that can carry out its motor functions without interference from the automonic nervous system and without being plagued by purgations administrated when not it but the rectum has an acquired dyschezia.
some colons are naturally greedy and absorb water too quickly and some are lazy, but most of them are well behaved if they are not interfered with.

Special reference is made to E. Liek's (72) extensive discussion of the syndrome of pseudo-appendicitis (particularly in its chronic form), on the basis of the literature and a twenty-five year surgical experience.

"The general character of the complaints, their sudden appearance and disappearance, their dependence on psychic factors, the slight involvement of the general condition and many other things point to a nervous disturbance of the intestinal function.....In my opinion the intestinal spasm is a reflex neurosis dependent on peripheral as well as central, specifically psychic, influences..... The increased occurrence during the last decades of this complaint so far designated as chronic appendicitis, is to be ascribed to mass suggestion..... Numerous observations over a long period of time have convinced me that spastic processes of a nervous character are at the base of many if not most cases of so-called chronic appendicitis..... On the basis of our many years' experience in the treatment of reflex neuroses I am inclined to consider the majority of operative successes as psychically conditioned..... It is not the anatomic alteration that is pathogenic here, but the wrong psychic attitude.....
Since the appendix of almost all adults shows anatomical alterations, the diagnosis of "chronic appendicitis" may be correct in the vast majority of cases, anatomically speaking. What we have to be clear about is that the clinical complaints in many cases have nothing to do with these alterations; a phenomenon which, incidentally, we meet in other fields of medicine, e.g., in tuberculosis.

Alkan (1) discusses the reasons why spasms of the appendix are of primary importance in appendicitis. Thus, spastic blockage of the intestinal content taking place on a psychic basis may result in the same deleterious anatomical processes as blockage brought about by other factors. In many cases of appendicitis where the clinical symptoms are not violent, though still evident, the appendix appears normal microscopically, but contracted and hard to the touch. Whether this spasm was a reaction to an inflammatory process or whether it was of a psychogenic functional nature cannot be diagnosed clinically. Mohr (40) says it is intelligible theoretically that psychic excitement may play a role in appendicitis. These facts are presented, of course, only as a proof of the ever-present psychic component and not as a basis on which to advise psychotherapy for this condition. Mohr believes, however, that psychic factors come into consideration in the prevention of appendicitis, and that they merit full
The term "functional bowel" as applied to a disease is anomalous, for the normal bowel is "functional". Other terms such as "colitis" which are applied to the symptom-complex under consideration are perhaps equally inexact. It has been pointed out that the etymological meaning of the word "colitis" is inflammation of the colon and that in the syndrome under discussion the colon is not inflamed in the sense that tissue injury is not demonstrable pathologically. If one accepts as a definition of inflammation "the response of tissue to injury", the term "colitis" is perhaps acceptable, for "mucous colitis" does seem to be an instance of physiologic response to tissue injury although the histologic evidence of injury is questionable. The term "mucous colitis" may be used to emphasize the amount of mucus present in the stools. An active bowel normally secretes mucus but in some cases the quantity is rather great and the mucus is retained in the contracted bowel, dried, and then expelled in short or long strings or shreds, the so-called "mucous casts" of the bowel, often containing considerable cellular detritus and stained with food material. The term "spastic colitis" was designed apparently to emphasize the element of spasm. In some cases the spasm in the sigmoid particularly does seem
to be a prominent feature. In a sense, these terms are justifiable, but on the whole it seems preferable to consider the phenomena as special manifestations of a more general disturbance of the bowel. The rather paradoxical term "chronic functional colitis" is sometimes applied. A more exact phrase would be "functional disturbance of the colon", but this seems too cumbersome for use.

Two other terms for the syndrome are commonly used in medical circles and are fairly exact, i.e., "irritable colon" and "irritable bowel", intimating merely an abnormal irritability of the colon. Still another term frequently used is that of "bowel distress", meaning distress arising from a structurally normal but functionally disturbed bowel, although by definition it should include any distress of bowel origin. It accurately described the distress but it is not as satisfactory a name for the symptom complex as "irritable colon".

Whenever progress through colon is impeded in any section, the ileo-caecal sphincter is closed. In some instances, a colonic disturbance may close both the ileo-caecal and pyloric sphincters. It is known that apart from sphincters, sympathetic interference spells atony, and parasympathetic spasm, but on the X-ray screen atony and spasm can be seen simultaneously present in different
sections under emotional stress. To take first an instance which may be regarded as lying between the physiological and pathological, during the imbalance between the pituitary and the ovary which characterizes the climacteric the patient may suffer much discomfort which the skiagram reveals to be associated with ballooning of some segments of the colon and spasmodic contraction of others. Such a condition is often comforted by oestrin and anti-spasmodic drugs and only aggravated by aperients. In more definitely pathological, psychoneurotic states the same thing may be present in a more marked form, but it is commoner then to find either atony or spasm.

The atonic type, on the other hand, is more often associated with depression and negativism. The condition was formerly attributed to visceroptosis, but X-ray examinations of normal individuals have shown that just as much dropping may be present in health. Indeed, considerable variations in the position of the viscera are compatible with good health. It is the sympathetic inhibition rather than the position of the colon which matters, though it is quite possible that visceroptosis by exerting a drag on the mesenteric nerves may contribute to that inhibition, thus establishing a vicious circle.

Wangensteen (102) has cited cases of functional spastic obstruction, fortunately small in number, which may lead
to confusion. He states that we all recognize these patients when they do not present the symptoms of bowel obstruction. They have considerable difficulty with gaseous distension and exhibit in high degree the features of a neurogenic complaint with reference to the bowel.

Wangensteen has seen seven such patients in whom the clinical picture in every way simulated an organic obstruction of the bowel. They complain of intermittent, crampy pain, at the height of which loud intestinal noises may be heard on auscultation. They exhibit, usually, considerable distention, and vomiting is a prominent feature. The roentgenographic film of the abdomen, however, indicates that the gas is practically entirely in the colon and stomach. If a mechanical obstruction in the pelvic colon, such as a carcinoma of the sigmoid flexure, can be ruled out, the uniform gaseous distention of the colon contradicts the presence of a mechanical obstruction. Following the administration of enemas, with an organic obstruction in the small intestine, the gas in the colon should disappear. He has placed so much reliance on the significance of the presence of the gaseous distention in the colon in such cases, that he believes they can be identified by this criterion, despite the other manifest signs of a mechanical obstruction.

One of these patients previously operated upon six times
for acute intestinal obstruction elsewhere has since been watched through two such attacks.

So far purely motor abnormalities have been spoken of, as if they occurred apart from secretory changes. This, however, can but seldom be the case. The colon is continuously lined with the crypts of Lieberkuhn, and those crypts are richly supplied with goblet cells, secreting mucous, which acts as a lubricant. As the contents of the colon become progressively more solid, more lubricant is required. Irritants of all sorts means more secretion. If there is spasm in addition there is still greater demand for lubrication. Therefore, the spastic type of constipation always involves the passage of some mucous, so that to label this mucous colitis is a misnomer, and tends to divert attention from the underlying cause which is so often psychological. If the colon is irritated further by drastic purgatives, there is further secretion of mucous. Over treatment by lavage, which these patients are apt to fly to, is also very likely to act as an irritant and produce mucous.

Colitis can, of course, occur, but in the type of case here considered there is no inflammatory change—no "itis" about it at all. "Mucous colitis" has been termed "asthma of the colon", which is an apt label, for it occurs under similar conditions and has similar symptoms.
to bronchial asthma. Formerly the muco-membranous type in which fibrinous casts of the bowel were passed used to be seen. The subject was nearly always a depressed introspective middle-aged woman. For some unknown reason muco-membranous colitis, better called muco-membranous colic, has become rare since the war. It seems to bear the same relationship to mucous colitis as that rare condition, fibrinous bronchitis, bears to asthma. Many cases illustrate the psychological background of such conditions.

Bloomfield (13) in Musser's Internal Medicine writes:

"No group of patients is more universally misdiagnosed and mistreated and most of the unfortunates who have been told they have "colitis" have a neurosis without any real organic disease.... No attempt should be made to make a final diagnosis without prolonged study of the entire individual from the physical, mental and social standpoints.... Sooner or later the patient begins to rationalize about his trouble and to blame it on one thing or another - certain articles of food, a past illness or injury, perhaps an operation or the finding of intestinal parasites. As the years go by he becomes more and more convinced that serious trouble exists and, as a rule, makes the rounds of the 'colon cultists'. Possibly a surgical operation or two has been done to
relieve 'drooping of the colon' or to mobilize his ce-
cum.... In really stubborn cases.... the cooperation of
a good psychiatrist, if one can be found, can be invoked
to great advantage."

The recognition of psychic factors, even to this ex-
tent, is, however, an exception with textbook writers.
Thus, Niles (81) in Cecil's Textbook of Medicine, writes:
"Mucous colitis (membranous colitis, mucous diarrhea, mu-
cous colic) was formerly regarded as a neurosis, but
clinical and pathological observations now justify the
conclusion that it is a form of chronic colitis." Cur-
iously enough, he continues his description in terms
which in themselves are highly suggestive of neurosis:
"It frequently, though not invariably, occurs in patients
with enteroptosis. Spastic constipation is always an
accompaniment. It is far more common among women than
men, and the sufferers are often highly neurotic. All
the causes of spastic constipation predispose to mucous
colitis."

It may be thought that ulcerative colitis with its
frank accompaniments of blood and pus, must come into
a different category. Admittedly there is a difference
of opinion on the subject. Many authorities think that
bacillary dysentery contracted from some carrier is usually
the initial cause; then when the lesion is established
the original infection disappears and no pathogenic organism can be found. It is possible that this is the course of events in some cases. It is also noteworthy that achlorhydria is a not infrequent accompaniment, implying a weakness of defense rather than a strength of attack, for it is generally agreed that the hydrochloric acid of the gastric juice is an important bactericidal agent and that it appears necessary for the assimilation of Vitamin B, itself necessary in its turn for the maintenance of a healthy tone in the bowel. Once the lesion is present, the ingestion of ordinary non-pathogenic organisms might well in these circumstances prevent its healing.

In spite of numerous attempts at an etiological classification of ulcerative colitis (specific bacteriological etiology, avitaminosis, etc.) no etiological differentiation from mucous colitis has been possible thus far. As a matter of fact, a number of cases of ulcerative colitis, treated psychotherapeutically, are reported in the literature. Recently, Langdon-Brown (69) has cited Culliman and Wittkower who accumulated a considerable body of evidence that even an acute hemorrhagic type of ulcerative colitis may come on after an emotional shock or be maintained by an emotional strain. This is a striking example of an organic visceral lesion in the
etiology of which psychological factors bulk large. In
fine, a woman's unhappy colon is often a protest against
her loveless and childless life.

Murray (80) concludes: "Investigation into the life
histories and mental attitudes of a series of twelve
patients suffering from bloody diarrhoeas or ulcerative
colitis revealed a close association between the emerg­
ence of a difficult psychologic situation and the onset
of the symptoms. Mental conflicts concerned with mar­
riage were more commonly found than other types of sit­
uations which might evoke anxiety. In each case the
patients faced their problems in an inadequate, infantile
manner. If the pathologic process has not progressed
too far, a thorough investigation into the patient's life
and mental attitude is indicated and may afford opportunity
for much needed psychotherapy."

Stimulated by Murray's publication, Sullivan (98) in­
vestigated some further cases of ulcerative colitis. He
reports a number of cases in which "psychogenic factors
seem to have played a major role in the onset and course
of the disease. He beleives that psychotherapy materially
alters the prognosis in these cases."

A working hypothesis of the mechanism by which emo­
tional disturbances can produce ulcerative colitis and
by which ulcers can be made to disappear by a change in
emotional stress was then proposed by Sullivan. "Emotion through the vegetative centers in the diencephalon whips the liquid contents of the small intestine down into the colon. In these particular individuals the enzymes in this liquid intestinal content may be of a higher digestive power than normal, or the natural protective powers of the mucosa may be lowered. At any rate, surface digestion of mucosa of the colon occurs, bacterial invasion is made easy, and acute ulceration results. With the emotional conflict solved, the intestinal motility returns to normal."

Having thus reviewed the status of the term "functional bowel", it is now appropriate to inquire into the nature of the syndrome under consideration. In the first place it is important to recognize that it is not a disease entity, but rather a group of symptoms resulting directly from a disturbance in the function of the bowel and indirectly from a host of causes.

The most important symptom is abdominal pain, which may vary in severity from an indefinite sensation of bloating and distention to severe pain, usually cramp-like, intermittent, rhythmical, lower abdominal, often related to and relieved by a bowel movement. The most familiar illustration of this pain is the "green apple colic" of childhood. In adults, this type of pain, an intestinal
coli, often simulates biliary or renal colic and the differential diagnosis may be difficult. The more chronic forms of "bowel distress" vary greatly in severity from patient to patient and in the same patient from time to time. The location of the distress also varies although it is usually lower abdominal and frequently shifts from point to point in the abdomen. It is frequently relieved by a bowel movement or the passage of flatus, although it may be brought on or made worse by a bowel movement. Food taking is likely to augment the distress just as eating or drinking is likely to cause defecation during an attack of acute enteritis due to intensification of the normal neuromuscular reflex. Many of the patients complain of continued abdominal soreness and discomfort not related to food taking or defecation. Nausea is a common symptom, particularly morning nausea in men as well as women and vomiting is not unusual. Abnormal or at least unusual hunger may be present consisting of "hunger pangs" referred to the mid- or lower abdomen and relieved by food taking. Belching, abdominal distention, rumbling and gurgling in the abdomen and excessive flatus are common. The patients often complain of more general symptoms such as headache, lethargy, fatigability, weakness, nervousness, insomnia, and dizziness but rarely if ever of true vertigo. These phenomena are of very quest-
ible relationship to the "functional bowel" itself, but may be concomitant manifestations of a more general underlying disorder. It is possible, of course, that some of them may be reflex manifestations from the bowel.

Physical examination usually reveals a very tender palpable ropelike colon. The acute tenderness of an "irritable bowel" is really an amazing phenomenon in comparison with the lack of tenderness in severe chronic ulcerative colitis. The physical examination also gives the physician a clue as to the general sensitivity of the patient, the degree of "nervousness" present, and his or her reactions as an individual.

A detailed description of the bowel movements is very important. The patient usually refers to diarrhea, constipation, or "difficulty with the bowels" associated with the distress. It is important to find out exactly what, in terms of bowel function, the patient means by his statements. It is also very helpful to observe the stools from day to day or have the patient keep a diary describing each stool in detail, especially as to the consistency rather than to frequency.

Assuming a patient with the symptomatology described, with a tender colon, definite stool disturbance, and no evidence of organic disease of any kind, what is the nature of the "functional bowel" disturbance? It consists ap-
parently in an unusual or abnormal irritability of the neuromuscular mechanism of the bowel in a disruption of the normal peristaltic rhythm. This may lead to hyperperistalsis and diarrhea of varying grades or to spasm and "spastic constipation". The abnormal muscular contractions and the resulting localized distentions of the bowel produce distress which is true visceral pain, for muscular contraction and distention are known to be the two types of stimuli in the bowel capable of producing visceral pain.

Another interesting condition involving the colon which has been classified as being neurogenic in origin consists of the megacolon - Hirschsprung's disease. This is a relatively rare condition appearing in childhood and characterized by obstinate constipation, tremendous dilatation of the colon and hypertrophy of its wall. That the disease is congenital in origin is being doubted more and more, for although the majority of cases are seen in children, there are instances in which it first makes its appearance in adult life. It is possible that a slight congenital defect in the nervous mechanism of the colon may be a contributing factor in these cases appearing in adults. In children the pathologic process is often a neuromuscular one. The barium-filled bowel presents a characteristic X-ray picture.
The condition is due to an abnormality in the innervation of the colon - an imbalance between the activities of the thoracico-lumbar and sacral outflows. In recent years it has been found that Hirschsprung's disease has to do with failure of relaxation of the rectosigmoid sphincter. In most subjects the rectosigmoid junction is not characterized by a well-marked sphincter but in Hirschsprung's disease the sphincter is conspicuous. The failure of a sphincter to relax has been named achalasia. Degeneration of the cells of Auerbach's plexus at the pelvi-rectal sphincter has been described. This observation of itself would suggest that the cause of the condition is underactivity of the parasympathetic innervation (motor) rather than overactivity of the sympathetic (inhibitory). According to Hurst, failure of the pelvi-rectal sphincter or of the internal anal sphincter to relax coordinately with contraction of the colonic wall is an important element in the pathogenesis of megacolon. It is most likely, however, that the imbalance between the sympathetic and parasympathetic innervations is not confined to the sphincters but affects the bowel wall as well. This conclusion is borne out by the fact that the dilated and immobile colon shows strong and effective contractions of the bowel after a spinal anesthetic, an effect which also argues strongly
against the view that, in most cases at any rate, the parasympathetic is primarily at fault. It seems to indicate, on the contrary, that the motor mechanism is intact but under the influence of an inordinate inhibitory action exerted through the sympathetic. Furthermore the most successful treatment of the condition consists in excision of the lumbar sympathetic ganglia, or section of the hypogastric and inferior mesenteric nerves.

Finally, attention should be called to the importance of proctogenic constipation, in the development of certain definite disturbances of the rectum and anus (1). Normally defecation is reflexly produced by increase in tension in the ampulla recti. The external sphincter is exceptional in being not only a striped voluntary muscle, but also subject to autonomic nervous centers. Psychic processes leading to conscious inhibition of the defecation reflex are, on the one hand, shame; on the other, fear of pain. In young girls who see "in the animal functions of the body a debasing of the human ideal", who in company consciously repress defecation, the whole process of defecation becomes disturbed. The rectal mucosa becomes hyperesthetic, the sphincters hypertonic, there results the condition of proctogenic constipation. The ampulla remains constantly filled with fecal masses, which in turn may compress the veins,
leading to the formation of hemorrhoids. Psycho-analysis in these cases reveals unconscious spite reactions, guilt feelings, secretiveness, etc., as causative factors. The highest degrees of this retention are caused by the fear of pain which occurs when the passage of hard fecal masses distends an erosion or fissure. At first, there is only a viscero-visceral reflex from the wound to the sphincter, then this reflex becomes fixed with fear, and the sphincter ceases to relax at all. This process is entirely different from tonic contractions of shorter or longer duration as they occur in smooth muscle sphincters, the sphincter ani being in part a voluntary muscle. The effect, however, is the same as in those sphincter spasms which occur entirely independent of the will, as for example at the pylorus.

We should thus be able to conclude that the hyper-irritability of the bowel apparently may come about as a result of the nervous state of the individual. Some students of the subject are inclined to think a real "irritable bowel" is always dependent upon a pre-existing nervous condition. This view is supported by the observation that "functional bowel" is very rare in negroes and those individuals in our civilization who seem the least disturbed by the so-called "stress and strain" of civilized life. Be that as it may, it is clear that acute
distress and stool disturbance may result from severe emotional stress, particularly fear, as is so well recognized in the lay literature of the world as a phenomenon of human experience.
Differential Diagnosis

From the practical standpoint, the consideration of the differential diagnosis of this subject is by far the most important. In dwelling upon the phase of the "psychogenic" versus the "acute" abdomen, it is important to bear in mind the relationships which psychic and organic disorders may hold to each other, namely: (1) Psychic disease may simulate organic conditions. (2) Organic disorders may produce pseudoneurotic symptoms and appear as psychic or functional states. (3) Organic and functional disease may supplement each other in the production of clinical symptoms, and (4) Organic and functional disease may exist independently of each other.

The following disorders of the nervous control of the gastro-intestinal tract are discussed briefly for the purpose of better understanding the purely functional disturbances and because in ascending to the higher levels of nervous control it becomes increasingly difficult to separate the organic from the functional component, as, for example, in encephalitis and brain tumors. The classification of Kantor (58) is rather loosely followed and only those conditions which are of importance in differential diagnosis are considered.

Local disorders of the end organ concern those secretory and motor disturbances as a result of the in-
gestion of abnormal foods or drugs, and to irregular eating habits. Furthermore, certain drugs, regardless of the method of their administration, have a paralyzing effect upon the nerve endings: such as the parasympathetic paralyzing effect of belladonna and the corresponding sympathetic paralysis of ergotoxin. In regard to organic disease of the intrinsic plexuses of Auerbach and Meissner, actual lesions have been found in tuberculous enteritis and a generalized neurofibromatosis may also involve these endings, giving rise to signs of local irritation which are apt to be confused with inflammatory processes of infection.

Concerning disorders of the ganglionic and segmental arcs, Kantor (58) describes as "solar syndromes" a variety of clinical affectations which he believes to be caused by irritation of the sympathetic and parasympathetic ganglia or their post-ganglionic fibers. Laignel-Lavastine, as quoted by Kantor, further maintains that the grave symptoms associated with peritoneal inflammation, such as fall in blood pressure and diarrhea are due not so much to the direct irritation of the peritoneum as to the effect of paralysis of the solar plexus.

As these "solar syndromes" are, in the majority of cases, a part of neurological condition involving the cord as well as the ganglia, hence both the segmental
and ganglionic arcs, it is usually not possible to localize the symptoms to primarily one or the other reflex arc. Master (73) describes the following neurological conditions of this nature which may give rise to acute abdominal pain likely to be mistaken for an acute surgical condition: tabetic crises of the stomach, gall bladder, bile ducts, ureter and bladder; spinal cord tumors and injuries with root irritation; spinal arthritis, transverse myelitis, meningeal irritation, herpes zoster; irritation of the cardiac and solar plexuses; reflex constriction and dilatation of the pulmonary vessels; lead colic; cardiospasm and pylorospasm; and the abdominal crises of morphin addiction. Hess (52) includes also the vague neuritis of tubercular and other origins, syringomyelia and poliomyelitis. These conditions are, according to Hess, frequently accompanied by severe diarrhea, vomiting and acute gastric dilatation, presenting a very confusing problem in diagnosis.

The abdominal crises of tabes dorsalis with their accompanying extreme epigastric pain and prostration are particularly apt to be mistaken for acute abdominal conditions. Nuzman (83) in a study of 1000 cases of tabes found that 97 wholly needless operations had been performed upon 87 patients. These operations included 19 for cholecystitis and gallstones, 18 for appendicitis,
13 for salpingitis, 7 for renal calculi, 7 for post-operative adhesions and 9 exploratory laparatomies.

Of interest here, although not directly related to the ganglionic and segmental arcs, are the intercostal neuralgias. Carnett (27) cites numerous cases of mistaken diagnoses and operations for appendicitis and gall bladder disease in which the abdominal symptoms of pain, tenderness and muscle spasm were due solely to a neuritis of the intercostal nerves. He states that neuralgias involving the seventh to tenth nerves are particularly apt to be mistaken for cholecystitis, while involvement of the tenth, eleventh and twelfth thoracic or first lumbar nerves on the right are apt to be diagnosed as appendicitis.

The suprasegmental arc, as described, arises in the floor of the third ventricle and passes downward by paths not yet discovered to the medulla and cord, where it connects with the preganglionic fibers. Hence, lesions in the cord, medulla or diencephalon may result in gastro-intestinal symptoms.

Kantor (58) discusses the two cases of Feltkamp in which syringomyelia processes involved the medulla and cord in its cervical and upper thoracic levels. In neither patient were the lesions low enough to involve the direct sympathetic or parasympathetic pathways to
the colon, yet both patients developed an ileus of the colon severe enough to require surgical intervention.

Epidemic encephalitis is especially important in reference to the autonomic nervous system, as the important diencephalic regulatory centers are attacked directly. Farr (44) reports three cases in which an encephalitis simulated an acute surgical abdomen; two cases simulating acute intestinal obstruction and one acute appendicitis, the latter case being operated. Stevenson (95) also reports ten cases in which encephalitis was diagnosed variously as perforated gastric ulcer, renal colic, strangulated hernia and acute appendicitis.

Abdominal migraine may also raise very serious diagnostic problems as a result of the acute abdominal pain characteristic of this condition. Bletzten and Brams (12) state that four out of ten patients with abdominal migraine were operated upon for an acute surgical condition. In none was there any demonstrable abdominal pathology found.

Wechsler (105) has reported 14 cases of local organic disease of the brain associated with acute, severe abdominal pain. These cases included the following conditions: one frontal lobe abscess; two temporal lobe abscesses; three frontal lobe tumors (right); one tumor
of the right temporal lobe and hippocampus; one right cerebellar tumor; one right cerebellar cyst; one right occipital meningioma; one right occipital angioma; one pituitary tumor; one Rathke's pouch tumor and one hydro-cephalus.

Most of these patients presented other symptoms referable to the gastro-intestinal tract, such as sharp abdominal cramps, nausea and vomiting and colic-like spasms. One of these patients was mistakenly operated upon for acute appendicitis, one for gall bladder disease and another had previously had a diagnosis of chronic appendicitis and hysteria.

Cushing (31) maintains that not only may brain tumors be characterized by abdominal symptoms, but that actual organic disease of the gastro-intestinal tract may be the result of a brain lesion. He presents three cases—patients who died of acute gastric perforation following operations for cerebellar tumors and eight other cases of mid-brain and cerebellar tumors associated with erosion and ulceration of the gastric mucosa. In explanation of this striking relationship he states, "the parasympathetic apparatus, in all probability under normal conditions, is strongly affected by cortical and psychic influences. However that may be, direct stimulation of the tuber (cinereum) or what theoretically
amounts to the same thing, a functional release of the vagus from paralysis of the antagonistic sympathetic fibers, leads to hypersecretion, hyper-chlorhydria, hypermotility and hypertonicity, especially marked in the pyloric segment. By the spasmodic contractions of the musculature, possibly supplemented by accompanying local spasm of the terminal blood vessels, small areas of ischemia and hemorrhagic infarction are produced, leaving the overlying mucosa exposed to the digestive effects of its own hyperacid juices."

Grant (48) has additionally reported two cases of verified mid-line cerebellar tumors, one patient with hemorrhage from a duodenal ulcer 72 hours following an operation for the tumor, and the other patient dying of gastric perforation and hemorrhage eight days following the brain operation. Neither patient had had previous gastric symptoms of any kind.

Organic illness may sometimes be masked by psychic complaints and social catastrophies and the psychic complaints may attract so much attention that the true cause of the patient's symptoms may be overlooked.

Yaskin (112) reports four cases of carcinoma of the pancreas in which nervous symptoms of depression, crying spells, anxiety, insomnia, anorexia, weight loss and weakness appeared three to eight months before any
physical symptoms or organic findings. He concludes that these mental reactions are a response of the central nervous system to the toxic and metabolic changes produced by a progressive visceral condition.

"The character and intensity of nervous symptoms further depend on the previous personality of a given patient, abnormal tendencies appear activated under the stress and strain of the exciting physical disability. The nervous manifestations are further modified by social and economic circumstances of the patient, the psychogenic factors play a large role in the symptomatology of these organic cases."

The most difficult problem to the surgeon is the patient with organic disease but with a large superstructure of neuroticism, and although no cause and effect relationship is definitely established between the organic and neurotic components of the disease, each seems to contribute an ample share in frustrating any treatment. In many cases this syndrome accounts for nervous breakdowns, mild depressions and extreme feelings of fatigue or toxicity which are otherwise unexplainable. Often it accounts for the inability of a healthy looking man to work or to earn even a meager living. Usually he blames all of his disability on some vague indigestion or pain in stomach or colon, and he may feel so sure that
poisons elaborated in the bowel are destroying the brain that he will almost beg surgeons to operate on him, not once, but several times. Unfortunately, because these people keep hoping against hope that they will some day be cured by some prescription or diet or operation, they generally keep going the rounds and sooner or later they part cheerfully with teeth or tonsillar tags or some detachable abdominal organ. Sometimes one faces the interesting question whether the desire for operation and subsequent pleasure of talking of one's operation is not as good a placebo as some of the other placebos that the practitioner is likely to use. And one has to recognize that one should not necessarily kick at the physician who is using one or another guess in the direction of operative interference and things like that. Nevertheless, it is sad that there still are patients who arrive practically eviscerated, for a last trial, which very often ought to have been the first - namely - that of getting the life adjustment within the range of socialized health while it can be fully used.

It is only natural that the surgeon should hesitate making a diagnosis of a psychoneurosis to explain symptoms which he knows only too well, may represent the earliest manifestation of some serious organic disease; a disease, perhaps, whose progress might be stopped by
early intervention. As Foss (46) states: "To the conscientious diagnostician these (psychoneurotic) patients are especially trying, for though the examiner may feel from the first few minutes of conversation that the diagnosis is obvious, he lives in the constant fear that in the incoherent recital somewhere lurks a point of great significance and that the definitely neurasthenic symptoms may, in a large measure, be the result of some organic, curable condition which he may overlook......

To send away a patient branded as a neurasthenic is often to acknowledge defeat, but to dismiss the patient with that diagnosis, only to meet her on the street a month later, obviously in good health, is to excite wonder and amazement, equaled only by the shock of hearing of her operation for duodenal ulcer, gallstones, renal calculus, or what not, at the hands of a more astute colleague."

Unfortunately, this concern for the patient's welfare is not the only factor which may lead to mistaken diagnoses. For as stressed by Bennett and Semrad (9): "The emphasis upon organic pathology in teaching has led the average physician to belittle the influence of emotional or situational factors as a cause of physical symptoms. He may feel that in attaching too much importance to psychogenic factors he may overlook organic disease, or more likely he may lack personal insight into the importance
of mental mechanisms in psycho-pathology. This lack of understanding in the general profession is responsible for an army of psychoneurotics constantly being labeled with a diagnosis of organic disease and being constantly mistreated for a non-existent physical disorder. Usually this faulty management of the functional problem leads to more and more maladjustment for the patient."

If the general welfare of the large mass of patients is to be considered, the surgeon must inevitably operate upon an occasional normal abdomen. Although such a mistake is to be regretted, it does not result in permanent harm to the patient with a normal background. But to the psychoneurotic or potentially psychotic patient, such a procedure may result in the precipitation or perpetuation of a disastrous mental condition, and contrary to the opinion of many surgeons, a surgical operation is seldom a successful method of psychotherapy.

Weisenberg, Yaskin and Pleasants (106) have reported the case histories of 14 patients with the diagnosis of psychoneurosis, and who later proved to have organic disease of the heart, lungs, gastro-intestinal or genito-urinary systems. In answer to the question "why were these errors in diagnosis made?" they list the following reasons: (1) Faulty or incomplete examinations. (2) Some patients were referred with assurance that no
organic conditions existed and the diagnosis was assumed correct. (3) With some cases, underlying causes, such as focal infections, were elusive and difficult of demonstration. (4) Many organic conditions, particularly carcinoma of the abdominal organs failed to reveal in the early stages trustworthy organic manifestations. (5) The assumption of a psychoneurosis because of the richness, bizarreness and variability of "functional symptoms", which make further investigation seem unnecessary. (6) Assumption that the present symptoms are merely a variation of a former reaction to a psychogenic situation.

In contradistinction to the study of Weisenberg, Yaskin and Pleasants, Bennett and Semrad (9) have analyzed the cases of 100 psychoneurotics who were admitted to the Nebraska University Hospital with a diagnosis of organic disease. The group included 27 males and 73 females, and only eleven had been diagnosed as having psychoneurotic as well as organic conditions; and in 13 patients the possibility of a functional disease had been mentioned. Although the mistaken diagnoses ranged from carcinoma of the stomach to cerebral neoplasms, the 29 cases admitted with a diagnosis of organic gastrointestinal disease concern us here. These included nine diagnoses of gall bladder disease, two of gastric ulcer, two of carcinoma of the stomach, one of pylorospasm, five
of colon disease, including irritable colon, carcinoma, ileo-caecal stasis and colitis, four of chronic appendicitis, two of Meckel's diverticulum, and one each of gastro-entero-spasm, reflex vomiting, hemorrhoids and unspecified gastro-intestinal pathology. These symptoms were usually vague, unspecified with unlocalized abdominal distress, not referable to any one organ. The patients were frequently convinced that they had a particular abdominal disease. Constipation, anorexia, nausea, vomiting and inability to eat certain foods were very common. Of the entire group of 100 patients, 73 had had surgical operations, including 38 appendectomies, 37 tonsillectomies and 43 pelvic operations, with a total of 179 operations, averaging 2.4 per patient. At least 50 per cent were totally unnecessary as shown by subsequent psychiatric study.

They conclude, "These mistakes in diagnoses came largely from lack of general understanding of the principles of psychopathology, failure to elicit adequate history and to consider situational and psychogenic factors and failure to appreciate the importance of the personality make-up of the patient. In evaluating symptoms many physicians overlook the emotional setting, out of which the physical sensations develop in the neurotic." They also emphasize the fact that "one reason for failure
at times to elicit the true emotional relationship to the patient's complaints is his insistence that he is physically ill. He has been tricked into a delusion and attempts too often to inoculate the physician with the same idea and if unsuccessful he keeps seeking other medical aid until he is treated for his imaginary complaint."

In the diagnosis of the "psychogenic abdomen" nothing can replace a thorough knowledge of the various mental disorders which may underly the symptomatology. Too often a diagnosis of psychoneurosis is made solely upon the negative findings of a superficial physical and X-ray examination, and equally as often a diagnosis of organic disease is made on the basis of a minor physical finding which could not possibly explain the symptoms which the patient presents. Unfortunately, one cannot construct a table of differential diagnosis with the symptoms of the psychogenic abdomen in one column and the various organic diseases in the other. Points such as the following emphasized by McLester (75) are helpful in suggesting a neurotic condition, i.e. association of the abdominal symptoms with many obviously unrelated symptoms, bizarre nature of the symptoms, variation from day to day, the intensity of interest of the patient, the manner of recitation and so forth. However, they neither establish the diagnosis of a psychoneurosis, nor do they
exclude an organic cause. Ideally, two criteria must be fulfilled before a diagnosis of "psychogenic abdomen", gastric neurosis, nervous indigestion or whatever the prevailing terminology happens to be, namely: first, the absence of organic findings adequate to explain the symptomatology, and second, the establishment of an etiological agent for the underlying mental condition. Unfortunately, the latter criteria cannot always be fulfilled, as after the most painstaking investigation of a typical case of neurasthenia or hysteria the underlying conflict or motive may not be discovered. It cannot be overemphasized, however, that these functional abdominal symptoms are but symptoms — symptoms of an underlying mental disorder, and that it is this mental disorder which must be diagnosed, and not the "psychogenic abdomen".

The following points brought out by Weisenberg, Yaskin and Pleasants (106) make clear the method of attack: (1) Every case must be considered from the standpoint of personality make-up with reference to heredity, early development, school and vocational records, sexual and vocational factors, social and economic adaptibility and the individual's reaction at various periods to environmental conditions, that is, disease, injury and mental and physical storms; (2) a careful history, especially
in regard to the chronological development of symptoms; 
(3) complete physical as well as neurological examination; 
(4) the complete evaluation of possible physical and 
psychological factors; and (5) no one should make a diag­
nosis of psychoneurosis until all indicated examinations 
are completed.

This approach in regard to the personality makeup of 
the patient is, of course, the basis of the psychiatric 
method. Its detailed discussion is not in place here, 
but suffice it to say that each point requires thorough 
investigation in the light of its relationship to the 
symptoms of which the patient complains, for it is 
through this approach that the etiological psychogenic 
factors will be discovered.

The importance of a careful history cannot be over­ 
stressed, particularly in regard to the time element. 
The relation of the onset of the symptoms to environmental 
factors is most important and, though often neglected, 
it may furnish the most valuable clue towards proper 
evaluation of the psychological elements. Information 
such as the response to previous therapy, alleviation 
of symptoms by previous operations, shift in symp­toma­
tology from one system to another following operation, 
and the patient's knowledge about the disease in quest­ 
ion must be elicited in every case. Important also is
the time of onset of the present and past symptoms in respect to the age of the patient. Most neuroses can be traced back to adolescence and extreme caution must be used in making such a diagnosis in a middle-aged person who has no previous history suggestive of abnormal emotional responses.

A complete physical and neurological examination is indicated regardless of the apparent irrelevancy or bizarre quality of the symptoms. It is only by this means that costly mistakes can be avoided, for a diagnosis of a psychoneurosis, regardless of the correctness of the diagnosis, does not rule out concurrent or supplementary organic disease. This does not imply, however, the indiscriminate use of expensive laboratory and roentgenological examinations as a substitute for sound clinical judgement. Isolated physical findings must not be allowed to assume an importance greater than they would ordinarily justify and their relation to the symptoms of the patient must always be questioned.

The essence of this thesis is contained in a few short words, adopted from Kennedy (62): "The primary ego is the gastro-intestinal tract."


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