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Modern treatment of colitis and the intestinal parasites

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The Modern Treatment of Colitis
And The Intestinal Parasites.

By
Charles A. Tompkins

A Thesis
Presented to the Faculty of
The University of Nebraska College of Medicine
in partial fulfillment of the requirements for
The Degree of Doctor of Medicine.

Omaha, Nebraska
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Introduction.

During the authors school years, he has become very interested in the treatment of colitis of various types and the intestinal parasites. There has been an attempt to cover all current literature on these subjects and present it in as concise a manner as possible. The systemic diseases, in which there is a secondary colitis, are not considered in this thesis.

The author has found himself wondering just how to handle given cases and the rationale for handling the cases in any given manner. He has read articles on various entities and heard many lectures in which the treatment was handled very generally and not given in detail. Likewise, he has found himself asking or wondering why such a procedure was advocated. For this reason, to satisfy his own curiosity and the curiosity of those who may be interested, there has been an attempt to give the treatment in detail and in so far as possible explain why such a treatment is rational. While the therapy has been handled in detail an attempt has been made to keep the discussion as brief as possible. Effort has been made to write the thesis in such a manner that those who are more advanced in the art and science of medicine can scan the paper for generalities and leave the details for those less learned in these particulars.

In short one may say that the thesis is on the "how" and "why" of the therapy in the primary colitides and parasitic infestations.

Granulamatous Diseases of the Colon.

Tuberculosis of The Large Intestine.

It may be said at the onset that tuberculosis of the bowel or any place in the body is primarily a medical problem. Surgery is to be used in selected cases only as an adjunct to careful medical supervision.

The most important part in the treatment of tuberculosis in any form is rest, both body and mind. S. Adolphus Knopf believes that a change of climate, though not necessarily a marked one, is nearly always helpful. In advising a change of climate one must consider the financial status of the patient, supervision at the prospective new habitat, and the patients own attitude toward the matter. Indeed, if the patient cannot obtain rest of mind without a change of climate, and there are no real reasons for advising otherwise, certainly a change is advisable. It seems that the change is more important than the climate. In patients who have been raised in a locality where the climate is cold, it is best to advise a change to a similar rigorous and high altitude climate as Colorado or Montana. For those born and raised in warmer climates choose such places as Arizona, New Mexico, Southern California and Western Texas. The ideal climate is one where the extremes are not great; with a minimum of fogs; with the purest possible atmosphere; with relatively little humidity; with much sunshine and with all conditions enabling the patient to live comfortably out of doors the greatest number of days out of the year and the greatest number of hours per day. When the sanatorium regimen can be carried out, climate

becomes of secondary importance. In every instance one must consider the type of tuberculosis and the patient; certainly heliotherapy will be contraindicated in certain types of the disease as active tuberculosis of the exudative type, or the adult type occurring in childhood. (29) (50) (80)

The success of treatment will be almost directly proportional to an early diagnosis. The patient should be kept in bed until afebrile and until all dyspeptic symptoms have disappeared.

The diet becomes especially important in intestinal tuberculosis. The diet must be considered with special reference to the bowel condition and likewise if there is a pulmonary tuberculosis diet must be planned with this condition in mind. A smooth diet, low in residue and high in calories, should be given. As in other bowel conditions certain foods are poorly tolerated. One of these is raw milk. Smithies has advocated parboiling, or cirating it. Malted milk is usually well borne. Fats are usually tolerated poorly. Stewart advocates the smooth diet of Alvarez. The advantages of this diet are that irritability is minimum, bowel rest maximum; high caloric values; the bulk is small; it is easily prepared and easily assimilated. Stewart gives 3-4 ounces of milk every waking hour. Hermannsdorfer believes that a diet high in protien hastens the healing of wounds. Dr. Edgar Mayer also favors the use of high protien diets. Several authorities advocate excess fats but these are poorly borne in intestinal tuberculosis. When the patient is febrile push fluids and decrease the calories 25%. Keep the food intake at the basal requirements to rest the alimentary tract. (29) (50) (52) (99).

Some authorities eliminate sodium chloride from the diet. There seems to be no rationale given by those using such restriction of salt. Mayer concludes that some people react favorably to the withdrawal of table salt, but that it is not safe as a routine proposition to put all tuberculosis patients on a salt free diet with the idea that it will be beneficial to all of them. (50).

The idea of high calcium diets originated primarily with the opinion that patients suffering with tuberculosis have previously been demineralized. The use of calcium was further substantiated by the fact that a low blood calcium rendered patients more susceptible to hemorrhage. Another thought in the minds of calcium advocates is that calcium therapy aids the process of healing by calcification. Certainly some individuals, especially children, often improve with increased amount of calcium in their food or as a medicament. Probably the high calcium content of milk is one of the reasons for its value. It has not been established that the blood calcium in tuberculosis is lower than normal; certainly excess calcium in the food does not seem to aid the calcification of the tubercle. Intravenous calcium chloride as recommended by Fisher did not prove of value in the hands of Archibald. (3) (29) (50) (80).

High vitamin content in the diet is advocated by many. Law-rason Brown and Homer T. Sampson report that they have apparently cured cases of intestinal tuberculosis by giving one ounce (30cc) of cod liver oil and ice cold tomato or orange juice, four ounces, immediately after meals. It has not certainly been demonstrated that any large increase over the usual amount of vitamins is advisable even in healthy persons. If it can be shown that there is a vitamin deficiency obviously the lack of vitamins should be

supplied. This occurs only rarely in the American population among adults. Since it is very probable that reasonable increase in vitamin intake is not harmful, there should be no hesitancy in supplying all patients with a high vitamin diet. (19) (29) (50) (80).

The early nausea and vomiting and loss of appetite in many cases are serious obstacles. Many patients loathe foods of all kinds. A change of air at times promptly restores the appetite. Guard against over-feeding especially in intestinal and toxic patients. Care should be taken not to use drugs that disturb the alimentary tract. Often it is advisable to give frequent small feedings rather than the usual three meals per day. (29) (80).

Heliotherapy has long been used in the treatment of tuberculosis. It's effect seems to be primarily stimulative and palliative. Stewart states that in even the apparently hopeless, sunlight is important, if for nothing more than its palliative effect. In many cases the abdominal pains are lessened, discomfort tends to disappear, the diarrhea clears up, the fever tends to subside, the appetite improves and there is a gain in weight. Ultraviolet light has met with considerable approval. Lawrason Brown reports good results with the use of the Quartz lamp. In the use of direct sunlight, the procedure consists in graduated exposure of the body to the sunlight for increasing periods daily, until the resistance developed permits a long stay in the open air. Full sunlight for a portion of each day may be given all afebrile patients and even some with slight elevation of the temperature. Too much sunlight may increase the activity of the tuberculosis foci. If sunlight is not available use ultraviolet

light. This too must be given in graduated doses until the patient is able to tolerate long exposures over the entire body.

(3) (29) (50) (80) (99).

Arsenic has long been used in the treatment for tuberculosis. It is used in the form of treparsol or stovarsol at the Mayo clinic. The weight of evidence at the present time seems to be that its effects are slight and as it may upset digestion it should be used with discretion in intestinal tuberculosis. One must remember that arsenic is a poison and in large doses it is distinctly harmful. Whereas in small doses it stimulates the production of blood cells, in large doses it causes blood destruction, kidney irritation, and when pushed may cause a multiple neuritis. The drug should not be administered unless there is a positive indication. (50) (83).

The use of hypophosphates is probably empirical. Phosphates may be helpful if there is actually an imbalance in the calcium-phosphate ratio. In some cases the administration of parathyroid extract along with calcium by mouth or calcium chloride intravenously over a long period of time, and in small doses, has found favor at the Mayo clinic. (50) (83).

Iodine is used by some. It's use seems paradoxical, on first thought, in that it is used in granulomatous conditions with the idea of breaking down granulomatous tissue. Since scar tissue formation, that is, the tubercle is considered protective, it does not seem rational to give a drug supposed to break down such tissue. It may act like tuberculin, if given in sufficient quantity, in stimulating the tubercles and lighting up a quiescent tuberculous process. The drug may find a rational basis in treat-

ing tuberculoma of the intestine if the process is localized. The drug may also be rationally used, possibly, in small, very slowly increasing doses, as graded doses of tuberculin, in stimulating the resistive forces of the body. (50).

Oxygen injected into the peritoneal cavity may be beneficial in selected cases. (83).

The use of tuberculin is a debatable question and is not without it's dangers. It is not in itself curative, but it is, at most, a stimulant to the curative efforts of the organism. It should be used only on selected cases, and if used one should observe the patient closely. It seems to be most useful in localized tuberculous processes and may be used selectively in cases of tuberculoma of the bowel when for some reason operation is not advisable. Tuberculin should be used only by those experienced in its action. A reaction should not be produced. The end desired is to get as high a grade of tuberculin tolerance as possible. This may require months. Treatment with tuberculin should not be begun unless it can be continued for some months. (29) (50) (80).

Creosote has long been used for its supposed antiseptic effect. Fishbein states that its value is doubtful and its disadvantages many. Brown and Sampson use drop doses of creosote in a capsule with a quarter grain of iodoform, after meals, for diarrhea. It is strongly recommended by Addison, who begins with 1 minim three times a day and if well borne, increases the dose to 8 or 10 minims. (19) (50) (80).

As a last resort in the treatment of diarrhea and pain Brown and Sampson use Phenyl Salicylate and Tully powder (pulvis mor-

phinae comp., consisting of morphinae sulphate .5 gm., camphor 9.5 gm., precip. chalk 10 gm. and glyceriza 10 gm.) 2.5 grains each every four hours. For pain Brown uses small doses of opium, codine or aspirin with phenacetin. (19) (39).

For flatulence and gas a mixture of carbonate of magnesium and of tincture of belladonna, in peppermint water will often given relief. This preparation can only be used for a short interval as the magnesium carbonate is laxative. In this case soda bicarbonate may be substituted.

For relief of abdominal spasm hot fomentations may be helpful. One ounce of liquid petrolatum 4 to 6 times daily protects the ulcers and quiets spasms. If there are spastic contractions and local ulceration add 20 grains of orthoform and .5 grain of extract of belladonna. In the late stages when the diarrhea is distressing the diet should be altogether fluid. The patient should be kept in bed. After each bowel movement 60 gr. of bismuth subgallate in small quantities of hot water is frequently helpful. This automatically regulates continuance of the medication. The action is through the protective quality of the bismuth which reduces irritation. If this method fails irrigate one or two times daily with physiological saline at 105° F and by the exhibition of opium which decreases intestinal peristalsis. Opium is more constipating than morphine because it contains papaverine which relaxes involuntary muscles. The morphine contained in opium is also constipating through it's action on the central nervous system. In some cases irrigation with nitrate of silver (1:2,000), tannic acid (1:5,000) at 105° F may be helpful. (52).

Treatment by xray has found favor with Brown and Sampson. (19).

Tuberculous lesions of the bowel for which surgical intervention is instituted occurs in two general types: Hyperplastic tuberculosis and complications of tuberculous ulcerative colitis.

Surgical intervention in the ulcerative type is confined largely to complications such as obstruction, or abscess formation due to the fact that the disease is not usually limited to a single bowel segment wherein resection would be a feasible procedure. Other surgical procedures in the ulcerative type is a debatable question. Archibald gives as the contraindications for surgery extensive and progressive pulmonary tuberculosis or extensive involvement of the small bowel. Physical findings and xray inform us as to the lung condition but not as to the bowel condition. Archibald does an exploratory laparotomy if the lung condition is not hopeless. If the involvement is limited to the colon he proceeds with a radical operation with resection. (3).

The conduct of the operative procedure becomes especially important in tuberculous patients. An anesthetic must be chosen which has a minimum effect on the lungs. Gas-oxygen is perhaps the best. Morphine sulphate and atropine are given one half hour before operation and novacaine is used freely to help out the gas. Try to avoid rapid and deep respiratory movements on induction also avoid violent exertion. Rather than to permit restlessness, which is very hard on the lungs, add chloroform to the gas. (3).

Postoperatively several problems may arise. Cough may be distressing. Morphine sulphate and heroine may be helpful. Pituitrin combined with eserine is given alternately every two hours. Eserine stimulates the secretory nerve endings of glands and the

myoneural junction of smooth and striated muscle. In non-toxic postoperative cases 4 mg. (~~1~~15 grain) may help prevent distension. The drug may be given by mouth or intramuscularly. Pituitrin is given subcutaneously to prevent ileus and tympanites. One cc. of double strength pituitary liquid is repeated every hour or two for one to four doses. (3) (12).

Intravenous physiological saline may help control vomiting. For the same purpose soda bicarbonate is given intravenously or per rectum. The treatment is used to prevent vomiting on the basis of relative hyperacidity. (3) (12).

The patient cannot return to a full diet for a week at best. This is important in guarding against enlighting a latent pulmonary tuberculosis. (3).

Enemata of glycerine and olive oil are of distinct value in controlling the abdominal distress and should be used freely. (3).

If the ulcerative process extends more than three feet beyond the ileocecal valve one can't hope to do more than relieve the pain. Resection of more than three feet of the small intestine interferes too much with absorption and the patients rapidly go down from inanition. Usually the pain is not great; so simply close and do nothing further surgically. Heliotherapy or the quartz lamp with iodine intravenously should be tried. If the appendix is diseased remove it as pain is often relieved by simply removing the organ.

If the right colon and lower two feet of the ileum is involved and if the patients condition warrants it, radical resection may be done. If there is too much pulmonary involvement do a short circuiting operation, but do not resect. (3).

If the whole colon is involved clear down to the sigmoid do not attempt such an extensive resection. (3).

If there are scattered lesions through out the colon and the lungs are normal, a spontaneous cure may be brought about by making an artificial anus. (3).

Archibald reports a low operative mortality. He says much cough is to be expected but that it can be controled. Most have advanced pulmonary tuberculosis but a well planned operation relieves bowel misery and the patients are grateful. A remaining few are cured. This view is also held by Dowdle. (3) (39).

In the hyperpastic type of tuberculosis all authorities seem pretty well agreed that operation is the procedure of choice, removing the focus if possible. An artificial anus is to be made only as a last resort. If resection is not practical some form of entero-anastomosis should be done. (2) (39) (52) (46) (83).

Conclusions.

Rest both physical and mental is of utmost importance.

In considering the advisability of change of climate, the case may be individualized. The ideal climate is one with a minimum of fogs; where extremes are not great; with the purest possible atmosphere; with relatively little humidity; with much sunshine, and all conditions favoring a maximum of comfortable out-door life.

The diet chosen must be considered with reference to the

bowel and general condition and with reference to individual tolerance. A smooth, low residue, high calory diet should be given. High vitamin and high calcium diets are to be considered.

Heliotherapy is of value for its stimulative and palliative effect.

Arsenic is used only upon definite indication by most authorities. It's use should be understood before administering the drug.

Oxygen injected into the peritoneal cavity is probably of value in selected cases.

The use of tuberculin is debatable and if used should be administered in selected cases by experienced individuals.

Cresote is advocated by some men.

For the diarrhea Phyenyl Salicylate and Tully powder is advocated as a last resort. The patient is kept absolutely at rest. The diet should be liquid. Bismuth subgallate is used alone or with saline irrigations followed by opium.

For flatulence and gas magnesium carbonate and belladonna may be tried. Hot fomentations on the abdomen is given for the pain.

Xray finds favor with some.

Surgical intervention in the ulcerative type is mainly confined to complications. Other surgical procedures in the ulcerative type is a debatable question. The conduct of the operative procedure is important; the general condition and pulmonary involvement if present must be considered.

Operation is the procedure of choice in the hyperplastic type of tuberculosis.

Actinomycosis.

The type of results obtained in the treatment of actinomycosis are largely dependent on the time of diagnosis and treatment. The forms of treatment are three: medical, surgical and roentgen rays and radium.

Medical treatment consists of general restorative measures and the administration of massive doses of a saturated solution of potassium iodide. The mode of action is uncertain but its value is unquestionable. Massive doses, beginning at 50 grains (3.25 gm.) or less, and increasing up to 200 gm., three times a day, are given. Bevan gives the iodide of potash intermittently giving the drug one week then misses from three to five days. He believes this allows the resistant spores to develop and be effected in the next course of treatment. (16) (31) (32) (80) (83) (91).

Xray or radium has not been tried out alone long enough and on a sufficient number of cases to ascertain its true value. Cope has used radium in a case of thoracic actinomycosis with markedly beneficial results. Bevan believes that xray in conjunction with iodine frees free nascent iodine in greater amounts than without exposure. Baracz advocates injecting the sinuses and fistulas with a 20% solution of citrate of silver and using xray in addition. McKenty believes that xray is harmful and spreads the disease. Ruhrah also disfavors the use of xray. (16) (32) (80) (83) (91).

The use of vaccine therapy in actinomycosis has a questionable value. Colebrook has treated 32 cases by this method. The vaccines used were prepared from strains of actinomycosis bovis

but derived from man, and in addition vaccines were added corresponding to the secondary infections. He summarized his results by saying: "The treatment of actinomycosis by vaccines facilitates recovery when efficient surgical drainage of the affected tissues is secured and maintained; when, however, if drainage is unsatisfactory the use of appropriate vaccines will not usually suffice to stay the progress of the infection." Cope uses a stock vaccine until the autogenous vaccine can be prepared. The dose of vaccine is regulated carefully according to the patients reaction. Doses of more than fifty million have been given at intervals of three to seven days. (31) (32) (83).

The success of resection of the bowel depends on whether or not the focus can be completely removed. Sometimes secondary abscesses, fistulas and sinuses result which necessitate incision, drainage and curettment. Bevan uses a stick or solution of silver nitrate in accessible regions. He also uses iodoform packings to maintain drainage. One percent potassium iodide is injected into the surrounding tissue or by cataphoresis. (16) (31) (32) (45) (54) (80) (83) (91) (97) (100).

Conclusions.

The general management should be restorative measures as in tuberculosis.

Massive doses of iodides have a definite therapeutic value.

The use of xray and radium is still a debatable question.

The use of vaccine therapy is of questionable value.

Surgical resection of the bowel is successful if the en-

tire focus can be removed.

Syphilis and Chancroid.

In the early stage of the disease, before generalization has occurred, a complete, prompt, intensive course of treatment with mercury and arsphenamine may result in complete cure.

Drueck administers treatment according to Pollitzers method. Three injections of arsphenamine, each consisting of one gram for from 25-30 pounds of body weight is given on successive days. This course is followed by eight weekly doses of two and one half grains of mercury salicylate. Such a series is given three times a year with two months between each series. This method is founded on the scientific theory of fractional sterilization in the laboratory. The treatment gives a concentrated attack on the spirochetes in such a manner that their development between treatments is minimal. From clinical experience it is known that a single injection cannot be safely given which will destroy all of the organisms; and when there is a prolonged interval between treatments the spirochetes may have multiplied to such an extent that there are about as many as before the course of treatment. Most of the organisms are killed during the first course of treatment and as the second soon follows many of the remaining are overcome and theoretically the invaders are completely wiped out during the third course of treatment. (40).

Blood Wassermanns are taken after each course and a spinal fluid examination is made after the second. During the second

year a wasserman is taken every three months with a lumbar puncture. If at any time the wasserman becomes positive treatment is once more begun. If both spinal fluid and blood wasserman remain consistently negative for twenty four months the patient is considered cured. (40).

In the second year all cases with a positive wasserman are given six injections of arsphenamine and ten to twelve injections at weekly intervals of gray oil or mercuric salicylate. A wasserman is taken after each course until several successive negatives are obtained. Before becoming in the least optimistic as to a complete cure there must be at least five unbroken negative wassermans at least six months apart without treatment and with no clinical evidence of syphilis. (40).

The third year, if the wasserman has been negative with no recurrences from the first year, the patient should pass into a period of observation with a wasserman taken at regular intervals. (40).

The method of arsphenamine administration should be thoroughly understood. The water to be used is distilled the day prior to usage and boiled on the day of administration and cooled to room temperature. The ampules of arsphenamine are immersed into 95% alcohol; twenty cc. of the water is placed in a sixty cc. medicine glass into which the desired amount of arsphenamine has been placed. The powder floats on the surface until completely dissolved. After the powder is dissolved draw the contents into a 30 cc. Luer syringe. With a sterile gauze, dry the needle just before coming into contact with the tissues. The tissues of

course are previously sterilized. After the needle has been inserted into the vein sufficient blood is withdrawn to fill the syringe. This assures one that he is in the vein and the toxicity of the drug is said to be reduced by means of the blood albumen and serum. Injection is made slowly, requiring about one minute. Withdraw the needle quickly, raise the arm and make pressure on the site of injection. (40).

The drug may be given intrarectally but it is less effective. If the veins are very difficult to hit the drug may be given intrarectally in larger doses. A saline cathartic is given the day preceding and two hours prior to injection, a rectal enema is given. No food is taken six hours prior to the injection. Paregoric is given at the time to tighten the bowel, so that the fluid can be retained 18-24 hours. The patient is placed in the genupectoral position. The administration is through a catheter inserted into the rectum six inches. Six tenths gram of arsphenamine is dissolved in distilled water. Normal saline is added to make 30 cc. The solution is made alkaline with enough sodium hydroxide just to clear the solution. This makes the monosodium rather than the disodium salt. Through a Luer syringe in the catheter inject the prepared solution slowly. After withdrawal have the patient retain the genupectoral position as long as possible, then the patient is to assume the Sims position. If the drug is given at home it is best given at bedtime. (40).

In regard to mercury it may be said that the insoluble salts are preferable to the soluble salts as the effect is more continuous and the injections need not be made so often. The injections are made once a week, intramuscularly, using the

gray oil (oleum cinereum) or the salicylate. Injections are perhaps best made deep into the gluteal muscles. Strict asepsis is important. In infants the drug is given by inunction. One ounce of equal parts of mercurial ointment and lanolin are spread on the abdominal binder daily. (40).

In the treatment of the tertiary type of syphilis the above outlined procedures are carried out. In addition potassium iodide is given, preferably in milk or essence of pepsin, the dose being built up to sixty to one hundred grains daily in small frequently repeated doses. (40).

The patient is put to bed and the bowel is relieved of all irritable material which might excite the colon. Every attempt should be made to avoid septic infection. The bowel should be emptied regularly and the rectum irrigated daily with a bland antiseptic, followed by an irrigation of six ounces of 1% iodoform or ichthyol emulsified in olive oil, this later to be retained. (40).

Martin advises, in addition to Drucek's intrarectal instillations, use of the actual cautery for excision and cauterization of the condylomatous region. Late syphilitic phenomena, including various forms of colonic swelling may require short-circuiting operations. (83).

In cases of chancroid of the anorectal region the patient should be put to bed, the bowels kept regular but not diarrheal and irrigated two or three times daily. An iodoform suppository should be inserted twice daily. The diet should be bland and unstimulating. Morphine may be required for the pain. (40).

In the phagadoenic type, the patient is put to bed and hot antiseptic fomentations are continuously applied as hot as tolerable. The pads should be changed every hour and in the interval should be kept hot with the electric lamp or some other means. If the process is chronic it is always associated with some constitutional disease which should be sought out and treated. (40).

Conclusions.

Syphilis

Early diagnosis with prompt and intensive mercury and arsphenamine medication is the only chance in most cases, for a complete cure of the disease.

In the tertiary type potassium iodide is administered in connection with the arsphenamine and mercury courses.

Every attempt should be made to avoid secondary bowel infections.

The bowel should be emptied regularly and the rectum irrigated daily with a bland antiseptic.

Short-circuiting operations may be required for the late syphilitic phenomena.

Some use the actual cautery for excision of any condylomatous masses.

Chancroid.

The patient should be put to bed and the bowels kept regular but not diarrheal.

An iodoform suppository should be inserted into the rectum twice daily.

The diet should be bland and unirritating.

Morphine may be required for the pain.

In the phagadenic type hot, antiseptic fomentations are continually applied.

Any associated constitutional diseases should be sought out and treated.

Gonorrhoea.

In the treatment of rectal gonorrhoea the patient should be put to bed for a few days. The bowels should be kept open but without diarrheal passages as they are more painful than the passage of solid masses. (41).

The rectum should be irrigated two or three times daily with a hot solution of 1-4,000 permanganate of potash or 1-1000 Protorgol. The solutions should be hot. In some instances saturated boric solutions must be substituted because of the pain. (41)

Later when the acute symptoms have subsided these antiseptics should be discontinued for a hot saline injection two or three times daily held 20 minutes. When the solution has drained out, one ounce of 1-500 silver nitrate solution is injected to be retained as long as possible. Continue at least one week after the patient is apparently well. (41).

For the tenesmus a suppository of opium 1 gr., cocain, $\frac{1}{4}$ gr., and belladonna $\frac{1}{4}$ gr. is inserted each night. (41).

Care should be taken not to injure the mucous membrane as abscesses are prone to develop at the sites of a broken mucous membrane. (41).

After the discharge ceases, the ulcers and hyperemic patches are touched with 10% silver nitrate. All submucous abscesses should be opened. If there is a catarrh or gleet discharge a 2% solution of alum or tannic acid may be used locally. Any condylomata are cauterized. (41).

Conclusions.

The patient should be put to bed for a few days.

The bowels should be kept open but not diarrheal.

The rectum should be irrigated two or three times daily with a hot permanganate of potash or Protargol solution.

Use hot saline injections after the acute symptoms have subsided.

A suppository of opium, cocain and bellodonna is inserted every night for the tenesmus.

Care should be taken not to injure the mucous membrane.

After the discharge ceases, the ulcers and hyperemic patches are touched with 10% silver nitrate.

All submucous abscesses should be opened.

If there is a catarrhl or gleetly discharge a 2% solution of alum or tannic acid may be used.

Cauterize any condylomata.

Chronic Ulcerative Colitis.

The various types of treatment for chronic ulcerative colitis has arisen from three main groups of physicians: (1) Those who believed the condition was an infectious process and who advocate treatment directed toward a chronic, severe, debilitating infection; (2) Those who believe it to be a metabolic disease and attempt to seek out and treat some underlying deficiency; (3) and those who believe the problem is surgical and advocate various operations. (8) (83).

Clinical knowledge of the disease has had only a brief period of development. The disease was first described by Wilks in 1885 and White in 1888. (83) (109).

As in all inflammatory diseases, rest both local and general becomes an important part of the treatment. The bowel may be rested to some degree by heat locally to the abdomen in the form of stupes and electric baking. Diet of the proper type is an important aid in properly resting the bowel. The patient should always be put to bed in the acute cases and sometimes the chronic cases. Every attempt should be made to relieve the patient of all mental strain. Rouse believes that only in the very acute cases should the patient be confined to bed, this procedure being abandoned in favor of plenty of fresh air, sunshine and mental diversion. (11) (29) (36) (51) (67) (74) (81)

The diet agreed upon by most authorities today is a high calorie, high vitamin, low residue diet. One should aim to avoid residue and flatulence thereby keeping irritation and distension

at a minimum thereby allowing the ulcers to heal. The high caloric content helps to maintain the body resistance. The high vitamin content is given on the rationale that the disease process may be, at least to some degree, on the basis of a vitamin deficiency. Many authorities favor the addition diet which is used at Mayos. On admission to the hospital the patient is given a strictly bland diet which serves as a foundation to which additions are made, usually every second day. The rapidity with which increase is made is determined by the nature (extent and severity) of the disease, the patients likes and dislikes in food and his general makeup. The diet served the patient on entrance is inadequate in minerals and vitamins. The deficiency is due to the omission of vegetables, fruit and milk; this omission is frequently necessary at the beginning of treatment in order to combat diarrhea and abdominal distress. Vegetables and fruit are first restricted because of their effect on the intestinal peristalsis. Milk is added late in the course of the disease because of the common complaint that milk is poorly tolerated and because it leaves a large residue in the intestines. (29). (83)

Foundation Diet.*

Breakfast	Dinner	Supper
Cereal, #bland, 1 serving.	Meat soup with vegetable, 1 serving	Steamed rice 1 serving.
Cream $\frac{1}{2}$ cup	Meat 1 serving (liver 3 times per week.)	Meat or fish 1 serving or 2 eggs
Bacon 2 strips	Potato 1 medium sized	Bread, white or rye, 1 slice
Egg, 1		
Toast, 1 slice		
Butter, 2 squares		
Coffee if desired		

(Breakfast)	(Dinner)	(Supper)
Sugar	Gravy if desired	Butter, 2 squares
Brewers' yeast :	Bread, white or rye 1 slice	Bland dessert, no fruit, 1 serving
	Butter, 2 squares	Cream, 2 tablespoons
	Bland desert, "no fruit, 1 serving	Tea if desired
	Cream, 2 tablespoons	Sugar
	Tea if desired	Brewers' yeast.
	Sugar	
	Brewers' yeast	

The addition diet.

Made to the foundation diet as rapidly as the patients condition permit; finally the foundation diet with the nine additions, constitutes the full diet, containing 80 gm. of protien and 3,000 calories. Jelly or jam without seeds may be served if desired. Beverages should not be iced. The patient is instructed to eat ice cream slowly. Condiments, such as mustard, horseradish, catsup, vinegar and highly seasoned sauces or relishes are best avoided. To avoid any undue peristalsis, food is not given between meals. (29) (83).

Order of Additions.

One banana, very ripe.
 Orange juice, $\frac{1}{4}$ glass.
 Vegetable puree, 2 tablespoons.
 Milk in the form of cream soup or
 milk toast.
 Whole milk, 2 glasses.
 Cream, 2 glasses, added to milk so
 that each glass contains half
 milk and half cream.
 Bland fruit, canned or cooked peaches,
 apricots, pears, strained apple
 sauce, baked apple without skin, 1
 serving.
 Tomato juice, $\frac{1}{2}$ glass.
 Whole cooked vegetable, 2 servings
 (puree omitted) including, as desired,

young tender carrots, beets, spinach, string beans, asparagus and green lettuce, cut very fine, with plain mayonnaise or cooked dressing if desired.

*Given on admission, contains approximately 60 gm. of protein and 2,000 calories.

#Cream of wheat, farina, puffed rice, puffed wheat, corn flakes, rice krispies and strained oatmeal.

:Brewers yeast, 200 mg. standardized vitamin fraction is given with each meal.

"Custards, cornstarch puddings, junkets, gelatin desserts without nuts or fruit, plain rice puddings, simple cakes and cookies and plain ice cream.

The patient is kept on this restricted diet only a short time. Addition of foods rich in minerals and vitamins is made as rapidly as possible. Milk provides calcium and phosphorus in generous amounts; vegetables and fruits increase iron; green leafy vegetables are an especially good source of iron. As recently demonstrated peaches and apricots aid in the formation of hemoglobin; meal, liver and eggs help to supply iron. (29) (83)

Vitamin B is furnished by yeast. Vitamin C is furnished by bananas, orange and tomato juice. Milk, butter and vegetables, especially fresh, green vegetables, furnish a good supply of vitamin A and D. Cod liver oil is given in selected cases; it may cause nausea and vomiting. Some give iron iodide and malt extract to aid in the mineral and vitamin supply. (9) (29) (36) (42) (44) (83) (85) (90) (102).

In the acute stages of the disease Bassler gives only rice or albumen water adding milk later. As the patient improves a more liberal diet is permitted. (11).

Some authorities advise changing the intestinal flora. This may be done by increasing the carbohydrate content of the diet and giving acidophylus milk or as Dr. Hall suggests, give lactose and buttermilk. If the flora is essentially putrefactive proteid is largely eliminated. In the fermentative diarrheas the carbohydrates must be reduced. (49) (58).

Good nursing care is important in this disease. The treatment as well as being directed toward the bowel should be directed toward the patient's general condition. Blood transfusions have frequently found favor. Bland's pills may be given to combat any secondary anemia. Mental hygiene and sunbaths often result in systemic improvement. If there is an achlorhydria the associated gastritis should be treated; and if the acid does not return hydrochloric acid should be given the rest of the patient's life. Any other supportive measures indicated should be used. (8) (28) (62) (69) (81) (90).

In the acute case the patient should be kept warm, in bed, and fluids should be supplied to compensate for the great loss by bowel. The fluids may need to be administered intravenously in the form of a glucose solution or subcutaneously in the form of saline solution. Feedings should not be frequent as everything taken into the stomach is likely to initiate a peristaltic wave and consequently increase irritation and bleeding. Transfusions have already been mentioned. Small quantities are given (200-300 cc) at a time, at three to four day intervals. Larger

amounts have no additional value and may increase the internal bleeding. (83).

Let us now consider forms of oral medications which have not found an appropriate place for discussion heretofore.

Opiates find an important place in the symptomatic treatment of the disease and also in bringing about bowel rest. The drug should be used with discretion as the disease is chronic and drug addiction is always a possibility. The opiates are definitely indicated in acute exacerbations of the disease for relief of pain and diarrhea. If the diarrhea is too suddenly checked, gas pains will often be distressing. As a sedative to intestinal hyperperistalsis, opium is the drug of choice and, when given in small doses (tinct. of deodorized opium, 3 minims (60.2 cc) every 2 or 3 hours) it diminishes without entirely halting the intestinal motility and thus avoids "gas". (36) (90).

Bismuth in some form is used in certain phases of the disease. The preparations used are the various insoluble salts of bismuth. These drugs relieve irritation of the bowel by their protective and astringent powers. In this manner they check diarrhea. The drug decreases intestinal peristalsis by protecting the eatarrhl bowel. Bismuth salicylate is sometimes used with the idea of a double action in that the bismuch is protective and the salicylic acid is antiseptic. For the diarrhea large doses of bismuth subcarbonate (teasp. every 2 hrs.) are given. This often relieves the constant urge to go to stool, and is good treatment along with the opium therapy.

Charcoal, kaolin or bolus alba or fullers' earth or other

absorbents or carminatives are of value at times, but the results may be disappointing. It must be remembered that these drugs lose their absorptive powers as soon as they are well soaked. As already mentioned "gas" may be controlled to some degree by diet. If the flatulence is putrefactive in origin the protein content of the diet should be decreased, if fermentative in origin the carbohydrate should be decreased. At times changing the intestinal flora becomes a rational procedure to attempt to control the flatulence. Heliotherapy and abdominal stupes may decrease the distress. (8) (36) (62) (63) (89).

Various dye preparations have been used internally. Mercurochrome tablets may be beneficial in some cases. Young and Bassler have used the drug intravenously and found it helpful in some advanced cases. Gentian violet is advocated by Barger; it is given by mouth both in liquid and tablet form. In low dilutions it kills the diplococcus of Barger in a test tube. Three to five tablets of a half grain each are given every twenty four hours or enough to color the stools blue. (8) (90).

Arsenic given by mouth may be of some value. Treparsol is favored by Rouse. It's effect is constitutional being stimulative to the blood forming organs. (90).

Tincture of iodine (10 minims in water t.i.d.) has been advocated by Logan and it's use verified by other workers. Logan has recently reported a cure of three cases by the use of iodine. Barger believes that iodine definitely produces remissions. Tucker uses ten grains of sodium iodide three times a day. If improvement doesn't come in a week, discontinue the iodine therapy. (8)

(36) (81) (83) (90) (102).

Calcium lactate in large doses apparently reduces spasm and irritability of the bowel. Weigand reports a case in which good results were obtained with calcium and parathyroid treatment. Six months after the onset of the disease a girl, 22 years of age, was put on the ten grains of calcium lactate and ten grains of ammonium chloride by mouth three times daily; parathormone was given every second day in fifteen unit dosage for three weeks then every third day until the middle of the ninth month. Blood disappeared from the stools in a few weeks. At the end of the eighth month she menstruated for the first time since the onset. Her weight increased from 99 pounds to 124 pounds during the course of treatment until she was discharged eight and one half months after the onset. (74) (105).

Purgatives are a direct trauma to the bowel and should not be used. The bowels will move if the spasm is controlled. The use of an agar preparation is of value in preventing the formation of small hard, scybalous feces. The treatment should be sedative rather than stimulative. Mineral oil is advocated by some to decrease irritation and to keep the bowels regular. Macalister believes that liquid paraffin forms a coat on the bowel in which bacteria can't live. (74) (88).

Einhorn believes that medicaments may be given with agar to advantage, as fluids are retained and fecal material does not become dry, which occasionally happens when astringents are given so instead of being protective they become irritative. Agar is a useful vehicle in that it gives up the medicament slowly thereby promoting a more continued effect. Einhorn has

used tanin agar, simaruba agar, gambir agar and myrtell agar in one or two teaspoonful doses t.i.d. p.c. in water. If there is an associated amebic dysentery he gives ipecacuanha agar with one of the above. If there are colicky pains lupulin agar is added. The above procedures are highly recommended and are said to prevent the need of opiates. (27) (44).

Various antiseptics have been used with minimum results. Salol (Phenyl-Salicyl.) is slightly antiseptic. It's antiseptic properties are greatly increased when the drug is decomposed into its constituents, phenol and salicylic acid. The drug is prescribed as an intestinal antiseptic in diarrhea, enteritis and "intestinal putrefaction." It is doubtful, however, if this or other alleged intestinal antiseptics exert any appreciable control on the bacterial flora of the intestinal tract. Betanaphol is used by some. It is several times more antiseptic than phenol. Internally it's utility is limited because of the danger of poisoning from its possible absorption. Small doses of mercury or calomel are sometimes used, but the antiseptic property in minimal dosage is slight and larger doses are contraindicated because of the irritation to the bowel. Benzyl benzoate and bismuth salicylate have also been used. (88).

A great mass of material has appeared in the literature concerning various vaccines and serums in the treatment of chronic ulcerative colitis. Bargaen and his associates believe that they have found a specific organism, the strepto-bacillus or the diplococcus of Bargaen. They prepared a vaccine and bacterial filtrate which they use in all cases and, as they report, with remarkable results.

The serum has been prepared by injecting into horses in-

creasing doses of freshly isolated strains of the diplostrep-
 tococcus. Many of these strains are used after they have been
 preserved, during a period of immunization, in dense suspensions in
 a mixture of two parts of glycerin and one part of a solution
 of sodium chloride, 25%. The antibody euglobulin (specific anti-
 body) solution (concentrated serum) has now been given^{at Mayo's} in approx-
 imately 700 cases of chronic ulcerative colitis (83) (1933).

The serum is administered deeply into the muscles after
 desensitization by small intracutaneous injections. The in-
 jections are given every eight to twelve hours beginning with
 .1cc. of the concentrated antibody solution, increasing each in-
 jection .1cc. until the average maximal dosage of 3cc. is reached.
 The dosage is graded up or down according to the patient's tol-
 erance. In some cases only 1cc. daily is tolerated. Improve-
 ment of the patient's condition usually runs parallel to the
 local or systemic reaction to the serum. There has been gener-
 alized serum sickness in not more than 5% of their cases. (83).

There has been a great difference of opinion as to the re-
 sults with Bargens vaccine. During the past year or two enthus-
 iasm has seemed to wain. As some laboratory workers have shown
 Bargens bacillus is found in practically all normal stools. As
 Buie points out, Bargens vaccine or vaccine filtrate will not
 destroy ulcers of secondary infections; so later all patients
 are treated with an autogenous vaccine. (6) (7) (8) (27) (30)
 (43) (51) (60) (62) (67) (81) (88) (90) (98) (102) (107).

Fasting of the Mayo clinic has prepared an antibody solution
 obtained by precipitation in ether. Water of the specific
 immune serum of chronic ulcerative colitis adds a new and valu-

able adjuvant in the treatment of this disease, according to the Mayo group. They believe it is particularly efficacious in the treatment of more severe, subacute cases. This in conjunction with specific vaccine and other symptomatic agents has greatly reduced the need of operative procedures in the advanced cases. (6).

Some authorities have reported good results with the use of antidysenteric serum. As Rolleston points out the results may be a result of serum sickness. Various non-specific serums and vaccines have been used simply as shock or foreign protien therapy. Hurst reported a case in 1921 in which the administration of antidysenteric serum gave a miraculous cure. A young man almost moribund, after being ill for over one year, and in whom no improvement had followed an appendicostomy, recovered completely in two weeks. Five days after the first injection sigmoidoscopic examination showed that the innumerable ulcers had disappeared, and nine days later the mucous membrane appeared normal. More frequently, according to Hurst, the serum produces a certain amount of improvement, with the result that other treatment leads to recovery more rapidly than would otherwise have been the case. (11) (62) (63) (88) (101).

Some have reported good results with colon bacilli vaccines, preferably many strains. (11) (49).

Elimination of secondary foci of infection becomes of utmost importance in the treatment of many cases of chronic ulcerative colitis, especially in avoiding relapses. Soper explains that exacerbations may be a result of release of Barger's bacilli from some distant focus. (8) (27) (62) (67) (81) (90) (98).

Burnford has used a special flushing electrode with which he has cured 24 cases, six without relapses. He based his criteria as to a cure on the appearance of normal stools without pus and a normal mucous membrane on sigmoidoscopic examination. Ionization is carried out while a zinc solution is passing into the rectum. A one half percent solution is used. The solution is passed up to the point of tolerance. At first only a little may be tolerated with only two or three milli-amperes of current, but finally three pints may be held while a current of twenty milli-amperes is passing for fifteen minutes or longer. (28).

Practically every astringent and antiseptic in the pharmacopeia has been used for colonic irrigations. Silver nitrate, mild silver protien, acraflavine, fused silver nitrate, potassium permanganate, olive oil and bismuth, witch hazel, oxyquinolin sulphate, boric acid, acetozone, argyrol, albargin (silver nucleinate), allantoin, chloramin T, peroxide, tanic acid, thymol, resorcin, creolin, gentian violet and lysol are among the drugs used. Buie uses various ones of these preparations through a sigmoidoscope. He believes that this local treatment is essential to the healing of the secondarily infected ulcers. (11) (27) (36) (49) (62) (63).

It was early established that the disease affects solely or primarily the large intestine thereby making local treatment at least a theoretically rational procedure. Each author professes a preference for some particular local remedy. Certain difficulties, however, arise practically. Anything in sufficient strength to be bacteriacidal will irritate rather than heal.

Most preparations are too bland and so not bacteriacidal or too irritant. (27) (83).

Aqueous solutions of acraflavine has been used with good results the past few years. The drug is not germicidal but is antiseptic. It inhibits the growth of colon bacilli or Staphylococci in dilutions of 1:200,000. It is non-toxic, but highly penetrative and is non-irritating in the usual clinical practice. It is used in the rectum in dilutions of 1:4000 to 1:2000. The patient is given an enema of 750cc. twice daily, to be retained from ten to twenty minutes. The left lateral position is assumed during the injection; an ordinary rectal tube is inserted 3 or 4 inches being all that is necessary to ensure full contact of the colon with the solution. No other cleansing enema is necessary. When the symptoms of urgency and diarrhea abate the injections may be reduced to one per day and increase the strength from 1:4000 to 1:3,500 and in a few days to 1:3000. If much mucous appears, decrease the strength of the solution. The treatment is continued until the temperature is normal and there is no more diarrhea. (27).

One may now alternate with a weak soda bicarbonate solution; the alkali increases the antiseptic action of the dye. The procedure is continued until examination through a sigmoidoscope shows the mucous membrane to be normal. Occasionally in the late stages injections of small amounts (50-100 cc) of a 10% solution of sulph-ichthyl in liquid petrolatum or cotton seed oil is advantageous. Logan advocates a 2% solution of scarlet red in olive oil. (27).

The Mayo clinic uses acraflairn 1:4,000, mercurochrome to

2%, silver nitrate 1 to 3 grains in a liter of water, mild silver-protien (argyrol) in various solutions, acetyl-tannic acid (tannigen), copper sulphate, plain water and physiological saline. It has been their experience that warm physiological saline takes precedence over any other irrigation in the occasional case in which they consider an irrigation necessary. In cases in which the rectum or rectosigmoid region is involved, instillations of bismuth or olive oil, and bismuth and Hamamelis in full strength seems to have had value. (83).

Lynch and Felson favor potassium permanganate, peroxide, chloramine T -- especially the former. They inject large quantities of potassium permanganate solutions starting with 1:10,000 dilution and working up to 1:5,000. Several quarts are injected if possible and retained one hour. The solution is more easily retained if the tube is left inserted. Sometimes good results are obtained by suddenly switching to peroxide or chloramin T. It is possible that these strong oxidizing agents affect the bacteria directly, especially the anaerobes. (49).

Einhorn advocates using an intestinal tube through the mouth into the cecum. Irrigations are done in this manner to avoid appendicostomy or cecostomy. The tube is left two or three weeks. Nutrition is given by mouth as usual. (44).

Various surgical procedures have been advocated. Cecostomy, appendicostomy and ileostomy are advocated mainly for irrigation purposes. Colectomy has been done but with a frightful mortality. Buie believes that these procedures are of little value and that the favorable reports may have been remissions. Colectomy may become necessary for segmental contractures and abscess formation.

Ileosigmoidoscopy usually proves unsatisfactory as the rectum and sigmoid are the primary sites and are practically always involved as long as the disease persists. Buie believes the operations are only to be considered as life saving measures. Ileostomy is favored by most authorities. The ileum should be cut about 15 cm. above the ileocecal valve and both ends brought out through the abdominal incision. Exploration and handling of the colon is prohibitive. Hurst believes that appendicostomy cuts the course of the disease in half. Wallis said in 1909 that surgery with irrigation through the stoma was the best if not the only chance for cure. Such a statement would hardly be made today. Logan advocates giving surgical rest to the colon except in cases in reach of enemas. (27) (70) (88) (90) (104).

Logan has advocated hyperemia of the bowel produced by hot water injections at temperatures as high as 120°F. (70).

Since the disease is subject to recurrences every precaution should be taken to prevent further trouble. Every case should be treated until the sigmoidoscopic shows a normal bowel mucosa. The patient is to be educated in regard to his diet, as dietary indiscretions often bring about a relapse. Eradication of foci is very important as a prophylactic against further attacks. Some authorities believe that pelvic and abdominal tumors, multiple adenoma, adhesions and floating kidneys may predispose to colitis. Mummery reports cures of colitis by simple appendectomy. A mental hygiene must not be forgotten and all psychic trauma should be avoided. (11) (77).

Conclusions.

Rest to the diseased organ and mental rest are important therapeutic measures.

The favorite diet seems to be one high in calories, high in vitamins and low in residue.

Some authorities advise changing the intestinal flora.

Nursing care and proper general treatment is important.

The acute case should be kept in bed, kept warm and fluids should be supplied to compensate for the loss by the bowel. Proper symptomatic and general treatment should be instituted.

Various protectives and astringents have a place in therapy.

Iodine given by mouth possibly has cured isolated cases and definitely produces remissions.

Calcium lactate alone or in conjunction with parathyroid therapy is advocated by some.

Purgatives are contraindicated.

Various antiseptics are used internally with minimal results.

Serums and vaccines of different types have been used with variable results.

Secondary foci of infection should be removed or treated.

Burnford has had some success with ionization.

Most workers use some form of colonic irrigation in the chronic stages of the disease, believing that the value is greatest in irradiating secondary infections.

Einhorn advocates the use of an intestinal tube, through the mouth, for irrigative purposes.

In the light of present day information surgery is to be done only as a last resort in selected cases.

Logan has advocated the production of hyperemia of the bowel by means of hot water injections.

An attempt should be made to avoid recurrences.

Parasitic Diseases of the Large Intestine.

Amebiasis.

Since the etiology of the disease is definitely known treatment may be directed specifically toward the endameba histilytica and toward the symptoms given the patient distress. As in all infestations of the more severe types the treatment may need to be supportive to some degree.

During the acute attack the patient should be put to bed. The diet should be bland but the amount may be liberal if the appetite is good. (83).

Emetine has become the standard drug for specific treatment especially in the acute cases. The first really specific treatment of amebic dysentery was with ipecacuanha. This drug was soon superseded by emetine which was introduced by Sir Leonard Rogers in 1911. At first the drug was given parenterally but of late it is more often given by mouth. A compound, emetine bismuth iodide, which contains 30% emetine, has been prepared for oral use. The drug is almost insoluble in neutral or acid solution, but dissolves readily in the alkaline contents of duodenum. The usual dose is 3 grains daily for twelve consecutive days. Notwithstanding its extremely slight solubility in gastric contents, some nausea usually follows and often vomiting. (73) (75) (83).

The margin between the effective therapeutic dose and toxicity is small. The drug is by no means harmless. Toxic effects are manifested by vomiting; a fall in blood pressure and the characteristic "emetine pulse." The circulatory system is particularly liable to become involved and the heart should be

watched continuously from the onset of its administration. Any cardiac irregularity is a danger signal. The drug is often mentally depressing and a very painful neuritis and desquamation of the skin are well known sequels. These symptoms are less apt to develop if a more generous diet than milk is given. (72) (73) (83).

The intramuscular injection of emetine hydrochloride is very painful and may cause muscular atrophy. It is important that the drug be given intramuscularly rather than subcutaneously or an abscess is likely to develop. One grain is given daily until ten grains or at most twelve grains of the drug is given, being guided by the heart findings and the patient's weight. (72).

The introduction of emetine therapy was a definite step forward and it still seems to be the treatment of choice in the early stages of acute amebic dysentery and for amebic hepatitis. The effect in these cases is often brilliant, the dysenteric symptoms ceasing within a few days, and amebae disappearing from the stool in a short time.

Undoubtedly many cases have responded to auremetine, emetine bismuth iodide, or emetol that have not responded to the preparations given intramuscularly. The more acute the symptoms the more striking and permanent are the results. According to Dobell sufficient emetine is absorbed to act on the parasites in the liver. The increased therapeutic effect of the emetine bismuth iodide preparation is probably due to the more potent sterilizing powers of the double iodide on the amebae. Seventy percent relapse with the hypodermic or intramuscular injections of emetine hydrochloride whereas only ten percent relapse by the oral adminis-

tration. Brown concludes that ipecac and its derivatives are only effective in from 58% - 80% of the cases. Brown does not give the auremetine in the very acute cases but uses the drug hypodermically as the hydrochloride. Auremetine is practically free from the side effects as nausea, vomiting and abdominal distress. It is also less depressing than the emetine hydrochloride given by hypodermic injection and it is not necessary to keep the patient in bed because of the drug administration alone. (21) (71) (73) (76).

The exact therapeutics of emetine is uncertain but as Dale and Dobell point out the action may be on the host and not as a direct amebicide. (37).

Gordon has advocated the use of emetine periodide by mouth. He doesn't give the drug in capsules as they may pass clear through the bowel without disintegrating. Six grains are given daily, by mouth, mixed in milk. The drug does not produce nausea. (55).

Perhaps no disease responds so *majestically* as does acute amebic dysentery to emetine. Yet irradiation of the parasites, the prevention of recurrences, and the overcoming of individual intolerance to the therapy becomes a most baffling problem. The acute symptoms subside but the least laxity on the part of the patient or the doctor results in a relapse. Subjective relief is rapidly obtained, but to ensure the entire destruction of the parasite is another matter. The very nature of the endameba *histilytica* is against this, as the position of the parasite in the intestinal mucosa affords protection. The question of re-infection, rather than recurrence, cannot be overlooked. Treat-

ment seems to favor encystment, and cysts are far more resistant to treat than the active endameba. In some cases emetin given at intervals during a month seems to retard encystment, as well as to destroy the parasite as it passes from the cystic stage. (23).

Di-Hydranol was developed and experimented with by Leonard and his associates. The drug is excreted partly in the urine and partly in the feces. Upwards of three grams may be taken daily without toxic effects. The experiments have shown di-hydranol to be an intestinal disinfectant for both protozoa and bacteria. Thirteen out of fourteen cases treated with di-hydranol by Frust were cured after a single treatment. (24) (84).

The course consists of a 25% solution of di-hydranol (2-4 dihydroxy-phenyl n - heptane) in olive oil put in 10 minim gelatin capsules given in increasing dosage. The first day two capsules are given after each meal, the second day, three capsules after each meal and on subsequent days four capsules are given after each meal until the required number are taken. Less than fifty are non-effective; it is best to give from sixty to one hundred capsules. (84).

Little or no preliminary treatment is necessary. It is also administered in chocolate covered agar blocks. (84).

Seibert is a strong advocate of stovarsol. The drug was substituted in the place of emetine bismuth iodide in 1936 at the U. S. Veterans Bureau Hospital at Fort Snelling. He feels that it is a marked forward step not only for quicker more decided improvement but because it is much cheaper and a much larger percentage of stools are negative after such treatment. The patients are more comfortable and their moral less disturbed.

The average period of hospitalization is lessened by one half. (95).

Stovarsol is given by mouth in 0.25 gm. doses three times a day for seven days; during this time the patient is given a hypodermic of two thirds of a grain of emetine hydrochloride twice daily. At the end of this period no medication is given for three days then epsom salts are given each morning for six days and examination made of the stools. The patients are instructed to send the second stool of each day, for if amebae are present they are most likely to be found in the second stool. If six stools are consecutively negative the patient is discharged; if it is his first treatment he is instructed to return in sixty days for re-examination. If the stools are positive after seven days another course of stovarsol is given, but no emetine is given except in rare cases. No signs of toxicity have been noted even though the second course is given as soon as five days after the first one. (84).

Stovarsol contains 27 $\frac{1}{2}$ % of arsenic but as it is the pentavalent form its toxicity is almost nil. Only four of their cases out of over three hundred treated in 1926 showed a mild rash, and this disappeared in from one to three days after the drug was discontinued. (22) (24) (78) (84).

Some individuals have an idiosyncrasy to stovarsol especially after repeated courses. The practice of giving one tablet every three hours until twelve are taken, as advocated by some is dangerous, and hasn't been found to be any more effective than any other method of administration. As a minor measure of precaution the patients may be given glucose (one pound in a quart of orange or lemon water to be taken in twenty four hours) daily during its administration. (76).

Treparsol is another form of arsenic used by some. It is used by Brown and at the Mayo clinic. It is administered orally in doses of 0.25 grams with each meal for four days; that is, a total of twelve tablets is given. After an eight to ten day rest period, this course is repeated. A third course is seldom necessary but may be given after another rest period. It is used both in active cases and for the treatment of carriers. Brown reports that it is effective in fully 90% of the carriers. Treparsol and stovarsol are equally effective but since treparsol is rapidly eliminated, it would seem to be preferable to stovarsol. (20 (21)).

Mason believes that the oil of chenopodium has a curative effect in some cases. One ounce in 30 cc. to 50 cc. of olive oil is injected just inside of the sphincter muscle. His own son became symptom free after a single enema and hasn't had a recurrence for a number of years. Prior to this he had been on various treatments in Siam but not without recurrences. As Mason himself states the treatment does not work so well here. As he points out perhaps the success of various treatments in different localities may be altered by secondary invaders. (72).

When there is no improvement under the above treatment do a proctoscopic examination and treat the rectum locally if its mucous membrane is ulcerated, inflamed or covered with patches of mucous. A cleansing enema is given one hour before, the patient is put in the knee chest position except that the right arm is extended as far as possible across the chest so that the right side of the body is lower. The proctoscope is lubricated, then introduced beyond the internal sphincter, the obturator is

withdrawn and the electric cord connected. Now the scope is slowly pushed through the semilunar valves until the recto-sigmoid flexure opens up. Two ounces of a one-half percent solution of mercurochrome are then injected into the scope from an eye and ear bulb syringe. This solution generally passes through the sigmoid and disappears, then the scope is removed. If the fluid remains in sight have the patient take a number of deep breaths or have an assistant press up on the abdomen several times. Don't withdraw the tube until the solution is out of sight or the fluid will follow the tube and the operator will be spattered. (95).

The patient then lies down on his right side, rolls over onto his back, then off of the table, this maneuver throws the solution as far up the large bowel as it is possible to get it. (95).

The rectal ulcers usually heal rapidly and generally clear up after six or eight treatments; also the patches of tenacious mucous, which harbor the amebae and in under which the ulcer forms, responds readily to this treatment. (95).

Yatren 105 (iodine-oxyquinoline-sulphonic acid compound) has found favor. It is administered with sodium carbonate to render it more soluble. The drug is about 28% iodine. In this country the drug is on the market as wafers of one-half gram each and pills one fourth gram each. Both are salol coated. The preparation was first used in Germany locally on amebic ulcers in 1912. This method has now given way to oral administration. Favorable results from its use have been reported from Germany, England, Brazil, Japan and China. The drug was intro-

duced in this country by Muhlens and Menk in 1921. Other names for this drug are tryen, griserinneu, loretin, xantropin, anayodin and chiniofon. It is also put up in gelatin capsules. The drug is very effective, more pleasant than any other form of therapy and yet it is not necessary to reduce the diet unduly. Throughout the course of treatment fish, eggs, milk and milk puddings may be given. (64) (65) (73) (75).

During the first course of treatment one gram of the drug is given three times a day for a week. In association daily enemas are given for the first three days which contain 100 cc. of two percent aqueous solution of yatren. After an interval of two weeks the course is repeated without enemas. The third course after two more weeks consists of five grams of the drug three times a day. Turner and Jones in a series of fifty one cases using a variety of treatments found that yatren was apparently the most successful. No toxic symptoms were noted by them. (65) (74) (78).

Sayer and Manson modify the above treatment some. They state that the drug may be used intramuscularly or even intravenously as well as orally or rectally. They use 200 cc. of a two and one half percent solution by rectum. First they inject a pint of sodium bicarbonate water followed by the yatren solution which is run in slowly and retained as long as possible. They give fifteen grains orally three times daily unless there is diarrhea when the dosage is reduced to from four to eight grains three times daily. (73) (83).

The plant *castila nicholsoni* contains an active principle, probably a glucoside, which is very valuable in treatment. Thera-

apeutically it is equal or superior to emetine. It is easily and safely administered orally. Patients tend to gain weight rather than lose under the treatment. Unfortunately, reliable preparations of this plant are not yet available commercially. (83).

Liver abscess is an ever present danger in amebic dysentery. Early lesions sometimes heal under treatment with emetine administration either as the bismuth iodide or by injection of the hydrochloride. Occasionally the abscess may be aspirated and a dilute solution of emetine injected into the cavity. Unless there is definite improvement a radical operation must be performed to establish drainage. A 30 to 60% mortality is associated with radical drainage. (83) (86).

It is important to treat any associated chronic ulcerative colitis, which is common. The recognition of both entities in the same patient becomes important diagnostically as the etiology is different and the two conditions must be treated as separate entities. As Weinberger and Mason have stressed there is often a concomitant bacillary dysentery. Diagnosis of any associated entities becomes very important. Lack of treatment of the associated conditions may account for poor results with the usual measures in amebic dysentery therapy. (22) (72) (106).

Chapparó amargoso given by mouth and enemas of one quart of kerosine are used as supplements to emetine treatments by Brown. Bismuth subnitrate or salicylate is sometimes used as a "follow-up" after the course of emetine. Cephalin and absorbed emetin in a few instances is used. Martindale and Willmore use massive doses of bismuth subnitrate as James and Deekes did in

the canal zone. They do not find it a cure but a valuable adjuvant. In the acute case a heaped teaspoonful is stirred up in soda water given every three hours during the day for twenty days then three times daily for an indefinite period. No symptoms of poisoning appear even after months. (20) (25) (76).

Martindale and Willmore use the following routine in the acute case with blood, mucous and amebae in the stools, or organisms found in the sigmoidoscopic scrapings. (76).

(a) Auremetine, one grain, is given in soft gelatin capsules four times daily after food, on alternate days for seven days and then daily to a total of 40-60 grains.

(b) Stovarsol, four grains three times daily, for seven days on alternate days with the auremetine. Previously they gave four grains twice daily for ten days, alternating with the auremetine days, or even to fifteen days.

(c) On stovarsol days a rectal injection of emetol 2 ounces (= one grain of emetine base), in ether six ounces and olive oil twelve ounces.

(d) "Panama bismuth" three hourly for twenty days, then three times daily.

For the chronic or cyst carrying cases:

- (a) Auremetine and
- (b) Stovarsol as in the acute cases.
- (c) "Panama Bismuth", three times daily before food.

The necessity of controlling all cases by routine sigmoidoscopic examination should be emphasized. Carcinoma frequently develops on an ulcer site and also because areas of submucous amebic infiltration, from which teeming amoebae may be scraped out by a sharp spoon, may be found after repeated stool examinations are negative. Since the amoebae inhabit the interstices of the mucosa

and submucosa all medication by irrigation of the bowel or enemas seems theoretically impractical; however Brown believes such treatment is of value. (25) (76).

Surgery is used only as a last resort. Ileostomy is the operation of choice for complete rest of the bowel. (83).

Conclusions.

Emetine continues to be an invaluable drug in treatment and seems to be particularly valuable in rapidly controlling most of the acute phases of amebic dysentery.

The organic arsenicals would seem to be more effective in iradicating the parasite than are ipecac and its derivatives. Emetine seems to be a useful combination. In discriminate use of the arsenicals is not without risk.

Yatren is a valuable addition to the therapeutic armamentarium in amebic dysentery.

In cases with proctitis, recurrence is more probable than in those with gross ulcerative lesions.

Certain cases seem to be very resistant to treatment but persistence and variation in types of treatment should effect a cure in most cases.

Bismuth subnitrate or salicylate, chapparo, amargoso, kerosine enemas, mercurochome enemas are used.

Surgery is to be used only as a last resort.

Much yet is to be desired in the treatment of persistent and chronic cases of endamebiasis.

Oil of chenopodium is found useful in some cases by Mason.

Endameba Coli and Endolimax Nana.

The pathogenicity of these parasites is questioned by some men. Covey and Underwood believe that they may be pathogenic as does Mason and Many others. Probably the resistance of the host is a factor in determining whether or not the amebae will cause trouble. This fact is important in treatment in that general measures to increase the resistance of the host will find a place in therapy. (33) (34) (35) (72) (83) (103).

In the experience of the Mayo group treatment usually advocated for endamebae is effective. Some say there must have been endamebae present only not found. At any rate it should be said that from the standpoint of clinical data that when these patients are found with symptoms referable to the intestinal tract they should be considered pathogenic and treated in a manner tending to eradicate them. (83).

As Underwood has pointed out any gross parasitic invasion causes massive vagal stimulation with abdominal distress, low blood pressure, slow pulse and giddiness. Then too, various individuals may have a specific sensitivity to any given parasite. The parasitic involvement predisposes to secondary infestations so the patient may be rid of his parasites but have a persisting colitis. In this case therapy must be directed toward the secondary invaders. (103).

Conclusions.

Endameba coli and endolimax nana may be pathogenic and should be treated as in infestations with the endameba histilytica.

Treat any secondary invaders.

Flagellates.

The flagellates include the *Giardia lamblia*, *Trichomonas hominis* and *Chilomastix mesnili*. The former is definitely pathogenic but there is still a difference of opinion in regard to the other two. Probably they may be disease producing if in sufficient quantities. (83).

The Mayo group have used instillations of magnesium sulphate, as for duodenal drainage, in association with intravenous administration of arsphenamine but more recently arsenic has been given by mouth in the form of treparsol. Underwood and Covey use stovarsol. (33) (83) (103).

If symptoms are being produced by *Trichomonas hominis* a diet of meat only for ten days or longer has irradiated the parasites. The discomfort of such a diet is indicated only on rare occasions for the amount of relief that it produces. (83).

Simon has discussed the use of intraduodenal instillations in the treatment of intestinal parasites. Harvey Beck in 1911 gave watery solutions of ipecac root through the duodenal tube. M. Ernest Jutte in 1912 used transintestinal lavage with massive amounts of hypertonic salt solution. A hypertonic solution is not absorbed as it draws fluids into the intestines rather than passing out of the intestine itself because of its osmotic action. In 1917 Jutte suggested such a procedure in the irradiation of intestinal parasites. It had been previously suggested by Paleski in 1915 including medicaments. In 1920 Hemmeter presented an exhaustive resume of the subject of *Giardia intestinalis*. Its irradiation is difficult because the parasite goes into the crypts; so any medication must be absorbed as well as have a local

effect in order to irradiate the parasite. He believed that hexamethylamine might meet this indication since formaldehyde could be detected by him in the bile shortly following absorptions into the portal system. In more refractive cases, methylene blue (50 cc. of .5% solution) was suggested. Simon also uses arsphenamine 6-9 dg. dissolved in ninety cubic centimeters of water. In 1923 Kantor stressed the important fact that salvarsan and other arsenicals are excreted mainly through the intestinal glands and biliary tract and recommended arsphenamine per rectum as well as intravenously and through the duodenal tube. It is important to give sufficiently large doses as the parasites become tolerant. Lyons recommended 25% magnesium sulphate by duodenal lavage plus arsphenamine intravenously. (96).

Rivas in 1926 showed that protozoal and metazoal parasites are destroyed by a comparatively short exposure to 45°-47°C. He advocates lavage of one to two liters of normal saline at 47°C. for ten minutes. Colonic flushes are used for organisms in the large bowel. He also uses two or three ounces of 30% magnesium sulphate prior to the saline and repeated once or twice during the process of the flushing. There is danger of sloughing the bowel if the solution is used too hot. (96).

In conjunction with the administration of mercurochome by mouth, local rectal treatments are of some value in the treatment of the flagellates although not much as the irrigations do not reach high enough. However, a drop of one half percent solution of mercurochome added to a specimen containing *Chilomastix mesnili* and *Giardia lamblia* caused activities to cease at once. Mercurochome may be given in salol coated capsules. One

and one half to three grains are given two to four times daily according to the susceptibility of the patient to this drug. The patient is instructed as to the symptoms of irritation and to take only enough to keep the stools a dark mahogany. At the end of two weeks medication is stopped for a few days, the stools examined, and if found positive, treatment is resumed. This is too recent a treatment to state definitely its effectiveness. (95).

Incidentally it may be stated that three patients became stool free of flagellates after being on sodium salicylate for three weeks as a treatment for rheumatic fever.

Conclusions.

Magnesium sulphate hypertonic instillations, as for duodenal drainage in association with an arsenical is useful.

A diet containing only meat may rid the bowel of flagellates but the discomfort of such treatment only occasionally warrants its use.

Medicated duodenal instillations of hexamethylamine and methylene blue may be helpful; also a solution of arsphenamine may be used.

Lavage of the intestine and colonic flushes with saline solution at 47°C. has been advocated.

Mecurochrome by mouth and for local rectal treatments seem to be helpful.

Sodium salicylate may be of value in the irradiation of flagellates.

Balantidium Coli.

Oil of chenopodium has been advocated for the irradiation of this parasite. The drug paralyzes but doesn't kill the in-

vaders. Therefore its administration must be followed by brisk purgation or duodenal instillations. Therapeutic doses of the drug may produce minor toxic symptoms, especially nausea, dizziness, sometimes vomiting, temporary deafness or general depression. The deafness may be rather persistent. Severe intoxication is rare, and is usually due to gross over dosage; but a few deaths have been reported from therapeutic doses. The symptoms in severe cases pass into marked depression, convulsions and coma. Fasting increases the toxicity of the drug. Subminimal doses, repeated at intervals of several days, become toxic, thus indicating cumulation. The drug is absorbed slowly from the stomach but rapidly from the intestine. (83).

Against hookworm or amebas, the routine consists in a light evening meal, followed by a purgative dose of magnesium sulphate. In the morning, the patient receives some milk followed by three doses of chenopodium oil, each of 0.5 cc. (7 minims) on a teaspoonful of granulated sugar an hour apart. Two hours after the last dose magnesium sulphate is again given. The course is repeated every three to five days until the parasites have disappeared from the feces. (83).

Tapeworms.

The treatment of Magath and Brown is used routinely at Mayos. No lunch or supper is given the day preceding the treatment. Black coffee, tea and water may be taken freely. At six o'clock in the afternoon fifteen to thirty grams of magnesium sulphate are given by mouth and again at six o'clock in the morning. No breakfast is given and following the first bowel movement,

30 cc. of the following emulsion is given: oleoresin of aspidium, 6 cc.; powdered acacia, 8 gm.; distilled water to make 60 cc. One hour later another 30 cc. of the same emulsion is given. Two hours later 30 gm. of magnesium sulphate is given again and two hours later a large soap suds enema is given. All the stools, from the time of the first administration of magnesium sulphate, are passed into a container and examined. The patient is cautioned not to put any toilet paper in the specimen. Obviously the stools will contain much water; so let them settle and pour off the top. Now warm water is run through the specimen on a twenty mesh sieve and then rinsed into a pan by running water through the bottom. With a hand lens search is made for the head of the worm. It is necessary to get the head or the parasite continues to throw off segments. This treatment is successful for both the beef and pork tapeworm. For the dwarf tapeworm oil of chenopodium, thymol or betanaphthol have proved satisfactory. (25). (83).

Brown and Magath insert a Rehfuß tube into the duodenum and inject the various solution very slowly with a glass syringe. The fluids are injected at body temperature. The magnesium sulphate is important as it assures early purgation which means lessened absorption of the vermifuge. After the last dose of magnesium sulphate a syringe full of water is injected at one half hour intervals. The more fluid in the bowel the greater the chance of recovering the worm intact. (25).

If purgation hasn't begun within two or three hours of the administration of the last dose of vermifuge an enema should be given. When the worm is expelled it usually comes intact but should only a portion of it protrude from the anus an enema is given at once to wash out the remainder. The parasite is usually

expelled within three hours of the administration of the vermifuge. If the head is detached it usually comes away with the body and can be found. (25).

If the patient has been properly prepared the discharge from the bowel will contain practically nothing but water and tapeworm. The head of the *Taenia saginata* isn't much larger than a pinhead and may easily be overlooked. Every part of the material from the bowel should be saved at least until the head has been found. A large flat pan and a good light are essential for an examination for the head of the worm. (25).

It is usually easy to tell when the tube is in the duodenum. The reaction is acid in the stomach and alkaline in the duodenum and the material from the stomach is white or colorless and yellow or dark brown from the duodenum. (25).

Leave the tube in position if possible, until purging begins as it permits the injection of much water and ensures more rapid purgation and a better chance for getting the worm intact. Under no circumstances is the tube withdrawn until the drugs have passed well down into the bowel as its premature removal is liable to result in gagging and vomiting on account of regurgitation of the drugs into the stomach. (25).

Occasionally the patient gags and expells the tube immediately after the injection of the vermifuge but this is rare if the tube is well engaged and if the drug has been warmed and injected slowly. However, the magnesium sulphate ensures purgation. (25).

Brown and Magath have treated twelve cases in this manner with 100% results and they agree with the conclusions of Gnatt, Weist and Schneider. These authorities have had similar success. (25) (53) (57) (93).

Several authors advocate the use of duodenal tube for the administration of anthelmintics. By so doing nausea and vomiting is eliminated, smaller dosages are required, the worm is usually expelled entire, and toxic symptoms are less commonly met with. (57).

If the intestinal tract hasn't been thoroughly emptied poor results may be expected from any form of treatment. Other factors are inadequate dosage or vomiting inducted by the drug used. In spite of the best of technique there will be some failures. If the head is not found the matter of cure is a question of doubt until ova are demonstrated microscopically or segments seen in the stool. However the method of search described by Brown and Magath usually results in discovery of the head if it is to be found. (57).

In summarizing we may say that the steps in treatment are the following:-

1. Preparatory.
2. Administration of the drug.
3. Searching for the head of the worm.

Conclusions.

The method of Brown and Magath seems to be most popular.

Some authorities believe that the drugs may best be administered through a duodenal tube.

Round worm.

For adults 2 cc. of oil of chenopodium is given in capsules of 1 cc. each, an hour apart. Two hours after the last dose is administered 30 cc. of magnesium sulphate is given. If this method

fails, and no toxic symptoms arise after thorough catharsis in the evening the following morning 0.3 gm. of santonin followed by 0.065 to 0.12 gm. of calomel may be given. This can be given on two successive days and repeated in a week if no toxic symptoms arise. (83).

More recently hexylresorcinol, a crystalline drug given by mouth has proved very efficacious. This has been given in doses of one gram administered in enteric-coated capsules, followed in two hours by a dose of salts. Repeat in a week if necessary. (83).

Pin worms.

Care should be taken to prevent reinfection from the subject himself. Adults should wear canvass gloves at night and children should have their hands tied in the sleeves of their night clothes. Bedclothes, underwear and night clothes should be changed daily. A warm saline enema at bedtime, or a 1% thymol ointment locally is helpful for the pruritis ani and perianal irritation. Cold water enemas have also been suggested. A week or ten days of such a regimen followed strictly will usually cure. More strenuous treatment has been advised. Leifer suggests oral administration of 10 gm. daily of bismuth subcarbonate and Chandler advises carbon tetrachloride in 3 cc. doses followed in two hours by 30 gm. of magnesium sulphate. (83).

Strongyloides

Thymol, chenopodium, arsenicals and "flowers of sulphur" have been used but treatment has not been satisfactory. Faust has shown that gentian violet is effective. (83).

Delangen (1928) was the first to show that gentian violet

was effective in Strongyloides therapy. More recently (1930) Faust has confirmed its efficacy. A patient almost in complete collapse, bed ridden three months, was given enteric coated gentian violet tablets, one gr. three times daily. There was marked improvement inside of three weeks. (47).

A postmortem observation on a patient who had been given one third grain tablets of gentian violet three times a day for two successive days antemortem showed a diffusely stained gastrointestinal tract from the stomach ~~on~~ except in the mucous covered areas (duodenum).

The hyperinfective type of parasite is responsible for the so-called hyper-infective individuals who have once become parasitized. This type is altered by the minimal doses of gentian violet to the direct type which remains unaltered. In heavy infestations, both in man and monkeys, minimal amounts of dye are sufficient to kill the adult female worms in situ and to cause their evacuation in the feces, at the same time having no effect on the larvae which have already been hatched. (47).

Ankylostomiasis.

Prophylaxis is the keynote of treatment. Stools of infected individuals should be properly disposed of, those infested should be treated and people in infested regions should wear some sort of protection on their feet.

Thymol is given in capsules of 5 grains (.3 gm.) each. The evening before magnesium sulphate is given. At six o'clock in the morning one half of the dose of thymol for the patients age is given, at eight o'clock in the morning the other one half is

taken. One half hour later and at ten a. m. more salts are given. No fats or alcohol should be taken during the treatment, as they facilitate its absorption. Doses of thymol according to age as recommended by Stitt, are for patients less than five years, 7.5 gr. (0.48 gm.) grading upward; so that patients between twenty-five and fifty nine years of age take an average of 60 gr. (4 gm.). As a mouth wash a saturated watery solution may be used. (83).

Oil of chenopodium is given in doses of 1.5 cc.; 0.5 cc. respectively is given at seven, eight and nine a. m. At eleven o'clock magnesium sulphate is given. Two such treatments is said to remove 99% of the worms.

Carbon tetrachloride is given in 3 cc. doses administered in hard gelatin capsules. It is cheaper, more effective and when chemically pure safer than the former two drugs. However in the use of all of these drugs toxic symptoms should be watched for. Smillie and Augustine recently have found carbon tetrachloride, 2 cc. and oil of chenopodium 1 cc. very efficacious. Hexylresorcinol, as suggested for the treatment of ascariasis, is also said to hold forth hope of being a remedy. (83).

Trichinosis.

The patient should be given brisk purgation to clean out the worms before the female has burrowed into the intestinal walls and deposited ova in the lymphatic system. Thymol may be given. (83).

Bacillary Dysentery.

General management is very important. The patient should be kept in bed and kept warm. Hot applications to the abdomen are comforting. The mouth may be kept clean with antiseptic washes. It is commonly advised to empty the bowel at the onset to clear out indigested material. One half ounce of castor oil may be given. (29) (79).

Some withhold all food the first three or four days giving only ice for thirst. Tea sweetened with lactose is usually well borne, and broths may be given. Lactose is of value because of its food value and lack of fermentation. It also lessens the toxicity of the various bacteria. It favors the growth of the acid producing bacilli and so inhibits the action of the dysentery bacilli. Buttermilk is advised by some. Albumen water is also given by some. No milk is given by most men. During the less acute stage smooth cereals and citrated milk are given. When the mucous has disappeared from the stools the diet may be gradually increased by adding lightly poached eggs, crackers and butter, custards and fruit juices. Later fish, chicken and mashed potatoes are added. The return to the normal diet is by degrees. Siegel in treating children gives nothing but tea for one or two days, then malt broth and buttermilk. A liquid diet may cause an increase in abdominal pain and increase the number of stools. Gruels are well borne and caseine is recommended by many. With convalescence there is permitted a gradual return to the normal diet but with caution because of the danger of relapse. (29) (79).

Saline treatment is usually recommended. Sodium sulphate in thirty grain doses is given every hour or sixty every two hours,

until fecal material appears in the stools. Then give four to eight cc. every four hours. The object is to prevent toxic absorption. The experiments of Macht and Finesilver showed conclusively that a solution of sodium sulphate in an isolated loop of gut prevented absorption of drugs from that loop; it may be presumed that the salt acts similarly on dysentery toxins. In children or adults suffering from dehydration use caution or give in conjunction intravenous or subcutaneous injections of saline. (29).

In fulminating cases it is, above all, necessary to forestall collapse by keeping the patient warm and by intravenous injections of normal saline in amounts up to 1,000 or 2,000 cc. In the choleraic type Rogers hypertonic saline (sodium chloride 8 gm., calcium chloride 0.25 gm., water one pint, 1921 formula) may be given intravenously. In the later stages to prevent constipation a daily morning dose of magnesium or sodium sulphate is advisable. Rogers has found that calcium permanganate is antitoxic, and uses solution of 1:1,000 (10 gr. to a pint) for a colonic irrigation. (29).

Graham and others expressed the opinion that fatality is not due primarily to cardiac failure, but due to circulatory failure on the vasomotor side; in fact to toxemic shock. If body fluids are below normal the absorption of toxins from the intestines goes on at a maximum rate and the absorbed toxins have their full effect and can't be made harmless by the tissues. Water in the intestine delays absorption of toxins. Magnesium sulphate (in over 2% solution), as already pointed out, delays absorption. (56).

Atropin relieves the colic. Adrenalin relieves colic and

stimulates the circulation. Ten to twenty drops by mouth every two hours or by enema may be given. Opium is not given unless required for the tenesmus. Mason gives the primary purge with castor oil in from fifteen minims to one ounce of tincture of opium. (29) (72).

Kaolin given in hot water or tea may aid in absorbing toxins and probably bacteria. One Hundred to three hundred grams are given in from three to five hundred cubic centimeters of hot water or tea. (29).

During convalescence the salines are of value in keeping the bowels open to prevent hard feces from irritating the ulcerated or eroded bowel wall. (79).

Local treatment may be of value especially in chronic cases. Silver nitrate in one to five percent solution is advised by Martin, and is effective. Dakins solution however is safer, more satisfactory, and less expensive. Beginning with a 25% solution 300 to 500 cc. of the solution is injected per rectum three times daily. The concentration is increased, according to the patients tolerance up to full strength. It is essential that the solution reach as high in the colon as the disease process; so the patient is placed in the knee-chest position if strong enough and in some cases the volume is increased. If this is not successful surgical treatment may be necessary. Yatten is also curative and much less trying to the patient than Dakins solution. It should be given as a combined oral and rectal treatment 0.5 grains three times daily, orally and 3 grains in 200 cc. of water by rectum preceded by a cleansing enema. It is best given at night and retained until the following morning. An enema of normal saline may be given if the

tenesmus is not so severe as to make the treatment too painful. Bolus alba (kaolin) may be given by enema, 200 gm. in 400-500 cc. of water. Enemata of collargol or argyrol may be used. (29) (79).

Bacteriophage has been used by d'Herelle who treated cases with cultures of dysentery bacilli that had undergone this type of lysis. (79).

In addition to normal saline to keep up body fluids and lessen toxic symptoms 5% glucose may be added. The detoxifying effect of glucose is well known and the solution may be of value because of it's nutritive effect. (79).

Convalescent serum (35-40 cc.) subcutaneously repeated in four or five days if necessary has been used by Neuman. (79).

Serum therapy is used for its well known curative effect due to its antitoxic and secondarily antibacterial properties. The treatment however is not without its dangers. Severe reactions are sometimes fatal especially in asthmatics and those previously treated with serum. The reactions are more severe if it is given intravenously. Asthmatics should receive an injection of atropine before the administration of serum. Give two cubic centimeters, wait ten minutes and give the balance. The polyvalent sera usually given may be deficient in the antibody to some races of bacilli. Willmore and Savage at El Tor have statistically shown the value of serum treatment. From 1909 to 1910 the mortality was 53% and 63%, from 1910 to 1911 it was 32.6% and 21%. The following year no serum was available and the mortality jumped to 70% and in 1912 to 1913 with serum the mortality was reduced to 12%. In 152 cases treated at the Peking

Union Medical College 79 were treated with serum. The effect was good in 51% moderate in 25% and nil in 24%. The most striking effect is its antitoxic effect in very toxic patients. The average or mild case responds with definite improvement, but as such patients are likely to improve anyway, the probability of serum sickness and the expense of serum treatment should be considered. The earlier the therapy is given the more effective it is. In acute cases the disease may be immediately cut short when a full dose is given within the first twenty four hour. Intramuscular injections of large doses is painful and since the serum is more effective intravenously it should be so given with the proper precautions. First 0.02 cc. of 10% serum is given intracutaneously. A positive reaction will appear in one hour and consists of a wheal surrounded by a red areola. If the reaction is positive desensitize with gradually increasing doses hypodermically every half hour, begin with .025 cc. and double the dose each time until 1 cc. is given. If there is no reaction give 1 cc. intravenously and follow at one half hour intervals with an injection of a dose double the preceding one. For intravenous use dilute the serum with an equal volume of normal saline and give slowly at body temperature. Intramuscular injections are best made in the adductor muscles of the thighs or subcutaneously in the flank or buttocks but if given subcutaneously absorption is slower and there is a possibility of abscess formation.

Large doses should be administered. Smyly administers two daily of 40-80 cc. each. Some advocate 60-120 cc. Best results are obtained if the serum therapy is continued until the temperature is normal and the stools are free from mucous. Exceptions

to this rule would be in cases in which the serum was obviously inert after two or three trials or in late cases where traces of mucous is passed for a long time. (29) (72) (79) (92).

It is advantageous to follow the progress of all cases while under treatment by repeated sigmoidoscopic examinations. If the rectum alone is ulcerated the local measures described above may be helpful.

Surgical intervention is necessary if ulceration is higher up than can be reached by antiseptic solutions, or in severe cases where complete rest of the colon is essential. This is inferred when the patient can only retain small quantities of solution and when cultures taken on swabs from sigmoidoscopic examination continue to show dysentery bacilli, even when the visible length of the bowel is improving. For this condition appendocostomy is the operation of choice. The upper end of the colon can thus be reached by Dakins solution. If the aim is to set the bowel completely at rest cecostomy or ileostomy may be chosen. Ileostomy is more effective, in that while all fecal matter is diverted from the diseased bowel the patient can be given nourishing, abundant diet and colon irrigations with Dakins solution, or some of the other solutions discussed above, can be carried out through the lower ileostomy opening. After the disease is cured continuity of the bowel can be restored. (29) (79).

Conclusions.

General management is important. The patient should be kept warm and in bed. The bowel should be emptied at the onset.

Liquid diet is given at the onset. Additions are made very gradually remembering that improper diet is a factor in relapses.

Saline treatment is recommended per rectum, mouth, subcutaneously and intravenously. Rogers hypertonic saline is useful in the fulminating cases. Glucose may be of value in the intravenous, and subcutaneous injections.

Atropin and adrenalin relieve colic.

Opium is only given if required for the tenesmus. Opium may be given with the primary purge.

Local treatment is of value, especially in chronic cases.

Serum therapy has a definite place.

Surgical intervention may be rational in selected cases.

Colonic Diseases of Functional Origin.

Mucous Colitis.

Chronic colitis, mucous colitis, membranous colitis, idiopathic colitis, irritable colon and spastic colitis are synonymous terms. The treatment varies due to the diversity of opinions as to etiology. Those who hold that it is nervous give tonics and sedatives. Those who believe it is a question of chronic constipation direct their treatment toward some method of keeping the bowel empty. Those who believe it is a reflex phenomenon as intussusception, floating kidney, enteroptosis, uterine displacement or the like treat according to the cause. Those who believe it is an autonomic nervous system imbalance direct their therapy along those lines. The men who believe it is a question of bacterial or food allergy direct their efforts along the line of desensitization. One would conclude that there might be variable factors in etiology. It would seem logical that if we are dealing with a symptom, and the diagnosis of mucous colitis is a symptomatic diagnosis that we might find various etiological factors entering in. This only adds to the interest of the malady and spurs us on to a thorough and painstaking diagnostic regime searching ever for all etiological factors and treating the patient accordingly. (5) (14) (17) (38) (74) (79) (82) (110).

Perhaps a therapeutic discussion of the disease may best be considered with these various etiological opinions considered separately.

It is important to treat the whole patient rather than just a disease. Whether or not we believe that nervousness is a cause

or an effect nevertheless the fact remains that we are dealing with a nervous patient and the manner of the attending physician is often more important than his medicines. Any factor contributing to fatigue or a lowered vitality should be eliminated. For this reason elimination of all foci of infection should be considered. A flabby abdomen may best be supported with an abdominal belt. Uterine retroversion or any thing which might cause reflex disturbances should be considered, but carefully; the dangers of too many speculative procedures is real and will be pointed out in a more appropriate place. (12) (29) (83).

The diet is important. It may be said that the patient is again to be considered. Avoid dogmatic statements as these patients take everything very seriously. It is important that the patient does not attach too morbid a significance to his diet or any other measures. With this preliminary remark it may be said that a wholesome mixed diet should be given, and at the outset bland. Certain modifications may be made to suit conditions as hyperacidity, achylia and atony. Theoretically a bland diet is constipating but it is less harmful to use mild laxatives than roughage. Vitamin B is fundamental in producing appetite and bowel movements. Ample diet is important to maintain the nutrition and keep the bowels more nearly normal. If the appetite is poor, bitter tonics are given before meals. An attempt should be made to try to satisfy the palate. If there is much putrefaction it may be necessary to exclude for a time putrefactive foods as meat, eggs, peas and beans. Plenty of milk is important if the patient is a good milk drinker as it is less putrefactive. In some cases a strict milk diet may be feasible,

in such a case raw milk is used instead of pasteurized milk. If fresh milk is obnoxious perhaps dried milk, malted milk or acid milk (contraindicated if there is hyperacidity) will be desirable. Van Noorden has advocated a coarse diet with a high cellulose residue inclusive of a large fat ration. This diet is not favorable in most cases but in cases in which there is a hypokinesia of one part of the colon with spasm of another part it may be desirable. In most cases it is distinctly harmful. There is a difference of opinion in regard to changing the intestinal flora. Acidophylous milk may help in some cases. The diet should be varied according to the stools. When the bland non-irritative diet is needed, a diet outlined by Alvarez is desirable.

Breakfast.

Orange juice; grape-fruit - avoid the fiber; cantaloupes and melons regurgitate for hours. Coffee in moderation; chocolate, cocoa or tea. One or two eggs with ham or bacon (avoid the purely fibrous part). White bread and butter; toast or zwieback. Any smooth mush as cream of wheat; farina; germia; cornmeal or strained rolled oats. Puffed cereals and corn flakes are allowed. No shredded wheat or other coarse breakfast foods.

Lunch or dinner.

Broths; boullions; cream soups; chowder. A small portion of meat, fish, oysters, chicken or squab (avoid fibrous parts and gristle). No smoked or canned fish or pork. Avoid veal, crab and lobster if they seem to cause indigestion. White bread and butter; hot biscuits (small so mostly crust); no rough bran breads or bran biscuits. Rice; potatoes - baked, mashed, hashed,

brown or French fried; sweet potatoes; hominy; tomatoes stewed, strained and with cracker crumbs; well cooked cauliflower tops with cream sauce; asparagus tips. Later may try brussels sprouts, Italian pastes; noodles; macaroni or spaghetti, cooked soft with a little cheese or cream sauce.

Purees of peas; beans; lentles; lima beans or artichoke hearts. All skins or fibers should be removed by passing through a rice. "Kornlet" in cans furnishes sweet-corn without the indigestible husks. There are practically no other vegetables that can be pureed to advantage. Spinach is not usable. Bananas fried in butter or baked in their skins. String beans are allowed if young and tender. No salads at first. Later, a little tender lettuce may be tried with apples or bananas, tomato jelly or boiled egg. Mayonnaise and French dressings are allowed.

For Dessert.

Simple puddings, custards, ice cream, jello, plain cake, canned or stewed fruit. Avoid cheese, nuts and raisins.

If constipated, stewed fruit may be taken once or twice a day. Too much sugar should not be used. Whole apple sauce strained may be diluted with tapioca or sago. Blackberries and loganberries stewed and strained and sweetened, the sweetened juice thickened with cornstarch. Canned pears and peaches are permitted. Later may try a fully ripe pear, peach or apple.

Avoid most of the green vegetables, salads and raw fruits.

Avoid sugar in concentrated form. Give no candy or other foods between meals.

As the inflammatory process subsides, foods which contain a large residue of undigested material are gradually added to the diet until eventually most of the food contains a large residue, such as that recommended for atonic constipation. In order to prevent recurrences and maintain the general health, it is essential that the bowels should move adequately without purgatives. As the disease is generally a result of pernicious purgation, continuation or resumption of the habit will invariably result in a relapse. (4) (10) (12) (29) (48) (66) (68) (74) (83).

It is important that stasis and fecal accumulation should be prevented, particularly during the earlier period of treatment. This is best accomplished by daily enemas of not more than one pint of warm sterile water or normal saline. The rectal tube should be inserted only 3 or 4 inches and the injection given while the patient is seated on the toilet. So-called "high enemas or colon irrigations" are useful particularly at the beginning of treatment when the colon isn't highly irritable or spastic. It removes the contents of the gut and cleanses the mucous membrane. It should be preceded by a low enema to clear the rectum and sigmoid. The patient should lie on his back with the knees bent and the hips elevated about one foot by a pillow. The tube is inserted only four inches and the water bag is not more than three feet above the pelvis. The fluid is allowed to flow in very slowly to avoid distension. More than

very slight discomfort should be avoided and irrigation stopped if necessary. In this manner several pints will gently flow as far as the cecum. The fluid is allowed to run out through a connecting T-tube, or it may be expelled by the patient. This may be repeated several times at one sitting. It is foolish to try to pass the tube beyond the rectum as it simply curls up in the ampulla. Plain water, normal saline solution, or sodium bicarbonate (one ounce to the quart) warmed to body temperature is mostly used. Mild astringents or stimulants (camomile tea, mucilage, chlorazene, silver nitrate, ichthyol) may be useful. (29).

A starch and opium enema early in the treatment while the symptoms are acute allows the patient to rest and allays the irritation of the colon. This is continued until the stools are reduced by one half. Twenty to forty minims of tincture of opium is used. The starch is made to a paste in 4 ounces of water; now take 16 oz. of water and bring to a boiling point and add the starch paste and bring to a boil again - cool. Use 2-4 oz. depending upon the size of the patient. Retain as long as possible. Insert a catheter 3 in. and let the solution run in. If there are toxic effects reduce to 10 or 15 minims of the tincture.

Colonic washes are now begun on alternate days and as a general rule not over two consecutive days. This stage is a matter of months. At the slightest hint reduce the number of washings. Treat in this manner until the stools are consistently less than five per day. (66).

Medicated enemas may now be used but never more frequently

than on alternate days. Albargen is sometimes used. Begin with 20 gr. in 30 oz. of normal saline and increase to 30 gr. Inject very slowly through a rubber catheter. Give a simple colonic wash first. Unless at least one half of it's volume is returned the administration of the medicated enema is abandoned for the day. If the wash is returned the medicated enema is given two hours after the wash was commenced. Instruct the patient to retain it five minutes the first time increasing gradually to fifteen minutes, but never more than twenty minutes. (66).

To dislodge mucous from the colon irrigations are preceded by a cathartic occasionally. Castor oil, mild mercurous chloride and salts, salts alone, a comp. cathartic pill, or comp. licorice powder is given. Stronger purges are irritative. Over catharsis may continue the colitis. (12).

Bastedo describes a similar irrigation to the one mentioned above by the two-tube process. As an inlet tube a #24 French catheter is used and as an outlet a velvet eye rectal tube #30 French is used. The water is run in slowly requiring about 1 hr. The enema is given for cleansing and not to move the bowels. The mucous requires much soaking. (12).

If the irrigation fails a brisk cathartic the same night may result in passage of large quantities of mucous which the water apparently has softened. (12).

These irrigations should not be over done. If the irrigations fail a slow injection at bedtime of from one half to one pint of warm olive oil, cottonseed or corn oil is given to be retained all night. (12).

Painful hemerrhoids and fissures are bad as they favor con-

stipation and prevent the use of irrigations, enemas or the occasional dose of castor oil. These may be treated with nightly instillations into the rectum by a soft rubber ear syringe of 60 cc. of warm oil to be retained all nite or by insertion of a 5 gr. ethyl amine benzoate suppository the first thing in the morning. In addition it may be necessary to keep the bowels softened with liquid petrolatum. (12).

In regard to the use of enemas it must be recognized that the treatment is not getting at an underlying cause and that their use should be with discretion as the bowel wall may be injured. The use of medicated enemas is questionable.

It is important that these patients do not overdo mentally, emotionally or physically. Perhaps one should likewise say that they should not underdo. It is not good for these people to reflect upon their own conditions. Indeed the symptoms may have arisen as a "flight from reality" to obtain some attention. They must be handled very kindly but equally as firmly. Try to arrange recreation, occupation and rest in the proper proportions. Avoid extra responsibilities as clubs and the like; however, some responsibility is good in many cases. These patients should not be "babied". They should have a complete period of relaxation daily, preferably after the midday meal. During this rest period a hot water bag, electric pad or hot compresses to the abdomen if desired. After the bowels, diet, and daily habits have been regular a change of surroundings may be of value in selected cases. The patients are to drink freely of water. The family, social and economic history should be studied carefully. If the patient is intelligent the matter should be faced squarely.

After it has been concluded that at least a part of the trouble is mental psychotherapeutic measure should be begun and in intelligent patients may be very helpful. The thorough examination is important both to rule out or find all etiological factors and also to impress the patient with your thoroughness and instill confidence. These patients are not to be told that "it is all in their head". Indeed it is very real and not imaginary, the symptoms are there but the subconscious mind is a directing force upsetting the entire autonomic system. In the intelligent cases the mechanism is explained to the patient based upon all the data obtained and in any given case will depend upon etiological factors. In our attempt to be thorough we must be cautious in speculative things. If there is a sexual traumatic background correction of mild cervical erosions or uterine displacements which are not giving symptoms should be thought over carefully as it may fix or transfer symptoms through suggestion. Make the patients program definite. Physical fatigue may be helpful in that it is often followed by a good nights sleep. Individualization is of utmost importance and cannot be over emphasized. (12) (14) (17) (18) (29) (48) (83) (110).

The autonomic mechanism may be upset by mental or emotional aberrations but it is not necessarily so. The mechanism is upset by grief, emotional disturbance and worry. The present feeling is that the autonomic system is primarily a result of some type of dysfunction of the endocrine glands. Both hypo and hyperthyroidism is a factor. If there is a parasympathetic preponderance calcium and parathyroid extract may help. If allergic attempt to desensitize or use an elimination diet. Ovarian extract

may find a place in some cases. (17).

If at the outset the patient will be unable to carry out the plan or is too sick it is seldom possible to cure them in the home. So hospitalization becomes imperative for a time where one can encourage and watch, and keep the family away as much as is wise. Usually a personal nurse is harmful. (12).

For nervousness and insomnia 20 gr. of sodium bromide after the morning and evening meals may be given. Phenobarbital is bad as it depresses the spirits. During especially nervous periods the following cocktail may be given: Equal parts of ammonia, tincture of valerian, compound tincture of lavender and spirits of chloroform. Strychnine is contraindicated as the patient is already in a state of overtone. (12) (29).

Physical therapeutic measures may be helpful. Cold spinal douches, cold rubbings up and down the spine, cold packs, massage, heat to the abdomen and plenty of fresh air and sunlight are all helpful measures. Warm baths and mild massages are soothing but one should avoid undue abdominal stimulation. These efforts make for progressive, voluntary relaxation and show a decrease in the general nervous tension. This is associated with decreased colon tension. (12) (29).

If the capacity of the stool is large and constipated increase the bulk with agavor kaolin. If the stool is dry or fragmented give mineral oil. Bellodonna may be prescribed as the extract with magnesium oxide and kaolin in powdered form. (Ext. of bellodonna gr. $\frac{1}{4}$; calcined mag. gr. 10, calcium lactate and kaolin aa. dr. 1 t. i. d. a. c.). (18) (29).

For gaseous dyspepsia, use charcoal as a powder $\frac{1}{4}$ - $\frac{1}{2}$ dram before meals and occasionally small quantities of yeast have

proved efficacious. Dihydranol seems to have been favorable in a few cases for loose stools. (29).

For pain atropin with bromides may be helpful. Opiates are to be avoided. The patient is put to bed until the attack is over. Hot moist applications are placed on the abdomen or a hot tub bath is given. A warm injection of olive or cotton seed oil or a solution of barium sulphate may bring about rapid relief. Codiene or pantopon (by hypo or orally) will be helpful. The atropin can be given subcutaneously if quick results are desired. Purgation and irrigation is avoided although if the constipation is severe and there is much mucous one or two colonic irrigations is previously discussed may be helpful. This should be the only occasion for rectal irrigations. After the acute symptoms have subsided belladonna, atropin, bellafolin, or novatropine may be given three times daily for a few days and in small intrarectal injections of warm olive oil at 9 P. M. for a few nights. (10) (29).

The question of gout being an etiological factor has arisen. If there are any gouty manifestations cincophenor neocincophen is given along with a decrease in the purine intake.

Dorst and Morris have brought up the question of bacterial hypersensitivity. The patient is skin tested with pure cultures. The patients are desensitized with exceedingly small doses daily, keeping always within the dose producing local or focal reaction. They state that it is slow work but that the results are gratifying in cases which are sensitive to their own intestinal flora. They experimented with treated and untreated bacterial suspensions with sodium ricinoleate. Those treated gave no reaction so the

sodium ricinoleate is a detoxifying agent. So they substituted the detoxified vaccine and found the antigenic properties of the vaccine unimpaired. They then tried sodium ricinoleate by mouth but the chemical proved to be very irritating. The William S. Merrell Co., of Cincinnati, worked out an enteric capsule of 5 gr. of pure sodium ricinoleate suspended in olive oil. These seldom give symptoms and can be taken for months. This treatment was then used alone without the vaccine with the idea that the bacteria would be detoxified and auto-vaccination occur. They observed that the skin tests gradually became less and less positive. Only patients having a sensitivity to their flora are benefited by the sodium ricinoleate. (29). (38).

Feldman, Friedenwald and Rosenthal believe the disease to be purely neurogenic associated with the following predisposing factors: Chronic constipation; viceroptosis; chronic diseases of the gall-bladder and appendix; chronic diseases of the female generative organs; endocrine disturbances; food allergy; abdominal adhesions; gastric dyspepsia; intestinal dyspepsia and stasis. If these observations be true they are a guide in preventative and curative treatment. (48).

Surgery has no place in the treatment.

Conclusions.

It is important to consider all etiological factors and attempt to remove predisposing causes.

It is important to individualize and treat the whole patient.

The diet outlined by Alvarez is a good diet as a guide, to be altered to fit the individual needs.

Irrigations are indicated only in the treatment of acute exacerbations and rarely to clean out mucous.

Psychotherapy is of decided value in many cases.

Symptomatic treatment for pain, flatulence, and the like is as usually instituted for such symptoms.

Desensitization would seem to be of value in patients who are sensitive to their flora.

Surgery has no place in the treatment.

Sprue.

There is no specific drug for the treatment of sprue. The patient should be put at rest in bed. Alkalies are given in moderation. Since the large carbohydrate molecule cannot be tolerated, an opinion expressed by some observers, due possibly to faulty pancreatic function, the sugars of commerce and cereals are not used. Milk, lean meat, vegetables, eggs and fruits are allowed. A mono-saccharid diet in conjunction with skimmed milk in severe cases is the diet of choice. The patients seem to do better in cold weather so keep them in tide water areas in the hot weather. Rogers has prepared a vaccine from the mouth ulcers of patients suffering from sprue. He gives 50 to 100 million bacteria once a week. He also uses one half grain of emetine hydrochloride by hypodermic every other day. Scott reports beneficial effects from calcium and parathyroid treatment. Calcium lactate is given in 10-15 gr. doses t.i.d. The extract of parathyroid is given in one tenth grain dosage twice daily. The beneficial effects are usually steady and permanent. As a rule it has been found that the fuller diet provides all of the cal-

cium needed and this element can first be left off. The regulator, parathormone, is continued for another week then reduced and as a rule stopped in a week or two. (1) (29) (87) (94) (108).

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