

The diagnosis and treatment of digestive diseases : a practical treatise for students and practitioners of medicine / by George M. Niles.

Contributors

Niles, George McCallum, 1864-
Augustus Long Health Sciences Library

Publication/Creation

Philadelphia : P. Blakiston's Son, [1914], ©1914.

Persistent URL

<https://wellcomecollection.org/works/puwy9ajd>

License and attribution

This material has been provided by This material has been provided by the Augustus C. Long Health Sciences Library at Columbia University and Columbia University Libraries/Information Services, through the Medical Heritage Library. The original may be consulted at the the Augustus C. Long Health Sciences Library at Columbia University and Columbia University. where the originals may be consulted.

This work has been identified as being free of known restrictions under copyright law, including all related and neighbouring rights and is being made available under the Creative Commons, Public Domain Mark.

You can copy, modify, distribute and perform the work, even for commercial purposes, without asking permission.



Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

COLUMBIA LIBRARIES OFFSITE
HEALTH SCIENCES STANDARD



HX64133788

RC801 .N59

The diagnosis and tr

RECAP


RC 801 N59

Columbia University
in the City of New York
School of Dental and Oral Surgery



Reference Library

100
11



Digitized by the Internet Archive
in 2010 with funding from
Open Knowledge Commons







THE DIAGNOSIS AND TREATMENT
OF
DIGESTIVE DISEASES

NILES



COLUMBIA
UNIVERSITY
LIBRARY

THE
DIAGNOSIS AND TREATMENT
OF
DIGESTIVE DISEASES

A PRACTICAL TREATISE FOR STUDENTS AND
PRACTITIONERS OF MEDICINE

BY

GEORGE M. NILES, M. D.

PROFESSOR OF GASTROENTEROLOGY AND CLINICAL MEDICINE, ATLANTA MEDICAL
COLLEGE; GASTROENTEROLOGIST TO THE GEORGIA BAPTIST HOSPITAL,
WESLEY MEMORIAL HOSPITAL, ATLANTA HOSPITAL; CONSULTING
GASTROENTEROLOGIST TO THE ANTI-TUBERCULOSIS ASSO-
CIATION, ATLANTA, GEORGIA

WITH 1 COLORED PLATE AND 86 OTHER ILLUSTRATIONS

PHILADELPHIA
P. BLAKISTON'S SON & CO.
1012 WALNUT STREET

ALBANY
YUENEVILLE
YUENEVILLE

Dent
27-24477

COPYRIGHT, 1914, BY P. BLAKISTON'S SON & CO.

RC801
N 59

To

E. C. THRASH, M. D. AND HANSELL CRENSHAW, M. D.,

TWO RARE SPIRITS, WHOSE WISDOM, ENCOURAGEMENT,

AND PHILOSOPHY HAVE GREATLY AIDED

ITS PREPARATION,

THIS VOLUME IS INSCRIBED



PREFACE

In advancing this volume, it is not my purpose to assist in the erroneous movement for divorcing gastrointestinal diseases from the broad field of internal medicine to which they rightfully belong, but to answer, for the student and busy general practitioner, two important questions regarding these diseases, namely, "*What is the disorder?*" and "*What should be done for it?*"

Not only general practitioners, but specialists in other lines, who find it necessary to keep informed in a general way concerning digestion and nutrition, have discussed with me what they desire in such a book. Briefly stated, they need a compact book, which shall contain first, concise, but easily intelligible, descriptions of the various reliable tests for the objects of study in the gastric contents, intestinal juices, and feces; second, practicable and least disturbing methods of determining the position, size, motility, etc., of the stomach, intestines, and other abdominal viscera; third, a succinct statement of the diagnostic methods indicated in the recognition of digestive diseases; and, finally, an exhaustive discussion of both general and special therapy as applied to these diseases.

This I have endeavored to accomplish. I have, however, purposely omitted lengthy arguments of unsettled etiologic questions, prolix descriptions of rare conditions which possess only academic interest, and the consideration of pathologic states of a purely surgical nature.

On the other hand, remembering Herbert Spencer's words, that "To so present ideas that they may be apprehended with the least possible mental effort, is a desideratum," and recognizing the importance of economizing the reader's attention, I have earnestly labored to express myself in a clear and explicit manner.

In the making of this work, I have in many instances departed from the beaten track, voicing conclusions and consequent therapeutic procedures at variance with those laid down in some accepted text-books. These conclusions have been reached by years of study and observation; the therapy has been proved to my satisfaction, and can be proved to the satisfaction of others who will honestly investigate.

I wish to express my appreciation and thanks to the following named gentlemen for various courtesies extended to me in the preparation of this volume: Dr. Max Einhorn, Dr. George Roe Lockwood, Dr. Robert Coleman Kemp, Dr. Anthony Bassler, Dr. C. D. Aaron, Dr. A. B. Jamison, Dr. J. D. Albright, and Dr. J. W. Weinstein.

GEORGE M. NILES.

TABLE OF CONTENTS

PART FIRST

GENERAL DIAGNOSIS AND TREATMENT OF DIGESTIVE DISEASES

DIGESTIVE DISEASES

CHAPTER I

| | PAGE |
|--|------|
| GETTING IN TOUCH WITH THE PATIENT. | I |

CHAPTER II

| | |
|--|----|
| DIAGNOSTIC METHODS. | 15 |
| Palpation of the Epigastric and Abdominal Surface. | 29 |
| Examination of the Abdomen below the Epigastrium | 35 |
| Transillumination of the Stomach or Gastrodiaphany | 41 |
| Chemic Examination of the Stomach Contents. | 44 |
| Test-meals. | 44 |

CHAPTER III

| | |
|--|----|
| EXAMINATION OF THE FECES. | 69 |
| Microscopical Examination of the Stools. | 74 |
| Intestinal Parasites. | 79 |

CHAPTER IV

| | |
|---|-----|
| EXAMINATION OF THE ESOPHAGUS, STOMACH AND INTESTINES BY THE ROENTGEN RAY | 110 |
|---|-----|

CHAPTER V

| | |
|--|-----|
| IS THE CASE STRICTLY SURGICAL?. | 159 |
| Early Malignant Growths in the Stomach or Intestines | 160 |
| Late Malignant Growths. | 160 |
| Non-malignant Growths of the Stomach, Pylorus or Duodenum | 162 |
| Confirmed Atony and Dilatation of the Stomach | 163 |
| Appendicitis, Acute or Relapsing. | 163 |
| Gastric or Duodenal Ulcer. | 166 |
| Hemorrhages from the Stomach or Upper Alimentary Tract. | 167 |
| Chronic and Indefinite Ills that have Resisted all Internal Treat- ment | 167 |

CHAPTER VI

| | PAGE |
|---------------------------|------|
| THE STOMACH-TUBE. | 170 |

CHAPTER VII

| | |
|--|-----|
| GASTRIC LAVAGE. | 185 |
| Indications for Gastric Lavage | 185 |

CHAPTER VIII

| | |
|--|-----|
| VARIOUS METHODS OF LOCAL TREATMENT OF THE STOMACH, INTERNAL AND EXTERNAL. | 203 |
| Electricity. | 205 |

CHAPTER IX

| | |
|--|-----|
| ORTHOPEDIC METHODS OF SUPPORTING THE ABDOMINAL WALLS AND VISCERA. | 222 |
|--|-----|

CHAPTER X

| | |
|---|-----|
| LOCAL TREATMENT OF THE INTESTINES | 233 |
| Local Applications | 243 |

CHAPTER XI

| | |
|--|-----|
| HYDROTHERAPY IN GASTROINTESTINAL DISEASES. | 260 |
|--|-----|

CHAPTER XII

| | |
|--|-----|
| PSYCHOTHERAPY IN GASTROINTESTINAL DISEASES | 282 |
|--|-----|

CHAPTER XIII

| | |
|--|-----|
| GENERAL CONSIDERATIONS OF DIET | 315 |
| Chemic Composition of Common Food Substances | 325 |
| Artificial Foods. | 336 |
| Duodenal Alimentation | 340 |
| Rectal Feeding. | 344 |
| Recipes for Nutrient Enemata | 348 |
| Other Methods of Nourishing the Body | 349 |

CHAPTER XIV

| | |
|--|-----|
| DRUG THERAPY IN DIGESTIVE DISEASES | 351 |
|--|-----|

PART SECOND

SPECIAL DIAGNOSIS AND TREATMENT OF DIGESTIVE DISEASES

CHAPTER XV

| | PAGE |
|--|------|
| NEUROSES, MOTOR, SENSORY, AND SECRETORY | 377 |
| Motor Neuroses | 381 |
| Sensory Neuroses. | 384 |
| Secretory Neuroses | 387 |
| Secretory Neuroses of the Intestines. | 396 |
| General Considerations in Therapy of Digestive Neuroses. | 400 |

CHAPTER XVI

| | |
|--|-----|
| THE GASTRITES, ACUTE AND CHRONIC. | 403 |
| Acute Gastritis. | 403 |
| Acute Infectious Gastritis | 406 |
| Toxic Gastritis. | 407 |
| Phlegmonous Gastritis. | 408 |
| Chronic Catarrhal Gastritis | 410 |
| Achyilia Gastrica | 415 |
| Treatment of Chronic Gastritis. | 417 |
| Diet for Chronic Gastritis (Ewald) | 420 |
| Diet for First Week of Treatment (Einhorn). | 420 |
| Diet for Chronic Gastritis (Friedenwald and Ruhrah). | 421 |
| Alcoholic Gastritis | 423 |

CHAPTER XVII

| | |
|---|-----|
| MOTOR INSUFFICIENCY AND DILATATION OF THE STOMACH | 426 |
| Motor Insufficiency of the Second Degree | 429 |
| Acute Dilatation of the Stomach | 435 |

CHAPTER XVIII

| | |
|--|-----|
| HEMATEMESIS—ULCER OF THE STOMACH | 439 |
| Ulcer of the Stomach | 440 |
| Treatment of Gastric Ulcer | 445 |
| Indications for Surgery | 456 |
| Chronic Erosions. | 457 |

CHAPTER XIX

| | |
|---|-----|
| TUMORS OF THE STOMACH—FOREIGN BODIES IN THE STOMACH | 460 |
| Diagnosis of Cancer of the Stomach. | 464 |
| Medical Treatment of Gastric Cancer. | 477 |
| Foreign Bodies in the Stomach. | 481 |

CHAPTER XX

| | PAGE |
|---|------|
| DUODENAL ULCER—INTESTINAL ULCERATION—PROCTITIS. | 485 |
| Treatment of Duodenal Ulcer | 491 |
| Intestinal Ulcers | 492 |
| Proctitis. | 494 |

CHAPTER XXI

| | |
|---------------------------------|-----|
| DIARRHEA AND DYSENTERY. | 515 |
| Treatment of Diarrhea | 521 |
| Dysentery. | 525 |
| Amebic Dysentery | 533 |

CHAPTER XXII

| | |
|------------------------|-----|
| CONSTIPATION | 543 |
|------------------------|-----|

CHAPTER XXIII

| | |
|--------------------------------|-----|
| INTESTINAL PARASITES | 557 |
| Vermes | 558 |
| GENERAL INDEX | 571 |

PART FIRST

GENERAL DIAGNOSIS AND TREATMENT OF
DIGESTIVE DISEASES



DIGESTIVE DISEASES

CHAPTER I

GETTING IN TOUCH WITH THE PATIENT

In the management of ills, to which the gastrointestinal tract is heir, the physician should never lose sight of the individual. To attempt a rational treatment of these many and oftentimes perplexing manifestations of disordered digestion, without delving into the personality underlying and permeating them all, will in very many instances prove disappointing to both patient and physician.

I admit that in the acute expressions of gross dietetic errors, routine methods to cleanse the alimentary canal and relieve distress are generally sufficient. These conditions require but little scientific acumen, the indications for treatment being obvious. Such disorders, apart from their emergent nature and the demand for quick and intelligent care, do not generally call for any great amount of either tact or patience on the part of the medical attendant.

When, however, an indigestion, either real or supposed, passes the acute stage, and assumes the least tendency to chronicity, then it is that the whole personality of the sufferer becomes involved, and the digestion alone is no longer the only issue.

When a patient requests aid for any form of gastrointestinal discomfort, his complaints should be received with close attention, and met with kindly interest. It matters not whether the disturbance lies in the stomach, the in-

testines, or is the reflection of a disturbed mentality, it is a thing of reality to the patient; otherwise, he would not come for relief. He is naturally unable to differentiate between important and unimportant symptoms—all are important to him; and a lack of interest from the one to whom he has come for aid may impair confidence at the start, and greatly handicap the most worthy efforts.

Again, the attitude of the physician toward the patient should be as far as possible optimistic. In no class of diseases, other than those purely mental, is there such a tendency toward pessimism, low spirits, or even a settled gloom, as in the digestive troubles. The sour-appearing dyspeptic, with his complaints and grumblings, his warped viewpoint of life, and his mournful introspection, has become a familiar and classic picture.

These sad-visaged sufferers nearly always come with a ready-made diagnosis, whose basic supports may be built upon the most nebulous foundations, but who cannot be swerved from their false ideas by rough tactics. No matter how foolish some of these ideas may appear to the trained intellect of the medical man, or how bizarre the fancies, they must be met as if they were real pathologic entities, not ridiculed nor scoffed at.

These varied symptoms do not necessarily denote a weak mentality. It appears that digestive distress, when long drawn out, affects all grades of intelligence with an almost equal blight. It seemingly spares no one. Thus, to assume that a patient is weak minded, because he gives way to depression and food-fear as a result of dyspepsia, is in the vast majority of instances absolutely incorrect and unjust. Furthermore, there are few cases of chronic indigestion that can be successfully managed by medical and dietetic measures alone, if administered in a routine manner, unaccompanied by any moral propulsive power. The dynamics of medicine and the dynamics of mind cannot be disassociated. It is, therefore, necessary at the very beginning of the treatment to get in close touch with the

individuality of the patient; to discover, if possible, his vulnerable points both for good and ill; to probe with sympathetic interest his hopes, his fears, his aspirations. Many times in such a preliminary investigation, the whole secret is bared; the primary underlying cause is disclosed; and knowing this, the indications for treatment are clear as the noonday sun.

Recently there consulted me a widow, who complained of poor digestion and extreme nervousness. She had noted that at the end of each month, as "rent-day" drew near and her depleted finances seemed insufficient to meet her imperative obligations, her digestion would become more painful. After her rent had been paid, she claimed that for several days she always enjoyed a comparative freedom from her chronic ills. A careless or unsympathetic inquiry would not have brought out these facts, and the knowledge of them enabled me to relieve both her suffering body and her perturbed mentality.

The temperament, that "climate of the mind," as it is called by Dr. Weir Mitchell, often gives important clues, if rightly read. To expect gastric neuroses in phlegmatic, unintelligent laborers, who perform physical toil requiring no mental effort, and whose bodies demand practically all of the available vitality, leaving but little for the nerves, would be foolish. On the other hand, in this strenuous march of the twentieth-century civilization, to "keep up with the procession" requires a constant tax on every bodily and nervous resource, so that in the alert and wide-awake individuals of middle age, or younger, it is sometimes almost impossible to differentiate between organic and neurotic disturbances of digestion, unless, in addition to known scientific methods of diagnosis, careful studies of both disposition and temperament are conscientiously made.

Some of the most bitter complaints of various digestive ills come from young, rosy and well-nourished individuals, with no signs of cachexia, but with evident hyper-sensitive

nerves. Then we often have to contend with the young or middle-aged woman of good circumstances, of refinement and education, but who has nothing to attract her thoughts outward; consequently, they stray inward, to her hurt. Then, and perhaps the worst, there is the successful business man, who after years of unremitting toil, retires from active participation in the serious affairs of life, expecting to enjoy in peace his well-earned rest. Unfortunately, his dreams are seldom realized. Too often his industrious mind, with no tangible daily occupation, will become short-circuited upon his digestion, and he is then liable to become a prey to the many fads and isms preached from the housetops by the various cults, each one claiming the secret of health. Such patients are frequently in the incipient stages of organic disease, the consequence of both age and previous incessant labor, and when there is superimposed an added complication of morbid introspection, the task of the medical adviser is greatly increased. These are the cases where the personality of the physician counts for much, and unless he can get in close touch with such a patient, so as to treat both the disease and the individual, the results are generally unsatisfactory.

Another class of patients who require careful personal study are the chronic "complainers." They are often excellent people, who lead useful lives, but who have imperceptibly fallen into the habit of magnifying every epigastric or abdominal sensation, and have gradually become convinced that they have weak and impaired digestive organs. They can give no good reasons for their unceasing complaints—they simply and automatically complain. These again call for careful study in order to lift them out of the doleful rut into which they have unconsciously fallen, and to place them upon the solid ground of normal thinking, acting and talking.

In making up the anamnesis, and grouping the symptoms into a coherent whole, I have to an extent followed the

general plan of Cohnheim, and for that part which I have utilized I desire to make acknowledgment.

It is seldom wise to allow a patient to tell his story in his own way. If allowed, he will aimlessly enumerate all his subjective symptoms without regard for chronology, rhyme or reason, taking up valuable time to little purpose.

Usually I first get a general idea of the family history, inquiring as to neurotic ancestry, intemperance, possible malignant or specific troubles, and manner of daily life. The seeds of many digestive diseases are sown before birth, and numberless unfortunates are ushered into life with weak digestive organs, brought about by parental infirmities, and fostered by parental shortcomings.

Many times I have noted patients with a history of poor digestion dating back to childhood, who admitted early recollections of dyspeptic parents, creating a "dyspeptic environment" from which the passage of time had not released them. These sufferers are deeply imbued with their beliefs, and ordinary methods of treatment possess for them no efficacy whatever.

Next I inquire how long the present illness has been in evidence, together with the causes leading up to it. Such indefinite statements as "A long time," or "Several years" mean nothing, and are without value. To arrive at a definite starting point, the physician must learn *just when* the symptoms first appeared, whether the trouble developed suddenly or gradually, and whether it has been intermittent or steadily progressive.

Such information at once classifies the affection as acute or chronic, and clearly points the way for further questions.

Next comes the inquiry as to whether the discomfort is constant or only occasional. This is of importance, because the course and progress of the trouble, the remissions or intermissions, may in themselves name the diagnosis together with the indicated treatment.

Chronic gastritis, nervous dyspepsia, malignancies in or around the digestive tract, stenoses or kinks occurring

along the course of the alimentary canal—all these cause a certain amount of unbroken distress. On the other hand, periodic pains may raise the suspicion of duodenal ulcer, gall-stones, relapsing appendicitis, gastric crises, gastralgia, cyclic vomiting, or one of the many forms of psychic indigestion. It is especially necessary to learn whether these periods of discomfort are punctuated by those of entire comfort and well-being, or are simply remissions, where the patient feels better, but is not entirely well.

Considerations of appetite are of value. Many of the most chronic and persistent alimentary ills flourish right along in company with a normal, or even ravenous appetite, and this will point to one of two conclusions—either the presence of a neurosis, or the insistent demands of a half-starved body, tortured by a long, rigorous, and perhaps unnecessary course of dieting.

These constant voicings of “cell-hunger” are frequently the unrealized factors that make for the sour disposition and clouded mental horizon so characteristic of the confirmed dyspeptic who sticks to a limited diet for months and years.

Should, however, the appetite be consistently poor, this fact may point to malignant disease, to a scanty output of digestive juices, to chronic, so-called intestinal auto-intoxication, or even to a long-standing nervous anorexia.

Having disposed of this, the next question would naturally be in regard to swallowing. Apart from a psychic difficulty, which may be caused by disgusting sights or thoughts connected with the food, or by lack of saliva to moisten the bolus, the latter of which may come from either bodily or mental illness, an impediment to the act of deglutition would indicate the disease of either the esophagus or cardiac opening of the stomach.

A violent emotion will sometimes as effectually inhibit the power to swallow as a mechanical obstruction. A number of years ago, I observed a healthy and robust man attempt to eat a meal while his wife was at the height

of her first labor. After several futile attempts, he desisted, saying that had his throat been encircled by a knotted cord, it would have been just as possible to swallow. A few hours later, his wife having been safely delivered, he had no trouble in eating a hearty meal.

An intermittent difficulty might mean esophagismus or cardiospasm, but a gradual increase to where only finely comminuted food or liquids can be forced down the esophagus, especially in patients past middle life, would indicate either malignant growth or a gradual tightening cicatrix from previous ulcer. A stenosis following injury, or burns from corrosive substances, can generally be diagnosed from the history.

The possible presence of an esophageal diverticulum should be kept in mind, particularly if there is frequent difficulty in swallowing, accompanied by a sense of distention and regurgitation of portions of the food. The other diagnostic features of esophageal diverticulum cannot be discussed here.

The next question would be as to the pain or other uncomfortable sensations which brought the patient for relief. This is of deep significance, because a purely functional dyspepsia never causes actual pain. There may be feelings of distress, or distention, or pressure, or desire to eructate gas, or even acute nausea, but as to pain in the strict acceptation of the term, close questioning seldom discloses it. Many patients seem unable to distinguish the difference between pain and other sensory disturbances, and the physician should ever be on the alert lest error creep in.

I include as *pain*, sensations of crampy, colicky, cutting, stabbing, boring, or burning nature, and not the various other vague and indefinite feelings of discomfort, even though they bring about decided distress.

Another frequent condition that is denominated pain, unless carefully differentiated, is the globus hystericus. This, though easily recognized, needs to be dealt with

cautiously and tactfully. The term *hysterical* is looked on with aversion by all, and its application to any patient is sure to excite resentment or even indignation. Many a patient has changed her doctor in anger upon being told that some of the symptoms were hysterical, and few there are who will permit this supposed stigma to be mentioned with equanimity. Really, it is seldom necessary to inform a patient that some of her or his symptoms are hysterical, and my experience has taught me to steer clear of its mention directly or indirectly.

If pressure and discomfort alone are felt, the question arises whether they are constant, or only appearing after meals at irregular or stated intervals. Constant pressure in the abdomen, independent of the meals or the nature of the food, may indicate a gastric neurosis, pressure from a distended intestine, or encroachment upon the abdominal cavity from ascites or enlargement of some of the abdominal viscera.

A pressure located in and around the epigastrium, accompanied by fullness, distention, flatulence, malaise, heartburn, regurgitation of sour chyme, and perhaps vertigo, will excite the suspicion of a decided hyperchlorhydria, or peptic or duodenal ulcer. It might be well to mention, however, that this train of symptoms is occasionally the reflex expression of a chronic appendicitis, or even of a disturbance in or around the gall-bladder.

Pressure occurring only after taking solid food indicates chronic gastritis, while if it is in evidence after either solid or liquid food, a neurosis may be thought of.

Should there be actual pain, it is well to ascertain its character, and when and where it occurs. Should it be of a colicky, cutting or boring nature, radiating backward, it may mean one of several morbid conditions. If it recurs every few months, with periods of comparative health between, it may be cholelithiasis or some form of gastric crisis. Should it occur daily at a definite time after eating, and be relieved by vomiting or alkalies, it is probably

ulcer or perhaps only hyperchlorhydria. Should it be relieved by the escape of gas or free evacuation of the bowels, it may be an intestinal colic brought about by ordinary constipation; by excessive protein putrefaction, or by numerous kinks and twists found in ptosed intestines. The importance of visceroptosis, with its train of attendant evils, has but recently been recognized and only in the last few years has the medical profession realized the excellent results obtainable by raising and straightening out these twisted and distorted intestines.

Should vomiting alone relieve pain, and should the patient find that food taken many hours previously is ejected, it would indicate either a stenosed pylorus or a duodenal kink or other obstruction.

The symptom of vomiting, in any of its aspects, is important. Early morning vomiting from an empty stomach may indicate pregnancy, alcoholic gastritis, or gastrosuccorhea. Sudden and explosive vomiting immediately after eating indicates reflex excitation; a profuse vomiting of spoiled and fermented food every few days points to a dilated stomach; the vomiting of gastric crises or the cyclic form occur between periods of good health; while if it comes on after dietetic indiscretions, it may mean only the rebellion of an insulted stomach.

The condition of the patient's bowels is always worth careful inquiry. A detailed recital of their habit, character of stools, presence or absence of mucus, state of the mucus in regard to the feces, intestinal parasites, flatus, and other considerations, should never be omitted.

After these special symptoms have been noted, it is then in order to obtain a grouping of general symptoms, for now the physician can give them their proper weight in making up his estimate of the whole. Great loss of flesh, progressive weakness, anorexia or excessive appetite, abnormal thirst, change of disposition, troubled sleep, mental depression or irritability—all these to the observant intellect of the careful clinician will tell their story, and oftentimes a

practically certain diagnosis can be made without going further, though such a diagnosis is not always satisfactory.

The chief gastroenterologist of a busy Jewish clinic in New York City recently confessed that 80 per cent. of the diagnoses were made from the subjective symptoms alone. This state of affairs he did not defend, but pled the overwhelming amount of work to be accomplished in a necessarily brief space of time.

Having made all the proper inquiries of the patient, the physical and other forms of examinations are next in order.

While some patients demur at the necessary disrobing, incident to a thorough physical examination, at heart they appreciate the interest shown by the physician. Such objections can nearly always be overcome by a little tact and explanation of the purpose in view, and the more complete the examination, the more confidence will be instilled into wavering and doubting minds.

Knowing how often patients come with a self-made diagnosis of digestive disease, when the trouble is elsewhere, it behooves the examiner to observe carefully the general appearance of the whole body, not neglecting the facial expression.

With many, especially the uneducated, a disturbance anywhere between the neck and the symphysis pubis is denominated "stomach trouble." Not infrequently do I have women with marked ovarian disease, or men with irritations of the urinary bladder, who confidently lay the blame on that long-suffering viscus, the stomach, and are with difficulty convinced otherwise.

The appearance of the skin, its ruddy or sallow hue, its firm or wrinkled "feel," its healthy moisture or harsh dryness, pallor, or cyanosis, cachexia or eruption—any of these will tell their story. A slight erythema of the backs of the hands, which the patient has hardly noticed, may fix the diagnosis of pellagra, while the bronze color may stamp it Addison's disease.

The present state of nourishment is also of the utmost

importance, not only from a diagnostic standpoint, but from that of the nature of treatment, dietetic or otherwise, to be inaugurated. Let it not be forgotten that some of the most abject and emaciated specimens of humanity are brought to their miserable state by foolish systems of dieting. A very strict diet, in which the viands most relished are forbidden, is liable to set up first an anorexia, then a sitophobia, or fear of food. To expect the digestive organs, whose principal advisors and stimulators are the hormones, or psychic incentives, to perform their best work, when every meal is taken with indifference, disgust or gastronomic introspection, is chimerical. So, often, one after the other, loved delicacies are forbidden, while nothing appetizing is substituted, until the patient is reduced to the verge of caloric bankruptcy.

Recently there consulted me an intelligent young lady, who had for two years been gradually reduced in her food intake, so that she was getting only about three hundred calories daily. She complained of "sinking spells" in her stomach, of weak and trembling knees, and a tendency to cry at the least provocation. Examination revealed fairly healthy digestive organs, and little was required besides liberal alimentation to make her strong and happy once more. Evidently the disorder for which she first sought aid had long since disappeared, but the dietetic shadow still held on, to her discomfiture.

There is another class of patients, who strenuously insist on emptying the stomach at the first sign of epigastric distress, real or fancied. These are generally neurotic or hyper-sensitive individuals, who imagine that food can exert some malign effect on the stomach, if allowed to remain there too long. Without giving the meal a chance to be chymified, or ejected into the small intestine, where it can be of actual service to their body, they wildly drink warm water or some emetic, or, worse still, they contract the "stomach-tube habit," washing out the essentials of the meal before it comes into contact with any absorptive

surfaces. Sometimes the obsession takes the form of demanding a speedy evacuation of the bowels by some hydragogue, or copious enemas, so that the fecal current is continually accelerated, and the previously mentioned condition practically obtains. In no part of this chapter does its title apply more forcibly than to this class of sufferers.

The "habitus enteropticus," so strongly stressed by Cohnheim, while of some importance, does not possess for me that overshadowing significance. I constantly observe instances of incompetence of the abdominal walls, relaxed visceral supports, and marked visceroptoses in people of normal "habitus," and I am forced to confess that the conclusions so ably advocated by both Stiller and Cohnheim have not been altogether borne out by my experience.

The appearance and general contour of the abdomen is most instructive to the practised eye. Sometimes a view of the abdominal profile will disclose the full and wavy line of a dilated and ptosed stomach; sometimes the outline of a morbid growth. A relaxed and atrophied abdominal wall may reveal increased peristalsis, or abdominal stiffening of some of the muscles. Such signs are specially significant as indicating stenosis of the pylorus, or of the colon.

Visible peristalsis in old or emaciated people, or in multiparous women of slender physique, signifies but little, and must not be confounded with true "peristaltic unrest."

The appearance of the tongue is fraught with pitfalls for the unwary, and too often it is accorded undue significance. Foul and coated tongues are found in the presence of gastrointestinal disease, and sometimes where there is normal digestion. It would appear that hasty mastication, coupled with careless "oral toilet," is responsible for most of the coated tongues. The strawberry tongue of scarlatina, the tongue denuded of its epithelium in pellagra, the suggestive mucous patches, and the spongy or dry and glistening tongue of depressed bodily states have their import; and I should mention particularly the frequent and painful

little aphthous ulcers found on the tongue, sometimes called "dyspeptic ulcers." These annoying and sometimes oft-occurring little lesions seem to really have some connection with a disordered alimentary tract, though the actual relationship has never been demonstrated. The appearance of the tongue in disordered stomach and intestines may be accorded some corroborative weight, but, with the exceptions mentioned, should not be taken too seriously.

Auscultatory or scratching percussion, electric transillumination, inflation with air or carbonic acid gas have their place in mapping out the stomach and intestines, but all are liable to fallacies. When practicable, the Roentgen rays afford the most satisfactory information concerning the size, character and relative location of the abdominal organs. Incidentally, these rays have considerably altered previous conceptions of the topography of this cavity.

In the vast majority of cases, intelligent and careful palpation yields the most satisfactory and reliable information. Beginning with the epigastrium, the palpating fingers should deliberately and attentively examine, as far as possible, the stomach, the different divisions of the colon, the sigmoid flexure, the small intestines and appendix, the liver and gall-bladder, the spleen and kidneys, the abdominal rings, the rectum, and the abdominal cavity as a whole, searching for tumors, ascites or transpositions of the viscera.

In order to perform this successfully, the hands should be well warmed, the patient should be put in no cramped or uncomfortable position and by sympathetic assurances upon the part of the physician, he should be free from trepidation or fright, so that the mind will be at ease, and the abdomen properly relaxed.

Palpation discloses but little when forced upon a timorous or terror-stricken subject.

Due allowance should always be made, in seeking for sore or tender areas, for the mental attitude of the patient. Some give way to bitter complainings at the slightest

discomfort, while others, with Spartan fortitude, minimize the most exquisitely painful sensations. The physician will simply have to judge each case according to its merits, making various qualifications as indicated by temperamental infirmities.

The time and care spent in studying and determining the various phases of the patient's character, the cheery interest manifested, and the optimism brought into play, which should brighten and permeate every therapeutic procedure—all these are the necessary factors in getting into close and sympathetic touch with the discouraged dyspeptic, and, like the opening move in a campaign by a wise commander, will often decide the ultimate success or failure of the whole course of treatment.

CHAPTER II

DIAGNOSTIC METHODS

In the proper diagnosis of the various ills and abnormalities of the digestive tract, there are many special methods available. A careful scrutiny of external appearances, a painstaking manipulation and palpation, a proper chemic examination of the stomach or intestinal contents, making due allowances for modifying circumstances, a microscopic examination of these contents also, together with an X-ray examination both as to topography and motility—all have their helpful place, and should be used, when necessary, by the conscientious physician.

A brief mention of some of the more easily discernible points of interest is appropriate:

The greater curvature of a normally distended stomach lies about $1\frac{1}{2}$ to $2\frac{1}{2}$ inches above the umbilicus, where the abdominal muscles are firm and fairly taut. Some there are who possess abnormally large stomachs (especially hearty eaters or drinkers, for instance), and these should not necessarily be considered as pathologic, unless noticeable symptoms are also in evidence.

When a patient shows atony and relaxation of the stomach walls, with motor insufficiency, the lesser curvature in its normal relation to the diaphragm, while the lower border is below the level of the umbilicus, and, in addition, complains of marked gastric symptoms, we may consider it a case of dilatation of the atonic type. Again, as a result of pylorospasm, of benign or malignant stricture, or any obstruction to the orderly and free exit of the stomach contents, we find the so-called stenotic or obstructive form of dilatation of the stomach. These con-

ditions should not be confounded with gastropptosis, for in the latter case the lesser curvature is also markedly below its proper position.

In such prolapsed states, the suspensory ligaments of the stomach are relaxed and inefficient, and the entire viscus sinks; occasionally so much, that the lesser curvature looks inward to the right, and the greater curvature outward to the left. The pylorus may lie below the level of the umbilicus, rendering a "kink" or torsion of the duodenum quite easy to acquire, and mechanically obstructing the outlet of the stomach.

The varieties of gastropptosis and gastric dilatation are numerous, and will be mentioned again in the discussion of X-ray methods.

Whenever practicable the patient should have some preliminary preparation for examination, as this greatly facilitates the task of the physician. On the day or night previous the bowels should be emptied by a cathartic, or the lower bowels by copious enemata. Should there be much gaseous distention, the addition of one or two ounces of milk of asafetida to the enema will decidedly aid this. It is well for the stomach to be either empty, or that only a light meal should be eaten previous to the examination.

The patient should be examined in various positions, as may be indicated.

Inspection.—As a general rule the first part of the examination should be made in the dorsal position, as the physician can get a better idea of the general relations of the external abdomen if the whole surface is exposed at one time. There is generally no objection to this in female patients, if the pubic region is covered by a towel or garment.

In obese subjects, or those with much deposition of fat in the abdominal parietes, but little specific information can be gained from simple inspection. In thin individuals, however, or those with relaxed and attenuated abdominal walls, much can be learned.

Often a dilated stomach may be easily recognized by its bulging in the umbilical or hypogastric region, and under these circumstances the epigastric region is usually hollow and depressed. In such patients the artificial distentions of the stomach with carbonic acid gas frequently discloses the contour of that organ, including the peristaltic waves, with graphic accuracy.

Kussmaul has noted very active peristaltic movements in the dilated stomach, especially of the stenotic type, the waves passing from the linea alba below the umbilicus in an upward direction, and to the right to the lower margin of the liver.

Kemp facilitates inspection by placing the patient upon a raised table, the head toward the window, the shades being arranged so that the light enters on a plane only slightly above that of the patient, and directed from the head toward the feet. The physician, standing toward the foot of the table, and bending from side to side, can obtain much information by watching the play of shadows cast by the inequalities of the abdomen, as respiration progresses, and observing the undulations of the underlying organs as reflected on the surface. Other interesting viewpoints may be gained by standing to one or the other sides, or even permitting the patient to face the light in a semi-recumbent position.

In thin and slender multiparous women, a gastropptosis and enteroptosis may often be diagnosed by directing the patient to stand erect, and getting a side view. In this position the epigastrium will exhibit a depression, while the bulging surface of the lower abdomen will plainly show the presence of the ptosed viscera.

I have many times been able to follow with tolerable accuracy the peristaltic waves of the intestines, while any tumors or abnormal inequalities were plainly visible.

Percussion and Auscultation of the Stomach.—There are many factors to be considered in making out the size and position of the stomach by auscultation and percussion.

The findings may be influenced by its full or empty condition, by the tone of its walls, by the character of its contents (air, water, or food), by the position of the patient and by the amount of subcutaneous fat present. To get the best results the stomach should contain some air, at least; and Dehio has demonstrated, both on living subjects and the cadaver, that if the stomach is absolutely empty, any tympanitic sounds obtained by percussion over this viscus come from the colon and not the stomach, as the latter is contracted into the left concavity of the diaphragm, and not being in contact with the anterior thoracic wall, cannot produce any tympany.

Dr. Robert Coleman Kemp has devoted much time to the elucidation of this form of examination, and to him we owe many of our present methods.

The patient should first be examined in the dorsal position, with the knees slightly flexed, and the abdominal walls relaxed as much as possible. The percussion hammer may be used, if desired, but it is doubtful if the hammer can ever equal the percussing fingers in delicacy, where a practised touch is brought into play. Under ordinary circumstances the borders of the stomach may be made out with a reasonable degree of accuracy, though, if the colon contains much gas, confusion may occur in mapping out the lower border of the stomach. The percussion sound of the colon is somewhat lighter than that of the stomach, and also lacks some of the resonance and clearness of the latter. The presence of food in the stomach or feces in the colon naturally alters the sounds, and the physician should make due allowances. It is well to map out the stomach, and, if possible, the transverse colon, while the patient is lying down. The position is then changed to a standing posture, and the changes in location noted.

Quite frequently the presence of a tumor may be decided by percussion alone, for gaseous collections are sometimes confounded with real tumors by nervous and excitable individuals.

Auscultatory Percussion.—This is a most satisfactory method of mapping out the stomach, and, unless the patient is very obese, is fairly accurate. An ordinary stethoscope is best in this procedure, and the chest-piece should be placed firmly upon the naked surface above the seventh rib in the left mammary line, or between the tip of the ensiform cartilage and the left costal margin, or in the same vertical line, but below these points. When decided gastropotosis is suspected, the "point of bearing" may need to be quite low on the median line of the abdomen. The physician should first percuss near the stethoscope, lightly tapping the surface with a single finger, until the characteristic sound of that particular stomach is decided. He should then begin well away from the stethoscope and gently percuss in a straight line toward it until by the change of sound he knows the border is reached. This can be marked with a pencil or pen. He should then radiate in rather a large circle, percussing inward from each peripheral point, until the border line is reached, gently marking the points as located. In this manner the stomach can be quickly and, under ordinary circumstances, satisfactorily mapped out. The operator should remember that, when dilated or misplaced, the tendency of the stomach is for the greater bulk to lie to the left of the median line, though occasional cases of dilation yield a tympanitic sound quite a distance to the right of the abdomen.

In rare instances percussion gives valuable information concerning a tumor of the stomach wall, but, if facilities for X-ray examination are available, the latter is much more dependable.

Scratch Method of Auscultatory Percussion.—This method, which was originated by Kemp, has a field of usefulness. The stethoscope is placed upon the abdomen, as in the previous method, and the surface is lightly scratched by the middle finger in about the same way as the light percussion. The stomach tympany can be fairly well brought out in this way.

"Flicking percussion" is employed by some, but has nothing special to commend it.

Inflation of the Stomach with Carbonic Acid Gas.—Under proper conditions this is a useful adjunct to other means of outlining the stomach walls. It is especially useful in thin subjects with relaxed abdominal walls, and of little use in obese individuals, or those with rigid abdominal parietes.

Two ordinary glasses, each full of water are needed. In one is dissolved about a dram of tartaric acid; in the other about the same amount of bicarbonate of soda. These two solutions are to be drunk quickly, one after the other, and the patient instructed to lie down quietly with the mouth closed. The inflation follows promptly, the stomach contour becoming plainly visible.

This method is contraindicated when there has been a recent hemorrhage, when ulcer or cancer is present in the stomach, or in advanced arteriosclerosis.

A few observers have advocated inflating the stomach with air, either with a Davidson syringe or a double bulb. A stomach tube is first introduced through the cardia, and the air is then pumped in *ad libitum*. Some advocates of this method claim that the operator can tell with tolerable exactness just how much air is being pumped in, by keeping account of the compressions of the bulb. To say the least, this is problematical.

Outlining the Stomach by the Use of Water.—Dehio has investigated this method quite thoroughly, and by its intelligent use much can sometimes be learned. The patient is first percussed over the stomach, with that viscus empty, and the patient in a standing position. The physician then administers about 8 ounces of moderately cold water, and percusses the area of dulness. This water is followed up by several more glasses, each time noting the percussion results. The patient then assumes the recumbent position, and if tympanites is in evidence where dulness formerly appeared, it is proof positive that the former area of dulness corresponded to the stomach.

Occasionally, in marked atony, dilatation, or ptosis, a single glass of water will cause appreciable dulness below the umbilicus. This method is not applicable in stout patients, or where there is fecal accumulation in the colon.

There are many other methods of locating and delimiting the stomach, some of which are extremely complicated but not very practical. A few will simply be mentioned, though scant space will be accorded them. Leube introduces a stiff sound and, by moving it about in the stomach, determines the boundaries by touch. In suspected ulcer, cancer or erosions of any sort, this would be dangerous. Moreover, a method which is comparatively safe in skilled hands might subject the patient to grave risk in unpractised ones.

Some go so far as to inflate the stomach with carbonic acid gas, while a double quantity is injected into the large intestine through a colon tube. It is expected that the different pitches of sound between the colon and stomach will mark the limits of each. This has been tried by me a number of times without satisfaction.

Kemp's stomach whistle, in which a little whistle is attached to the end of a stomach tube, and the sound produced by short, quick, compressions of a Lockwood bulb inserted into the other end, is another novel method. This is quite interesting, and in practised hands may be useful. It will hardly, however, come into general use.

Splashing and Gurgling Sounds.—These sounds may be elicited when both air and fluid are in the stomach, depending largely on the state of the stomach walls. Some students of this subject consider such sounds as of no practical significance, other than denoting atony or relaxation of the stomach.

Some dexterity is required to produce these sounds without discomfort to the patient, and the physician should be gentle in the manipulations. The sounds are best demonstrated by rapidly tapping with the tips of two or three fingers, but without entirely removing them from

the abdominal surface. The patient should always be in the dorsal position with the abdominal walls freely relaxed. Sometimes rather energetic manipulation is required, and both hands may be brought into play, shaking the two sides well until the splashing is plainly heard. In some individuals there is at frequent intervals more or less splashing, denoting no special pathologic condition. When it is found several hours after a test meal, or found in the morning hours before any food or water has been taken, it certainly denotes an abnormality.

When well brought out, the splash is quite a reliable diagnostic sign as to the position of the lower border of the stomach, and it can be easily verified by changing the position of the patient, noting the varying location of the splash with each change.

I have occasionally found subjects with hyperesthetic abdominal surfaces, who could not bear this manipulation, and whose rectus muscles would become so rigid that no sound could be elicited. These are unsuitable for this test, and the time may be put to better use in other directions.

Deglutition Sounds.—These were first described by Meltzer, and in the last few years have, with the aid of the X-rays, become a diagnostic aid of considerable value. The deglutition sounds are the first, or the sound heard as the fluid enters the esophagus; and the second, which follows about seven seconds later. Both may be heard by placing the stethoscope over the ensiform cartilage, though the second sound is more distinct. In certain or suspected esophageal or cardiac obstruction, these sounds are both significant and helpful. If both sounds are absent, there is probably a decided stricture of the esophagus; while if the second sound is delayed, some obstruction to the orderly progress of food or liquid is assured.

It is most interesting and instructive, when a fluoroscopic examination is available, both to listen to the deglutition sounds, and to watch the causes of these sounds.

The patient is given some milk, to which bismuth has been added, and ordered to hold it in the mouth until told to swallow. Everything being ready, the X-ray is projected through his neck, and carried down as he swallows, while simultaneously the observer is listening and watching through the fluoroscope. Unless the physician is accustomed to the sounds of the X-ray machine, he may become confused by the two sounds. If, however, he will keep the stethoscope closely pressed in the ears, and his auditory attention fixed upon the deglutition sounds, he will soon be able to hear them satisfactorily.

Various other sounds in and about the stomach have been investigated, some of them seemingly for curiosity alone. Some have claimed to be able to hear "dripping sounds" as the fluid coursed along the stomach walls, but this is open to doubt. The succussion sound, produced by energetically shaking the whole body, is of no account as a diagnostic help.

Gurgling sounds in the stomach may be brought about by the contracting of its walls on mixed contents of fluid and gas. These sounds are sometimes weird and disquieting to the patient, but have no fixed diagnostic significance.

Esophagoscopy.—Efforts to examine the esophagus, and through it, the stomach, have been made for over a hundred years. In 1807 Bozini directly examined the upper end of the esophagus, and since that time many other investigators have industriously attempted to perfect and utilize this method of diagnosis.

For several reasons esophagoscopy will probably never become popular or widely employed. It is uncomfortable to the patient; there is often an element of danger attached to its use, unless in skilled and practised hands; and the slight view of a portion of the interior of the stomach which may at best be obtained is generally unsatisfactory.

There are two kinds of instruments for the purpose: the older ones, in which the illumination is thrown down the tube from the outside (Mikulicz, Rosenheim); and the

more recent ones, which have little, "cold" electric lamps on the distal end (Einhorn, Jackson). In 1906 Jackson improved upon Einhorn's instrument, and brought out one in which the interior of the stomach could be observed rather better. This instrument, besides being larger than previous ones, contains an auxiliary tube for the drainage and suction of the secretions. In addition, Dr. Jackson devised several accessories, intended to map the stomach or esophageal walls, to make applications, or to remove foreign bodies.

To quote Dr. Jackson, who deserves more consideration along this line than any other observer, I will use the following: "The explorable area varies in the normal adult stomach from one-half to three-quarters of the total mucous membrane, the field being considerably larger in infancy, dilatation, or prolapse. Careful attention to two points eliminates most of the difficulties in gastroscopy: The first of these is that profound anesthesia is essential (in the esophagus the use of cocain is preferred) since when the tube enters the stomach straining and retching are uncontrollable, annoying, and dangerous; the second point is the position of the patient, which is the most favorable one in bringing the mouth, pharynx and esophagus into a straight line. To accomplish this the patient is drawn forward until the tops of his shoulders clear the table by from 4 to 6 inches, and the mouth gag is inserted on the left side. The assistant is placed on the right side of the patient's head on a stool of appropriate height, as though on a side-saddle, his right leg beneath him in the kneeling position, his left foot supported on a stool 26 inches lower than the top of the table. His right forearm is passed beneath the patient's neck, supporting it, his right hand grasps the mouth gag, drawing it strongly at or in front of the bregma, bending it backward and exerting a certain degree of upward pressure. The foregoing points having received attention, certain difficulties remain. They lie, however, altogether above or opposite the cricoid cartilage,

and are surmountable with slight practice. Mikulicz determined 1 point, namely, that a gastroscope must be rigid. Rosenheim went a step further, and said that it must not only be rigid, but should be straight; now I think we are ready to add four more dicta: 1. Optic apparatus must be abandoned. 2. The tube must be passed by sight. 3. The stomach must be examined in a collapsed state, to permit of mopping, palpation with instrument, probing, and combined endoscopy and external palpation. 4. General anesthesia is indispensable to prevent contractions of the diaphragm which clamps the tube, rendering exploration impossible.

"The instrument with the obturator *in situ* is dipped in warm water, or better, thoroughly lubricated with glycerin. The esophagoscope may be introduced without the employment of a general anesthetic, although this is always preferable (the fear of the patient from the looks of the instrument, and the distress incident to its passage makes a general anesthetic almost essential in most instances). Should it not be used, the patient sits in a backed chair with head thrown back and face toward the ceiling. The instrument is pushed into the esophagus without exerting any force, and introduced the length of the esophagus. The obturator is then withdrawn, the lamp lit, and inspection begins and continues while the tube is being withdrawn. In stomach observations, it should be recalled that the most important regions of the organ for the site of pathologic lesions, the pyloric and lesser curvature—are not accessible to vision through the tube; and thus, that if nothing abnormal was noted in as much of the gastric mucosa as would be seen, that serious disease may still exist in these inaccessible regions. Both instruments should not be used, excepting where a diagnosis cannot possibly be made by the other well-known methods, and only when for existing reasons, a diagnosis is important to be obtained quickly. It should not be used in esophageal or gastric ulcer or phlegmonous gastritis, and it should be

recollected that serious stomach disease may exist in the walls, or extra-gastric of those areas, exploration of which might not show its presence on the mucosa side. Its field of usefulness is to make or confirm the existence of early malignant disease in the esophagus or stomach (carcinoma and sarcoma), to remove foreign bodies from both organs, and to diagnose and possibly remove papillomata or polypi from the stomach. In my experience, better results in examining the pyloric region are obtained in women than in men; this I believe is due to the fact that in women the vertical stomach is more commonly met with."

As the secretions in the esophagus and stomach are so frequently in the way, and exercise such a disconcerting effect, obtruding as they do just as the operator is about to obtain valuable information, it is well to administer to the patient two hours before using the instrument a full dose of morphin and atropin, or atropin alone, to partly dry up some of these secretions. As a confusing factor in the use of long tubes is the reflected light on its interior, Bassler has slightly modified the Jackson instrument by having the interior of the distal end oxidized or painted black for a distance of about 15 centimeters. By the existence of this darkened zone, a darker circle is seen about the tissue at the end opening separating this from the reflex of light nearer the eye.

The above somewhat detailed description will convince the reader that the esophagoscope and gastroscope are not instruments for the inexperienced or amateurs, and the physician should be chary in attempting to employ them unless he has received some special instruction, or feels that the need is very urgent. I have in more than one instance known of almost irreparable damage being inflicted by the use of these instruments in hands more zealous than experienced, and I trust this caution will be heeded.

Esophageal Sounds and Bougies.—These instruments are most useful in locating foreign bodies in the esophagus or

cardia, diagnosing and stretching strictures, and determining the presence of diverticula extending from the esophagus.

There are numerous shapes and forms of these instruments, some not being safe nor practical. In simple stricture of moderate degree the hard-rubber sounds with rounded olive tips are sufficient. Occasionally, when the obstruction is slight, a rather rigid stomach-tube will answer, as it is quite safe. Often, after a stricture has been well dilated, the passing of an ordinary stomach-tube at stated intervals will be quite sufficient to keep the esophagus open.

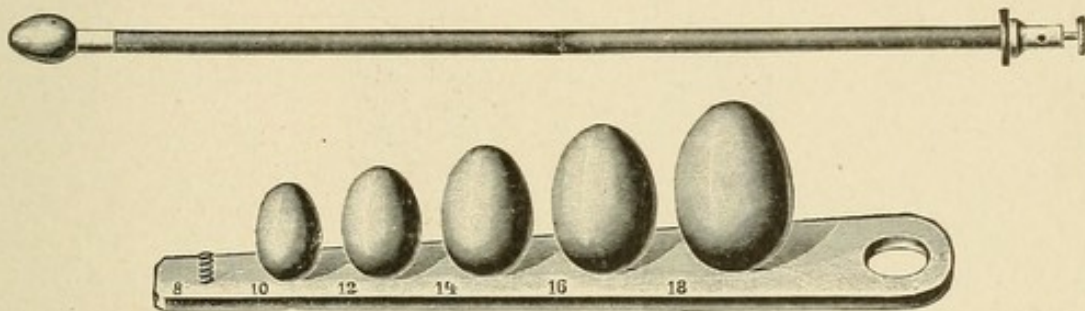


FIG. 1.—Esophageal electrode, which has different sized olives and which can also be used as an esophageal bougie. (*Bassler.*)

Several years ago I was consulted by a lady of fifty-eight years, who could swallow nothing but liquid food, and that slowly and with difficulty. Examination disclosed a fairly tight stricture, which was dilated easily. After a few dilations she could eat any kind of food she desired, if only it was well masticated or pulverized. Since then I have passed a 20 English tube at intervals of ten days or two weeks, finding this entirely adequate to keep her esophagus freely open.

A convenient form is a sound with a single coiled-wire or whalebone shaft and a number of olives of different sizes. If the shaft is too long to be conveniently carried it may be obtained in jointed form. These olives are sufficient for any permeable stricture, but occasionally those are found that are so tight and tortuous that they

cannot be penetrated. Under these circumstances Plummer has devised an ingenious method. The patient is directed at night to swallow 3 yards of buttonhole silk twist, with the assistance of water drunk to facilitate the passage of the thread. The following morning he is directed to swallow three more yards of the continuous thread, and if there is an opening through the stricture or diverticulum, the thread will go into the stomach and on

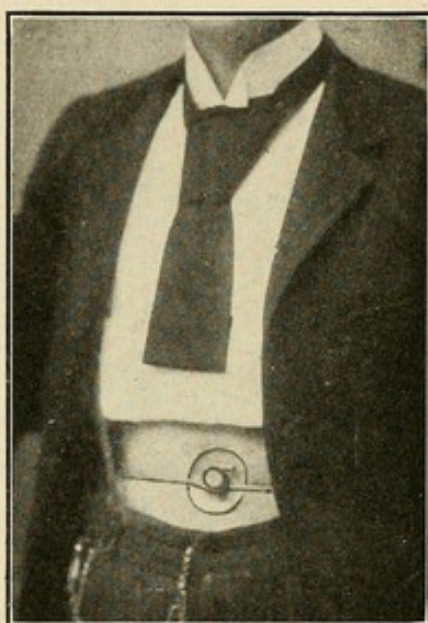


FIG. 2.—Gastrotomy for impermeable stricture of esophagus following accidental ingestion of acid. Patient wears a silver tube held in place by straps, and occluded by a cork stopper. Patient in good health about fourteen years after operation. (Operation performed by late Dr W. S. Armstrong.)

into the bowel, and will be firmly enough fixed to stand considerable traction. Over this thread a special form of perforated olive is passed, and with the thread as a guide, strictures that are other wise impermeable, may be safely penetrated; and by gradually increasing the sizes of olives, be satisfactorily dilated.

Without a guide it is unsafe to use much force in attempting to penetrate or enlarge a tight or strictured esophagus. The operator should be careful to use but moderate force, and when his sense of touch does not assure him

that he is in the esophageal channel, he should cautiously withdraw, and progress with the greatest caution. Inexpert or careless handling of esophageal bougies is fraught with danger.

These bougies should never be used in the presence of aneurysm of the thoracic aorta or recent hematemesis. In malignant growths on or about the esophagus or cardia, also, they should be employed only under most urgent need, and with the utmost care.

PALPATION OF THE EPIGASTRIC AND ABDOMINAL SURFACE

The importance of thorough and intelligent palpation of the abdomen as an aid to understanding pathologic conditions within cannot be overestimated. The tips of educated fingers and the palms of responsive hands can carry to the mind's eye a picture both graphic and accurate.

The patient should sufficiently disrobe so that the whole surface from the thorax to the symphysis pubis can be easily reached. To attempt an examination with a limited surface available, or a small area at a time is both unsatisfactory and unscientific.

One word of admonition is appropriate here: the physician should be sure that his hands are warm—comfortably warm to the patient. Nothing is more provocative of resentment of the abdominal muscles, or more perturbing to the patient, than cold or clammy hands upon this sensitive portion of the human body.

The patient should generally be placed in the recumbent position, first on the back, and in other positions as the examination progresses. The hand should be gently but firmly placed upon the abdominal surface, and permitted to remain quietly for a brief space of time, or until the abdominal walls and muscles become accustomed to its presence. It is well also to assure the patient that no pain of consequence will be inflicted, so that, as far as

possible, the element of apprehension and consequent tension may be eliminated.

The palpation is made with a rotary pressing movement, permitting the hand to slide smoothly over the skin from one part of the abdomen to another. A steady, firm, pressing movement, is much preferable to jabbing the fingers down into the soft yielding surface. By this means it is possible to press the hand deeply into the abdomen, and to detect deep-seated pathologic lesions of appreciable size. If thought necessary, the knees should be drawn up, and moderately deep and steady breathing should be encouraged. It is also well for the physician to make an occasional remark, or to engage the patient in desultory bits of conversation, so as to draw his mind from the examination. This is especially appropriate in a hysteric or neurotic patient, otherwise the objective findings are apt to be warped and biased by the patient's previously formed conclusions. During the various manipulations the physician should carefully note the facial expression, as certain areas are palpated, for in no class of disorders than those incident to the digestive system are the lights and shadows of the countenance more suggestive. If by these means sufficient abdominal relaxation cannot be obtained, the patient may be put in a warm bath, or even undergo complete anesthesia.

In the first examination, should the stomach or intestines be distended with gas, or should scybalous masses be in evidence along the course of the intestinal channel, these facts should be noted, and another examination be made after these factors are removed. "The various areas of the abdomen should be systematically explored, beginning first with the location of the stomach, then the small intestine, the ileocecal valve, the colon, and finishing with the marginal or deep organs, such as the liver, gall-bladder, spleen, kidneys, etc. In examining the lateral portion of the abdomen, both hands should be employed, the under one sustaining the lumbar region, while the upper makes

pressure upon it to note the character and consistency of the intervening tissues" (Bassler).

It is well to change the position of the body from time to time, observing the difference in position of the various organs. In relaxed abdominal supports, there may be a variation of several inches in the position of some of the organs, and Dehio's methods of mapping out the stomach by the aid of drinking one or more glasses of water are appropriate. The spleen or movable kidneys may be palpable in a semi-sitting or knee-chest position, when they cannot be located in the dorsal.

To find a movable kidney, I prefer the following method: with the patient on his back and in a partly sitting posture (nearly 45 degrees), I direct him to make a deep inspiration, and firmly grasp the wall of the abdomen close under the rib with my thumb in front and the other four fingers behind in the lumbar region. Holding this grip, I slowly put the patient in the recumbent position, directing him at the same time to breathe out fully. As this is done the kidney will be felt to slip upward with somewhat of a jerk, while the patient may experience rather a disagreeable sensation caused by the kidney being pressed upon. In obese patients it is sometimes necessary to turn them partly on the side, or even to follow up this manipulation in several angles of position.

In the examination of women, palpation of the abdomen should be supplemented when possible by pelvic and vaginal investigation, for oftentimes many symptoms attributed to the digestive system may be in reality reflexes from gynecologic disturbances.

It is well also to examine the anus and rectum, and, if thought advisable, the sigmoid may be explored. Many times have I found in these unsuspected tracts the *crux* of the whole situation.

Tenderness in the Epigastrium.—In thin and nervous subjects, particularly women, tenderness will nearly always be elicited by deep pressure in the epigastrium. This

comes from the celiac plexus, and, in the absence of other symptoms, is of no significance. The upper portions of the recti are often tender after hard exercise or stress of coughing or vomiting. The fact that the tenderness is in the abdominal wall instead of the underlying organs may be proved by pinching up the muscles laterally when they are relaxed, and this is a fact well worth proving in many instances. Epigastric tenderness may also be due to dilation of the right ventricle, to pleuritis, to acute or chronic affections of the liver or gall-bladder, and to subphrenic abscess. There are obviously tender areas in gastric cancer or ulcer of any extent, and in many there is a hyperesthetic condition of the epigastrium at all times. Chronic or acute gastritis, arsenical poisoning, gastralgia, phosphorus poisoning, or chronic pancreatitis may be expressed in epigastric tenderness, and all these should be considered when this symptom is present. In catarrhal states, tenderness is usually diffuse over the gastric region, and, except in acute gastritis, is not accompanied by much resistance of the walls. "In the local neurotic and gastropototic cases the tenderness is usually confined in an area just below the ensiform about the size of the palm of the hand, and as a rule is not accompanied by resistance" (Bassler).

The tenderness of gastric and duodenal ulcer is generally sharply demarked, is situated below the ensiform to the right or left of the median line, and is generally accompanied by a quick and lively resistance. The same may be said of unfavorable post-ulcer conditions, though the resistance is not so active, nor the line of pain so well demarked. The tender spot associated with a duodenal ulcer is frequently to the right of the median line, while that of ulcer of the stomach is to the left. This, however, should not be taken too literally, as quite a number of gastric ulcers have manifested a tender spot to the right of the median line. Diffuse pain and tenderness is generally noted in traumatism, in localized peritonitis and perigastritis, and

in disturbed conditions of the solar plexus of the sympathetic and celiac axis. Occasionally the examiner finds multiple circumscribed spots of tenderness over various parts of the epigastrium or abdomen, and these are likely to be manifestations of "nervous dyspepsia," that will-o-the-wisp of digestive disorders.

Tumors or Growths in the Epigastrium.—This is a most important consideration, for the ability to rightly diagnose and weigh the significance of tumors in this region cannot be overestimated.

I will enumerate a number of them, and briefly discuss their possible bearing on disturbances in the epigastric locality or the whole body. Tumors of the stomach proper, usually carcinomatous, rarely sarcomatous, or due to inflammatory infiltration and deposits around a gastric ulcer, may sometimes be felt here, especially when the patient takes a deep breath, driving the abdominal viscera down from out the cover of the diaphragmatic dome. As to the pylorus, it must not be forgotten that the normal pylorus can sometimes be felt in a child, or slender adult, as a round, finger-like mass deep in the right side of the epigastrium. The actual connection of a gastric tumor with the stomach can be proved more clearly if that viscus is inflated with carbonic acid gas, according to directions previously given.

The transverse colon traverses the lower part of the epigastrium in many cases. Its sacculations and peristalsis can often be made out in rachitic children or thin adults, particularly when they are flatulent or constipated. In Hirschsprung's disease, or congenital dilatation of the colon, if there is fecal accumulation, there may be an immense tumor squarely in the epigastrium. In aged people with stiffened and sclerotic intestinal walls, the colon can frequently be plainly palpated in the epigastrium, and its sacculated feeling may be much like a tumor.

Tumors in connection with the *omentum* usually lie below the colon, but in tubercular peritonitis these inflam-

matory growths in their exuberance may extend well up into the epigastrium. The same may be said of malignant nodules.

I have in mind at present two instances of this sort, one still living, in which the epigastrium showed a crowded mass of tumors originating lower down in the abdominal cavity.

Swellings derived from the *pancreas* sometimes extend forward from the depths of the abdominal cavity, being felt vaguely in the epigastric and upper umbilical region. They are sometimes most puzzling. These tumors have the stomach in front of them and are seemingly fixed to the posterior abdominal wall. They move but little on respiration, and sometimes require complete anesthesia for their disclosure. These tumors may be carcinomatous, and may leave in their wake wasting, anemia, jaundice and death.

The so-called pancreatic cysts are sometimes located here, but are in reality not pancreatic but "peripancreatic cysts," as denominated by Jex Blake.

Tumors in connection with the *duodenum* may be felt in the right side of the epigastrium, and are usually due to primary malignant disease. Many of these are not recognized on account of the lack of careful and deep palpation, for they are deeply placed, and have to be differentiated from such conditions as cancer of the stomach, pylorus, pancreas, bile ducts, and portal fissure generally, not by their physical signs so much as by the general symptoms and progress of the malady. A growth on the first part of the duodenum gives rise to symptoms practically like those of cancer of the pylorus—wasting, anemia, dilatation of the stomach with visible and restless peristalsis, attacks of copious vomiting, and perhaps occasional hematemesis. Jaundice will not be present unless secondary growths occur in the portal fissure. Malignant disease with palpable tumor in the second part of the duodenum, involving the bile ducts, soon produces a marked jaundice

of the obstructive type. Cancer in the third part of the duodenum produces duodenal stenosis, dilatation of the duodenum and stomach and troublesome vomiting. In the last-named condition, the vomitus will contain bile and pancreatic ferments.

Growths in connection with the *kidneys* and *suprarenal capsules* occur in the epigastrium only after they have reached considerable size. They rise up out of the loin and flanks, and their diagnosis at such an advanced stage should cause no confusion.

Sometimes enlargement of the *spleen* brings its blunt anterior end into the epigastrium. This, too, should be obvious when it occurs.

In every region of the abdomen there is a plentiful supply of *lymphatic glands*, and these glands are prone to become enlarged and palpable. When such are felt the physician should be mindful of Hodgkin's disease, chronic peritonitis, tuberculous peritonitis, or malignant growths. In the epigastrium the glands may be felt as nodulated chains or masses, usually hard and rounded, but softer and even cystic if their contents caseate or break down into pus; they occasionally calcify, becoming hard and stony. The enlarged glands appearing only on the epigastric region belong to the stomach or mesentery, and the diagnosis of their significance is always important.

EXAMINATION OF THE ABDOMEN BELOW THE EPIGASTRIUM

A careful examination of this region is most important, and in many instances, enlightening. In the several divisions of this area there is much to be noted, much to be considered. In the preparation of the following, I am greatly indebted to Dr. Jex Blake.

Left Hypochondriac Region.—An abnormally lobulated liver may make a superficial tumor in this area, but it will be continuous with the main mass of that organ. A tumor

of the left lobe of the liver may also project superficially into the left hypochondrium.

A part of the stomach lies normally in this region, and the presence of a gastric tumor may need to be differentiated from a splenic tumor. This may be done by noting that the stomach, being mobile, changes position with respiration, while the spleen is capable of but little movement.

The normal spleen is not palpable in the abdomen. When it is enlarged, from the first degree on up, it can be detected by placing the patient in a recumbent position with his abdominal walls freely relaxed. The physician, standing on the patient's left side, should palpate the left hypochondrium by hooking his fingers over the costal margin about the eighth or ninth costal cartilages. The fingers are firmly tucked in during expiration, being relaxed during inspiration. The spleen can usually be recognized by the fact that it comes down under the left costal margin on inspiration, has a smooth surface and a notched upper and inner margin.

Tumors of the pancreas and retroperitoneal cysts sometimes extend into this region, and rarely tumors of the left kidney or suprarenal body.

Right Lumbar Region.—Sometimes an abnormally lobulated liver may present a thin flange of liver tissue in this region, causing the physician to mistake it for a movable kidney or a dilated gall-bladder.

The ascending colon can usually be palpated and rolled under the fingers in this region, and in aged people it may feel almost like a rod. When filled with feces it may present a doughy feel, and can be moulded by pressure. Where there is obstruction lower down, the colon may be distended, sacculated, and exhibiting visible peristalsis. This colon may become thickened with inflammatory products, may become abscessed, or, from pericolitis, perityphlitis, appendicitis or hyperplastic tuberculosis, may form a thickened and tender mass directly under the abdominal wall. In acute conditions of this sort, the

patient may be acutely ill, though if such growths seem to be assuming a chronicity, malignancy may be suspected.

Thickening of the ascending colon, with tenderness, and perhaps mucous or blood-streaked stools, may be encountered in mucous colitis and dysentery. It is also found in the later stages of amebic dysentery.

The ascending colon may be felt as a sausage-shaped tumor in acute and chronic ileocecal or ileocolic intussusception. It may appear first in the right iliac region, extended across the abdomen at or above the umbilicus, and then down the left into the pelvis. Along with this will be spasmodic abdominal pain, vomiting, passage of mucus and blood by the rectum, and tenesmus.

The small intestine is rarely the cause of abdominal tumefaction, unless in the case of enteric intussusception.

Tumors in connection with the right kidney usually make their appearance deep down in this region, with the ascending colon and perhaps the small intestine in front of them. The characteristic feature of such tumors is that they may be lifted forward *en masse* from behind by a hand placed at the back of the loin. Furthermore, the peculiar shape and consistency of a movable kidney, and the sickening sensation elicited as it is pressed upon, should be noted.

Umbilical Region.—Since X-ray examinations of this region after a bismuth test-meal have become so frequent, it has been discovered that the stomach is much more movable than was formerly supposed, and that even in health its lower border often extends below the level of the umbilicus. If, however, very much of the stomach is found in the umbilical area, pathologic dilatation or ptosis may be inferred.

Tumors in reference to the transverse colon have been previously considered; likewise tumors in connection with the omentum.

Growths arising from the duodenum, kidneys, suprarenals, pancreas, and mesentery may all be encountered

in the deeper portions of the umbilical region, usually as more or less fixed masses arising from or connected with some definite part of the posterior abdominal wall. Their satisfactory diagnosis will depend largely on the condition of the patient, the amount of adipose tissue present, and the degree of relaxation obtained.

The aorta bifurcates just below and just to the left of the umbilicus. In thin and relaxed individuals this portion of the aorta is plain indeed, and its throbbing presence not infrequently excites suspicion of aneurysm. Aneurysm here is quite rare, and the normal aorta lacks that lateral expansion that is found in this abnormality.

Left Lumbar Region.—The most frequent tumorous growth in this region is an enlarged spleen. Tumors of the stomach, omentum, suprarenal, kidney or descending colon may be found in this area, and they can generally be differentiated from splenic dulness without special difficulty.

Right Inguinal Region and Right Iliac Fossa.—This is a region fraught with many problems, and embracing many diagnostic pitfalls for the unwary. Swellings and growths in the inguinal region rarely are confined to it, but extend more or less into the right iliac. In this fossa may be encountered inflammatory thickenings and abscesses connected with the cecum and appendix, bearing in connections symptoms such as abdominal pain, fever, vomiting and constipation. The physical signs in some of these conditions are deceptive, and not at all commensurate with their gravity. Sarcoma or lymphosarcoma of the cecum is quite rare, and gives rise to a softer mass and more rapid growth than a cecal carcinoma.

The diagnosis of appendicitis is given in full elsewhere in this book.

Inflammation of the right ovary or tube, or ovarian neuralgia, may produce symptoms, especially in nervous patients, closely simulating appendicitis. A doubt under such circumstances may be cleared up by a vaginal examination.

Inflammatory swellings and abscesses in the left iliac fossa may arise in connection with psoas abscess, from the swelling or breaking down of lymphatic glands, infected from perhaps some small wound in the leg or perineum.

Left Inguinal Region and Left Inguinal Fossa.—The sigmoid flexure is here, and when filled with scybalous masses forms quite a prominent swelling. This region is sometimes the seat of cancerous growth, accompanied by cachexia, the passage of blood-stained stools, and followed later by intestinal obstruction.

Before leaving this subject it will be well to discuss the so-called "Head zones," which have received considerable attention in some quarters. According to Dr. Head, stimulation is excited from diseased states of internal organs, and, being transmitted by way of the sympathetics to a distinct spinal segment, are referred to sensory fibers of the skin which pass backward into the same segment. This means the existence of hyperalgesic areas on the body reflexly caused by disease of organs within, and, according to the localities on the skin in which these areas are observed, inferences of diagnostic worth should be assumed as to which of the internal organs are affected and where the lesion is situated.

These zones have some value, when taken in connection with other symptoms, but too much weight must not be accorded them alone. Where certain sensitive spots are due to hysteria, uremia, neuralgia, or central nervous diseases, to separate them from the "Head zones" is an impossible task. Bassler admits that the pyloric and gall-bladder zones are more often present than the others, but even to these too much diagnostic significance should not be given.

There are certain gastric conditions, however, in which pressure spots of real diagnostic worth have been located. Boas has shown that in gastric ulcer, about one-third of the cases give tender pressure points situated to the left of the spine close to the twelfth dorsal vertebra. In my experi-

ence, and that of some other American observers, this spot is generally higher up, being at or near the tenth dorsal vertebra. When present, this spot is noted as a very tender area close to the spinous process and keenly painful to deep point pressure. Some cases are seen where the characteristic tender spot is to the right of the spine, being suggestive of ulcer of the pylorus or duodenum. Kelling explains these spots as being due to the supersensitive posterior branch of the intercostal nerves, which in turn are due to a reflex hyperesthesia from the sympathetic nerves.

The physician, in searching for these tender spots, must not be misled by other tender spots (usually higher up) due to neurasthenia, disease of the spine or cord, or infectious disease.

Any tender spots in the back that cover a rather large area, are perhaps on both sides of the spine, and range up, are probably the expression of a neurosis. These neurotic tender spots are inclined to shift from place to place, and do not manifest that extreme tenderness in one small spot as do the tender areas from gastric ulcer.

In gall-bladder disease there is generally found a painful area in the back on the right side. This area is diffuse, though in simple, uncomplicated gall-stone disease it may be located in a rather small area to the right of the eleventh dorsal vertebra and along the course of the last ribs. In cholelithiasis a reflex area of tenderness may be found in the back of the right shoulder at the upper part of the scapula. This is so common that it has been noted by the laity, and referred to by them as a "liver pain." In disease of the intestines, especially where the colon is crowded with feces, there is often present a transverse dragging pain in the back. In enlargements of the spleen (malaria, leukemia) the dragging weight of this organ, or the tension of its fibro-elastic framework brought about by rapid swelling, may cause a somewhat acute pain midway between the spine and thoracic margin about the eighth rib.

A general caution may be inserted in connection with

the search for tender spots on the abdomen or back: Many patients, who come to the physician for diagnosis of digestive diseases, are neurotic in the extreme, and have preconceived ideas as to their malady. These ideas naturally color their statements, and cause them to magnify the soreness of certain areas, while they may minimize that of other areas, perhaps more important. In such cases the examiner should be on his guard, not letting the patient know that he expects to find, nor bringing out answers by leading questions. I have in more than one instance, by suggestive inquiries purposely given, elicited a history totally at variance with the real pathologic condition. I find it useful at times to direct my questions *negatively*, and if there is no affirmation of the symptoms sought, it may be considered fairly certain that they do not exist. For instance, in pellagra, I would not ask, "Do you have shooting pains in the limbs?" but ask instead the question "You have never been troubled with shooting pains, have you?" Some phlegmatic and matter-of-fact individuals are inclined to minimize all their symptoms, and the physician must in such cases, allow an added weight to the somewhat grudging admission of illness. These are the toilers of both sexes, who feel that they have no time for sickness, and who, only by careful questioning, will grant the examiner a full and comprehensive history of subjective symptoms.

TRANSILLUMINATION OF THE STOMACH OR GASTRODIAPHANY

Viewing the shape of the stomach from outside the body by means of brightly illuminating the inside of this organ has a limited use in diagnosis. By the employment of transillumination of the stomach, gastroptosis, dilatation, irregularities in contour, and occasionally, morbid growths may be recognized.

Casenave, in 1845, first applied this method to living tissues, and in 1867 Milliot experimented quite extensively

with it in the stomachs of animals and cadavers. To Dr. Max Einhorn, however, we owe its availability in transilluminating the stomachs of living humans, and demonstrating its worth.

Einhorn's instrument consists of a soft-rubber and rather small stomach-tube, through which runs a small cable, carrying at the distal end a little Edison lamp. The other end of the wires are connected with a battery, and there is a convenient interrupter some distance from the tube. The lamp is enclosed in a small glass bulb, which both acts as a reflector and prevents the heat of the light from burning the stomach mucosa. He has the patient drink about two glasses of water, inserts the light, and examines him in a darkened room.

As it was difficult to move or adjust the lamp in the stomach with any degree of certainty, Kemp devised a circumscribing gastrodiaphane, in which there was used a cable about 6 inches longer than the Einhorn instrument, but about the same caliber. The cable is more flexible in the vicinity of the light, allowing rather free movement. At the base of the light is attached an extremely thin accessory cable, running parallel with the main cable, and increasing its size but little. After introducing the light as far as is desired, the accessory cable is gently drawn upon, and by slightly shifting the angle of the main cable, the light can be moved almost at will in the stomach. A little practice and care will enable the physician to get a fairly accurate idea of the stomach contour in this manner. Care should be taken that the two cables are parallel when passed into the stomach, and that the accessory cable is sufficiently relaxed before the two are withdrawn. Eight dry cells with a rheostat will afford ample strength, and this may be procured in the form of a pocket battery. It is advisable to have an extra lamp at hand in case of need.

Water was the medium formerly employed, but a great advance has been achieved in the use of fluorescent media. Three such media have been found to be of value.

Bisulphate of quinin, 10 grains to a pint of water, to which may be added five drops of dilute phosphoric acid. The reaction of this solution is acid, and the fluorescence a pale violet. This fluorescence is somewhat increased by greater acidity, but disappears if the solution becomes alkaline.

Esculin.—This is a preparation obtained from the *Æsculus hippocastanum* (horse-chestnut) indigenous to Europe. An eighth to half a grain of esculin in half a pint of an alkaline solution will give a pale blue fluorescence.

Fluorescin (phthalic anhydrid, five parts), a naphthalin product, and resorcin (seven parts), heated to 200° C. This is a reddish powder, slightly soluble in water, neutral in reaction, but not fluorescent in this reaction. In an alkaline medium it gives a beautiful green fluorescence, a liquid opal.

The last is the most available agent for this purpose, and may be obtained from Merck & Co. quite cheaply. The addition of a small quantity of glycerin adds to the fluorescence, and the contents of the stomach must be alkalinized. There should be given first two or more glasses of water in which about half a dram of soda has been dissolved; this should be followed by another glass of water, in which are dissolved a dram of glycerin and half a grain of fluorescin.

This method greatly enhances the value of transillumination, and the fluorescin exerts no deleterious effects. On catheterization of these patients, greenish fluorescent urine is obtained an hour after the administration of the above-mentioned solution, but no albumen, sugar nor casts have been found.

In order to obtain satisfactory results from gastrodigraphy, the patient should be in a dark room, with the abdomen and back exposed to view. The lamp and tube may be introduced by artificial light, which is put out before the internal lamp is lit. When the electric current

is turned on, the patient should stand up, for in this position every outline of the stomach is more plainly visible.

With gastropptosis, the lesser curvature can be outlined, while with a dilated stomach the complete contour can often be observed.

If we illuminate in the dorsal position, but little will be shown, for as Meltzing contends, there is but little of the stomach against the anterior wall of the abdomen in this position.

CHEMIC EXAMINATION OF THE STOMACH CONTENTS

The examination of the stomach contents after the ingestion of different test-meals is now recognized almost universally as a diagnostic method of great worth. Suitable allowance should be made for modifying factors, and the clinical history of the case should not be disregarded, but it is admitted by all unprejudiced observers that certain conclusions may be formed from the chemic examination of test-meals that cannot be reached any other way.

It has been demonstrated by physiologists that the secretions of the stomach begin as soon as the food enters that viscus, continuing until the chyme has passed into the intestines, though with lesser activity toward the end of stomach digestion. It follows, therefore, that examinations at different periods of digestion will give different results, and it is best to make the examination at a definite time and during the height of digestion. For this purpose a number of test-meals have been devised, which, being extracted at different times after ingestion, naturally give different results.

TEST-MEALS

Riegel's Test-dinner.—This is the oldest one used, and consists of a plate of meat broth weighing from 5 to 7 ounces, 1 1/2 ounces of mashed potatoes, and a plain roll.

This should be extracted from the stomach four hours after eating.

Ewald's.—This is another of the early test-meals. It consists of 6 ounces of finely chopped meat, stale bread 1 ounce, and a little butter. This should be extracted in three hours.

Germain-Sée's Test-meal.—In this test-meal the patient is given 3 to 5 ounces of white bread, 2 or 3 ounces of finely chopped meat, and a large glass of water. This is to be extracted in two hours.

Ewald-Boas Test-meal.—This is the most available one, and for plain examination of the chemic functions of the stomach, is probably used more than any other. It consists of two slices of white bread, toasted if preferred (no butter), and a glass and a half of water. This should be extracted in exactly one hour.

Boas has suggested a dry test-meal, consisting of a plain roll without any water, but this is difficult to take, and possesses no commensurate advantages.

Boas' Test-breakfast.—One ounce of rolled oats boiled in 1 pint of water. This is indicated where an accurate test for lactic acid is desired, as it contains none of this acid.

In the employment of test-meals, there are several modifying factors, both physical and psychic, to be considered. The meal should be an indication of what the stomach is doing and its condition at the time the test-meal is extracted. To place the patient under the influence of adverse circumstances, such as change of habits or fear, defeats the object in view. So far as practicable, it is not wise to inform the patient that the stomach is to be aspirated at the next visit, and, if he asks the direct question, the physician, while not deceiving him, should do all that is possible to allay his fears. It is my custom, when I desire a patient to return for a test-meal, to simply inform him that I wish him to come for "further examination."

It is best that a test-meal should be taken in the morning

on an empty stomach, or at least where nothing but water has been ingested one or more hours previously. This is not always practicable, and variations from this particular time have to be resorted to. Any time up to noon the patient may be required to abstain from food until the test-meal is taken; later than that, however, it is well to permit a light repast that will pass out of the stomach before the test-meal is taken. I often take test-meals at one, two or three in the afternoon, when the early morning hour is not practicable.

There are many circumstances and conditions in private practice quite different from hospital practice, and the resourceful physician must meet these differences with tact and intelligence.

Some observers, mostly European, use tea as the fluid of test-meals. In my opinion water is preferable, as tea irritates some stomachs, and besides has no uniform strength.

The methods of extracting test-meals, and other considerations involved therein, are fully discussed in a separate chapter.

Before chemically testing the ingesta, several points may be brought out by a microscopic examination. Some gastroenterologists advise a careful measurement of the aspirated contents, but, as I do not think it necessary to entirely empty the stomach, except for special reasons, I do not follow this procedure. If, however, a very large quantity is easily aspirated several hours after a test-meal, it would excite suspicion of hypersecretion, and a test of both the secretory and motor functions would be in order.

Microscopic inspection may disclose large undigested pieces of bread; in others remnants of bread that are nearly digested or slightly digested; in others a fine fluid mushy mass. These findings are at once suggestive. After a Riegel's test-meal the differences are more distinctive; for the mass may be fine, uniform and mushy, containing no

coarse elements; or there may be coarse undigested meat fibers.

Mucus, frank blood or plentiful bile are readily visible. In some instances the gastric contents, when placed in a glass vessel, form three layers: at the bottom, a fine starchy, fluffy mass; next a cloudy zone; and on top a foamy layer, the last-named being evidence of gaseous fermentation.

In cases of achylia gastrica, especially in senile cases, the bread is aspirated with difficulty, and presents a dry and unchanged appearance. The unresponsive and almost parched gastric mucosa of these aged patients absorbs the fluid of the test-meal, instead of secreting any juice of its own.

The gross amount of mucus present may be tested by a hooked wire, which is passed through the contents and drawn up. In excessive amounts of mucus, there are long strings visible, varying in viscosity. This mucus may be clear or stained with the pathologic coloring matter in the stomach. In rare instances blood-stained mucus may be picked up on this wire.

Odor.—In normal test-meals the odor is “bready” and not disagreeable. In some pathologic conditions the odor is anything but pleasant, varying from a “fermenting smell” to a distinct putrescence. In the presence of advanced carcinoma, with decided obstruction, the odor may be foul indeed.

Before beginning the chemic examination proper, the contents should be filtered. The regular filter paper is preferable, though, if this cannot be obtained, several layers of gauze or cheese-cloth will answer.

For practical purposes the most important feature to determine is the amount of hydrochloric acid present, free or combined, during the height of digestion. Should hydrochloric acid be present, it is necessary to ascertain whether it is normal in quantity, increased or deficient. Should it either be absent, or deficient in amount, then lowered digestive power of the stomach is proved.

When free hydrochloric acid is present in easily appreciable amount, the determination of pepsin is unnecessary; in fact, pepsin may be present when the acid is absent; but the presence of hydrochloric acid is *prima facie* evidence of the presence of pepsin. In the total absence of the acid, tests for pepsin should be employed.

For a complete chemic examination and analysis the following tests should be carried out:

1. Reaction.
2. Free hydrochloric acid.
3. Total acidity.
4. Combined hydrochloric acid.
5. Organic acids (lactic, acetic, butyric).
6. Propepton.
7. Pepton.
8. Pepsin.
9. Renin.
10. Dextrin.
11. Erythrodextrin.
12. Achroodextrin.
13. Occult blood.
14. Bile and intestinal juices.

Before judging of abnormal conditions in test-meal findings, it is necessary that the examiner should be familiar with normal conditions.

A normal Ewald-Boas test-meal, extracted an hour after ingestion, should show free hydrochloric acid, 15 to 25; total acidity, 50 to 60; propepton and pepton, small amount; pepsin and rennin present; erythrodextrin present in small amount, or absent; dextrin absent.

Some patients may have the free hydrochloric acid present within normal limits, and suffer with symptoms of hyperacidity; others may have a marked excess of free acid, and complain of no special discomfort pointing to that condition. This is to a great extent a matter of individual peculiarity.

Reaction.—This may be determined by blue and red litmus paper. Should the filtrate be acid, it turns the blue paper red; and conversely, if it is alkaline, it turns the red paper blue. In a filtrate of neutral reaction, there is, of course, no change.

For a qualitative estimate of the presence of acid in general, and free hydrochloric acid in particular, congo-red and dimethylamidoazobenzol paper may be used (the latter is usually called dimethyl paper). The presence of any acid turns the congo-red paper blue; and the deepness of the blue is to an extent an indicator of the amount of free acid in the filtrate. The dimethyl paper responds to hydrochloric acid, and turns red in its presence. A small amount of free hydrochloric acid may turn the yellow dimethyl paper only a light pink, while a great amount will turn it a bright scarlet. While this method is by no means exact, a fairly good estimate may be made by it, which will give the doctor a "working basis" until a quantitative estimate can be made.

Tests for Free Hydrochloric Acid.—Many tests for this acid have been advocated, some of which possess but little merit. Most of these tests are based upon the assumption that certain coloring matters respond to mineral acids and not to organic. About the only organic acid liable to interfere is the lactic, and this can be eliminated, if necessary, by quantitative check tests.

Gunsburg's Phloroglucin-vanillin Test.—This reagent consists of 2 grams of phloroglucin and 1 gram of vanillin dissolved in 30 grams of absolute alcohol. Into a small porcelain dish are placed an equal number of drops of this reagent and gastric filtrate. The dish is then held over an alcohol lamp (not too closely) and the contents allowed to evaporate slowly. A cherry-red color appears if free hydrochloric acid be present. If there are only traces, a rose tint appears at the margin; while if no free hydrochloric acid is present, the color of the evaporating solution varies from a yellow to a brown.

This test responds only to free hydrochloric acid, and not to organic acids. The disadvantage of this method lies in the instability of the solution, which must be made fresh at frequent intervals and kept in a dark place.

Boas' Resorcin-sugar Test.—Five grams of resorcin and 3 grams of cane-sugar are dissolved in 100 c.c. of alcohol. An equal amount of this reagent and gastric filtrate are slowly evaporated to dryness in a porcelain dish, as in the previous test. The presence of free hydrochloric acid is demonstrated by a rose-red color, which fades on cooling. This responds to hydrochloric acid only, and is preferable to the Gunsberg test. This solution is both cheaper and more stable.

Toepfer's Quantitative Method.—By this method free hydrochloric acid, combined hydrochloric acid, total hydrochloric acid, and acid salts are readily and accurately determined. Ordinary routine examinations seldom call for more than a determination of total acidity, free and combined hydrochloric acid, but when free acid is absent, the pepsin and rennin tests may be indicated.

In the employment of Toepfer's method the following solutions are required:

(1) A 1 per cent. alcoholic solution of phenolphthalein (colorless).

(2) A 1 per cent. aqueous solution of sodium alizarin sulphate (brownish yellow).

(3) A 0.5 per cent. alcoholic solution of dimethyl-amidoazobenzol (yellowish red).

(4) A decinormal solution of NaOH (sodium hydrate) as a titrating solution.

The *rationale* of Toepfer's method consists in the sensitiveness of the three-color end-reagents to the various constituents of the gastric juice. To judge of the different stages of color changes calls for a definite "color sense" on the part of the physician, and an inability to note the fine gradations of color, as they blend one into another, will

seriously handicap the examiner. I have known several otherwise excellent diagnosticians, who, because of their indifferent color perception, could not successfully avail themselves of this method.

The decinormal solution should be of such accurate strength that 1 c.c. will neutralize 0.00365 hydrochloric acid.

Some use 10 c.c. of the gastric filtrate for each test, but often there is not a great amount of this filtrate available, and I seldom use more than 5 c.c., but with equal accuracy.

Into each of three beakers or small glass containers, are put 5 c.c. of the gastric filtrate. To obtain the free hydrochloric acid two drops of the solution of dimethylamidoazobenzol are added, and into this is titrated drop by drop the decinormal solution of sodium hydrate until the filtrate turns an orange yellow.

Some examiners make the error of carrying this reaction to a lemon yellow, which is incorrect. To carry the titration thus far would put an unduly large number into the class of hyperchlorhydria. Let me insist that the titration be stopped at an *orange* yellow.

To obtain the total acidity, two drops of the phenolphthalein solution are put into another beaker, and the decinormal solution titrated into it until the end-reaction of red is reached, or until no more redness is produced by titration.

Where the gastric filtrate is scanty, another convenient method may be employed for determining the total acidity. After the free hydrochloric acid has been determined, into the *same* solution may be placed two drops of the phenolphthalein solution. This produces no change in color until the titration is proceeded with, but the end reaction of red takes place just the same as in the plain filtrate, minus the dimethylamidoazobenzol. Let the titration proceed until the end reaction is reached, and the sum of the free hydrochloric acid, plus the amount of decinormal solution

required to obtain the end reaction, will represent the total acidity.

To obtain the combined acid, add to the other beaker of gastric filtrate one small drop of the sodium-alizarin-sulphonate solution. Titrate with the decinormal solution until an end reaction of a marked purple is reached.

The titration may be performed with a graduated pipet, or, much preferably, a graduated buret supported on a stand. This pipet or buret should be graduated to $1/5$ c.c.

To obtain the combined acid, subtract the index of the end reaction from the total acidity.

In making these calculations, as the degree of acidity is represented by the number of cubic centimeters of the decinormal solution required to bring about the proper color reaction in the gastric filtrate, plus the proper indicating solution, and the figures are based on the assumption that 100 c.c. of the filtrate will be used, while in reality only 5 c.c. are used, the number of cubic centimeters of the decinormal solution must be multiplied by 20. For instance, if 1 c.c. of the decinormal solution were required to color the gastric filtrate plus the dimethylamidoazobenzol solution an orange yellow, the result should read 20; and that would be within normal limits.

To compute the free hydrochloric acid in percentage, multiply the first result by 20, and then by 0.00365.

If 10 c.c. of gastric juice are employed, multiply the result by 10. Sometimes where the amount of the test-meal is extremely scanty as much as 5 c.c. are not available for the tests. Should only 2 c.c. be available, the result should be multiplied by 50. When as small an amount as this is examined, however, great care should be exercised in noting the color gradations, lest a decided error ensue in the final calculations.

A further suggestion in making these examinations is to have beneath the glass beaker a white ground, that a good, clear light be available, and that the examiner should not permit the possible reflection of colored walls,

curtains, etc., to interfere with his judgment of color changes, or end reactions.

Lactic Acid.—The most-used test is Uffelmann's, and is fairly accurate. It should be freshly made before each test, and is prepared as follows: 10 c.c. of a 4 per cent. carbolic acid solution is mixed with 20 c.c. of distilled (or plain) water, and to this is added one drop of sesquichlorid of iron. This makes an amethyst-blue solution. Should the blue be too marked, it can be lightened by the addition of a small amount of water. To this solution add a few drops of the gastric filtrate, and, in the presence of lactic acid, a canary-yellow reaction follows. Some have described it as a "canary-green," but this does not accord with my observation. Fatty acids produce an ash-gray reaction, and inorganic acids decolorize the amethyst-blue solution.

Should phosphates be present, they may give the same reaction as lactic acid, and the following modified Uffelmann test has been proposed to eliminate that possible error. Take 5 c.c. of the filtrate plus 10 c.c. of ether, shake it in a test-tube, and allow it to stand until the ethereal solution has separated from the watery solution. Pour the ethereal part into another test-tube, and place it in a glass of hot water to evaporate. Add 1 c.c. of distilled water to the remaining drops, and test for lactic acid with the Uffelmann solution. If the canary color occurs, lactic acid may be considered present beyond a peradventure.

Boas' Test for Lactic Acid.—Take 10 to 20 c.c. of the gastric filtrate, and evaporate it into a syrupy consistency over the water bath. Should free hydrochloric acid be present, neutralize it with an excess of barium carbonate. A few drops of phosphoric acid are then mixed in and the carbonic acid expelled by boiling. The fluid is then cooled, and extracted two or three times with 50 c.c. of ether.

After half an hour pour off the clear ethereal layer. The ether is now evaporated, and the residue washed in a flask with 45 c.c. of water, well shaken and filtered. Concen-

trated sulphuric acid, 5 c.c., and a pinch of manganese dioxid are added to the filtrate. The mixture is then distilled over a small flame, and the vapor conducted into a narrow cylinder containing about 10 c.c. of an alkaline iodine solution. This consists of equal parts of a decinormal iodine solution and the standard potassium hydroxid solution. The vapor may be conducted into the same quantity of Nessler's reagent. If lactic acid is present, it gives rise to the iodoform reaction (clouding and odor of iodoform) with the iodine mixture. If Nessler's reagent is used, yellowish-red aldehyd of mercury appears.

This is a good and reliable test, but, as will be understood, requires considerable technic and great care to perform it successfully. For this reason, it is not often available to the general practitioner, and is clinically impractical.

The presence of lactic acid in a test-meal may or may not possess significance. I might say, however, that when a test-breakfast or test-dinner is taken under proper conditions, which admit of only traces of lactic acid, and this acid is found in appreciable quantities, it is of pathologic significance, and indicates either subacidity or stagnation. The impression prevails in certain quarters that the presence of lactic acid is pathologic of cancer. This is putting it too strongly. It may fairly be stated that conditions existing in the presence of cancer are favorable for the presence of lactic acid, and that finding this acid is only one of several indications that point the diagnostic finger toward cancer.

Volatile Acids.—Fatty or volatile acids are recognized by boiling a small amount of the gastric filtrate in a test-tube. A strip of moistened blue litmus paper is held over the tube so that the vapor will come in contact with it but not the boiling filtrate. The paper turns red if volatile acid is present.

Either butyric or acetic acid can be recognized by their odor in the gastric contents when present in an appreciable quantity. Such a small amount of butyric acid will throw

out such a characteristic odor of spoiled butter, that any other test is hardly necessary.

Should the acetic acid be present in only small amount, it can be determined by Einhorn's test of neutralizing the watery residue of the ethereal extract of the gastric filtrate with carbonate of soda, and then adding neutral chlorid of iron. The presence of acetic acid is shown by development of a red color.

Propeptone.—Add to the gastric filtrate about 5 c.c. of the saturated solution of sodium chlorid. A small amount of the former is sufficient. If propeptone is present, it will be precipitated; if no precipitation occurs, add one or two drops of acetic acid, and a precipitation will take place in the presence of propeptone, which clears up on heating, but becomes turbid on cooling.

Peptone.—After filtering out the propeptone, take 2 c.c. of the gastric filtrate, and make it strongly alkaline by adding sodium hydroxid solution. Then add a few drops of a weak 1 per cent. copper solution. Peptone gives a purple or violet-red color.

Pepsin.—A thin disk of the white of a hard-boiled egg, weighing about 1 gram (1 cm. in diameter and 1 mm. thick) is placed in a test-tube containing about 5 c.c. of the gastric filtrate. This should be kept at blood temperature, and a most convenient method is by the use of a thermos bottle.

If free hydrochloric acid is not present in the filtrate, add two drops of dilute hydrochloric acid. The presence of pepsin will cause a disappearance of the albumen in from two to six hours.

Most of the methods for quantitative determination of pepsin are too complicated for the physician, unless he has special experience in a chemical laboratory. The simplest one that has come to my notice is one devised by Henry Illoway, and which is sufficiently exact for all practical purposes.

Ten cgm., exact weight, of egg-albumen (white of hen's egg) is coagulated in the following manner:

The egg is placed in a pot of cold water, which is then covered with a lid and put on to boil. It is allowed to cook for ten minutes after the water has begun to boil—in all it should be heated twenty minutes from the time it has been put on. The egg is then taken out and allowed to cool.

So that the gastric filtrate may act on the albumen in the same way as food in the stomach, the cube is cut in half. The filtrate can then act on eight sides instead of four.

This coagulated albumen is now put into 10 c.c. of gastric filtrate (from stomach contents extracted one hour after ingestion of an Ewald-Boas test-meal) and this is placed in a thermostat which is kept at 38° C.

The time in which the 10 cgm. are digested, entirely, partially, or not at all, will give a correct idea as to the status of the pepsin secretion in the case under examination. Illoway has shown that normal digestion of the albumen requires from five to five and one-half hours.

His classification is as follows:

Hyperpepsinia.—Digestion requiring only from three to four hours, not in any pathologic sense necessarily, but only to indicate a secretion of pepsin greater than usual, which, however, may be the normal in that individual case.

Normal Pepsinia.—Digestion of the albumen requiring from five to five and one-half hours.

Hypo-pepsinia.—Digestion requiring more than the usual time. The degree of this condition is indicated by the number of hours required beyond the standard of time.

Apepsinia.—No change in nor digestion of the albumen.

Another method often used is that of Mett. This consists in sucking fresh egg-albumen into capillary tubes of 1 or 2 mm. in diameter, coagulating the albumen by boiling, and then cutting off portions of the tube 3 to 5 cm. long, and placing these pieces in the gastric contents. These pieces should be kept in the incubator at body temperature for ten hours. At the end of this time each end of the tube should show a lack of albumen which has been digested away, while some of the solid albumen will remain in the

center of the tube. Both the empty portions of the tube and the portion that is full are measured, and the activity of the pepsin digestion thus determined. The relative amount of pepsin varies according to the square of the length of the empty portion of the tube, the figures of the latter being expressed in millimeters; thus 3 mm. of digestion equals nine parts of pepsin; 2 mm. equals four parts of pepsin, etc.

Rennin.—Add five drops of the gastric filtrate to 10 c.c. of fresh neutral milk in a test-tube. Some advise neutralizing the gastric filtrate with decinormal sodium hydroxid solution, but this is not necessary. Place the tube of milk in a glass of warm water at a temperature of about 100° F., or in a thermostat. A thermos bottle will also answer, and is both cheap and convenient.

Normal Rennin.—Coagulation will occur in five to fifteen minutes if the rennin content be normal.

Deficient Rennin.—If five drops of the gastric filtrate give no result, add 1 c.c. of the filtrate to 5 or 10 c.c. of the sweet milk under the same conditions. If no coagulation occurs in fifteen to thirty minutes, rennin may be considered deficient.

Absence of Rennin.—When no reaction is obtained in half an hour with 5 c.c. of gastric filtrate in 10 c.c. of milk, rennin may be considered absent.

It has been demonstrated by more than one observer that rennin is in nearly normal amount when pepsin is deficient or absent, and it has also been shown that rennin is one of the last elements in the process of gastric digestion to disappear.

Starch Digestion.—The orderly progress of starch digestion can be followed and the different stages separated with probably more exactitude than any other physiologic division of general digestion.

In a recent trial of a murder case in Atlanta, Ga., one of the most vital factors in fixing the time of the death of the victim was the fact that starch digestion in her stomach

had reached the erythroextrin stage. This, in addition to the fact that no free acid was present, fixed the time of her death with almost absolute certainty at less than an hour after she had eaten a carbohydrate meal.

The first step in starch digestion begins in the mouth through the action of the ptyalin. It has been thought that the action of ptyalin, which transforms starch into maltose and dextrose, was halted practically as soon as there was a free secretion of acid in the stomach. Later physiologic experiments have proved that the action of the ptyalin continues uninterruptedly in that portion of the stomach contents unaffected by the acid, and does not cease until the *whole contents* have lost their alkaline reaction.

The first of starch digestion, therefore, is denominated *Amylodextrin* or *Amidulin*, giving a light, but distinct blue with Lugol's solution.

Erythroextrin.—Gradually, as the inversion progresses, the color produced by the Lugol's solution becomes violet blue, violet, red violet, red, or mahogany brown. This varied color change is why the continued inversion is called erythroextrin.

Achroextrin.—With continued action of the ptyalin, a stage is reached in which Lugol's solution produces no color reaction; this is called achroextrin, meaning without color. Amylodextrin is precipitated by tannic acid and alcohol, while erythroextrin and achroextrin are precipitated by alcohol and ether, not by tannic acid. These two dextrins do not reduce Fehling's solution, nor do they ferment with yeast.

Maltose.—This is soluble in alcohol, insoluble in ether. It reduces Fehling's solution, but does not ferment with yeast.

Dextrose.—This is insoluble in alcohol and ether and ferments readily with yeast.

These reactions are quite important, as they enable the physician to not only determine the degree of starch con-

version in cases of hyperacidity and hypersecretion, but also enables the observer to state with a fair degree of accuracy how long a meal has been taken. This, as has been noted above, may become a question of medico-legal importance.

Occult Blood.—The presence or absence of occult blood in the gastric contents is of weighty diagnostic import. In several conditions, either malignant or benign, the knowledge concerning occult blood is sufficient to name the diagnosis; while in feces also its presence is suggestive of various pathologic states.

There have been many tests devised for the detection of occult blood in the gastric contents and feces, and I will endeavor to give several of the most practical and reliable.

The simplest test is performed with benzidin paper, which is immersed in the gastric filtrate, and then has a few drops of hydrogen peroxide poured over it. After drying a short time, the paper turns blue in the presence of occult blood. This is feasible when there is rather a large amount of occult blood present, and the paper can be kept perfectly dry. Moisture on the hands of the examiner, or a moist atmosphere in the room renders this test unreliable.

In the detection of occult blood, it is recognized that many of the red corpuscles are degenerated and broken down, especially in the feces after the blood has passed through the whole intestinal canal. The hematin crystals remain, however, and these respond to the tests.

A general plan of extraction of the hematin is advisable, and this is accomplished by rubbing up with half a test-tube of the gastric filtrate, of the same amount of a watery extract of the feces, one-third its volume of glacial acetic acid and one-half its volume of ether. The mixture is well shaken, and allowed to separate. Should this be slow, a few drops of methyl alcohol will hasten the separation. The clear supernatant ether contains the hemoglobin, and should be poured off for the other examinations.

It is well not to depend on any single test, but to perform

two or more with the ethereal extract, if sufficient is at hand.

Guaiac Test.—This is a fairly satisfactory test, but hardly as reliable as the aloin. It is accomplished by the oxidation of the guaiaconic acid in the presence of blood into a guaiac blue. A fresh alcoholic solution of guaiac is made by scraping with a knife a few grains of old gum guaiac into a test-tube containing about 5 c.c. of alcohol. (The area of guaiac containing the yellow particles is the most sensitive solution for the reagent.) To the alcoholic guaiac solution is added about 2 c.c. of hydrogen peroxid, and the contents shaken. To this mixture is added 1 c.c. of the acetic-etherial extract, and in the presence of occult blood a blue-violet color will appear in the upper part of the mixture, or in the whole mixture if much occult blood is present. This blue will fade, if the mixture is allowed to stand for some time. In the examination of feces containing blood, a purplish-brown color may be observed due to both the blood and the urobilin contained in the extract. Should no blood be present, no color would appear, unless a faint brown from the urobilin.

Aloin Test.—This test is probably the most dependable of the various ones advocated. The reagent is prepared as follows: In a test-tube about one-third filled with 70-per cent. alcohol, a small amount of powdered aloin is placed (about as much as will go on the tip of a knife blade), and allowed to dissolve. About 3 c.c. of the acetic-etherial extract is placed in a tube, to which an equal amount of the aloin solution is added. This mixture is then treated with about 2 c.c. of thoroughly ozonized turpentine, or an equal amount of hydrogen peroxide. (The turpentine is better.) Ozonized turpentine is prepared by allowing chemically pure turpentine to stand exposed to the air for about a month. The above mixture is thoroughly shaken, and, if blood is present, the reaction, a cherry red, will appear in the lower part or all of the solution in a short time. To make it more delicate, the ozonized turpentine

may be added drop by drop, and the color will show more deeply in the lower part of the mixture. This test must not be allowed more than fifteen minutes to develop, for after that time a reddish color may show, even if no blood is actually present in the specimen.

Adler's Benzidin Test.—This is quite a satisfactory test of stomach contents after an Ewald-Boas test-meal, but is not reliable for testing the feces, as it may react from such substances as potato, milk or farina, or other cereals as they pass down the intestinal canal. This reagent is prepared by dissolving as many benzidin crystals as will lie on the end of a spatula in one-third of a test-tube of 70-per cent. alcohol. When the crystals are dissolved, an excess of hydrogen peroxide is added (about one-fourth of the amount), and to the top of this the acetic-ethereal extract is added. When blood is present an intense green color is quickly in evidence, and when absent, only a milky white appears.

Iron Test.—This test is valuable, if the patient is not taking an iron preparation. It is quite sensitive, and is produced by placing a small amount of unfiltered gastric contents in a porcelain dish, with a pinch or two of potassium chlorid and a few drops of concentrated hydrochloric acid, mixing these well, and heating the contents over a small flame sufficiently to drive off the water and chlorin, and obtain a perfectly dry residue. To this a few drops of a diluted solution of potassium ferrocyanide are added, and when blood is present, the color of Prussian blue is apparent.

Spectroscope.—The spectroscope is advocated by some for the detection of fresh blood in the gastric contents, but it has no advantage over the previous tests mentioned, beside being open to the possibility of gross errors if wrongly interpreted.

When blood has been in the stomach or intestines any length of time, it is dark or black in appearance, and never red, unless poured out in large quantities and ejected quickly. There are few pathologic expressions more

dramatic and fear-inspiring than the appearance of blood in the vomitus or stools. Patients may put off treatment of their ailments from time to time, but when there is hematemesis or intestinal hemorrhage, aid is quickly and urgently sought. Blood in the stomach contents is found most often in gastric ulcer or cancer. It is sometimes present in benign stenosis, and occasionally in chronic gastritis from catarrhal ulcers. It may also arise from multiple erosions in the course of alcoholic gastritis, or following an alcoholic debauch. It is not uncommon in cirrhosis of the liver, and passive congestion due to portal obstruction, or heart or lung disease. It may arise from aneurysm into the esophagus or stomach, in severe anemia or hemophilia, scurvy, purpura hemorrhagica, Hodgkin's disease, typhus or yellow fever, malignant small-pox, or in pernicious malarial fever, or hemorrhagic scarlet fever. It may follow traumatism, and occult blood is not infrequently found in the stomach contents from inexperienced extraction or the use of an improper stomach tube. It must not be forgotten, also, that the blood may not originate in the stomach or esophagus, but may be swallowed from a pulmonary or nasal hemorrhage. Patients have had slight hemorrhages of this sort during sleep, have unconsciously swallowed the blood, and mistaken diagnoses of diseased conditions of the stomach or intestinal tract have been perpetrated. When testing for blood, either visible or occult, the physician should ever be on the alert as to its origin, lest grave errors as to diagnosis and consequent treatment becloud his viewpoint.

Bile and Intestinal Juices in the Stomach.—The presence of bile in the stomach may be due to stenosis of the intestines, to excessive vomiting in migraine, or to excessive vomiting from dietetic errors—in fact, bile will appear in the stomach after laborious vomiting from any cause.

An extremely small amount of bile will show itself in the gastric contents or lavage water, and a special test is seldom necessary. Should a test be desired, however,

there may be added to 2 c.c. of the gastric contents 1 c.c. of fuming nitric acid. The presence of bile turns this green.

The examination of the intestinal juice may with propriety be considered under the heading of examination of the duodenal contents. There are no intestinal juices normally in the stomach, and their presence there is due to the same causes as the presence of bile.

Character and Significance of Gastric Mucus.—A small amount of mucus and saliva is normally always present in the fasting stomach, and a certain amount admixed with the contents of a full stomach. The mucus in test-meals is found both well mixed with the substance of the meal and in a free form floating in coagulated lumps on the top. That finely mixed is the gastric mucus, secreted by the glands of the stomach and combined with the mucin constituents of the saliva. The other form of mucus is caused by irritation from the stomach-tube, or is swallowed mucus, originating in the mouth, pharynx or naso-pharynx. In patients with post-nasal catarrh there is being unconsciously swallowed much of the time quantities of thick glairy mucus, which is easily visible to the eye in the stomach contents. Unless this mucus is septic itself, or unless it is taken into an achylic stomach, it has but little local diagnostic significance.

The detection of excess mucus in test-meals has been discussed.

Examination of Duodenal Contents.—Many have been the methods for obtaining the duodenal juices, both direct and indirect. Boas first obtained them by massaging the empty stomach in the duodenal region, forcing the juice into the stomach, and extracting it with a stomach-tube. Hemmeter and Kuhn endeavored to pass a small stomach-tube directly into the duodenum, but were not very successful. Einhorn used the duodenal bucket with a certain measure of success, though the amount of juice secured was insignificant in quantity. He also endeavored to catheterize the duodenum.

Later on both Einhorn and M. Gross, independently, but about the same time, devised a method by which in the majority of cases the duodenal contents may be obtained.

The Gross tube consists of a perforated round metal ball about twice the size of a pea, to which is attached a thin, flexible rubber tube 0.2 cm. in diameter and 125 cm. in length, marked every 10 cm. To this is attached a glass bulb, which is connected by a length of tubing with a mouth-piece, which the operator can use to aspirate with his own mouth, or to which an aspirating bulb may be attached.

Gross advises the following method:

Test-meal.—The patient is given in the morning a tumblerful of equal parts of milk and water. This mixture causes but little flow of hydrochloric acid, but contains sufficient fat to stimulate the pancreatic secretions. Half an hour later the duodenal tube is introduced. The patient should swallow the ball and tube, previously wet in water, until the mark 45 cm. reaches the lips. Then blow slightly through the tube into the stomach so as to smooth the tube out and cause it to hang freely in the stomach cavity. The patient should then lie down slowly, turn over on the right side, in which position, after a few minutes, the tube is permitted to glide down through the mouth without swallowing, following the pull of the ball until the 60 cm. has been reached. After five or ten minutes the aspiration may be begun, and it should show contents of a slightly yellow tint. The patient should remain with the mouth partly open, but should make no swallowing movements. The tube will gradually descend to the 65 or 70 cm. mark.

A second aspiration may now be made, and usually a yellowish liquid, free from casein, will appear, giving a weakly acid reaction. By waiting a while, and making several aspirations, the yellow aqueous contents of the duodenum will usually be secured, giving a neutral or alkaline reaction, and sometimes exhibiting a greenish-

yellow fluorescence. Occasionally the aspirated fluid remains acid, perhaps due to hyperchlorhydria, and, therefore neutralization of the duodenal contents may necessarily take place lower down. As a check, give a cup of coffee with the tube in place. Aspiration should then be performed, and if the fluid is still green, the contents are duodenal. By withdrawing the tube a short distance and aspirating, coffee is drawn out. Gross affirms that, unless there is some mechanical obstacle to the passage of the ball through the pylorus, that the duodenum will usually be reached and the contents successfully aspirated in an hour.

Einhorn's Duodenal Pump.—This has some advantages over the one just described, in that it may be used for both aspirating purposes, for duodenal lavage, or for duodenal alimentation. The illustration makes its workings quite clear. It has three markings—40 cm. (cardia), 56 cm. (pylorus), and 70 to 80, distance from the capsule. The duodenal contents are aspirated out by the syringe, the cock turned, they are then ejected into a vessel, and so on.

Einhorn's Method.—The patient in a fasting condition drinks a cup of tea with sugar but no milk, and then about half an hour later the capsule and tube (previously lubricated in water) are swallowed. The swallowing may be assisted by drinking half a glass of water. To be sure that the tube is in the stomach and is not kinked, a little fluid may be aspirated to determine its reaction. A syringe of water is then forced into the tube, followed by one of air, the tube is shut off by the stop-cock, and the thread with rubber hitched over the ear. The patient should not close the lips or teeth for a while, and should quietly wait about an hour for the tube to penetrate the duodenum.

When the tube reaches about the 70 cm. mark at the lips, aspiration is begun. If the perforated capsule is in the duodenum, on aspirating there is obtained a golden-yellow watery fluid, somewhat viscid, and of alkaline reaction. Einhorn recommends that when the flow commences, the piston of the syringe should be removed, and by keeping

the barrel of the syringe low, the liquid should be siphoned out. This I have attempted a number of times without success, and, while it may be practicable in the experienced hands of Einhorn, any one less expert will find it necessary to continue the aspiration in order to obtain the duodenal juices.

At times the tube coils in the stomach, and does not enter the duodenum. If the fluid obtained is acid, withdraw the tube to the 56 cm. mark, wash it out with water, blow air through it, and in half an hour the attempt may again be made. When the tube lies in the stomach, it does not collapse on aspiration; when it is in the duodenum, however, it collapses on aspiration, and the flow of fluid is much slower. As a further test, a little milk may be given, and, if no milk is aspirated, it may be safely assumed that the tube is in the duodenum.

There are some stomachs in which the conformation does not lend itself to the progress of the tube into the duodenum, and in others the pylorus may be stenosed, or in other ways obstruct the passage of the tube. In the great majority of individuals a certain amount of patience and perseverance will enable the physician to obtain the undiluted duodenal juices.

Examination of the Duodenal Juices.—The test for bile has been mentioned and it may be tested in the same manner as in the stomach.

Steapsin.—Take one drop of neutral milk, two drops of water, and two or three drops of the duodenal contents. The last named should be neutralized if the reaction is acid. Place this small amount of fluid in a small test-tube, and keep it at the temperature of the body. Put in this a minute piece of blue litmus agar, and in twenty minutes this should turn red from the development of fatty acids. As has been previously mentioned, a thermos bottle will serve fully as well as an expensive incubator.

Trypsin.—If the duodenal fluid is acid, neutralize it, and place in it a small piece of a hard-boiled egg. Keep this

two or three hours at blood temperature. If trypsin is present, the albumen will be dissolved.

Amylopsin.—To test for this, use a boiled starch solution or prepared starch paper. Mix the duodenal contents with the starch solution, or insert in it a narrow strip of starch paper, and leave it for a while at blood temperature. In about an hour add a weak iodine solution, and, if dextrin is present, a red color is developed.

Another test for amylopsin in which a quantity of a 1 per cent. solution of Kaulbaum's soluble starch, heated in an incubator to 55° c. A number of test-tubes are heated up, and 5 c.c. are put in a hot tube, to which five drops of the duodenal juice are added. This is shaken for about a minute, and 1/2 c.c. of a 250th normal iodine solution is then added. The normal iodine solution consists of an aqueous solution of equal parts of iodine, iodide of soda, iodide of potassium, and iodide of ammonium, 1 to 250.

If no amylopsin is present, the solution becomes blue; or green if bile is present; if amylopsin is normal, a pale pink; if in excess, it is colorless.

M. Gross has investigated the duodenal juices to a considerable extent, and has drawn certain conclusions from a microscopical examination of them. To quote him: "The microscopic inspection of the duodenal contents, as gathered with the aid of aspiration in the receptacle of the instrument, enables one after a short experience to draw certain conclusions as to the part of the duodenum from which the fluid emanates. Thus, in the *pars superior duodeni*, the contents are more likely to resemble gastric contents, although there are already all the characteristics of the duodenal contents, such as reaction, color, and oft-times ferments (secondary stomach, 'Nachmagen'). A few centimeters lower down, but still above the caruncle (papilla of Vater) they have all the properties of pure duodenal contents, that is, they are alkaline, limpid, viscid, fluid, light yellow to green or golden yellow; in rare cases it is even possible to obtain pure duodenal secretion, or

rather intestinal secretion, *i.e.*, without the admixture of bile. The fluid has a lighter color, scarcely yellow. In the *pars inferior*, a few centimeters lower still and below the caruncle, the duodenal contents may show the same characteristics as above the caruncle, but when the stomach is empty in irregular and infrequent intervals, the duodenal contents will contain also a wave of the characteristic bladder contents. In normal conditions, under the stimulation of ingested food, the inspissated bladder bile, mixed with the now abundantly secreted liver bile, flows freely into the duodenum at the beginning of digestion, and at the opening of the so-called duodeno-choledochal sphincter. When, however, this sphincter is closed, there is an obstacle to the flow of bile, compelling it to take its course through the cysticus and gall-bladder."

Our practical knowledge of the various modifications of the duodenal contents and intestinal juices is far from satisfactory, and much is yet to be learned concerning their bearing on pathologic digestive conditions.

The foregoing methods of examination of the stomach and upper intestinal tracts should not be taken singly, but should be correlated in all cases where the diagnosis is doubtful. To depend on any single diagnostic feature is unsafe and unscientific.

Test-meals, for instance, are of high value and furnish in many instances important diagnostic facts. To make a diagnosis, however, on the simple findings of a test-meal, without taking into consideration other symptoms subjective and objective, may lead the examiner into decided error.

In no class of diseases are isolated symptoms more fallacious and misleading than those of the digestive system, and the reader is admonished to take advantage of every aid, both clinical and laboratory, so that the diagnoses may represent a large perspective, and the liability to incorrect conclusions may be minimized.

CHAPTER III

EXAMINATION OF THE FECES

The intelligent examination of the feces is one of the most important aids in diagnosis of gastrointestinal conditions, and at the same time one of the most neglected. Apart from specialists in digestive diseases, health officers, or those engaged in laboratory investigations, the examination of normal or abnormal stools is infrequent and perfunctory.

The general practitioner should be familiar with the various appearances of the feces, and should also acquaint himself with the normal macroscopic and microscopic appearance.

In order to form a correct judgment it is necessary that a somewhat fixed standard be formed, so that deviations from this standard may be properly interpreted.

To Schmidt and Strasburger we are much indebted for painstaking studies and helpful conclusions in the examination of feces, and in "The Test-diet in Intestinal Diseases" by Dr. Adolf Schmidt, which has been acceptably translated by Dr. C. D. Aaron, we have a compact and excellent presentation of the subject.

The requirements which must be imposed on a suitable test-diet are manifold. To quote Prof. Schmidt, "It must be so selected that it can be taken by healthy persons as well as by most of those suffering with intestinal disorders; it must be free as possible, but not absolutely free, from waste matter, in order that the stimulus ordinarily furnished by the ingesta should not be completely absent; it must be capable of supplying the minimum, at least, of calories required by the body (at rest), and must contain the three chief groups of food-stuffs in proportionate relation to

each other; finally, it must be of simple composition, easy to make and uniformly prepared. Only when all these general requirements are fulfilled, the narrower selection with regard to the methods of subsequent fecal examination can proceed."

There are certain fundamentals in a test-diet, which must not be neglected, and according to Schmidt, they are as follows:

1. A certain measure of milk ($1\frac{1}{2}$ to $1\frac{1}{2}$ liters), which, however, may be boiled entirely with the foods;
2. About 100 gm. white bread (or zwieback, cakes, etc.);
3. A good portion (100-250) of potato-broth;
4. One-fourth pound chopped beef, a portion, at least, of which must remain raw or half raw.

These articles furnish a suitably balanced dietary, and one which can be borne by any ordinary digestive tract.

The following is the detailed test-diet, as recommended by Schmidt and Strasburger:

In the morning: 0.5 liter milk (or if milk does not agree, 0.5 liter cocoa, prepared from 20 gm. cocoa-powder, 10 gm. sugar, 400 gm. water, and 100 gm. milk, 50 gm. zwieback.

In the forenoon: 0.5 liter oatmeal gruel, prepared from 40 gm. oatmeal, 10 gm. butter, 200 gm. milk, 300 gm. water, 1 egg (strained) and salt to taste.

At noon: 125 gm. chopped beef (raw weight), broiled rare, with 20 gm. butter, so that the interior will remain raw. With this is given 250 gm. potato-broth, made of 190 gm. mashed potatoes, 100 gm. milk, and 10 gm. butter with some salt.

In the afternoon: Same as morning.

In the evening: Same as in forenoon.

This diet contains $1\frac{1}{2}$ liters milk, 100 gm. zwieback, 2 eggs, 50 gm. butter, 125 gm. beef, 190 gm. potatoes, and gruel made of 80 gm. oatmeal. It contains about 110 gm. albumen, 105 gm. fat, and 200 gm. carbohydrates, and furnishes a total of about 2247 calories, answer-

ing the minimum requirements of an adult at rest. It may be said in this connection, however, that this diet is quite a tax upon delicate stomachs, and often it is necessary to reduce it in general quantity.

This diet should be given for three days—sometimes longer—until a stool is obtained, which with a certainty comes from it. Under normal conditions this occurs at the second defecation after the inauguration of the test-diet. There is generally no difficulty in recognizing the feces arising from this test-diet, but, if desired, a capsule containing about 5 grains of carmine may be administered at the beginning and end of the test. This sharply defines the test-stool, unless there is diarrhea, in which event it is well instead to extend the diet over a rather longer period.

It will be somewhat obvious that the above test-diet, in its preparation and ingestion presents some difficulties when attempted outside of a well-ordered institution, or when attempted among individuals of a mediocre intellect. To overcome this I have made a modification of the Schmidt-Strasburger test-diet, which can be easily comprehended and applied, not only in hospitals, but also in private homes. This, too, more nearly conforms to the American custom of three daily meals, for, to vary in many particulars the habits of the patient will create an abnormal condition of the fecal evacuations, thereby defeating the object in view.

My modified test-diet is as follows:

Morning, coffee, tea or cocoa with much milk, oatmeal with milk, one soft-boiled or soft-poached egg, and one roll with much butter.

Noon, bouillon, if desired, $\frac{1}{4}$ pound of lean minced beef, roasted in butter (half raw inside), a liberal plate of baked and well-mashed Irish potatoes, tea, or tea with milk, and a roll with a liberal amount of butter.

Evening, oatmeal with plenty of milk, and a little sugar, if preferred, one or two eggs cooked any desired way, except

hard-fried, or, instead of the eggs, a moderate portion of roast veal or lamb, a roll with butter, and tea or milk.

A sufficiency of water should be drunk with this diet, and the patient should be encouraged to drink water liberally through the day.

After the second daily defecation follows the ingestion of this test-diet, the examination of the feces may generally begin.

Macroscopic.—This forms the most important part of the whole examination, if carefully and intelligently made, and alone is often sufficient to enable an experienced investigator to form a judgment of intestinal conditions. It first decides if color, consistency, and odor correspond with normal feces, due allowances being made as to color, if milk or cocoa has been ingested. The former produces light-brown stool, while the latter produces a red-brown. Other deviations through disease may be shown in black, tarry feces (blood), or sticky, clay-colored stools (fat).

The odor under normal conditions should be mildly excrementitious, with the characteristic odor of human stools. Under pathologic conditions it may give off a rancid odor (butyric acid) or a sour odor (acetic acid), or assume the vile odor of putrefaction.

In the diarrhea of pellagra the feces assume a characteristic odor which is almost pathognomonic. Nurses, who have had considerable experience in the care of this disease, have assured me that the diagnosis could in a majority of cases be made from the odor of the stools, even if most of the other marked symptoms were absent.

There may also be noted at first inspection, gross flakes of mucus, blood-stained pus, portions of tapeworm or other parasites, undigested particles of food, streaks of unmixed blood, or any other foreign bodies.

Regarding the mucus, it is important to decide whether it is thoroughly mixed with the feces, or easily separated. The former condition would point to an origin of the mucus

high up; the latter to its origin low down in the bowel. The same may apply to pus or blood.

In the next stage of the examination the entire stool may be stirred up with a spatula, and a portion about the size of a walnut placed in a small mortar. This should be well rubbed up, and, if stiff in consistency, enough water may be added to soften it to about the consistency of sauce. The ground-up specimen is then spread upon a smooth black plate, or any smooth black background. This test-diet, if normal will appear as a soft, homogeneous mass, with minute brown or reddish points.

If abnormal, there may appear as food remains, small shreds of connective tissue and tendons from the chopped meat eaten. These can be distinguished from the mucus by their whitish yellow color and their thread-like appearance. If in doubt, a thread is placed under a microscope and treated with acetic acid. In connective tissue the thread-like structure disappears.

Remains of muscle tissue appear as small, brown-colored rods, resembling tiny splinters of wood. These can be broken up by pressure, showing their muscular structure under the microscope. An excess of undigested muscular tissue in the feces points to disturbed intestinal digestion.

The potato remains appear as glassy, transparent granules, much like granules of mucus. Under the microscope they will show their cellular structure, and may be colored blue with iodine.

The fat remains are light in color, and clay-like in consistency, and if in excess may show in small, light-yellow lumps.

Mucus in large amounts, or even in small, may and should be recognized. Large shreds or strips, tubes, etc., as in the presence of mucous colic, may be removed before the specimen is ground up, and their identification is easy. The smaller flakes may be harder to recognize, though Schmidt affirms that there is no form of mucus found mingled with the feces, which on thorough inspection cannot

be recognized with the naked eye—especially if some of the ground-up mass is placed on a glass plate and held up against the light. The mucus will then show as glassy, transparent flakes, occasionally colored yellow by bilirubin, with irregular, ragged outlines. If still in doubt, the microscope can always serve as arbiter, disclosing with clearness the minute structure of the mucous-flakes.

Occasionally large crystals of ammonio-magnesium phosphate are present in putrefying and malodorous feces. They grate when the specimen is being rubbed up in the mortar, show the coffin-lid shape under the microscope, and are easily dissolved by any acids.

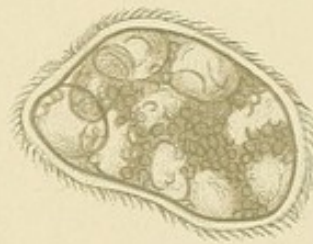
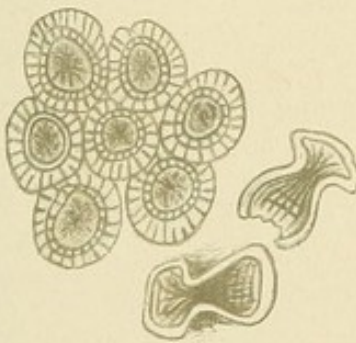
MICROSCOPICAL EXAMINATION OF THE STOOLS

For this examination care must be taken in the selection of fragments, as a random search will often disclose nothing. In the case of parasite eggs, etc., it is well to mix the stool with water, and allow the specimen to sediment, or to centrifugalize it. Mucous particles are to be chosen if protozoa are the objects of search. In searching for blood, for instance, it often makes much difference whether or not the right particle is taken.

Epithelial Cells.—These are found in squamous form in mucus which covers the stool, and comes from the anal region. Many of these cells are generally present in cases of proctitis or rectal cancer. Cylindrical cells are the commonest found. They are easily found in the lavage water of the rectum and sigmoid, and show all grades of degeneration, from well-preserved, even goblet cells to those in which the nucleus has disappeared absolutely. This often occurs in diarrhea, and sometimes the cells are so abundant that the condition is denominated “desquamative catarrh.”

Triple phosphate crystals are generally present, irregularly formed as a rule. Calcium phosphate crystals occur in the same form as in the urine. There are also

PLATE I.



Katharine Hill.

VEGETABLE CELLS FOUND IN FECES. (AFTER SCHMIDT AND STRASBURGER.)



calcium salts of still unknown acids, which are present in irregular, oval, or circular masses, sometimes fissured, sometimes with a concentric striation, and always bile stained. The calcium soaps and oxalate are also frequently found.

Cholesterin is often present, but not in typical crystal form, requiring a chemical examination for its detection. Charcot-Leyden crystals have been noted in the feces in a

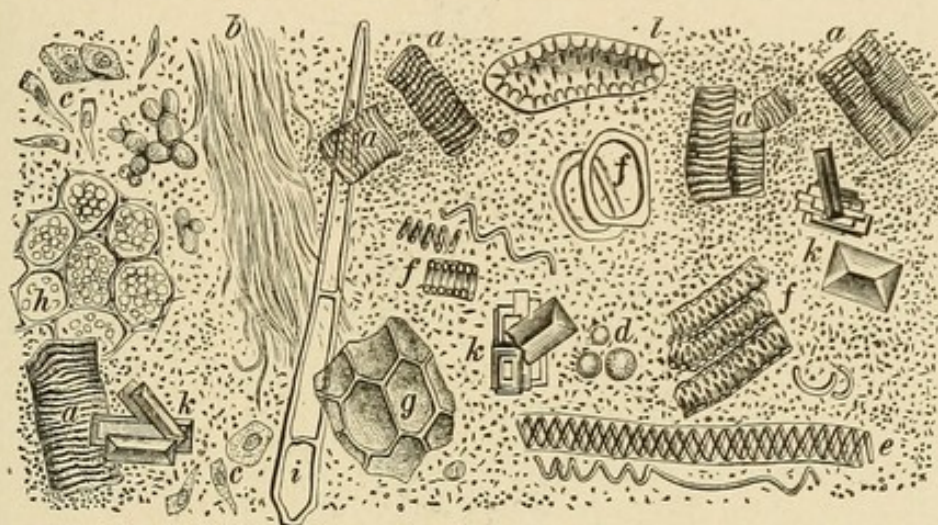


FIG. 3.—Normal feces. (Landois.)

a, Muscle fibers; *b*, tendon; *c*, epithelial cells; *d*, leucocytes, *e-i*, various forms of plant-cells, among which are large numbers of bacteria; between *h* and *b* are yeast-cells; *k*, ammonium-magnesium phosphate.

great variety of diseases, but most well-posted observers claim that their presence indicates some animal parasite, though it may be any, from the harmless oxyuris to the pernicious uncinaria.

Remnants of undigested food form the chief part of the picture, especially the thorn-like spines from various fruits and berries. The remains of these show in spiral cells, with the veins of leaves well defined; thick cellulose shells of various cells, some resembling soap masses, some parasite eggs; and the elastic tissue from meats. These heterogeneous objects can be readily identified only after careful and intent practice. Experience, however, will soon enable the examiner to readily recognize all the ordinary constituents

of normal or pathologic stools, and the rarer objects generally require special methods for their detection.

Examination for Gall-stones in the Feces.—To find gall-stones in the feces (and a careful search may continue for fifteen days after the colic) the stools are well mixed with water, and rubbed through a sieve. Sometimes no stone

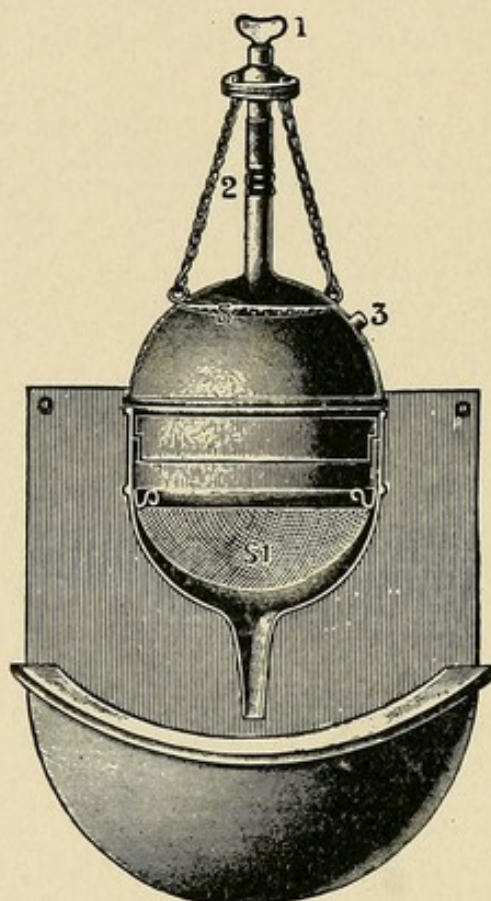


FIG. 4.—Boas' stool-sieve. (*Hemmeler.*)

is found, even when there have been typical symptoms of cholelithiasis. In such a case, it may have been infection of the bile ducts and not a stone that caused the pain; or the stone may have remained in the ampulla of Vater without entirely closing the duct; or, after engaging in the cystic duct, it may have fallen back into the gall-bladder; or it may have disintegrated in the intestine. All these considerations should be taken into account when searching for a stone without success.

The size of a gall-stone varies from that of a tiny con-

cretion to that of a pigeon's egg. The single stones are usually spherical and rough, but when multiple, they usually have well-defined facettes. When fractured they usually show their formation in concentric layers. Gall-stones are composed chiefly of cholesterin and the calcium salt of bilirubin, with traces of calcium carbonate.

For analysis the stone is dried and powdered, for unless it is powdered, the mucous coating will prevent its solution. The powder may then be dissolved in alcohol and ether, and the cholesterin crystallized out as the ether evaporates. After the cholesterin is extracted, the residue is treated in the cold with very dilute KOH solution. This will extract the bilirubin, the yellow solution of which will give Gmelin's test. The solution will be blue if bilirubin is present.

Pseudo Gall-stones.—These objects have been the cause of many diagnostic errors, and many have been the mistakes in naming these deceptive concretions real gall-stones. Every suspected stone should be fractured and examined chemically. Among the deceptive pseudo gall-stones may be mentioned masses of vegetable tissue, seeds of fruits, pieces of bone, enteroliths, masses of fats, and soaps of high melting point. Olive oil won its undeserved reputation as a means of removing gall-stones from the fact that many concretions of soaps, superficially resembling gall-stones are frequently passed after ingestion of a considerable quantity of this oil.

Gall-sand.—The sand-like concretions found so plentifully in some stools are probably not from the gall-bladder. Genuine gall-sand would be likely to disappear in the bowel, but its failure to do so would not explain the large quantities of it in the stools (Nauyn).

Pancreatic stones are rarely found in the stools, and, if found, would probably occur singly. They are white and consist chiefly of calcium carbonate.

Enteroliths.—By enterolith is meant an incrustation of organic salts around a body which serves as a nucleus, usually a hard particle of food or a lump of hardened feces.

They are seldom passed in the stools. Their chief importance is in connection with appendicitis (Emerson).

Intestinal Sand.—This condition is frequently reported, mostly in nervous patients. Intestinal sand in small granules about the size of ordinary sand sometimes appears in the stools in considerable quantities, even half an ounce or more. The passage of these granules may be an incident of a nervous period, and be preceded by much pain, as in the paroxysms of mucous colic. Many of these reported cases, on investigation, have proved to be instances of pseudo sand, seeds of berries, granules from the seed case of pears, concretions of altered blood pigment or bile pigment, or concretions of medicines, as salol. In other instances the sand may be real, *i.e.*, quartz swallowed with the food.

Meyer and Cook cite a case in which the granules proved to be masses containing resin and tannin, which came from the milk cells of the banana, which the action of the digestive juices had given a stony hardness.

Eichorst describes a condition which he calls "gravel-forming enteritis," explaining it as a secretory neurosis.

Chemical analysis of true intestinal sand has shown that it contains phosphates and carbonates, especially of calcium, but also of magnesium, iron, etc.; while in some of the granules calcium sulphate predominates. Practically all of them, however, contain some organic matter, many bacteria, fat, cholesterin, and urobilin (Emerson).

Emerson reports two cases of real intestinal sand. In one, a young boy ill with an indefinite nervous disorder, such large amounts of fine granules were occasionally passed that the sand was the most conspicuous constituent of the stool. The other patient, a young woman with an intestinal neurosis, passed many granules, which seemed to be plugs of cells impregnated with carbonates. The nature of the dead cells could not be determined.

This interesting condition lacks much of complete elucidation, and is a worthy field for exhaustive study.

Tumor Fragments.—Tumor fragments or the broken-down remains of polyps or intestinal growths may appear in the stools, having their origin in the rectum, colon, or even higher up. They are so altered in their passage by the intestinal contents that they are extremely hard to recognize; and require the scrutiny of one trained in such investigation to identify them satisfactorily.

INTESTINAL PARASITES

Ameba Dysenteriae.—This pathogenic protozoon, formerly called *Amœba coli*, is now generally admitted to be the cause of amebic dysentery, a colitis characterized by a chronic course, frequent and bloody stools, a tendency to relapse, and frequent association with abscess of the liver.



FIG. 5.—*Amœba coli*. (Hemmeter.)

Craig and other investigators in the field of tropical medicine have identified a number of different amebæ, some of which they claim to be harmless. Musgrave, however, doubts that there are any non-pathogenic forms of ameba, or at least, that they may not become pathogenic.

These protozoa are found with amebic dysentery. Most of them are in the floors of ulcers which undermine the mucosa of the colon and ileum, and in the burrowing tracts which radiate from these ulcers and undermine the mucosa. They are also found in the contents and walls of the liver abscesses, which complicate this disease, and in the sputum, if the abscesses have ruptured into the lungs.

The ameba dysenteriae is a rhizopod, varying in diameter from 8 to 50 microns. It has a clear hyaline ectosarc, seen best in the pseudopods, a finely granular endosarc, usually

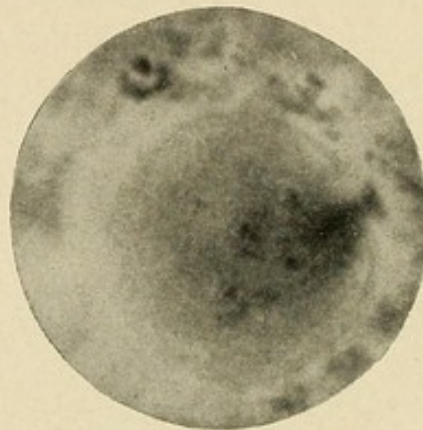


FIG. 6.—*E. coli*. $\times 1,200$. Cyst showing 6 nuclei. (There are 8 in the cyst, but 2 are out of focus.) (Craig.)

containing some of the parasite's ingesta (red blood-cells, leucocytes, bacteria, epithelial cells, and minute particles of food), and often one or more vacuoles, which do not pulsate. Its spherical nucleus, about 6 microns in diameter, is sometimes, especially when the ectosarc contains little foreign matter, clearly seen, but as a rule not visible in the living parasite. To demonstrate the nucleus, one kills the organism with corrosive sublimate, or stains it by appropriate methods (Emerson).

To obtain a specimen for examination, little flakes of mucus or pus should be selected, or the mucus may be secured by passing a soft catheter, or through a speculum. Preferably a saline cathartic should be previously administered, and the fluid portion of the stool examined *while warm*. The last precaution is quite necessary, and

various devices have been suggested to keep the stool warm. A most convenient method is to employ two tin buckets, one holding a pint, the other a quart or half gallon. The patient may use the small bucket for the stool, which may be passed either in the office or a convenient toilet. The larger bucket is partly filled with warm water, and the small one placed in this water until the specimen is examined. The slide should also be warmed, as the amebæ are not motile when cold.

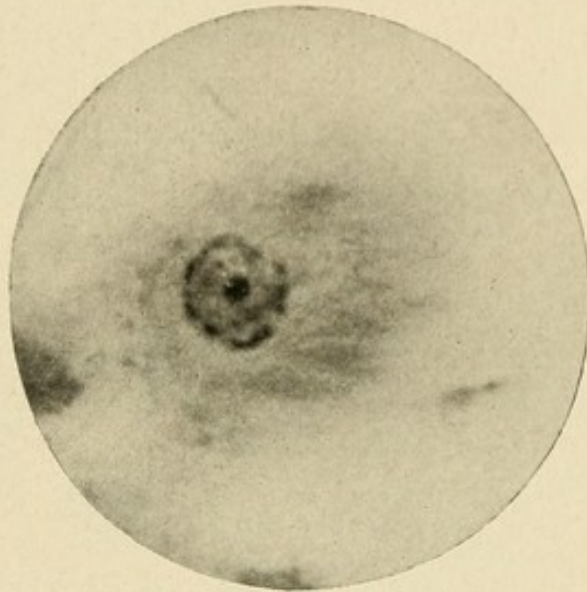


FIG. 7.—*E. Coli.* $\times 1,200$. Vegetative form showing character of nucleus.
(Craig.)

The organisms in different cases of amebic dysentery do not all look alike, and there is sometimes so much difference that some observers have divided them up into quite a number of varieties. The observer must endeavor to distinguish resting amebæ from degenerated or swollen epithelial cells, and for this reason, only those organisms should be called amebæ which unmistakably project a pseudopod, and which are to some extent motile. Others should be discarded.

The ameba dysenteriae has been found in various diarrheal conditions, and the physician should be mindful of this. Since they were first described by Losch, they have

been found in the stools during typhoid fever, in acute and chronic enteritis, colitis and proctitis, in pellagra, and even in the stools of apparently healthy individuals, who suffered no intestinal disturbance.

Allan, of Charlotte, has so frequently found the ameba in the stools of pellagrins, that he has argued a certain relation between the two conditions. While he has not proved his contention, it must be admitted that many pellagrins suffer from amebic dysentery, and that many cases of amebiasis also suffer from pellagra.

Schaudinn and Craig have positively separated the *Entameba coli* from the *Entameba histolytica*, the former the so-called harmless variety, the latter the pathogenic variety causing dysentery. The problem of non-pathogenic amebæ

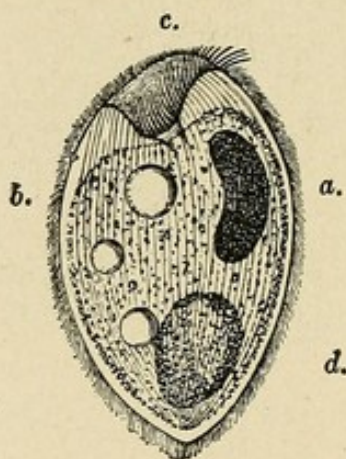


FIG. 8.—*Balantidium coli*.

a, Nucleus; *b*, vacuoles; *c*, cytostome, with pit and peristome; *d*, ingested material.
(Tyson after Leuckart.)

is of interest to the zoologist, but the physician can more safely consider every ameba he finds in the stools as possibly pathogenic and possessing present or future potentialities for harm. Musgrave examined 300 persons in Manila, of whom 101 had amebæ. Of these sixty-one had dysentery, and forty had no signs of the disease. During the next five months, however, every one of these forty developed a definite dysentery.

Balantidium Coli.—This parasite of the colon and cecum of the hog is of importance, as humans are not infrequently

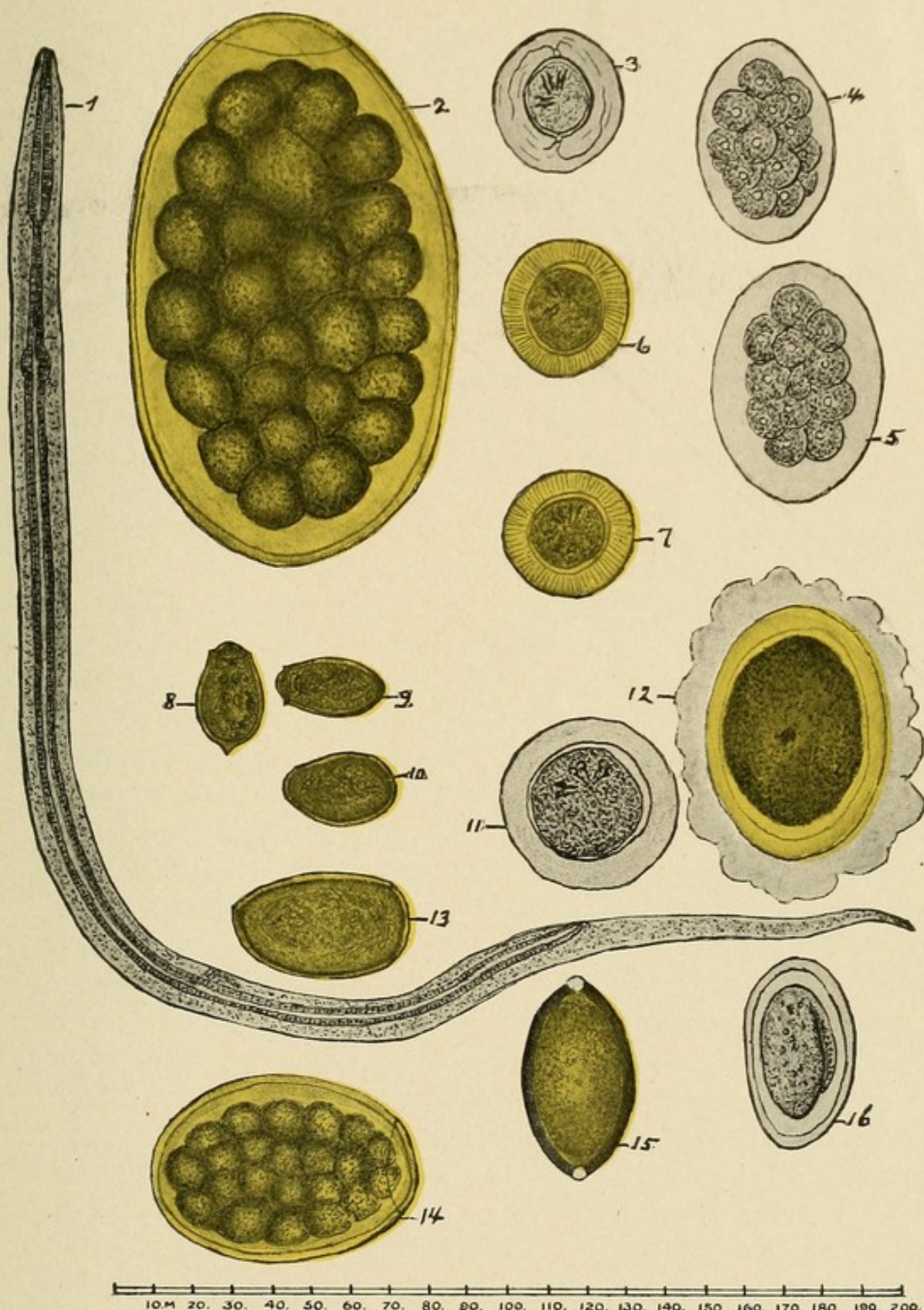


FIG. 9.—Parasitic bodies, ova, and larvæ met in human feces; color approximate only. (Tyson.)

- | | |
|--------------------------------------|--|
| 1. Larva strongyloides intestinalis. | 9. Ovum of opisthorchis felinus. |
| 2. Ovum of fasciola hepatica. | 10. Ovum of cotylogonimus heterophyes. |
| 3. Ovum of tænia nana. | 11. Ovum of tænia cucumerina. |
| 4. Ovum of uncinaria duodenalis. | 12. Ovum of ascaris lumbricoides. |
| 5. Ovum of uncinaria americana. | 13. Ovum of dicrocoelium lanceatum. |
| 6. Ovum of tænia saginata. | 14. Ovum of bothriocephalus latus. |
| 7. Ovum of tænia solium. | 15. Ovum of trichiuris trichiura. |
| 8. Ovum of opisthorchis sinensis. | 16. Ovum of oxyuris vermicularis. |



infected with it. The body is oval-shaped, the anterior end is slightly truncated, with a short peristome, generally funnel-shaped, and opens externally near the anterior pole. When feeding it opens out and broadens, so one can see it is a mouth which leads to a gullet, and not a simple furrow. The interior structure of this parasite consists of granular substance, and it contains a nucleus and contractile vacuoles. Fat and starch granules, and occasionally red and white corpuscles may be found within the granular substance. The posterior end is rounded, contains the anus, and particles may be observed to pass from it. This parasite can change its shape, and possesses both forward and rotary motion. Human infection from this parasite probably occurs most frequently through the infusorium entering its host in the encapsulated state. When hog feces are dried and pulverized, the encysted forms are scattered about and come in contact with food and drinking water, and in this way the infection easily follows.

The pathogenicity of these parasites to the human has been questioned by some, but it is now fairly well conceded that they may set up a severe catarrh, which may even be fatal. Henschen claims that they may cause a catarrh, which continues after they die out. Musgrave, Strong and Klimenko have furnished the most of our present information concerning them.

Ascaris Lumbricoides.—This, the ordinary "round worm," is very common, and, according to Garrison, occurs in about 0.4 of all cases. The female is about 20 to 40 cm. long, 5 mm. thick, with a straight and conical tail. The posterior end of this parasite is bent ventrally into a hook, and terminates into two spicules. The mouth of both male and female is surrounded by three papillæ, and the color is gray or a dirty reddish-brown. Though it is an inhabitant of the small intestine, and is therefore most often seen in the stools, it sometimes appears in the vomitus, generally to the great alarm and consternation of the

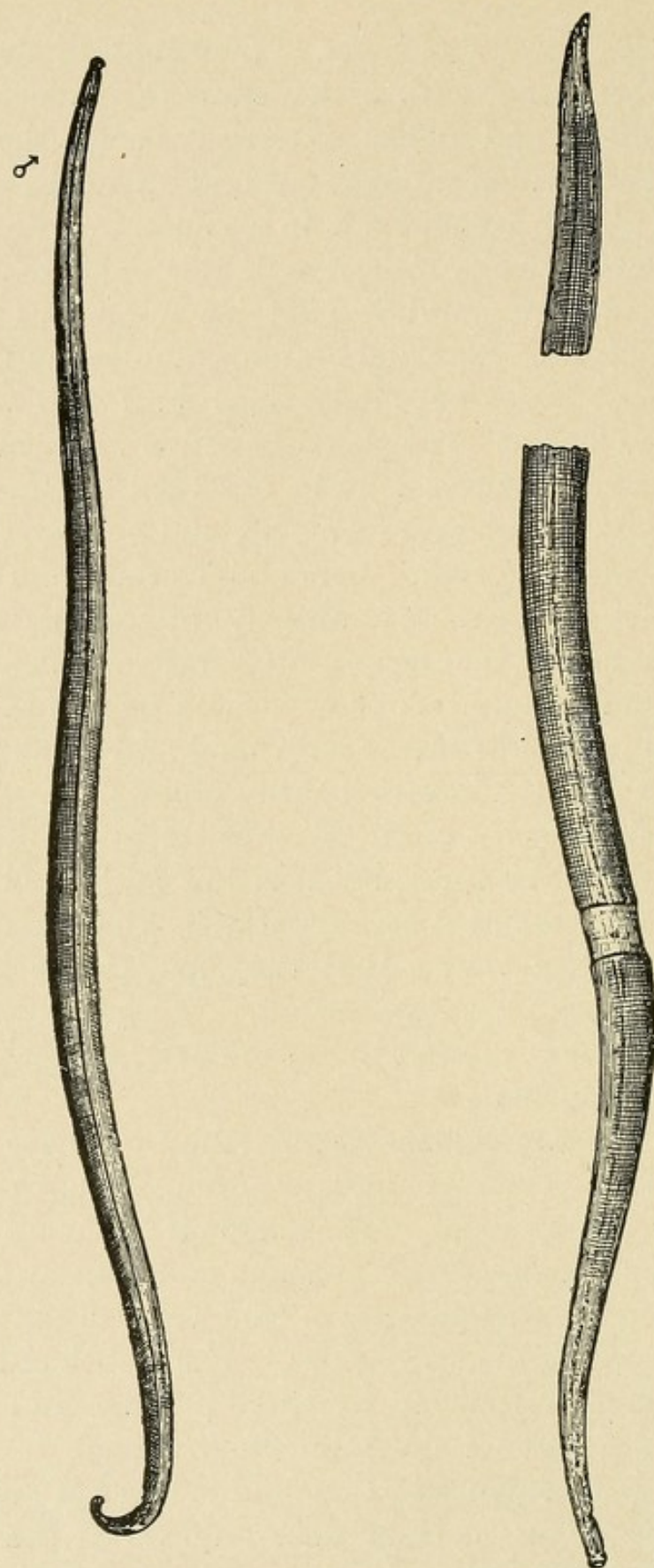


FIG. 10.—*Ascaris lumbricoides*: to left, male in lateral aspect; to right, female, ventral aspect, natural size. (Tyson after Railliet.)

patient. In fact, there is nothing more repulsive to the average individual than the vomiting of worms.

The eggs of this worm are also found in the stools in large

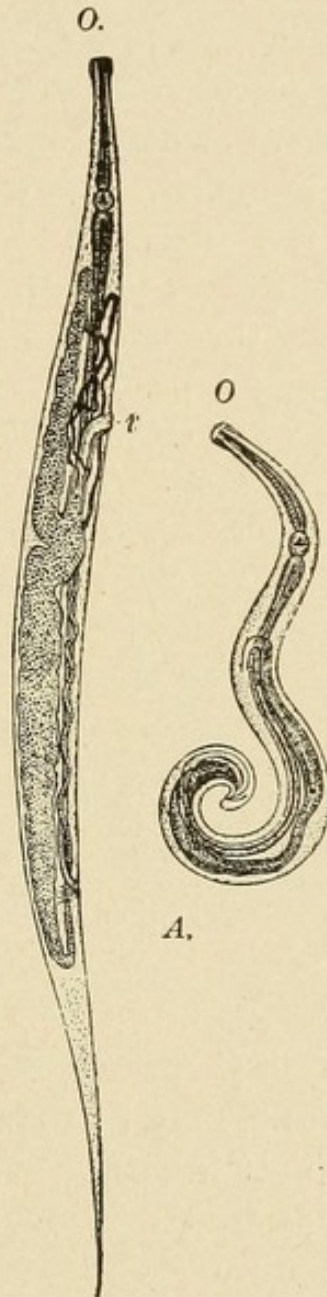


FIG. 11.—*Oxyuris vermicularis*: to left, female; to right, male (considerably enlarged).

A, Anus; *O*, mouth; *v*, vulva. (Tyson after Braun.)

numbers, are elliptical, are 50 to 70 microns long, and 40 to 50 microns wide. They have an unsegmented protoplasm surrounded by a thick transparent shell, which is covered

by a thick, uneven and lumpy gelatinous envelope, usually bile-stained. In searching for this worm it is well to first give santonin, which will promote both their death and expulsion.

Oxyuris Vermicularis.—(Thread-worm; Pin-worm; Seat-worm.) This little parasite occurs in the rectum and colon, even as high as the cecum, where it may invade the appendix and even reach the stomach. They have been known to penetrate through the uterus and tube into Douglas' cul-de-sac. Some abscesses are thought to have been caused by their boring through the intestinal walls. They are present in perhaps 0.8 per cent. of adults.

The adult male is from 3 to 5 mm. long, with its posterior end bent into a ventral hook. The female is about 10 mm. long. The worms are white in color. The eggs are 50 microns long and have a characteristic symmetry. The worm leaves the rectum to lay its eggs on the skin surrounding the anus, and it is then that the itching occurs. The eggs when deposited already contain a fairly well-developed embryo. These eggs are seldom found in the stools, except in the mucus which may coat the stool as it passes through the rectum. The eggs will not be found by a cursory examination of the skin around the anus, but it will be necessary to first scrape away the surface epithelium. They can then be observed.

Cestodes.—The adult parasites live in the small intestine of man; the larval forms may be found in the muscles and other organs. The most important varieties of tapeworms found in human beings are the *Tænia solium*, *Tænia medio-canellata*, and the *Bothriocephalus latus*.

The diagnosis can only be made by the discovery of the segments of this parasite or the eggs in the stools.

The tapeworm has a scolex or head, which may live for years, even when detached from the rest of its body, an oblong neck, and detachable segments (proglottides). These segments vary in size and shape and possess the power of limited motion. The worm itself is flat and lacks

both mouth and intestines. It grows by alternate generation through germination of a pear-shaped primary host, and remains united to the latter for a time as a colony of bandlike shape. Each segment forms a sexually active individual. The proglottides gradually increase in size as they become more distant from the head, and then diminish again toward the extremity. This worm is an hermaphrodite. On its head are four sucking disks, by which it attaches itself to the mucosa of the intestines, and by means of pores it derives its nourishment from the chyme.

The older and better-developed proglottides contain many fertile eggs, which are emptied into the intestinal canal and appear in the stools. The ovum contains an embryo, which requires for its development an intermediary host. After reaching the stomach the envelop is dissolved by the gastric juice. The embryo is set free, and finds its way by the lymphatics or blood-vessels to some place (usually the muscles), where it settles. It here surrounds itself with a sac, which may later be enveloped by a calcareous deposit. In this condition it is called a cysticercus or measle. When the measle reaches the stomach of a new host it opens, and its scole enters into the small intestine, where it develops into a full-grown tapeworm.

Tænia Solium.—This is the armed or pork tapeworm, is not common in America, but is rather frequent in Europe and Asia. When mature it may reach the astonishing length of 10 or 12 feet. The head of this worm is smaller than the head of a pin, spherical, and provided with four sucking disks, in the middle of which is the rostellum and a double row of hooklets, from twenty-four to twenty-six in number, and from these bristling hooklets it derives its name. The neck is narrow and slender and nearly an inch long. The body is divided into segments, possessing both male and female generative organs, and at about the four hundred and fiftieth they become mature and contain ripe ova. The segments are about 1 cm. long and about 7 or

8 mm. wide. The worm attains its full growth in three to four months, about which time the segments begin to shed and appear in the stools. The uterus forms a straight median tube in each segment, giving off five to seven branches on each side. The eggs are rounded and covered with a thick shell.

Occasionally the cysticerci (measles) are found in man, either in the muscles, brain, or skin.

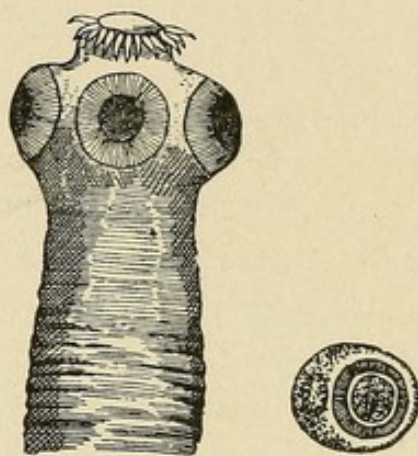


FIG. 12.—Head and neck, and ovum $\times 300$, of *tænia solium*. Embryophore surrounded by vitellus. (Tyson after Gould.)

When found in the muscles, they produce pain, numbness, weakness, and symptoms resembling peripheral neuritis. In the ventricles of the brain, they cause irritative symptoms, and may produce death.

Tænia Saginata.—This is the unarmed beef tapeworm, and is seen in America as well as Europe and Asia. It is longer, thicker, and wider than the armed variety, and may grow as long as 20 feet. The head measures over 2 mm. in breadth, has four large sucking disks, but no hooklets.

The ripe segments are about 18 mm. in length, and 8 or 10 in breadth. The uterus consists of a median stem, with from twenty to thirty-five lateral branches. The ova are large, and the shell thicker than those of the armed worm, but the difference is not striking enough to make it easy to discriminate between the two. The measles occur in beef,

being smaller than the *Tænia solium*. This parasite is acquired in man by the eating of raw beef.

Bothriocephalus Latus.—This tapeworm is found in certain districts bordering on the Baltic Sea, in Holland, Switzerland, and Japan. The very few cases found in the United States are believed to have been imported.

This tapeworm is the longest of the varieties, measuring from 25 to 30 feet, or even more in rare instances. The

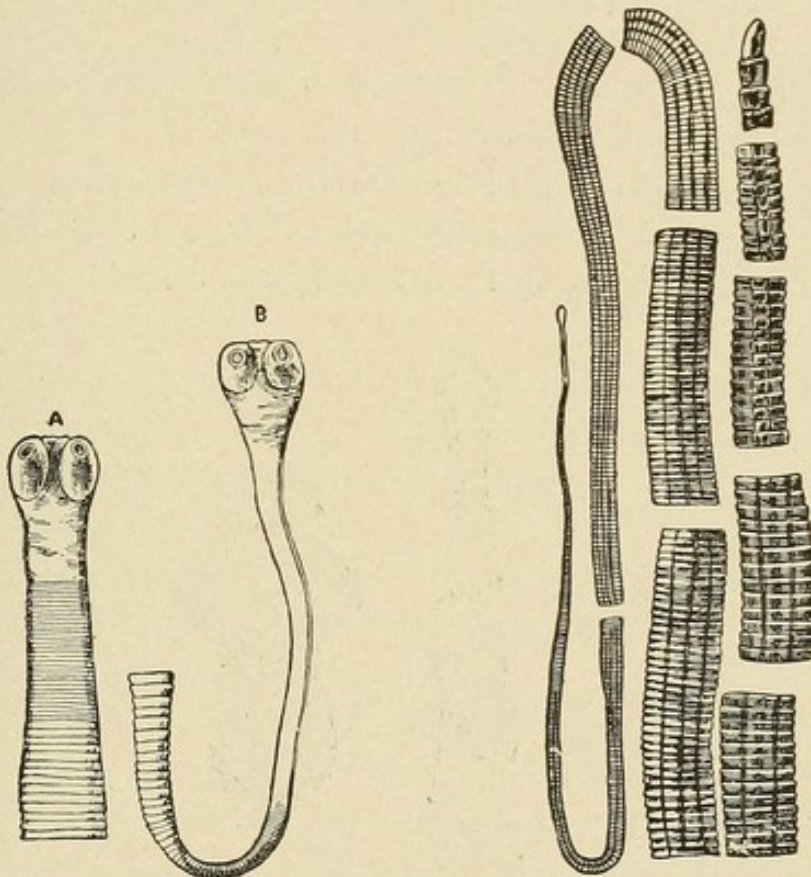


FIG. 13.—Head and neck of *tænia saginata*: A, retracted: B, extended. (Tyson after Gould.)

FIG. 14.—*Bothriocephalus latus*. (Tyson after Leuckart.)

head is elongated, almond-shaped, is about 2 mm. long and 1 mm. broad. It has no hooklets. The neck is narrow and short, about 2 cm. long, and passes at once into the body segment. The body is thin and flat. The full-grown proglottides are nearly square, and show the sexual organs in the center. The uterus shows a median dark line, with four to six lateral branches, resembling a star or

rosette. The eggs are oval and round, with a thin membrane and a lid. The larvæ of this parasite develop in the peritoneum and muscles of pike especially, and of other



FIG. 15.—*Tænia nana*: $\times 10$. (Tyson after Gould.)

fish, as perch or trout. Infection occurs from eating raw or insufficiently cooked fish.

Echinococci are the larvæ of the *Tænia echinococcus* of the dog. This is a tiny cestode 4 or 5 mm. long, consisting of three or four segments, of which the terminal one alone

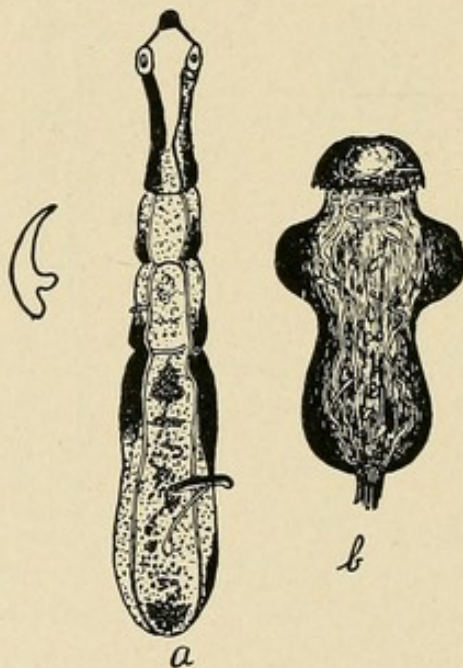


FIG. 16.—*Tænia echinococcus*. (Tyson after Coptin and Bevan.)
a, Adult; *b*, head from echinococcus cyst. On left a detached hooklet, as seen in fluid from cyst.

is mature. The head is small, provided with four sucking disks, and a rostellum with a double row of hooklets.

When these parasites are taken into the body with food or in any other manner, cysts develop in various parts of the

human organism, as in the liver or muscles. These cysts contain scolices, the head of the *tænia* presenting four sucking disks and a circle of hooklets. These cysts have been passed from the rectum. This malady is common in Iceland, rather frequent in Europe, and rare in the United States. It is commonly written of as *Echinococcus* Disease.

Tricocephalus Dispar (Whip-worm).—This parasite is found in the cecum and large intestine of man. It measures from 4 to 5 cm. long, the male being somewhat smaller than the female. It is easily recognized by the peculiar differences between the anterior and posterior portions. The anterior forms three-fifths of the body, is thin and hair-like, while the tail end of the female is more conical and thicker, terminating in a blunt extremity. The tail end of the male is rolled somewhat like a spring.

The number of these worms is variable, as many as a thousand having been counted, while sometimes only ten or fifteen are found. In some parts of Europe they are very common, but are rare in the United States. Occasionally profound symptoms of diarrhea and anemia have accompanied their presence, but often no symptoms appear, though many may be present.

Trichina Spiralis (Trichiniasis).—The trichina in its adult form lives in the small intestine. The embryos pass from the intestines, and reach the voluntary muscles, where they become encapsulated larvæ.

The history of trichiniasis is interesting. In 1822 Tiedemann described the ovoid cysts in the human muscle. Later Owen named it. In 1845 Leidy described it in the pig. In 1860 Zenker discovered in a young girl both the intestinal and muscle forms, and satisfactorily established their connection with the specific symptoms.

The proper understanding of this parasite is most important. Man is infected with it by eating the raw or partly cooked flesh of trichinous hogs, which contain the encapsulated trichinæ. These capsules are digested in the stomach, and the trichinæ set free. They then pass into

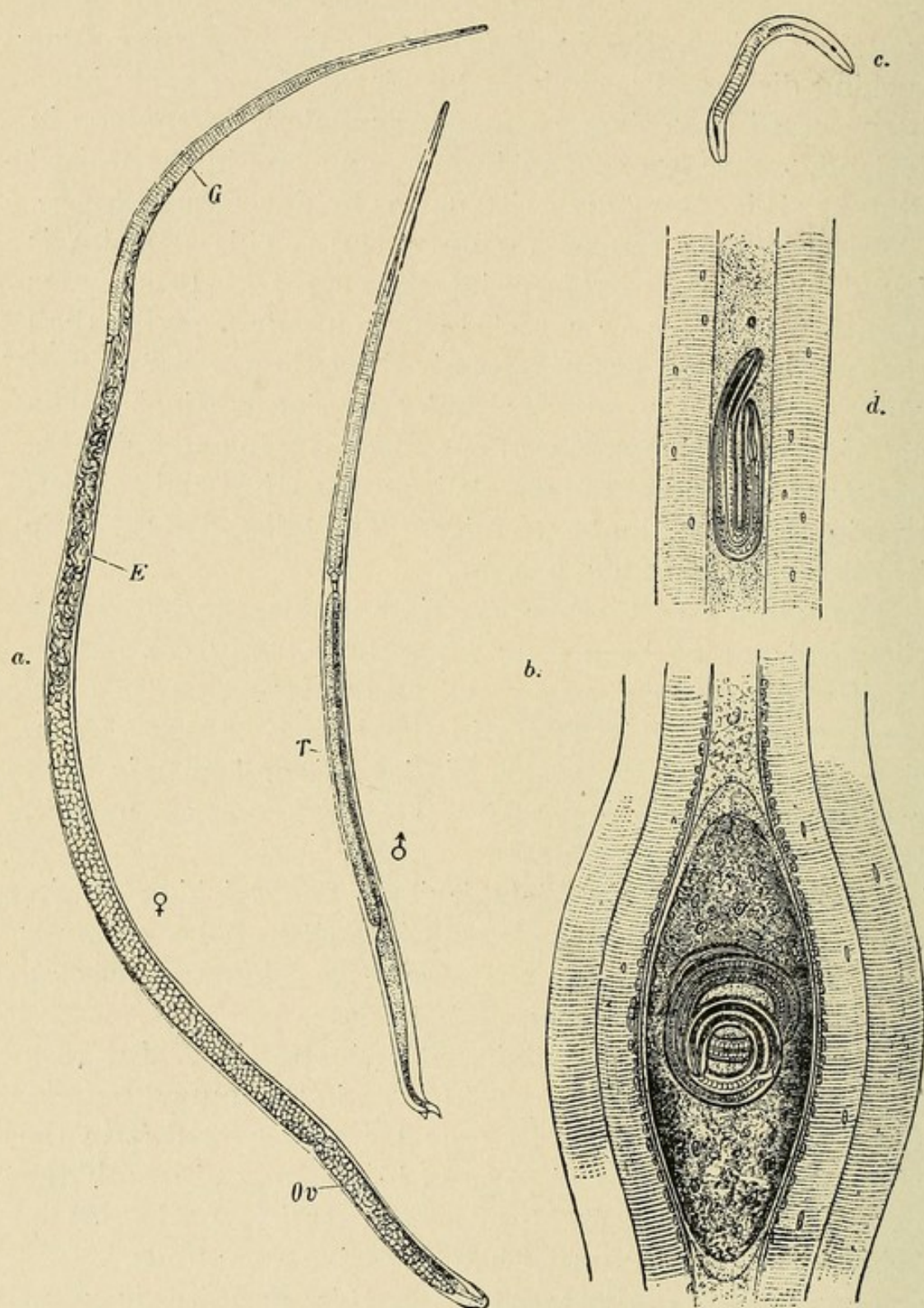


FIG. 17.—*Trichinella spiralis*. (Tyson after Braun.)

a, Gravid female "intestinal trichiura;" *C*, embryos; *G*, vulva; *Ov*, ovary;
b, adult male, "intestinal trichiura;" *T*, testicles; *C*, young larva; *d*, larva in
 musculature; *e*, encapsulated larva in muscle.

the small intestine, and about the third day become sexually mature. By the sixth or seventh day the embryos are fully developed. The young produced by each female trichina have been estimated at several hundred. The female worm penetrates the intestinal wall, and the embryos are probably discharged directly into the lymph-spaces, and thence into the venous system, whence they reach the muscles; and in about two weeks they develop into the full-grown muscle form. A myositis is then caused by their irritation, and they may become encapsulated. The trichinæ may live in these cysts for many years, and they may be surrounded by a calcareous deposit. In the hog the capsule does not readily become calcified, so that the trichinæ are not as readily visible as in man; besides, an apparently healthy animal may be suffering from the presence of the trichina.

The intestinal trichinæ are visible to the naked eye—white glistening worms 4 or 5 mm. long. The male is half this size, with two little projections from the hind end. The caudal extremity is thicker than the head. The muscle trichina is only about 0.6 mm. long and coiled in the capsule, with a pointed head and rounded tail. Theodore Janeway and one or two others have demonstrated the *Trichinella spiralis* in the human blood, and Packard reports finding an embryo in the blood of a patient, and a short time later larger embryos were found in the muscle, not yet encysted.

Strongyloides Intestinalis (*Anguillula stercoralis et intestinalis*; *Leptodera stercoralis et intestinalis*; *Rhabdomena strongyloides*).—This is a small nematode worm found in the feces. It is frequent in the tropics and warm countries in cases of endemic diarrhea, and is occasionally found in this country. Thayer reports three cases from Osler's clinic.

The adult female resembles a filaria, and measures about 2 mm. long and 35 microns wide. The body increases slightly and gradually in size from the head to the posterior

quarter, and then terminates suddenly in a short tail. The male is slightly smaller. These worms are abundant in the duodenum, fewer in the jejunum. The adult worms are seldom found in the stools.

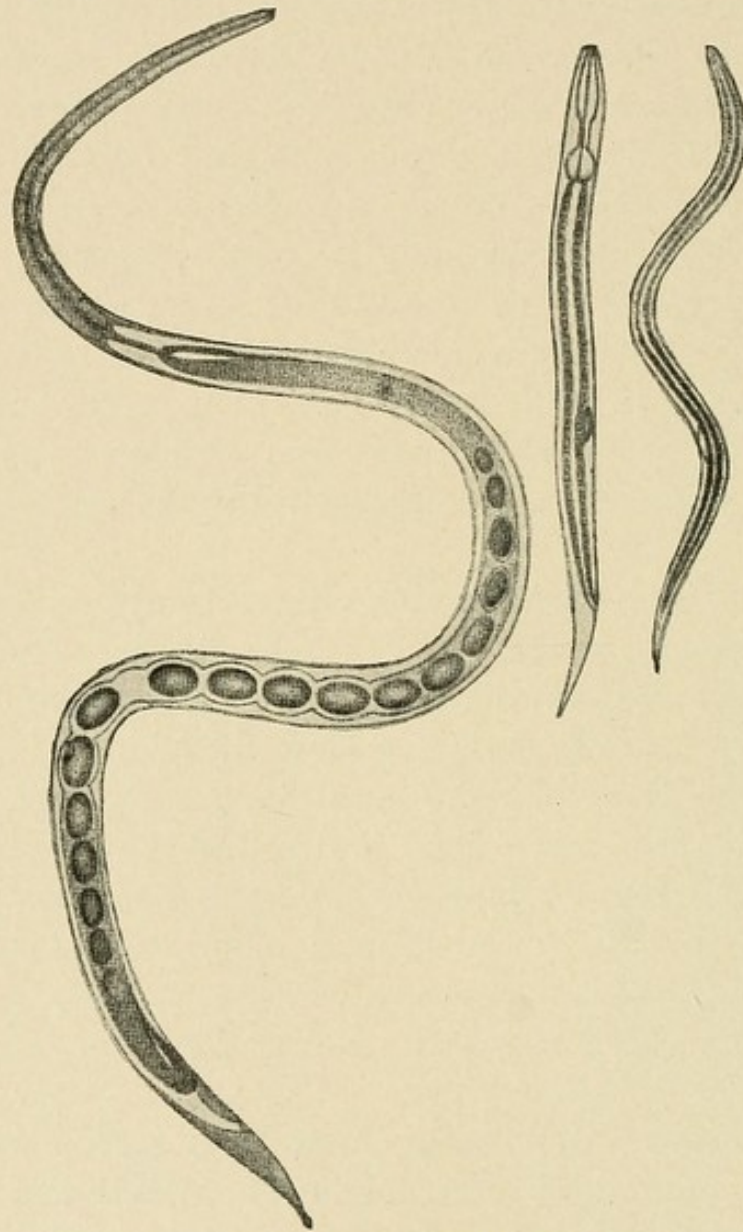


FIG. 18.—*Strongyloides intestinalis*; on the left, a gravid female from human intestine (natural size 2.5 mm.). In the middle, a rhabditiform larva from fresh fecal matter, $\times 120$; to the right, a filariform larva from culture, $\times 120$. (Tyson after Braun.)

The rhabditiform larvæ of this parasite found in the stools are quite active, and the best way to find them is to make a depression in the fecal mass, fill it with water, place the stool then in a thermostat or thermos bottle, and

examine the water next day for the eel-like worms. The eggs do occur, but rarely, and are extremely hard to distinguish from the *Uncinaria duodenalis*.

Trematodes (Fluke Worms; Distomiasis).—Flukes are found in the lungs, liver, small intestine, and in the blood.

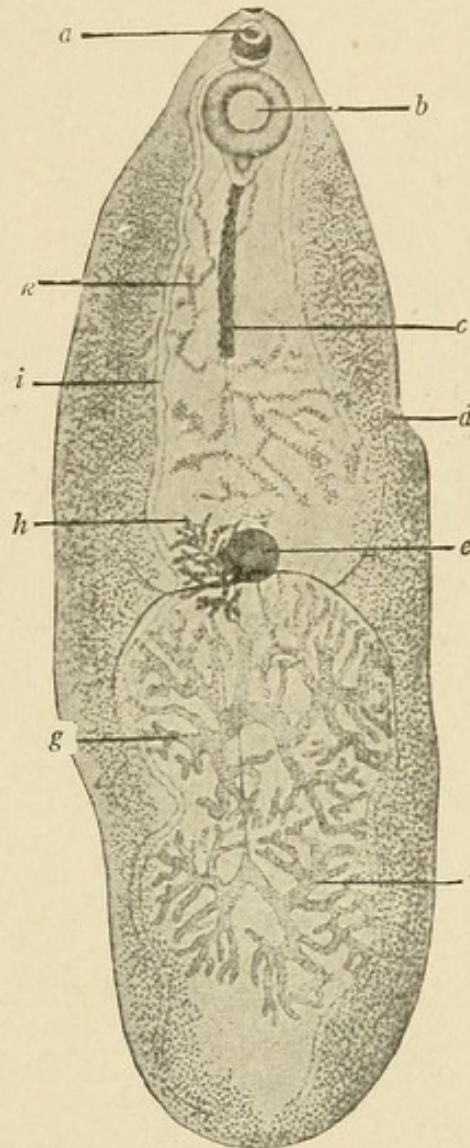


FIG. 19.—*Fasciolopsis buski*. (Tyson after Braun.)

a, Ora sucker; *b*, acetabulum; *c*, cirrus pouch; *d*, vitelline glands; *e*, "shell gland;" *f* and *g*, posterior and anterior testicles; *h*, ovary; *i*, cecum; *k*, uterus.

They are solid worms of a leaf or tongue shape, possessing a clinging apparatus in the form of oral and ventral sucking cups, which vary in number. Sometimes they have a hook-like projection. The intestinal canal of this parasite

is without an anus and split like a fork. They are generally hermaphroditic.

Flukes have been reported and carefully studied in the far East, especially in China, Japan, and India. Houghton reported that 8 per cent. of all male patients admitted to the

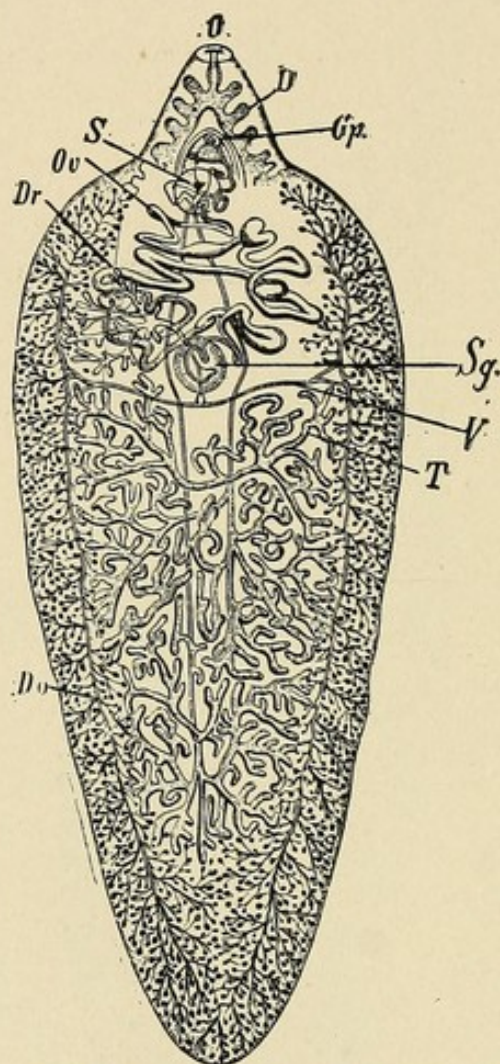


FIG. 20.—Showing the sexual glands of *fasciola hepatica*; 5×1. (Tyson after Braun.)

O, Oral sucker; D, intestinal ceca; Do, vitelline glands; Dr, ovary; Ov, uterine canal; T, testis; Sg, "shell gland;" V, transverse vitelline duct; Gp, genital pore; S, ventral sucker.

Wuhu General Hospital, Anhui, during one year were infected. Nearly all these patients were farmers and boatmen.

Well-marked cases of this infection show enlarged liver and spleen, cachexia, eosinophilia, ascites, greatly exaggerated knee-jerks, and bloody stools. The leucocyte

count is not increased, but varies from 2000 to 8500 per cubic millimeter.

The ova may be found in the blood, but they are noted mostly in the stools, although they are found with some

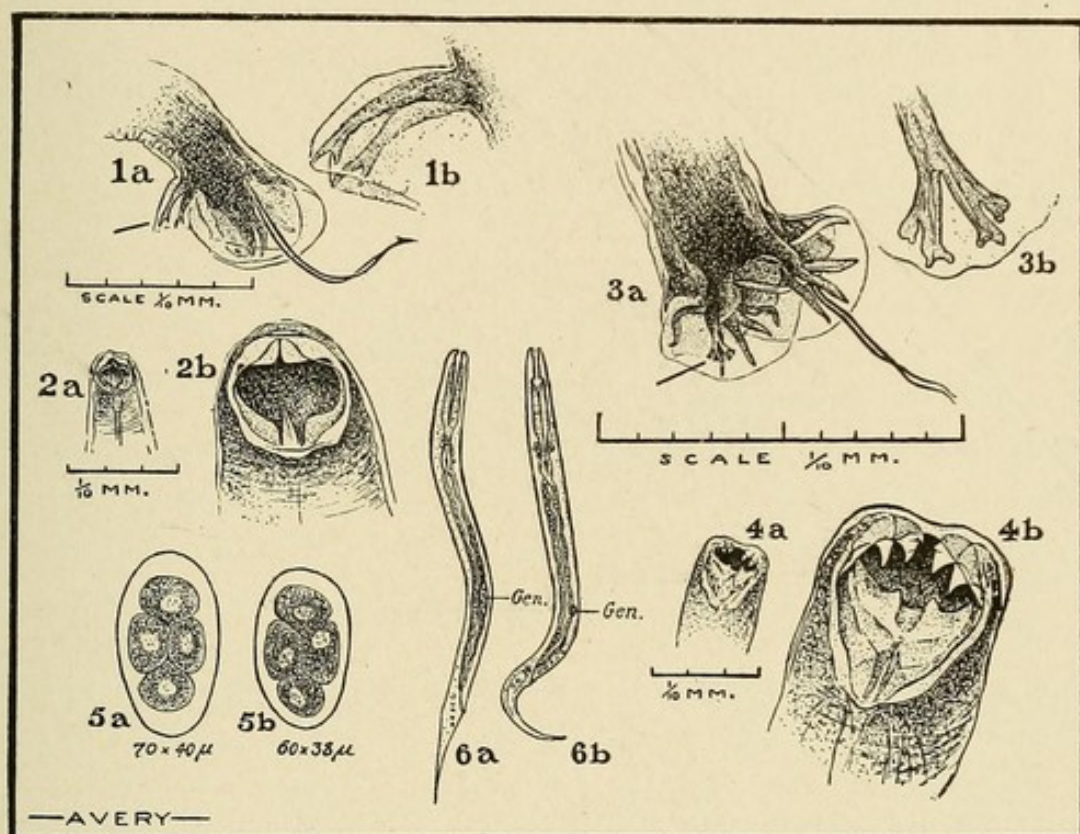


FIG. 21.—Copulatory bursa of *Necator americanus*, showing the deep cleft dividing the branches of the dorsal ray and the bipartite tips of the branches; also showing the fusion of the spicules to terminate in a single barb. Scale 1/10 mm. (Stitt.)

1b, Branches of dorsal ray magnified; 2a, the buccal capsule of *N. americanus*; 2b, the same magnified; 3a, copulatory bursa of *Anchylostoma duodenale*, showing shallow clefts between branches of the dorsal ray and the tridigitate terminations, spicules hair-like; 3b, the dorsal ray magnified; 4a, the buccal capsule of *A. duodenale*, showing the much larger mouth opening and the prominent hook-like ventral teeth; 4b, the same magnified; 5a, egg of *N. americanus*; 5b, egg of *A. duodenale*; 6a, rhabditiform larva of strongyloides as seen in fresh feces. 6b, rhabditiform larva of hookworm in feces eight to twelve hours after passage of stool.

difficulty. In size they resemble the ova of the *Ascaris lumbricoides*, for which, under the low power, they may be easily mistaken. The latter ova, however, are much more refractile, and, since their envelopes are sticky,

gather débris in the stool and leucocytes in the blood. In the fresh stool the embryo in the egg is quiescent and shaped like a melon seed; later there is motion of the cilia. The free-swimming miracidium is seen only after the stool has stood about ten hours. It can be kept alive in water for four or five days.

Among others in the trematode class may be mentioned the *Fasciolopsis buski*, found so far only in the far East; the *Distomum lanceolatum*, a very rare parasite which hatches

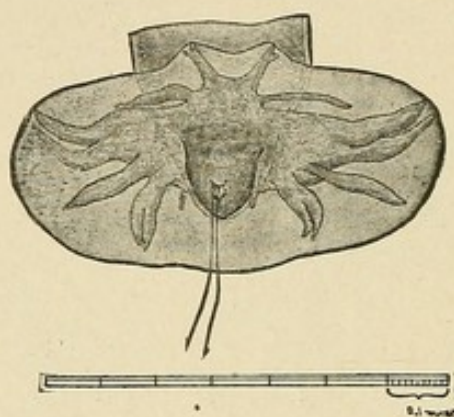


FIG. 22.—Tail, with expanded bursa, of male *Necator americanus*. (Tyson and Fussell.)

only on the intestine of some intermediary host, perhaps the slug, and has been found in the intestines and biliary ducts of European and American domestic animals; the *Fasciola hepatica*, or liver fluke, a widely spread parasite inhabiting the bile ducts of some herbivorous mammals. These are so frequently found, that their history and detailed description may be left to special works on parasites.

Uncinaria Duodenalis; Uncinaria Americana; Hookworm. *History.*—The history of our knowledge of this important parasite is most interesting. As has so often been found, where parasites of this class are concerned, members of the genus were first discovered in the lower animals, the worm being by no means confined to man. A German clergyman, by the name of Goeze, in 1792 was the first to describe it, his observations having been made on the particular species of hookworm that inhabits the

intestinal tract of the badger. Seven years later Froelich discovered a somewhat similar worm in the intestinal tract of the fox, and gave to the parasite our present appellation "hookworm," being the literal translation of the German "Haakenworm." He it was who also originated the name, "Uncinaria," this being the zoological name for the genus in which this worm is still included by most writers.

This worm was first observed as a human parasite in 1838 by an Italian named Dubini, and six years later he described it by the name of *Anchylostoma duodenale*. Ten years later both Bilharz and Griesinger proved that the profound anemia so common in northern Africa, and known as "Egyptian chlorosis" was certainly produced by this parasite. In 1878 it was shown that laborers working on the St. Gotthardt tunnel were almost all infected with the worm, and Perrocito, who discovered this, also demonstrated that the disease prevailed in the mountains of northern Italy, and was called "Mountain anemia" or "Mine anemia."

Following these observations, investigators from different parts of the world began to report this worm with great frequency, and at present it is known to be prevalent in every part of the globe where climate conditions favor its development.

Writings of many American physicians show beyond question that hookworm disease, the victims of which were called "dirt eaters," has prevailed in this country for at least a hundred years, and no doubt it has existed ever since the importation of slaves began. Notwithstanding this, the true nature and cause of the trouble was not recognized until recent years, and the first case of hookworm disease, where the diagnosis was definitely established, was reported by Blickhahn in 1893. In 1902 Stiles showed that the parasite as found in America differed in some minor particulars from those found in Egypt and southern Europe, and he gave to what was supposed to be our new-world species of the worm the name of *Uncinaria Ameri-*

cana. At that time it was also sometimes called "Necator Americanus," or the American murderer.

The hookworm belongs to the order of nematodes or round worms, being related to and much resembling the small "pin worm" which is well known. On careful examination, however, the two present marked differences, which may be detected with the naked eye by one well acquainted with their peculiarities. Microscopically they differ still more. Like the pin-worm, the hookworm is small, being in the case of the female about $1/2$ inch long, and about the width of an ordinary hat pin; the male is slightly smaller than the female. In the fresh state the worm is often of a pinkish gray; after death, however, it assumes a dull grayish tint. Unlike the pin-worm, this parasite is not found, except in rare instances, in the feces, and its presence in the stools plays no part in making the diagnosis of the disease.

Like many other diseases or infections, while the symptoms may point with almost a certainty to the presence of these worms in an individual, the only way to be absolutely sure is to examine the feces for the eggs. This examination is a simple one, requiring only a glass slide upon which to spread the specimen of feces and a low-power microscope. As the eggs are, as a rule, very numerous, the diagnosis can usually be made quickly, although in some instances, where the number of worms is small, the finding requires a more careful study. The eggs are found in the stools either unsegmented or during the early stages of segmentation. They have a clear thin shell. While the yolk will show all stages of segmentation, it is rare to find eggs with an undivided yolk, those divided into four, eight, sixteen, or more segments being the most common. The eggs should be searched for in the feces by mixing a small amount with a drop of water on a slide. The older the feces and the warmer the weather, the more advanced will be the segmentation.

To find eggs in stools, where they are not numerous, it is

well to follow the suggestions of Dock and Bass. The stool is diluted with about ten volumes of water, is strained through two or three layers of gauze in a funnel, and is then centrifugalized until the sediment is thrown down. The supernatant fluid is poured off, more water is added, the tube is well shaken, and the stool again centrifugalized. Since hookworm eggs stick to glass in a peculiar way, a drop of the sediment is put on a glass slide, and the slide is gently immersed in water, which will wash off much of the sediment, while the eggs will stick to the glass. Another drop of the sediment is then put on the same spot, and the immersion repeated. This being repeated several times, the eggs will be easily observed, if any are present. The disadvantage of this procedure lies in the fact that other varieties of eggs, which might be in the specimen are lost. The adult hookworms may be found in the sedimented stool after a small dose of thymol followed by oil. The adults are usually red from the blood with which they are filled. They abound in the duodenum, ileum, and jejunum, sometimes many thousands in one person, though in most instances, only a few hundred. While they do not multiply in the intestines, they may live there for years, and the clinical symptoms are not a fair criterion as to the number infesting the intestinal tract of any individual.

Larvæ of flies are sometimes present in stools. This occurs when the patients evacuate their bowels in exposed places, where the flies can deposit their eggs on or just inside the anal orifice. These larvæ are sometimes passed in astonishing quantities, generally to the great consternation of the patient. Their identification should present no special difficulty, and, should there be any doubt, if some of the larvæ together with a small amount of feces, are kept in a vessel over which is thrown netting or cheesecloth, so that air may freely enter; and if this is kept in a warm place for several days, the flies will hatch out, and their particular variety be known.

Plant Parasites.—Various yeasts are often present in

normal stools, though moulds are rare. Blastomycetes have been found in the stools of patients with systemic infection with this parasite. The *Oidium albicans* has occasionally been found in children. *Sarcinae* are frequently found in cases of dilated stomach, especially where the hydrochloric acid is deficient. When present in large numbers, they may aggravate a diarrhea by the products of their fermenting processes.

Microorganisms.—These form a large portion of the stool, most of them being dead. Almost any organism may appear accidentally in the feces, but there is a flora of bacteria so constantly found, that their presence may be considered normal. Among the most important are the *Bacillus coli*, *Bacillus lactis ærogenes*, *Bacillus bifidus*, *Bacillus ærogenes capsulatus* (gas-forming), and *Bacillus putrificus*.

The *Bacillus coli* is of importance in reference to the indolic type, and some observers are disposed to accord this bacillus a wide range of activity in the etiology of various diseases. The *Bacillus ærogenes capsulatus* is concerned in the saccharobutyric type of intestinal putrefaction. The *Bacillus lactis ærogenes* causes fermentation of milk and the production of lactic acid. These lactic-acid-producing bacilli are held to be antagonistic to putrefactive changes and much investigation has been entered into under this assumption. To even partly "sterilize" the intestinal tract, however, seems rather chimerical to most individuals. The *Bacillus bifidus* appears to be a normal inhabitant of the nursing infant, disappearing soon after the child is weaned. When it persists, its presence would seem to be associated with certain symptoms of intestinal intoxication. Its most characteristic shape is like the letter Y, hence its name. Involution forms are most common. The greatest interest attached to this organism is that it is one of the few intestinal organisms which is not discolored by the Gram method. It is a strict anærobe.

There might be mentioned also the *Bacillus pyocyaneus*,

Bacillus tetani, the *Staphylococcus* group, and many of the thermophilic and acidophilic organisms, but a detailed description would be superfluous in a work of this character. It may be stated, however, that the present opinion is that the lower bowel, at least, is not a favorable habitat for living organisms, and that most of them found in the stool are dead.

Tubercle Bacilli.—In searching for these it is not necessary to digest a solid stool. Mucous masses should be selected, especially the blood-stained or purulent particles, and these treated as sputum. In intestinal tuberculosis, the bacilli are often present; still in many cases of undoubted presence of this disease none are found. Probably many are destroyed before their exit with the stools, especially when there is much fermentation going on in the intestinal tract. When found, their origin from swallowed sputum must be considered, and the diagnosis of tuberculosis in children has been made this way.

Page's method, as cited by Emerson, is to suspend a piece of the solid stool half the size of a pea in 1.5 c.c. of distilled water, add 54 c.c. of a mixture of equal parts of absolute alcohol and ether, and centrifugalize for ten minutes; a smear made of sediment is fixed to the slide with a drop of egg-albumen, and stained as usual.

Bacillus Typhosus.—In typhoid fever is seen the "pea-soup" stools, copious in quantity, watery, of a foul odor, alkaline in reaction, with many triple phosphates. In some patients limited to a milk diet, diarrhea is less common, and in occasional cases, constipation is present. When the stool is blood-tinged, it sometimes presages a hemorrhage, though this is not a sure indication. Pus is rare in typhoid stools, unless in the presence of severe ulceration.

To grow this bacillus from stools a special medium is required, and for a detailed description of the preparation of this medium, the reader is referred to special works on clinical diagnosis. One method, as shown by Peabody and

Pratt, is to first use Malachite-green bouillon as an enriching medium. (The beef bouillon they used contained 1:1000 malachite green, and had an acidity of 0.5 per cent. to phenolphthalein, but the amount of dye and acidity must be determined for each preparation of the malachite green used.) While this completely inhibits the growth of *Bacillus coli*, *Bacillus typhosus* will often grow luxuriantly in it, although the dye does exercise some restraint over this organism. Tubes containing 15 c.c. of this medium are

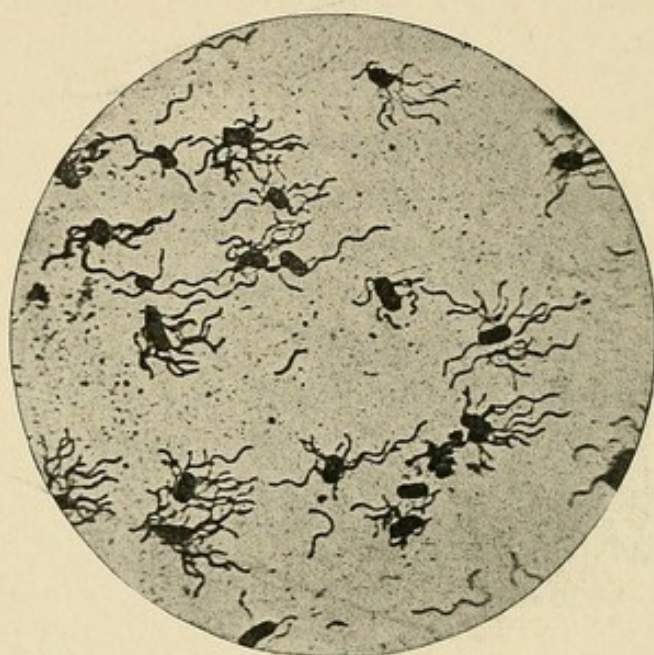


FIG. 23.—*Bacillus typhosus*, stained to show flagella.
(Oertel after Frankel and Pfeiffer.)

inoculated with one drop of the fluid stool or suspension of the stool, and are left in the thermostat eighteen to twenty-four hours, and then one drop of the culture is rubbed over the surface of a Drigalski-Conradi plate.

While the positive identification of the *Bacillus typhosus* is both useful and interesting, I may be pardoned for remarking that there are several other methods of diagnosis in this disease which are as satisfactory clinically, and are both easier and quicker.

***Spirillum Cholerae Asiaticæ*.**—This is a small, curved, "comma-shaped" bacillus. It is actively motile, and has a single long delicate flagellum at one end. It does not

produce spores, and involution forms are common. It stains readily in all bacterial stains, and is decolorized by the Gram method. It grows rapidly at ordinary room temperature on all commonly used media, in fact on some media too poor for other organisms to grow upon. It will not grow on potato at room temperature, but will in a thermostat. It is actively aerobic. It grows in a characteristic manner on gelatin which it liquefies, and on the gelatin plates the colonies soon appear as minute white

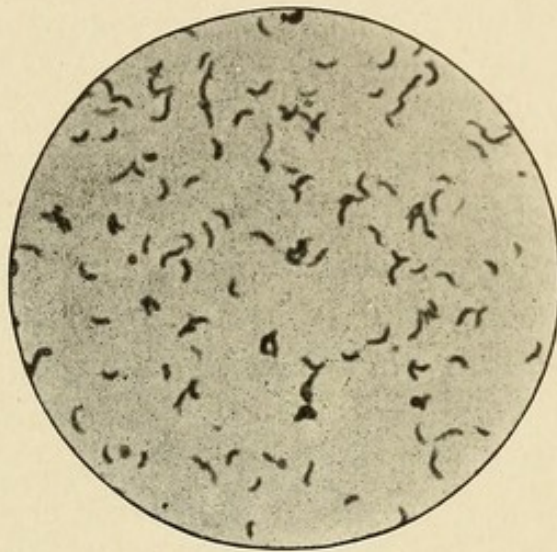


FIG. 24.—Cholera spirilla. (*Pitfield.*)

points, resembling fragments of broken ground glass with granular irregular margins. After liquefaction begins, the colony sinks into the little cup of liquid cloudy gelatin which surrounds it as a halo. This organism produces much indol and is sensitive to acids.

The stools in severe Asiatic cholera are quite characteristic. They are copious, ejaculated from the bowel with but little effort, and the water in them, which in the main is secreted by the intestinal wall, is dotted with gray flecks, these flecks consisting of masses of epithelial cells, cholera spirilla and fat droplets. They have but little fecal odor, are alkaline, sometimes blood-stained, and contain little albumen and much salt.

There are many other spirilla, pathogenic and non-pathogenic, but their identification and differentiation require special study and equipment. Some of them can only be recognized by a specific test of inoculation of a guinea-pig or other animal.

Cholera nostras gives rise to a profuse diarrhea not unlike the Asiatic variety, and in times of epidemic, it may be hard indeed to distinguish between the two. The true diagnosis of Asiatic cholera may be generally made directly from the stools, but during epidemics of this disease all severe diarrheal maladies should be regarded with extreme suspicion, whether or not any pathogenic organisms may be found in the feces.

The Dysentery Bacillus (Shiga's Bacillus).—This in shape and in some of its cultural characteristics resembles the *Bacillus typhosus*. It is a short organism with rounded ends, is non-motile, and is inclined to involution forms. This organism stains readily in the commonly used aniline dyes, showing a tendency to polar staining, and is decolorized by Gram's method.

This organism, and others in its closely related class, which have been identified by His, Flexner, Harris and others, are the cause of "bacillary" dysentery, which may occur sporadically or in severe epidemics. This form of dysentery may begin as an acute gastroenteritis with a diarrhea, which increases in severity until the stools lose their fecal character, are frequent, scanty, and painful, and contain chiefly mucus and blood and numerous organisms of dysentery.

In recognizing these organisms the agglutination tests are most important. The blood serum of a patient infected with an organism belonging to the Flexner-Harris type will agglutinate the pure culture of this organism in dilutions of 1:1000. In the Shiga bacillus, agglutination is less complete.

The physician will find that time, thought and patience in the field of investigation of feces will be well spent. This

is in many respects a fallow field, and, as research work in it proceeds, many and valuable will be the disclosures.

A test-meal from the stomach represents the normal or abnormal activities of only a small portion of the alimentary tract. The feces in many ways constitute an index of the workings of the *whole* alimentary tract, and when rightly read present a picture of the highest possible diagnostic value.

CHAPTER IV

EXAMINATION OF THE ESOPHAGUS, STOMACH AND INTESTINES BY THE ROENTGEN RAY

Perhaps no discovery of recent times has so advanced human knowledge concerning the intimate appearance and workings of the abdominal viscera as the Roentgen or X-ray. Especially in obscure conditions of these organs has this ray come to our aid, and, where formerly it was necessary to perform an exploratory laparotomy to clear up an uncertain diagnosis, the Roentgen ray now, in many instances, points out the real pathologic condition with unerring precision. Furthermore, in no department of X-ray diagnosis have such rapid advances been made as in the examination of the abdominal organs. The ordinary classical methods of physical examination have long ago penetrated the darkness of the lungs and chest, but the abdomen has been a *terra incognita* in many respects, till these rays enabled us to pierce its most hidden recesses.

On the other hand, however, this method requires special and expensive apparatus, expert technic, and trained judgment; there is connected with it some danger, unless proper precautions are taken, and, except where employed in hospitals or special institutions, it is quite an expensive procedure, beyond the means of individuals in ordinary circumstances. These disadvantages will probably disappear in the course of time.

The X-ray is most useful in deciding whether or not an operation is advisable, and, while many early cases of malignant disease have been diagnosed and relieved, many also have been spared the misfortune of needless operations.

In the diagnosis of diseased states of the esophagus, the X-ray has been partly considered. In the diagnosis of

diverticula, or the early diagnosis of cancer of the gullet, it is invaluable.

The appearance of the coursing of the bismuth and milk down this passage has been described, and any tortuous channels leading off from the esophagus are easily observed through the fluoroscope.

One difficulty in forming a correct idea of the size of any possible sacculation in the esophagus has been in the rapidity with which the contents pass through into the stomach. In the normal individual, where there is no marked constriction either in the lumen of the passage or at the cardia, fluids reach the cardiac end of the gullet in from five to ten seconds and solids in about twice that length of time. To obviate this quick emptying, it is necessary, in order to obtain a sharply defined outline of the esophageal walls, to plug in some way the lower end of the tube.

The best and most practicable method of accomplishing this has been devised by Bassler, and described by him in the *Journal of the American Medical Association*, April 26, 1913.

For this purpose he uses a simple device made by Tiemann and Company, which may be described as follows: To a 120 cm. (4-foot) length of rubber tubing 4 mm. in diameter, is attached a rubber bag covered with a reinforcement of silk, and having a brass tip at its lower end to give it weight. At the upper end of the tube is a cock. An ordinary surgical syringe of about 2-ounce capacity containing water is used to distend the bag, which, when distended is fusiform in shape, and measures about 10 cm. in its circumference. The tube is lubricated with glycerin and passed in the usual manner of a stomach-tube. It is allowed to go down to beyond a mark made on the tube, about 16 inches from the upper end of the bag. After the bag is in the stomach, it is filled with water by means of the syringe. This being done, the cock is closed, and the tube firmly pulled so that the elastic bag of water is drawn

tightly into the funnel-shaped cardiac orifice of the stomach. The patient is now told to exhale completely so as to raise the dome of the diaphragm to a high level, and the external tube held tightly at this point. It is then fastened about the forehead or around the neck of the patient with a secure knot. Sometimes an external weight is preferable to hold the bag up against the cardia, and weight of $1/2$ to 1 pound is generally sufficient. There being a silk string inside the tube, there is no danger of its breaking. The cardiac orifice being occluded, a mixture of bismuth, acacia and water is run into the esophagus from an irrigating jar by means of an ordinary urethral catheter, a rather large one being best.

About 150 c.c. of the bismuth suspension are placed in the irrigating jar, and allowed to flow in until the bismuth mixture appears in the mouth, showing that the gullet is filled. With the patient standing, radiographs are then taken in the lateral dorsal position, with the left back to the plate. Such plates show the outline of the esophagus with any changes present.

By this means of examination, irregularities of the walls can be observed, and it is possible to make a diagnosis of carcinoma of the gullet long before any stenosis appears.

After the plates are taken, the tube is allowed to relax so the bismuth will flow into the stomach, the cock is opened, and a slight upward tension causes the water to flow out of the bag either by pressure or siphonage, and the apparatus is then withdrawn from the esophagus.

This method is not practicable when stenosis is present.

In 1904 Rieder devised the bismuth meal, in which bismuth was given mixed with milk, oatmeal or any other pultaceous substance. This was followed by the bismuth suspension in and sedimentation by Holzknecht; after this came the double meal by Haudek, and the discovery of antiperistalsis by Jonas. At present barium sulphate has almost superseded bismuth, as it not only gives a more homogeneous appearance of the

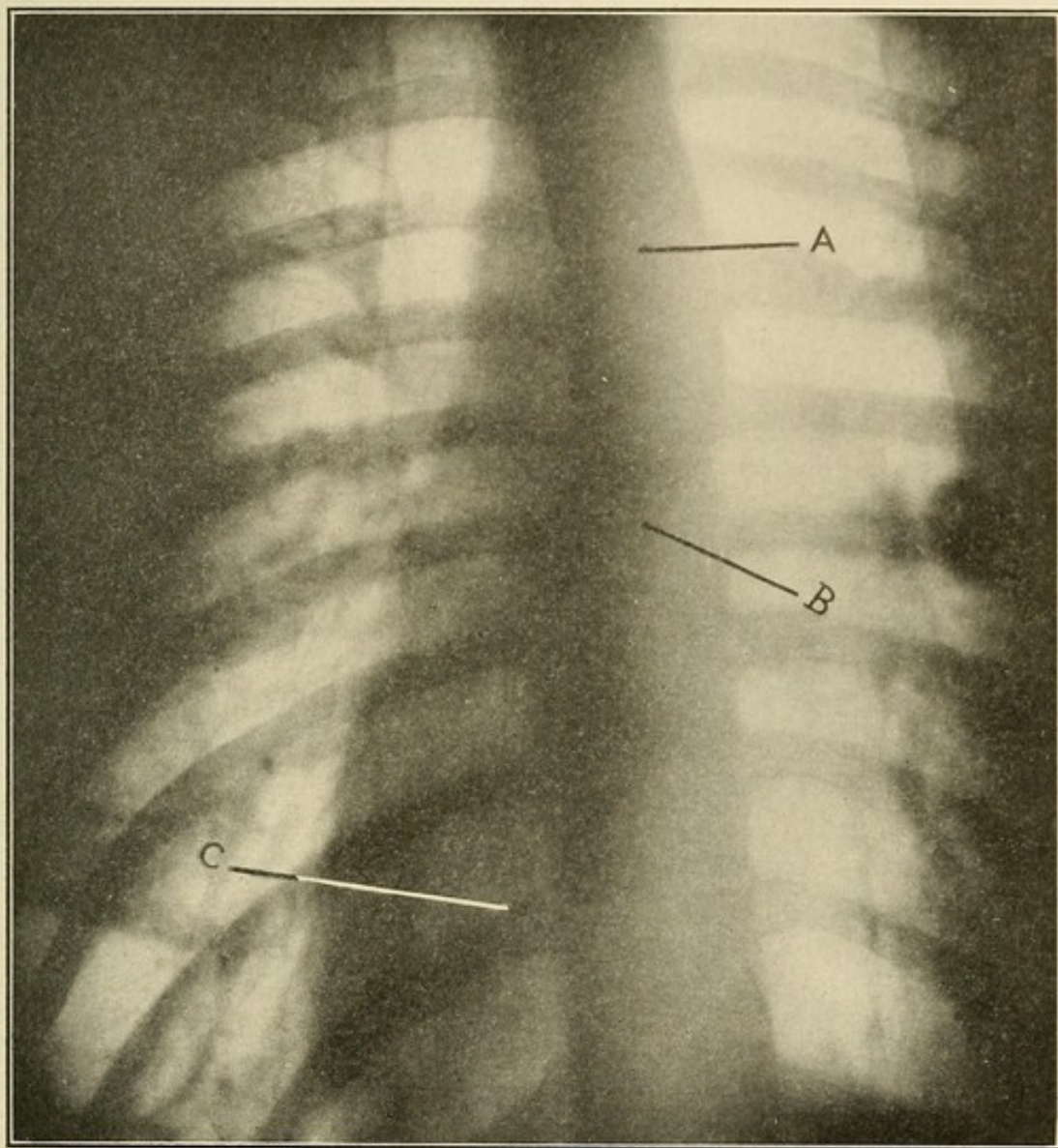


FIG. 25.—Stricture of esophagus from drinking acetic acid. Patient of Dr. Niles.
(Dr. John S. Derr.)

A, Esophagus; B, stricture; C, heart shadows.



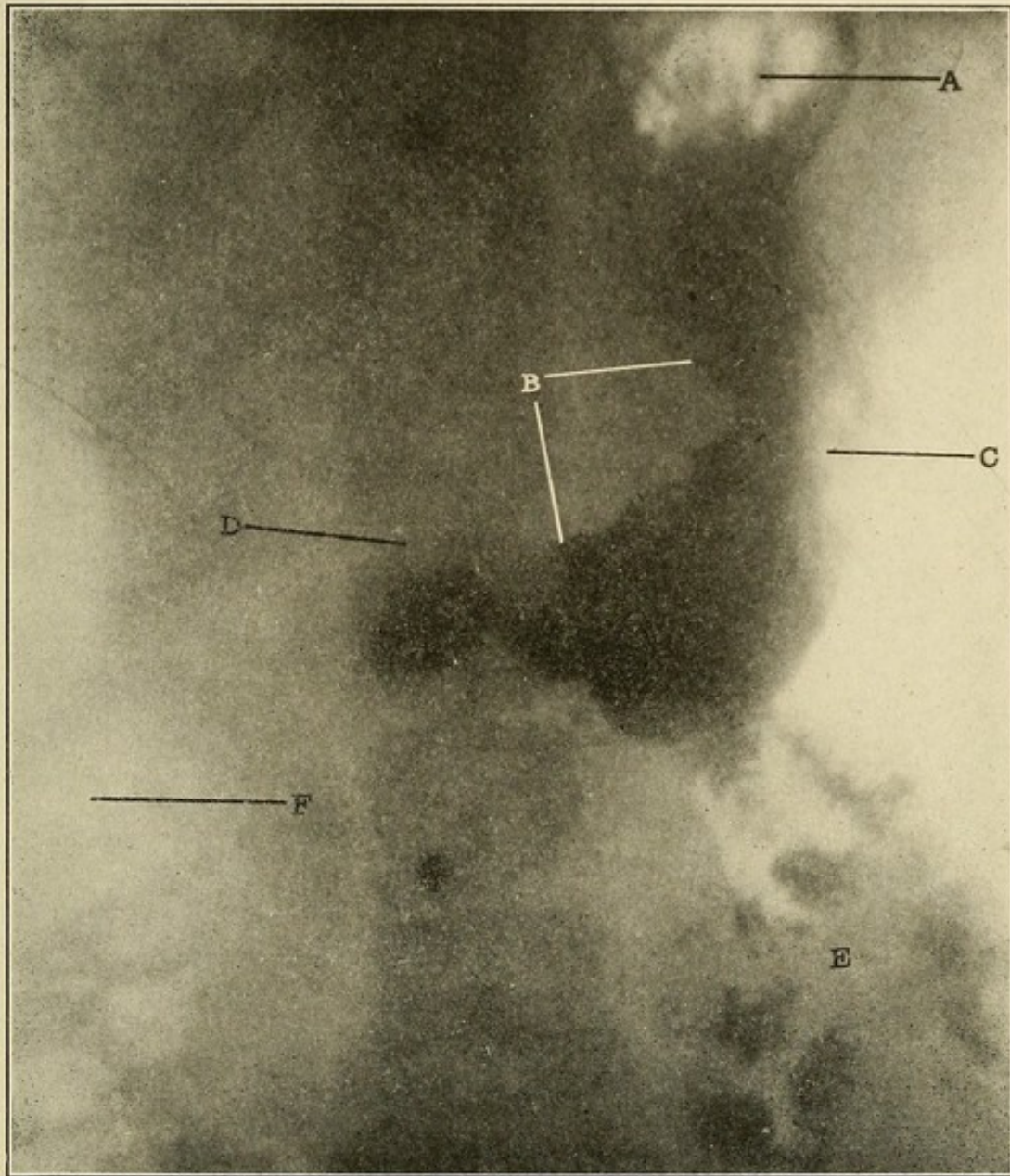


FIG. 26.—Gastric carcinoma.

A, Gas in fundus; *B*, marked involvement by new growth of the lesser curvature and pars pylorica; *C*, metastases in the outer part of the body of the stomach; *D*, duodenum; *E*, bismuth in the small intestine; *F*, gas in the splenic flexure of the colon.

Diagnosis proven by operation in St. Luke's Hospital. Markers at the ensiform and umbilicus. (*Made in the X-ray laboratory of Dr. Anthony Bassler, New York City.*)



mass in the stomach, but interferes less with the motility of that organ.

The double test-meal is given as follows: the patient takes the first bismuth meal at 7 a. m. Six hours later, 1 p. m., he presents himself at the office of the radiographer. A glance through the radioscope suffices to show the amount and shape of the bismuth residue, and give an idea of the most important point in the diagnosis—viz., the motility of the stomach. If the stomach be empty, a good idea of the motility both of the stomach and the intestines may be gained by observing the position of the bismuth head and tail in the colon.

The patient then takes the second bismuth meal, consisting of a heavy suspension of bismuth carbonate in water. The second meal defines the shape, size and position of the organ, and completes the Roentgen diagnosis.

Dr. Guido Holznecht, of Vienna, has recently furnished a very complete study of the significance of different symptom complexes, as disclosed by X-ray examination, and published in Archives of the Roentgen Ray. Acknowledgments are made to him for these groupings.

Symptom-Complex I.

1. Bismuth residue after six hours.
2. Normal stomach shadow in the screen.
3. Achylia.

Diagnosis.—Small carcinoma of the pylorus.

This symptom group is almost always associated with stenosis of the pylorus due to a small carcinoma. There is stagnation and loss of tone, as evidenced by the bismuth residue, which may be a small one. The patient may suffer from little or no disturbance, except loss of appetite, and slight malaise. This diagnosis is made more plain, when we remember that, unless there is stenosis, in the presence of achylia there is generally hypermotility, and the stomach would empty itself in two or three hours. Ordinary atonic delay of gastric evacuation never lasts as long as six hours, and the cause must be either stenosis or spasm of the

pylorus. Pylorospasm is never associated with achylia, but with hyperacidity.

The above is not a mere empirical symptom-complex, but a logical one, and a decided advance in the early diagnosis of carcinoma. Although the recognition of the achylia required the use of a test-meal and a stomach-tube, the clear conception of the stenosis and the accompanying circumstances could not have been reached so surely in any other manner.

The radiological examination also shows that the new growth is small and operable, since otherwise there would be some defect in shape or extent of the bismuth shadow. Diffuse contracting carcinoma, or deep circumscribed scirrhus would also show symptoms of achylia and loss of motility. This, however, would not give a normal gastric picture, but one showing shrinkage and defective filling.

Symptom-complex I (A).

1. Bismuth residue after six hours.
2. Normal shadow of the stomach.
3. Schwarz's fibrodermic capsule intact after five hours.

Diagnosis.—Small carcinoma of the pylorus.

Symptom-complex I (B).

1. Bismuth residue in stomach after six hours.
2. Head of the bismuth column in hepatic flexure.
3. Normal stomach shadow.

Diagnosis.—Small carcinoma of the pylorus.

The examination of the stomach for such a symptom group as the above is much more practicable when the "double bismuth meal" is taken. The patient should take a Rieder meal at 7 a. m., and should see the radiographer at 1 p. m. A previous test-meal has shown achylia. At a glance it is observed that there is a residue in the stomach, and that the head of the bismuth column is in the splenic flexure. Carcinoma is at once suspected. The second Rieder meal is now given, an aqueous suspension of bismuth. The form, position, size, and evacuation of the

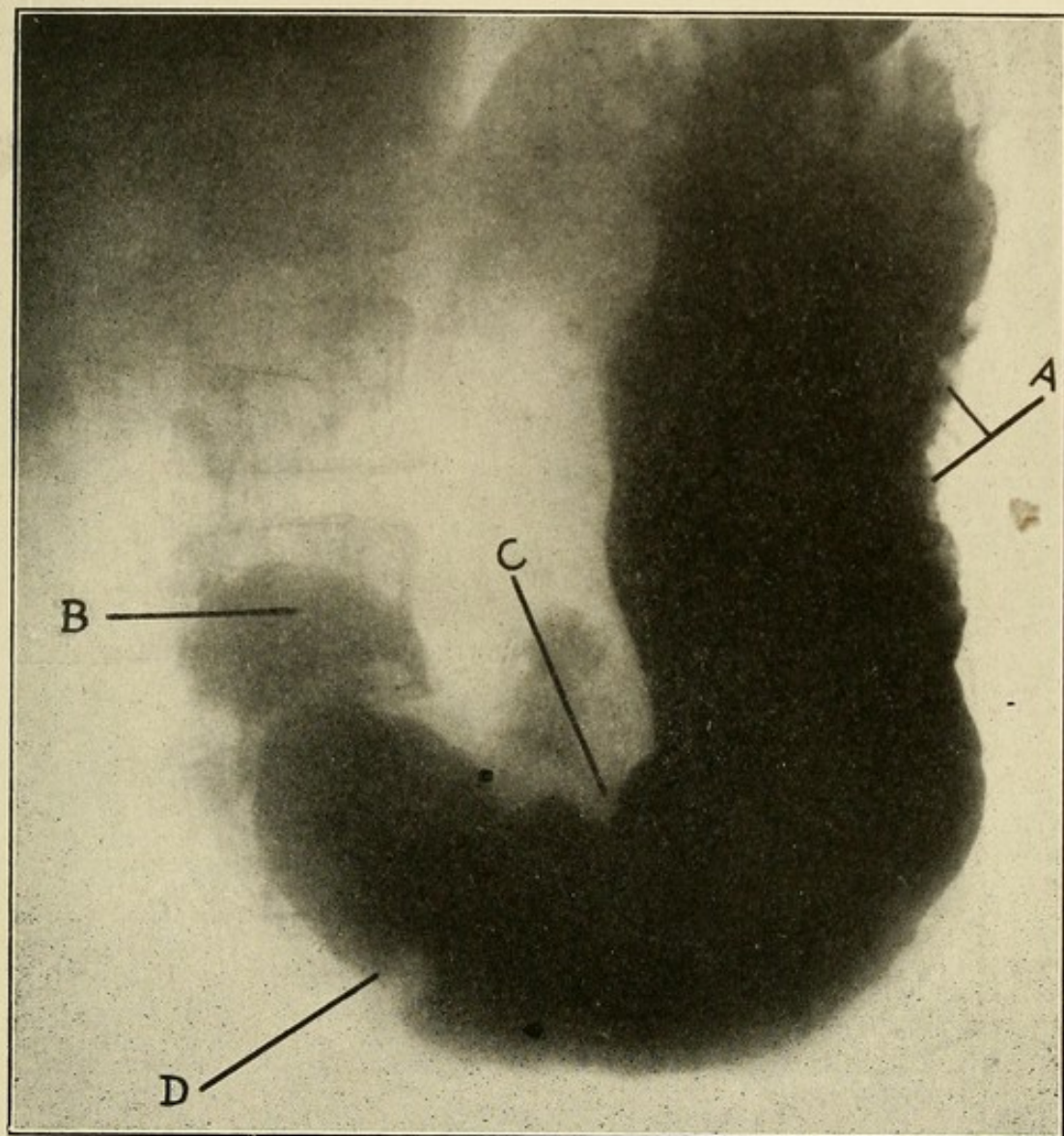
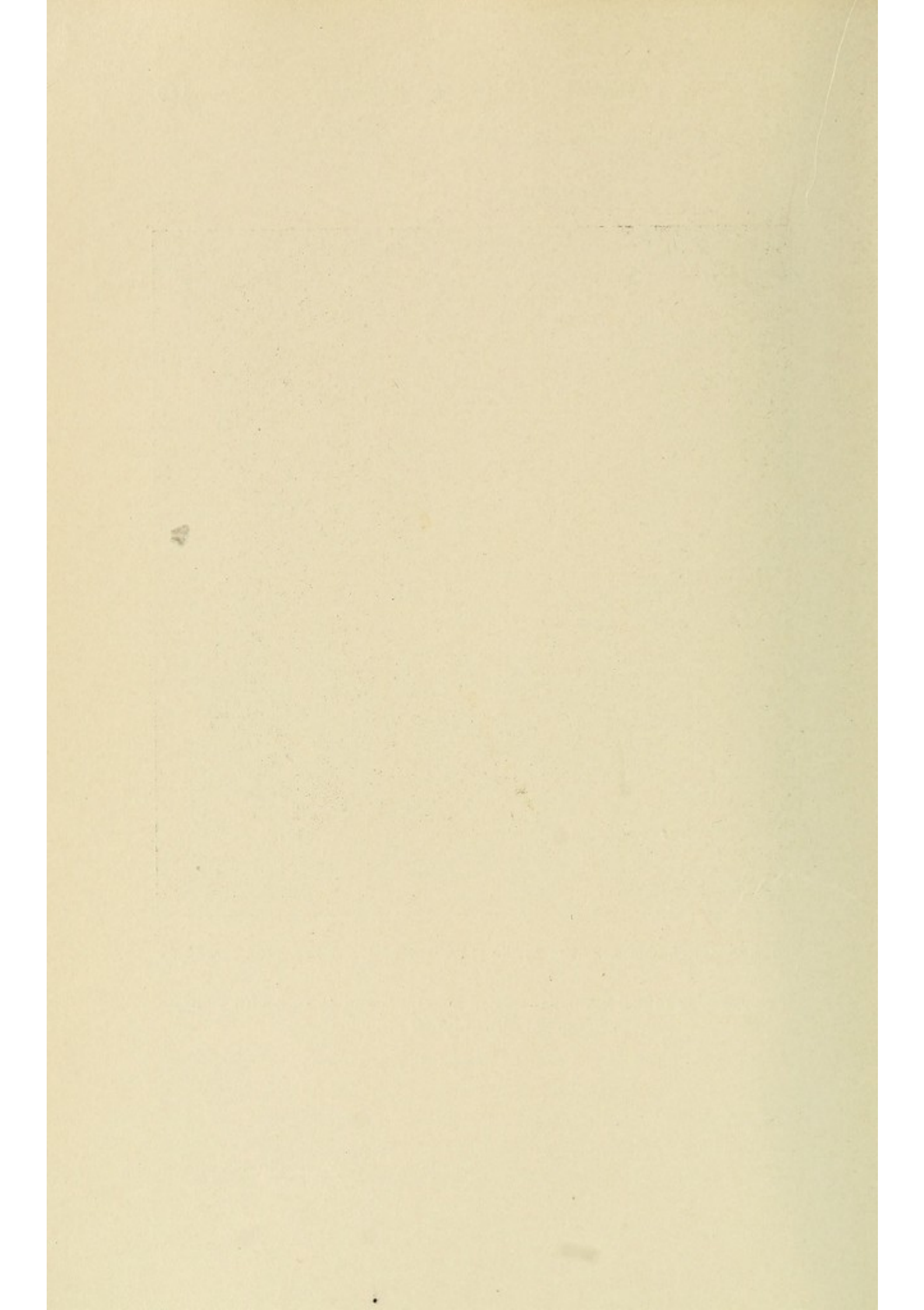


FIG. 27.—Carcinoma near the cardia. Patient of Dr. Niles. (*Skiagraph by Dr. John S. Derr.*)

A, Roughening caused by malignancy of growth; *C* and *D*, peristaltic contractions; *B*, normal cap. Marker at umbilicus.



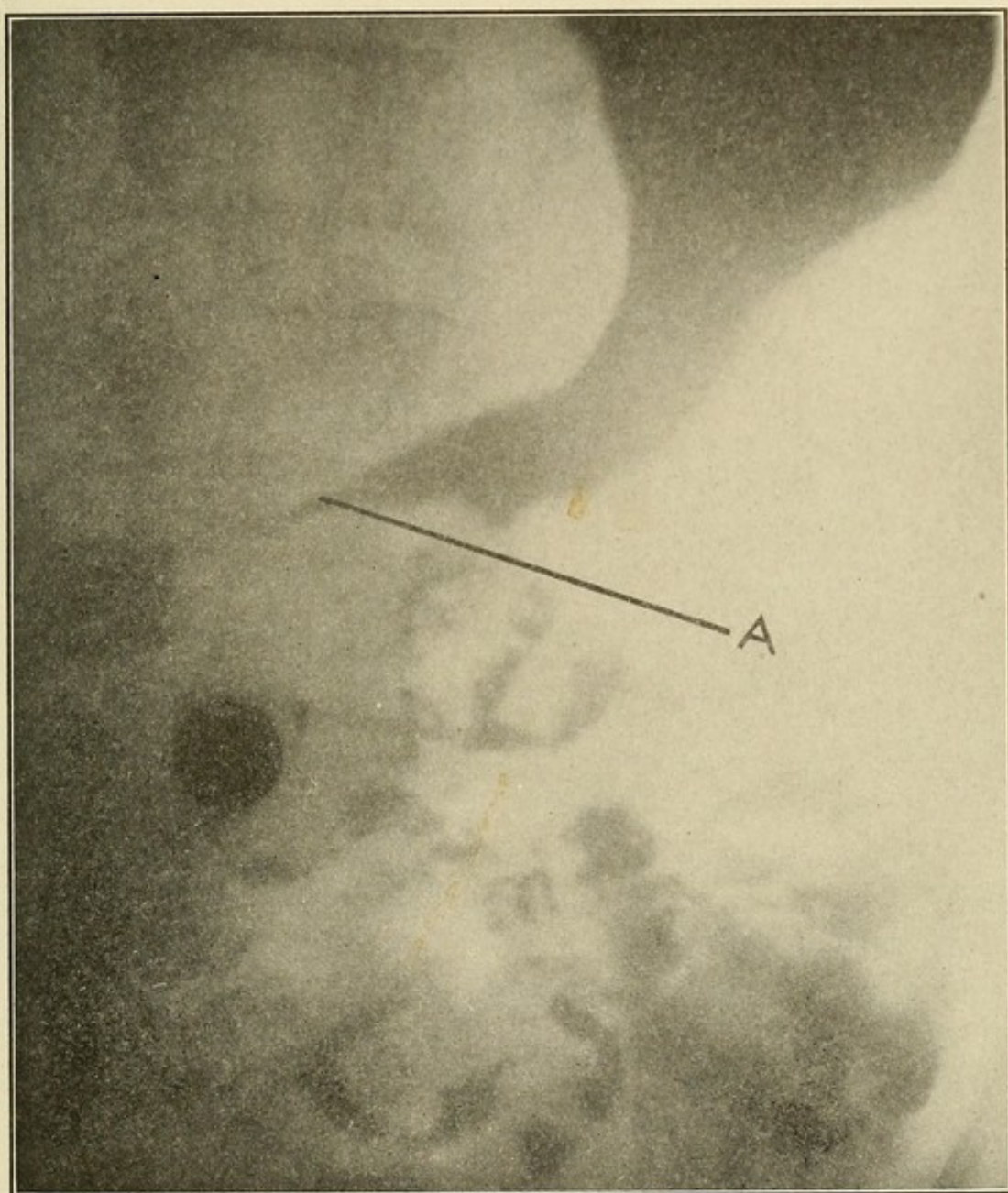


FIG. 28.—Horn-shaped contracted stomach. Inoperable carcinoma. Patient of Dr. Willis Jones. (*Skiagraph by Dr. John S. Derr.*)
A, Antrum almost obliterated by tumor; marker at umbilicus.



stomach are shown to be normal, and the radiological examination of the stomach is complete.

This symptom-complex might apply to an old callous ulcer with achylia, the latter being due to alteration in the mucous membrane, and the loss of motility to invasion of the pylorus. Such a case, however, would show a snail-shaped stomach with transverse and longitudinal contractions, and displacement of the pylorus to the left.

Symptom-complex II.

1. No residue after six hours.
2. Marked defect in gastric shadow.
3. Horn-shaped stomach.

Diagnosis.—Carcinoma. No stenosis. Inoperable.

Patients with such a picture may show no clinical symptoms, except anorexia and loss of weight, but derive little or no benefit from gastroenterostomy. The marked defect in the gastric shadow shows clearly the presence of a tumor, but this tumor is inoperable. Haudek has shown that when the stomach has lost its *hook form* from contraction, and has attained the *horn form*, it is no longer capable of complete resection. This form of the stomach can only be due to one of two causes—hypertonicity or shrinkage. The first is ruled out by the nature of the case, since the tone of the stomach walls would be impaired by the commencing cachexia. When the palpable tumor is small, we may be sure there is something else behind, and that the shrinkage is due to some widespread infiltration, which renders the resection inadvisable. On the other hand, when the stomach retains its ordinary physiologic hook form, we may with propriety consider the case to be operable. This radiological conclusion is logical and of importance.

Symptom-complex III.

1. No residue after six hours.
2. Marked defect in the shadow in the pars media or pars pylorica.
3. Hook-shaped stomach.

Diagnosis.—Carcinoma of the stomach. Operable.

Symptom-Complex IV.

1. Small residue after six hours.
2. Sensitive pressure-point over the stomach.
3. Normal stomach shadow.

Diagnosis.—Simple gastric ulcer.

This, in addition to a previous test-meal, showing either marked acidity or the presence of occult blood, makes the diagnosis fairly certain. In all cases of gastric ulcer there is a certain impairment of the motility. Haudek has never found an ulcer of the stomach without this delay in the evacuation of this organ, and no case of pyloric spasm without some lesion of the stomach wall. As regards the pressure-point, it is not enough to merely find a sensitive point somewhere in the epigastrium. The radiograph should show that the pressure-point falls on the lesser curvature of the stomach where an ulcer is most frequently situated, and that it moves with the stomach by pressure or indrawing of the abdominal walls (Jonas).

Diagnosis of gastric ulcer by means of the X-ray, will be more fully considered later in the chapter.

Symptom-complex V.

1. Small bismuth residue after six hours.
2. Pressure-point.
3. Displacement upward and to the left.
4. Snail form of the stomach shadow.

Diagnosis.—Old contracting ulcer on the lesser curvature of the pars pylorica.

Symptom-complex VI.

1. Small bismuth residue after six hours.
2. Pressure-point and resistance in the pars media.
3. Transverse contraction of the pars media.
4. Diverticulum without air bubble in the smaller curvature, immovable.

Diagnosis.—Callous ulcer of the pars media.

Even where a sensitive pressure-point is absent, the combination, hyperacidity, with a small residue after six hours,

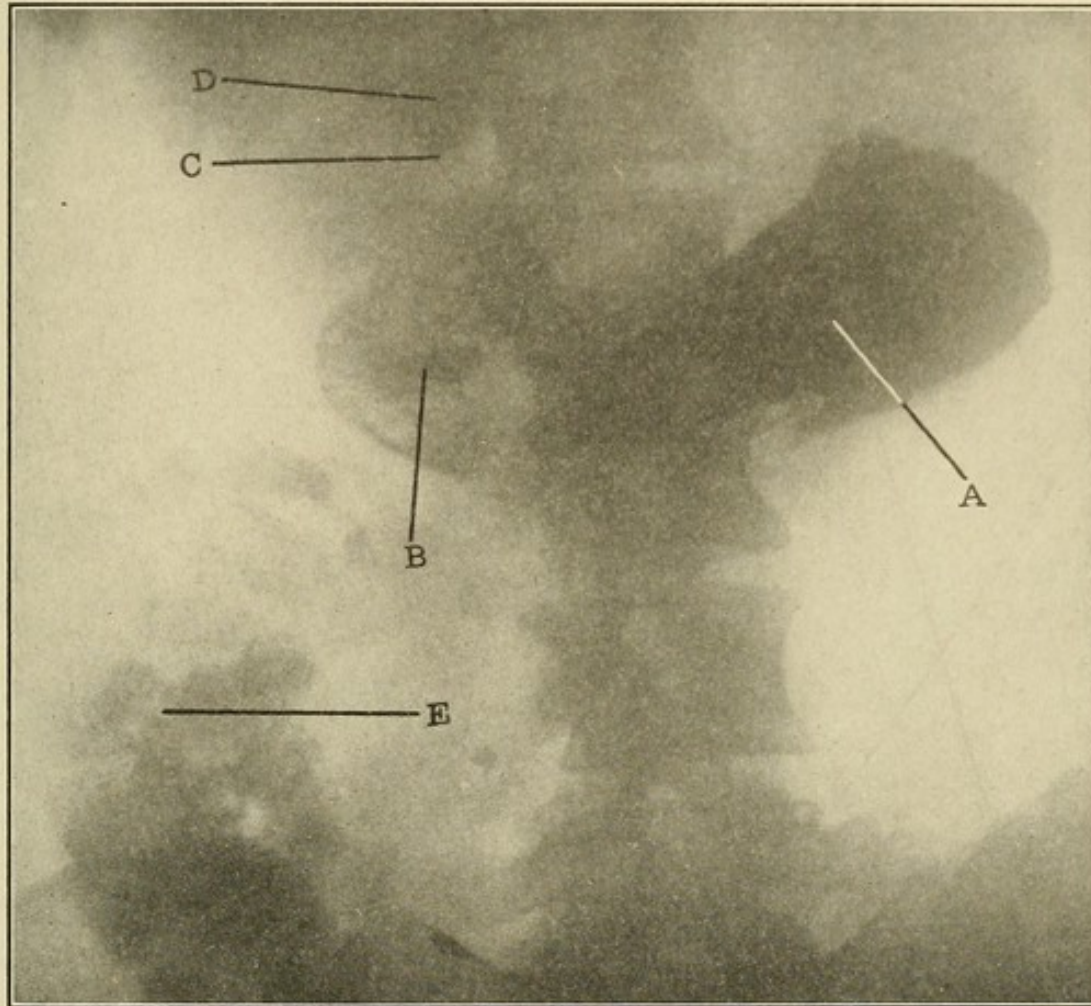


FIG. 29.—Gastric ulcer (chronic non-indurated). Diagnosis proven by operation in New York Polyclinic Hospital. Markers at the ensiform and umbilicus. (*Made in X-ray laboratory of Dr. Anthony Bassler, New York City.*)
A, Stomach; B, ulcer, in posterior wall of pars pylorica; C, pylorus; D, duodenal cap; E, cecum and ascending colon.



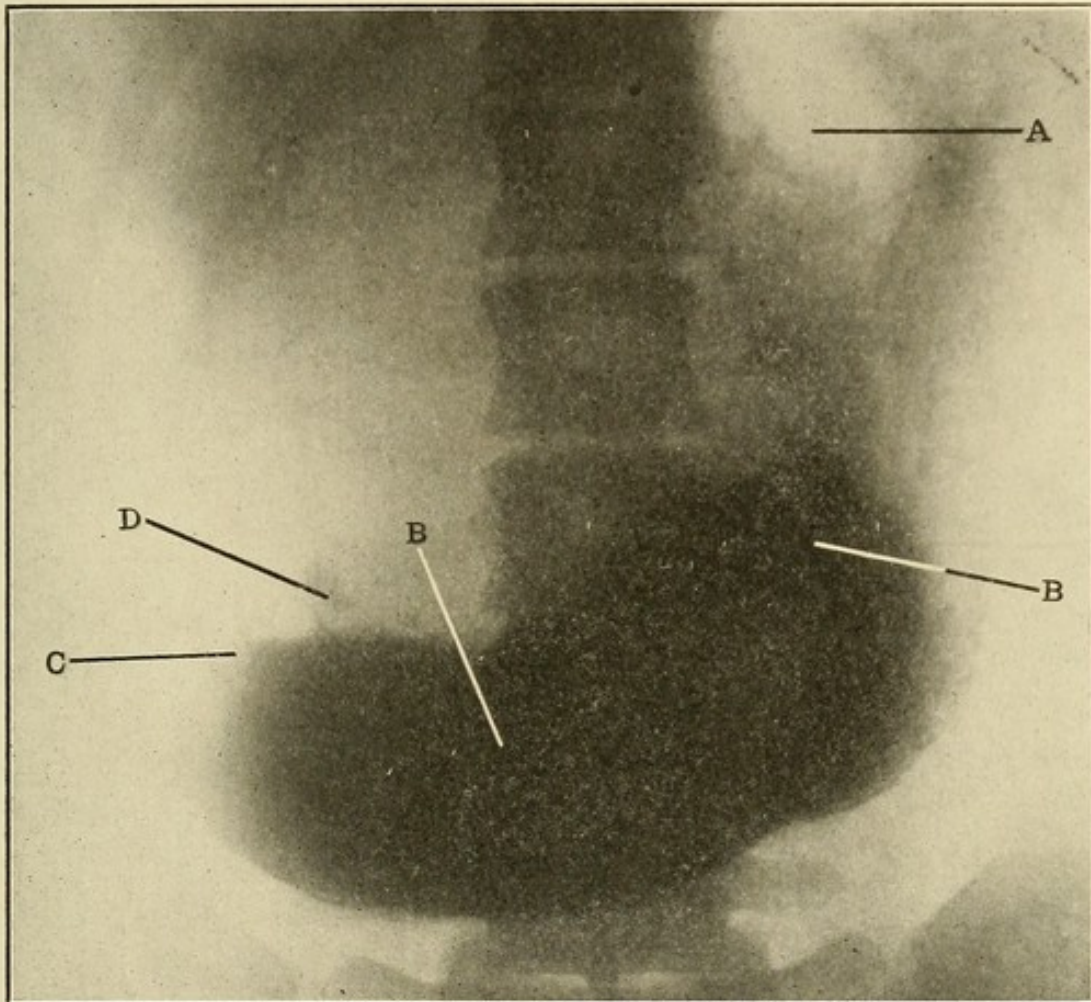
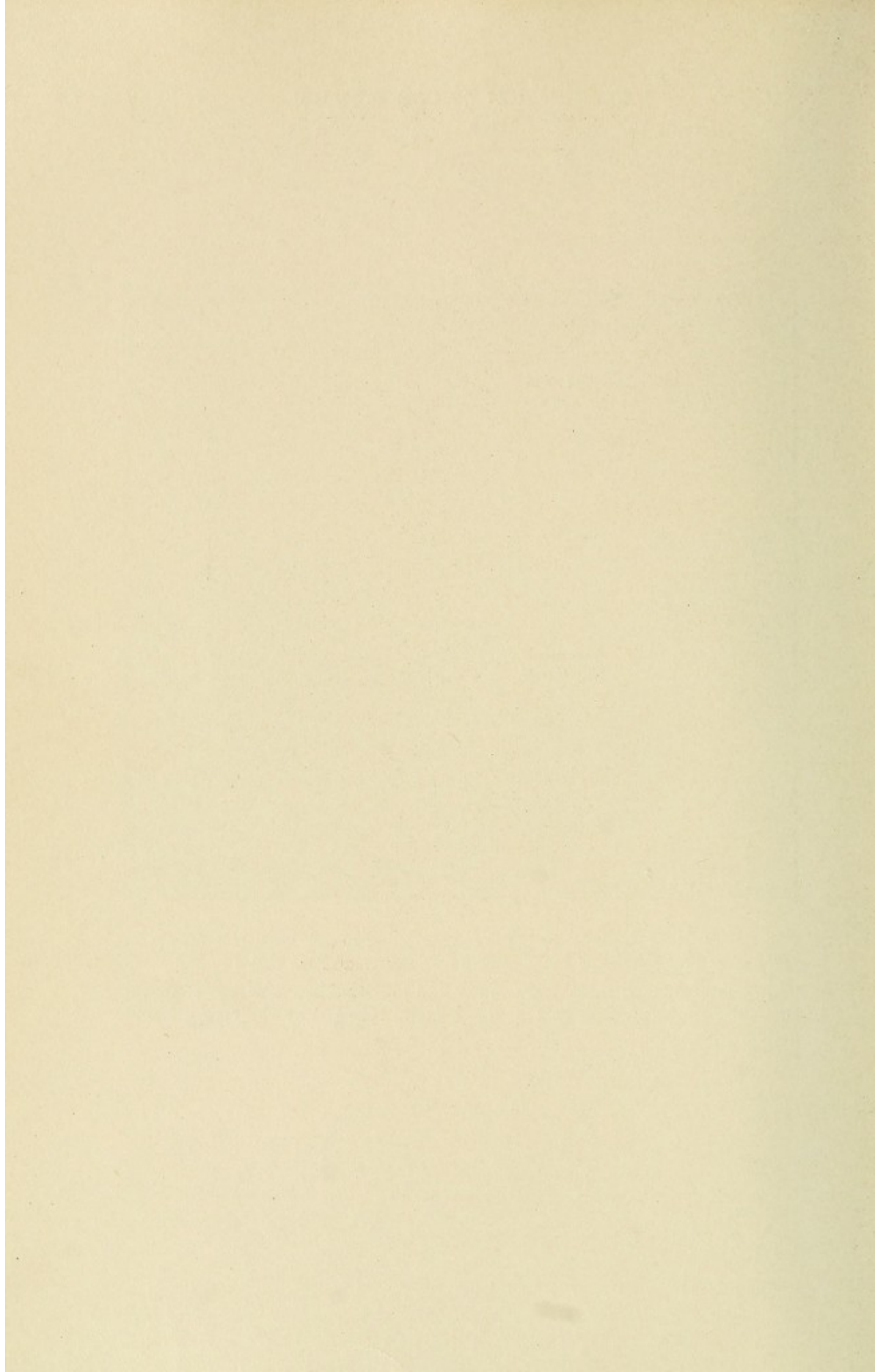


FIG. 30.—Dilated stomach, 19 hours retention due to pylorospasm. (*Made in the X-ray laboratory of Dr. Anthony Bassler, New York City.*)

A, Gas in fundus; B, B, transversely and longitudinally enlarged stomach; C, tight pylorus; D, first part of duodenum. Markers at the ensiform and umbilicus.



is almost characteristic of ulcer, according to the radiologists. This conclusion is not yet accepted without reservation by the internists.

Symptom-complex VII.

Large sickle-shaped residue after six hours.

Diagnosis.—Old stenosis of the pylorus, due to ulcer.

This symptom is due to dilatation and secondary atonic alteration of the musculature, with great loss of motility.

Symptom-complex VII (A).

1. Large residue after six hours.
2. Dilatation.
3. Loss of tone.

Diagnosis.—Old ulcer-stenosis.

The above symptoms, however, do not afford clear information as to the character of the lesion—whether a simple ulcer, a callous ulcer, or a carcinoma on the base of an old ulcer. To better decide this question it is well to consider the following:

Symptom-complex VIII.

1. Large sickle-shaped residue.
2. Marked defect in the filling of the pars pylorica.

Diagnosis.—Carcinoma on the base of an old ulcer, with stenosis.

This picture is fairly common. It has been recently advanced, and with reason, that a marked stenosis of the pylorus with dilatation and paralysis, might exist without vomiting or other severe symptoms. Vomiting might set in later, not necessarily from the stenosis, but from the commencing carcinoma. The signs of dilatation and vomiting, and the previous history of ulcer, all point to stenosis of the pylorus, and do not contraindicate operation.

Symptom-complex IX.

1. No bismuth residue after six hours.
2. Marked defect in the shadow of the pars pylorica or pars media.
3. Transverse constriction of the greater curvature.

Diagnosis.—Carcinoma on the base of an old ulcer. No stenosis.

Symptom-complex X.

1. Stomach empty after six hours. Head of the bismuth column at splenic flexure of colon.
2. Shortening of the stomach.
3. Congestion at the cardia.

Diagnosis.—Carcinoma of the pars cardiaca.

Symptom I indicates hypermotility of the stomach due to hypoacidity or anacidity. This should be confirmed by a second examination three hours after the bismuth meal. Symptom II indicates a diffuse contraction, and indicates carcinoma. Symptom III points to the rapid encroachment and advance of the pathologic process. The achylia renders the diagnosis of ulcer untenable. The condition is probably inoperable.

Symptom-complex XI.

1. Stomach empty after six hours. Head of bismuth column in the ascending colon.
2. Stomach shadow normal.
3. Pressure-point moving with the duodenum.

Diagnosis.—Duodenal ulcer.

Symptom-complex XII. Normal stomach.

1. Stomach empty in six hours. Head of bismuth column in the ascending colon.
2. Stomach shadow normal.
3. No increase of peristalsis; no antiperistalsis.
4. HCl normal.

This is the picture of a normal stomach, and in no case showing these signs has been found any anatomical alterations on operation or post-mortem examination.

It should always be remembered, however, that the less number of positive symptoms, the greater care is necessary in the Roentgen examination, and the greater caution should be observed in expressing an opinion.

In addition to the symptom-complexes so interestingly and clearly brought out by Holzknecht, and pointing to the

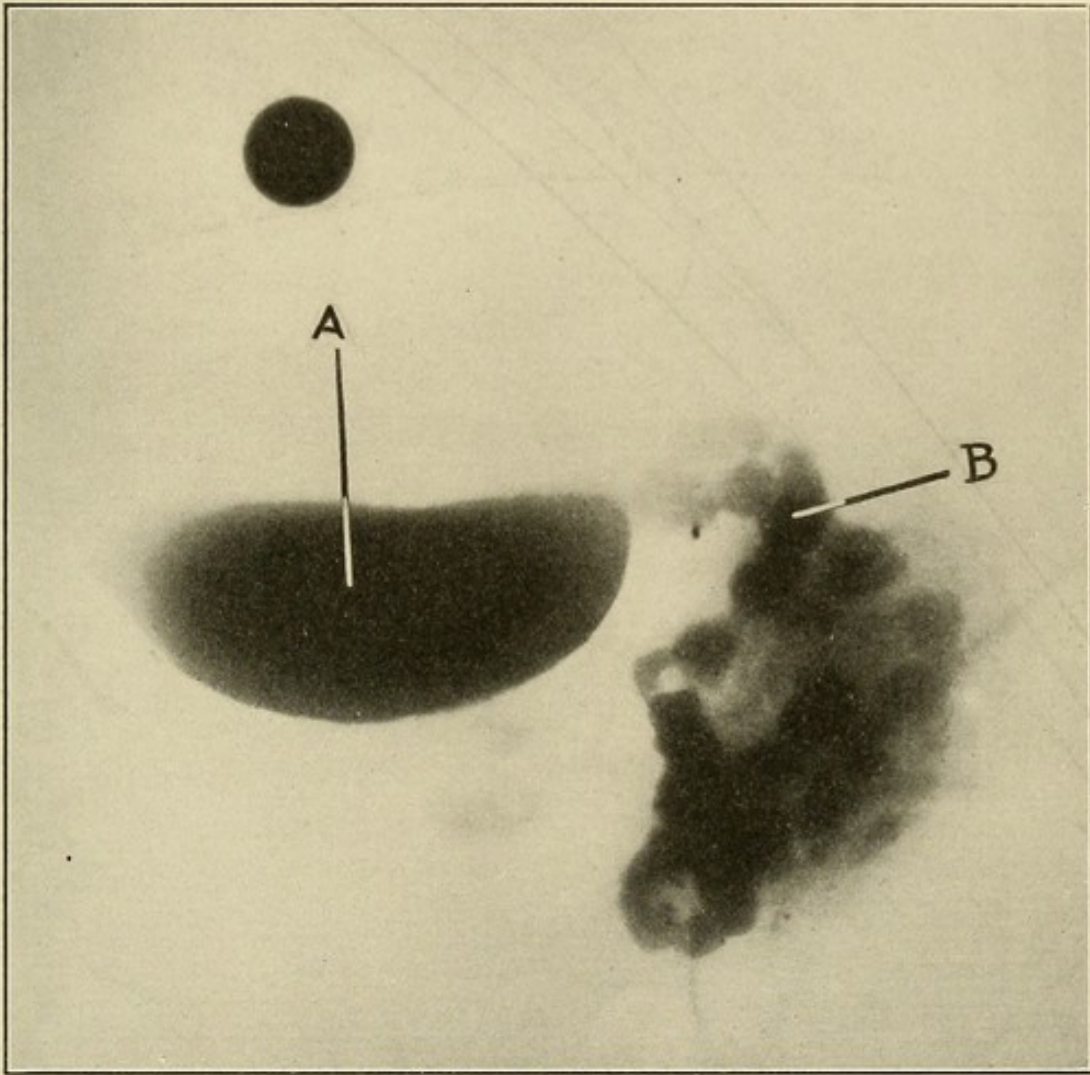


FIG. 31.—Six-hour residue. Pyloric Stenosis. Confirmed at operation.
Patient of Drs. L. L. Andrews and E. G. Jones. (*Dr. John S. Derr.*)
A, Six-hour residue; *B*, duodenum. Marker on umbilicus.



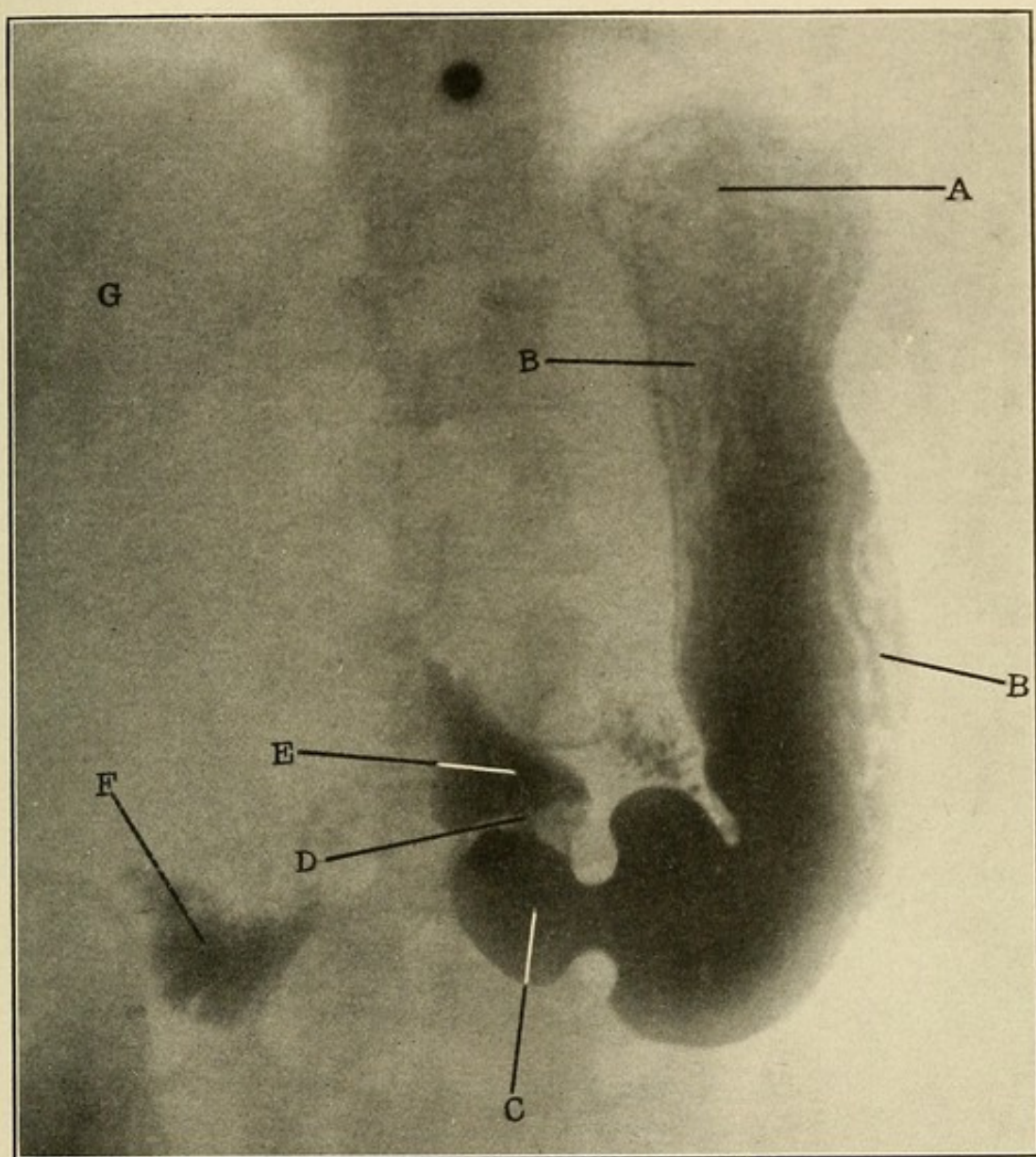


FIG. 32.—Gastroptosis (moderate) with hypermotility. (*Made in the X-ray laboratory of Dr. Anthony Bassler, New York City.*)

A, Gas in the fundis; B,B, rugæ; C, pars pylorica with hypermotility; D, pyloric muscle; E, normal duodenal cap; F, third part of duodenum; G, liver shadow. Markers at the ensiform and umbilicus.



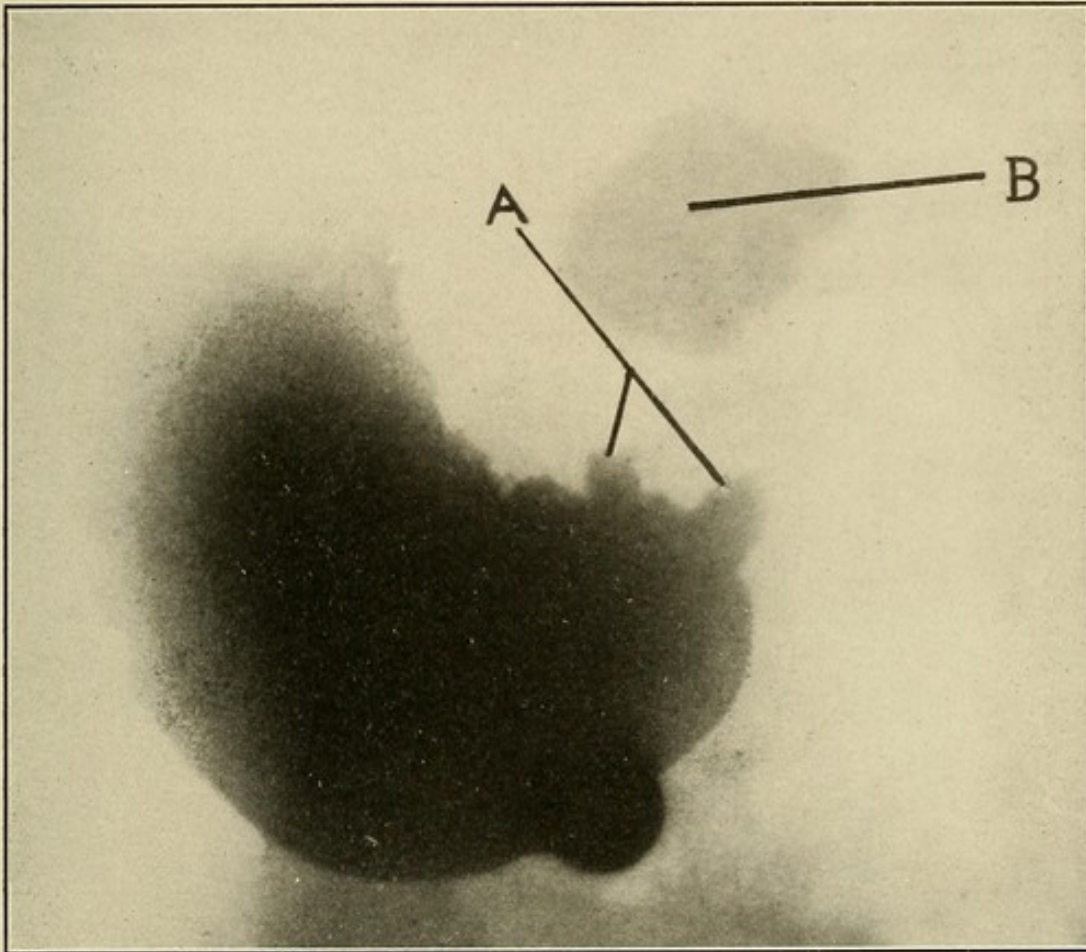


FIG. 33.—Pyloric stenosis from adhesions to gall-bladder. Confirmed at operation by Dr. E. C. Davis. The stones filling the gall-bladder did not show in skiagraph. (*Dr. John S. Derr.*)

A, Deformity of pylorus due to adhesions; *B*, deformed cap. Marker at umbilicus.



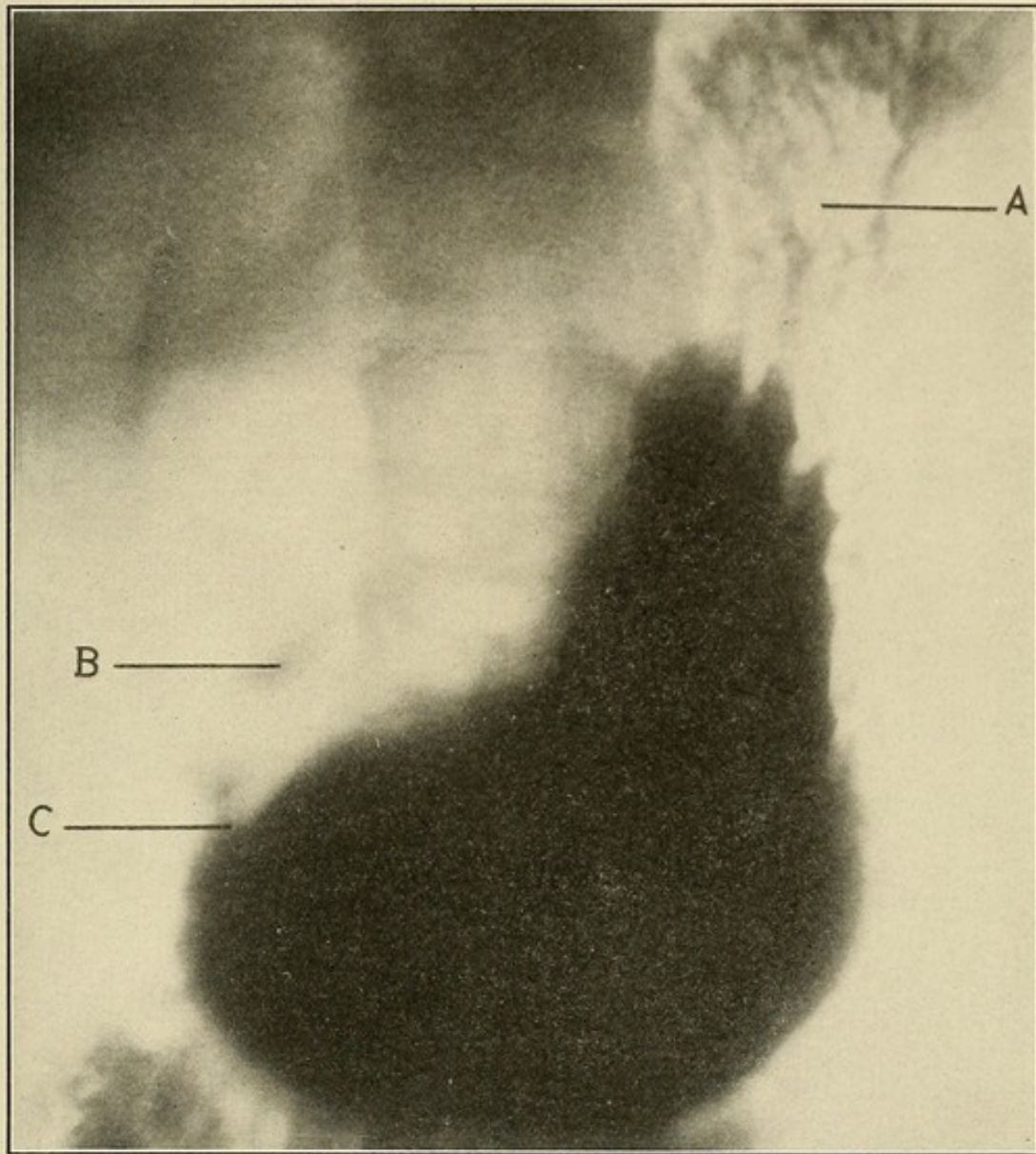


FIG. 34.—Atony and dilatation of stomach. Pyloric stenosis. Non-malignant. Diagnosis confirmed at operation. Patient of Dr. L. L. Andrews. (*Dr. John S. Derr.*)

A, Gas in cardia; B, remains of duodenal cap; C, pylorus. Marker hidden by stomach shadow.



diagnosis of gastric ulcer, there have been a number of important studies and experiments in which the X-ray was employed to diagnose this condition. In 1907 Jolasse reported that he had seen a patch of bismuth showing in the skiagram of a patient suffering from gastric ulcer. In the same year Hemmeter performed a number of experiments on cats and rabbits, in whom he artificially produced deep ulcerations in the pylorus. These ulcers were treated with bismuth, and if the animals were kept without fluid, the bismuth spots could be seen on the screen twenty-four hours later. Later on, Haudek and Clairmont made a number of other experiments with animals, and their observations corroborated Jolasse.

Leaving out the very technical details which lead up to the conclusions, Haudek cites the following:

1. A flat ulcer of the stomach does not give any shadow, due to the deposition of bismuth on its surface.
2. Any abnormal circumference shadow, which is seen after a bismuth meal is due to the enclosure of the bismuth in a pathological pocket, or diverticulum.
3. A penetrating ulcer of the stomach may frequently give rise to a special appearance—an outgrowth or diverticulum of the bismuth shadow, with an air bubble at its summit.

The radiological signs of a penetrating ulcer of the stomach are as follows:

1. A patch or streak of bismuth, isolated from the mass of the bismuth meal, or branching out from it, usually at the lesser curvature and in the pars media of the stomach.
2. A gas-bubble at the summit of this isolated patch.
3. Retention of the bismuth for a considerable time in this region.
4. Immobility of the bismuth patch, which is not influenced by palpation or pressure.

Haudek also concludes that penetrating gastric ulcer is by no means uncommon, and that the reason that they have been previously overlooked, lies in the fact that no

reliable diagnostic means for their detection have been available.

In the Roentgen ray we have the most convincing methods of diagnosing that interesting and sometimes confusing condition, the hour-glass stomach. This condition is divided by pathologists into two groups—congenital and acquired. The existence of the former is denied by good observers like Mayo Robson and Moyihan, the latter ascribing the so-called congenital hour-glass contraction to one of three causes—gastric ulcer, adhesions in the stomach or its walls, and carcinoma.

Acquired hour-glass contraction is generally the result of cicatricial contraction of a healing gastric ulcer. This ulcer is usually situated on the lesser curvature, and has extended to the long axis of the stomach; or there may have been two ulcers, one on either side of the lesser curvature. In consequence of the resulting contraction, the stomach appears to be divided into two pouches, the larger corresponding to the fundus, the smaller to the pyloric end of the viscus. The sulcus separating the two is generally of considerable length, and is usually situated somewhat nearer to the pylorus than the cardia. In some cases the stomach is adherent to the pancreas or to the undersurface of the liver, and occasionally the pyloric portion is dilated, the result of a coincident cicatricial or spasmodic stenosis of the pylorus.

Robson and Myonihan have reported two instances of the stomach being divided into three pouches by two constrictions, making the so-called "trifid stomach."

Dr. Robert Knox has contributed a valuable study on the X-ray diagnosis of hour-glass stomach, and acknowledgments are given for assistance in the preparation of this section.

The symptoms of this condition are fairly characteristic, though at times somewhat indefinite. At first the symptoms appear to depend on the original cause, while later on the condition itself may be diagnosed, if sufficient care

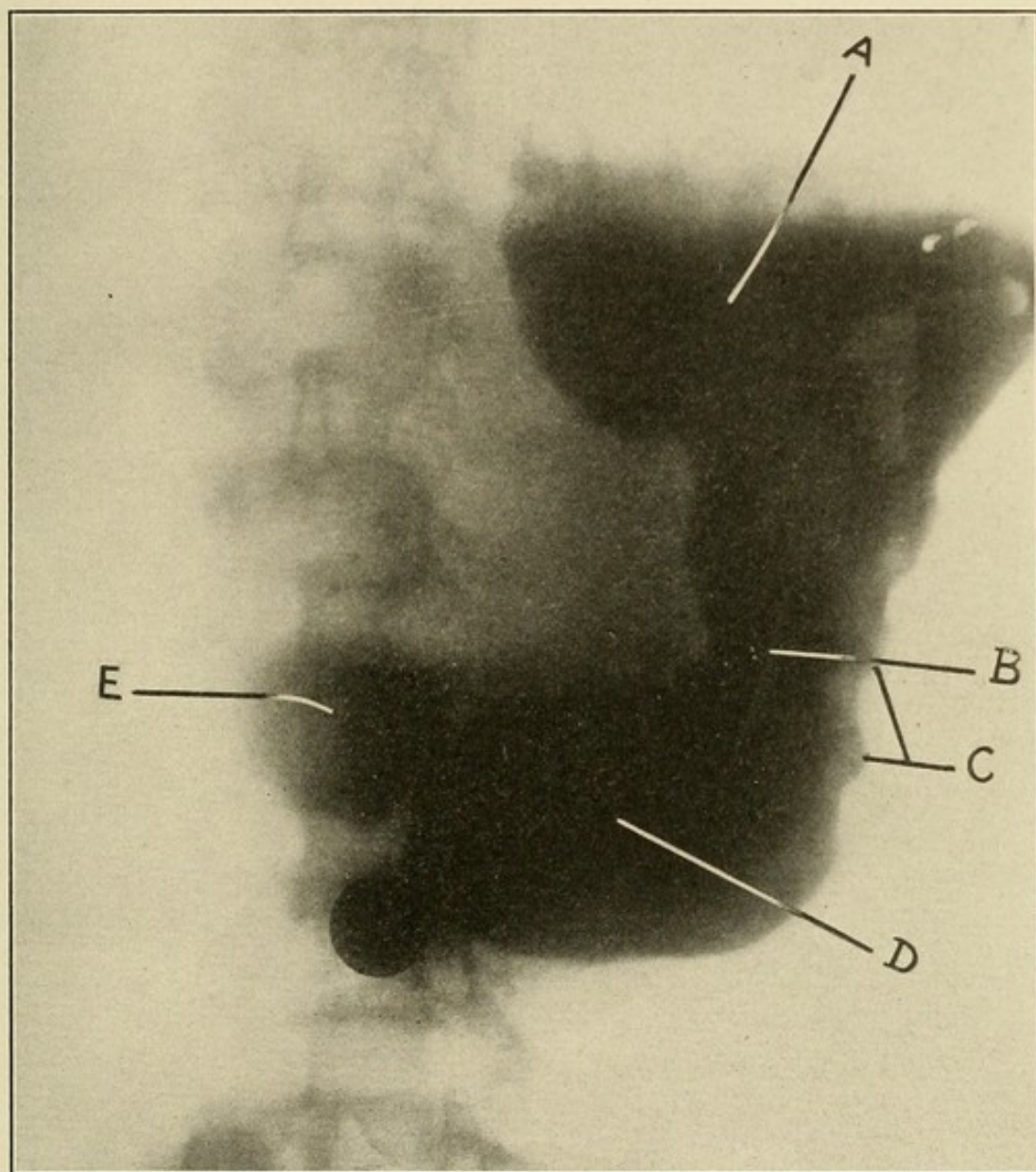


FIG. 35.—Hour-glass contraction of stomach. Patient of Dr. L. S. Hardin.
(*Dr. John S. Derr.*)

A, Dilated cardia; *B*, hour-glass contraction; *C*, peristaltic waves; *D*, antrum;
E, cap.



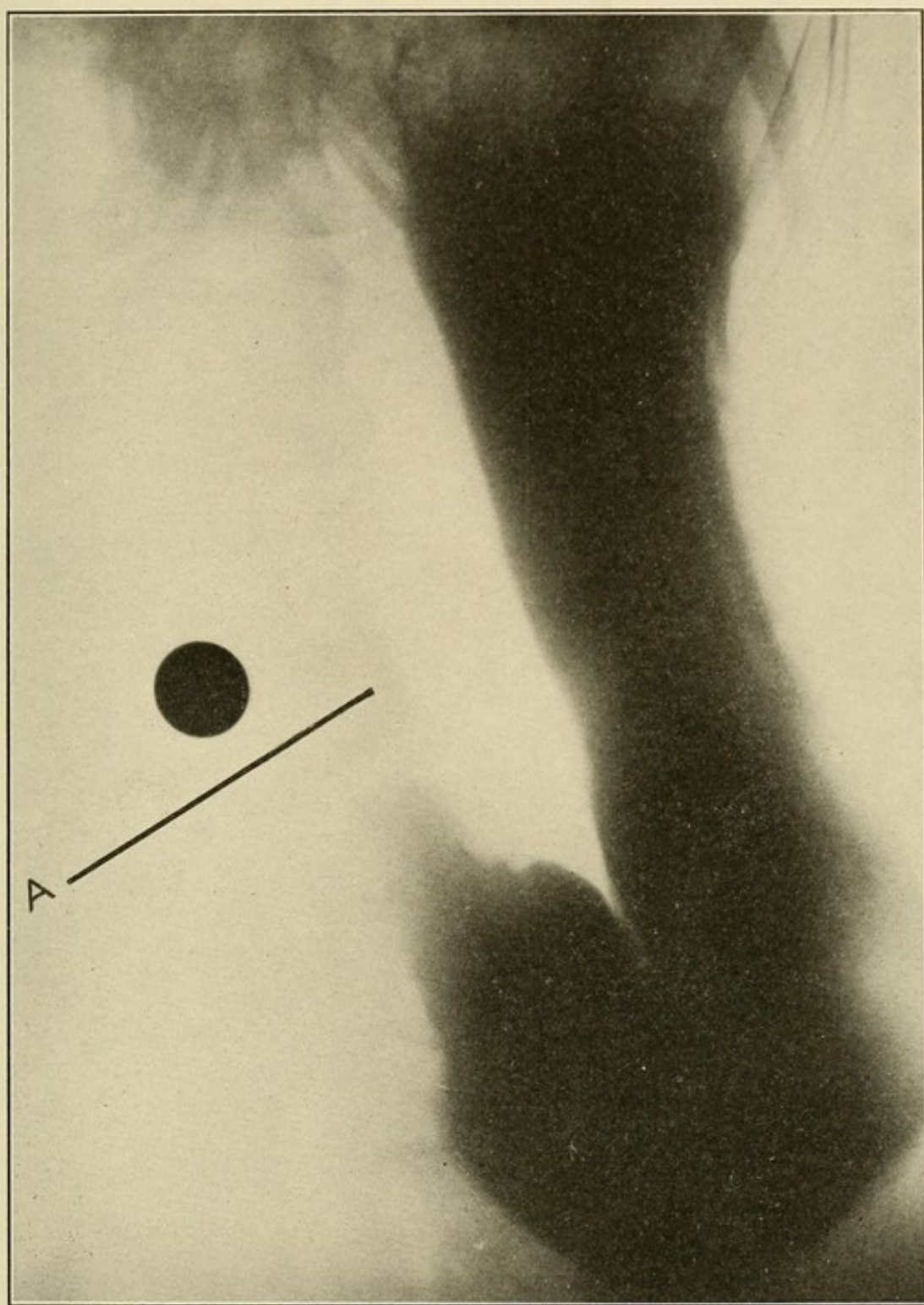


FIG. 36.—Water-trap stomach. Patient of Dr. L. C. Fischer. Confirmed at operation. (*Dr. John S. Derr.*)

A, Long pyloric arm. Marker at umbilicus.



and patience are exercised. The following are the characteristic symptoms of hour-glass contraction:

1. Pain after a meal, coming on at once or after some time.
2. Vomiting of the stomach contents, and sometimes also blood.
3. Emaciation slowly increasing.
4. The presence of a tumor, due to cicatrization of an old ulcer with absence of ascites and secondary nodes.

These symptoms may for a time simulate stenosis of the pylorus, the condition lasting for years, and causing great suffering. Fatal hemorrhage may occur, in which all the blood enters the bowel, and the patient may die without showing any of the diagnostic signs of bleeding into the stomach. This has been denominated "hematemesis into the intestine."

It will be noted that during lavage of the stomach all of the fluid fails to return. Often after an apparently thorough lavage, a further quantity of stomach contents makes its appearance. This is foul and bad-smelling, and several times, after the stomach has seemingly been washed clean, another lavage will show these signs of retained contents.

Another symptom of worth is a splash on palpation of the stomach after the apparent removal of all of its contents. Sometimes, on percussing the empty stomach, and again percussing it after distention, a change in the position of the tumor may be observed. The proximal pouch is first distended, then the distal pouch. Occasionally the notch between the two tumors is noticeable after distention. On dilatation, bubbling and sizzling sounds may be heard through the stethoscope some distance from the pylorus. Patients are sometimes themselves conscious of this symptom, as the food passes from one pouch to the other.

Some years ago a middle-aged woman came under my notice, in whom the diagnosis of hour-glass stomach could

be made by palpation. She reported extreme fullness in the epigastrium, which was relieved as the food was emptied in the second pouch. Unfortunately I lost sight of her, and am unable to report her present condition. I was unable at the time to get her in touch with a radiologist.

An examination of the stomach after a bismuth meal affords a positive diagnosis of this trouble. The movements of the stomach may be observed, the passage of the meal may be watched as it progresses from the cardiac to the pyloric segment, and a series of radiograms may be obtained of the position and appearance of the bismuth meal at successive intervals. By this method the operator may also learn the exact time which the stomach takes to empty itself, and thus be enabled to estimate the degree of obstruction present in a particular case.

For the detection of foreign bodies in the stomach or intestines the X-ray is invaluable. Pieces of metal can be easily located, and followed during their progress, should such take place. Two year ago there was sent me a girl twelve years of age, who reported swallowing an iron tap, about $1\frac{1}{2}$ inch in diameter. The tap was four-cornered, with rather sharp edges and corners, and it was hard to realize how she got it down her esophagus. An X-ray examination quickly located it in her stomach, from which it was removed.

Dr. C. Thurston Holland reports the radiography of a hairball in the stomach, in which the viscus was so filled by the mass of hair that the barium mixture, which was used in this instance, only left rather indistinct shadows around the walls of the stomach, though the food could be seen "flowing" through the pylorus into the duodenum.

Biliary calculi are sometimes clearly brought out by radiography, but at present the radio-diagnosis of cholelithiasis is subject to many errors, and a positive diagnosis is quite exceptional for the following reasons, as adduced by Dr. Jaugeas:

"Biliary calculi are as a rule exclusively organic in chem-

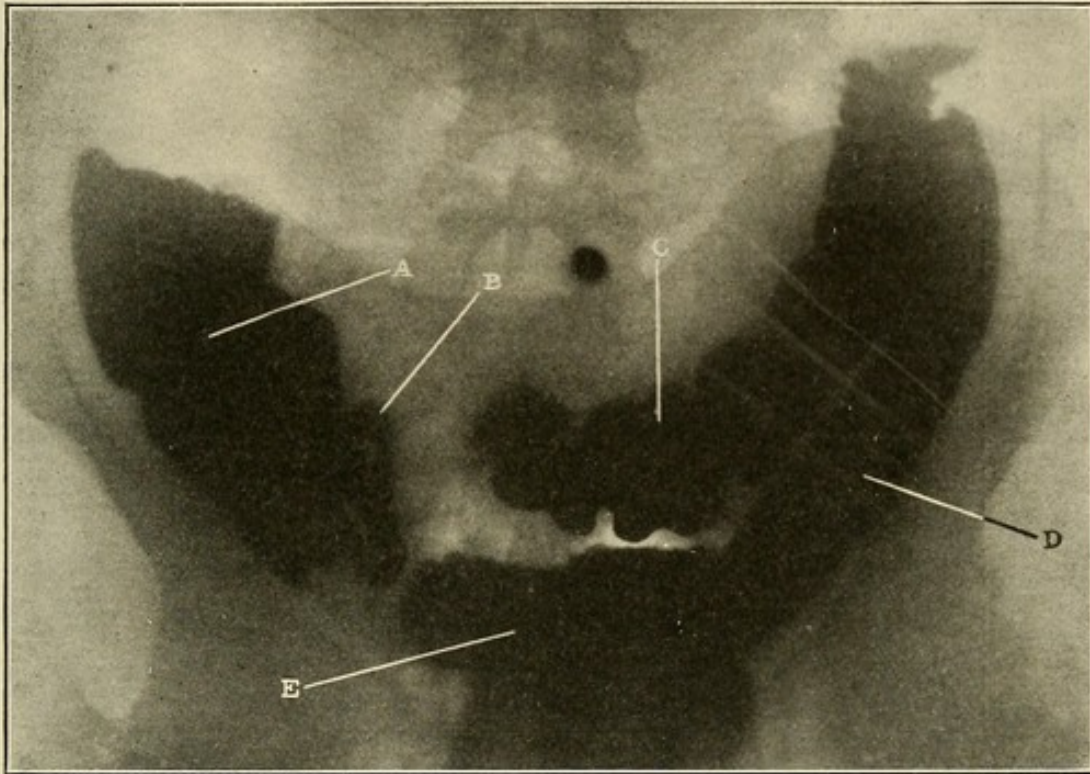


FIG. 37.—Lane's kink and coloaptosis. (*Made in the X-ray laboratory of Dr. Anthony Bassler, New York City.*)

A, Cecum; B, Lane's kink; C, transverse colon; D, sigmoid; E, dilated rectum. Markers at the ensiform and umbilicus.



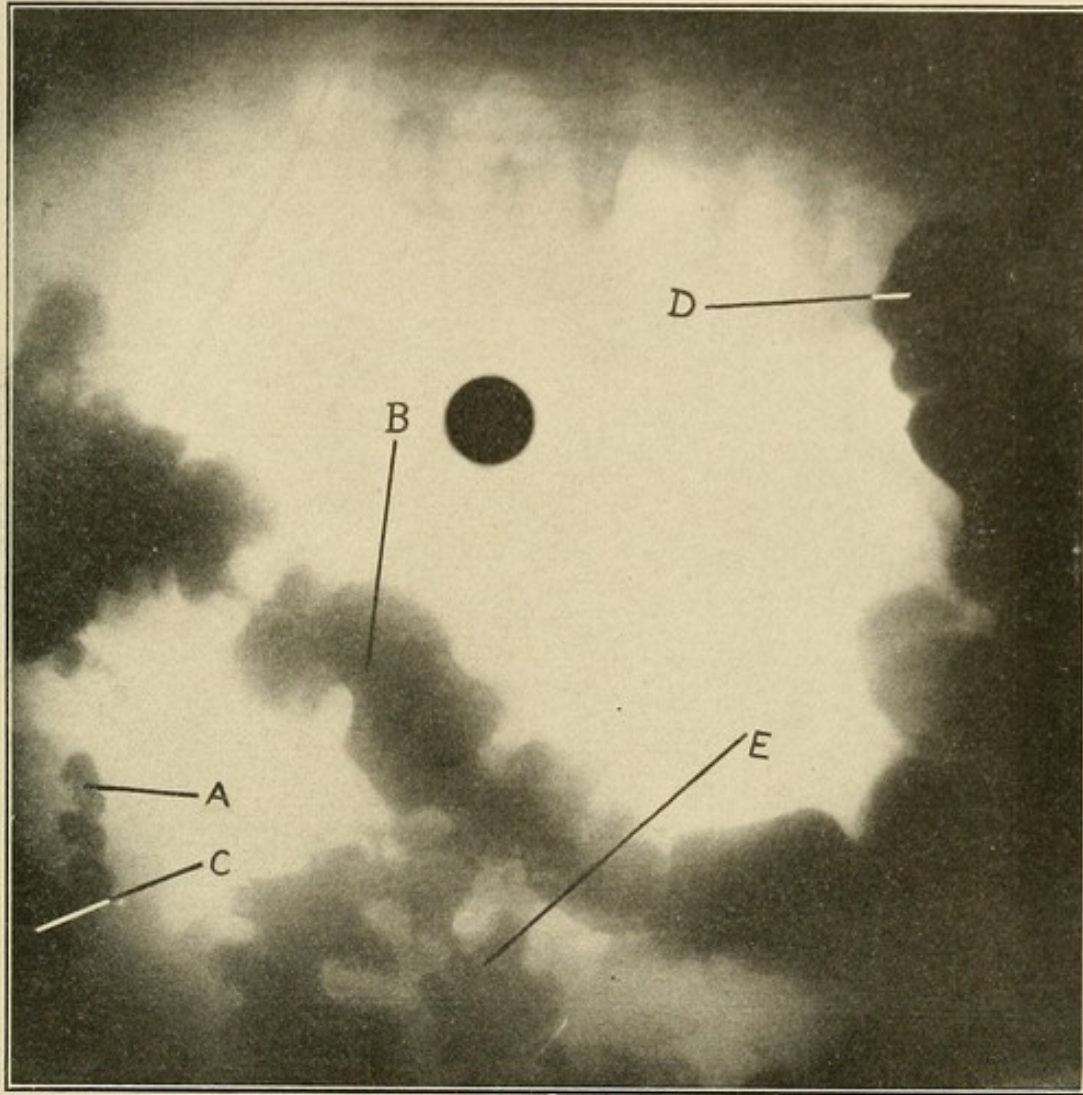
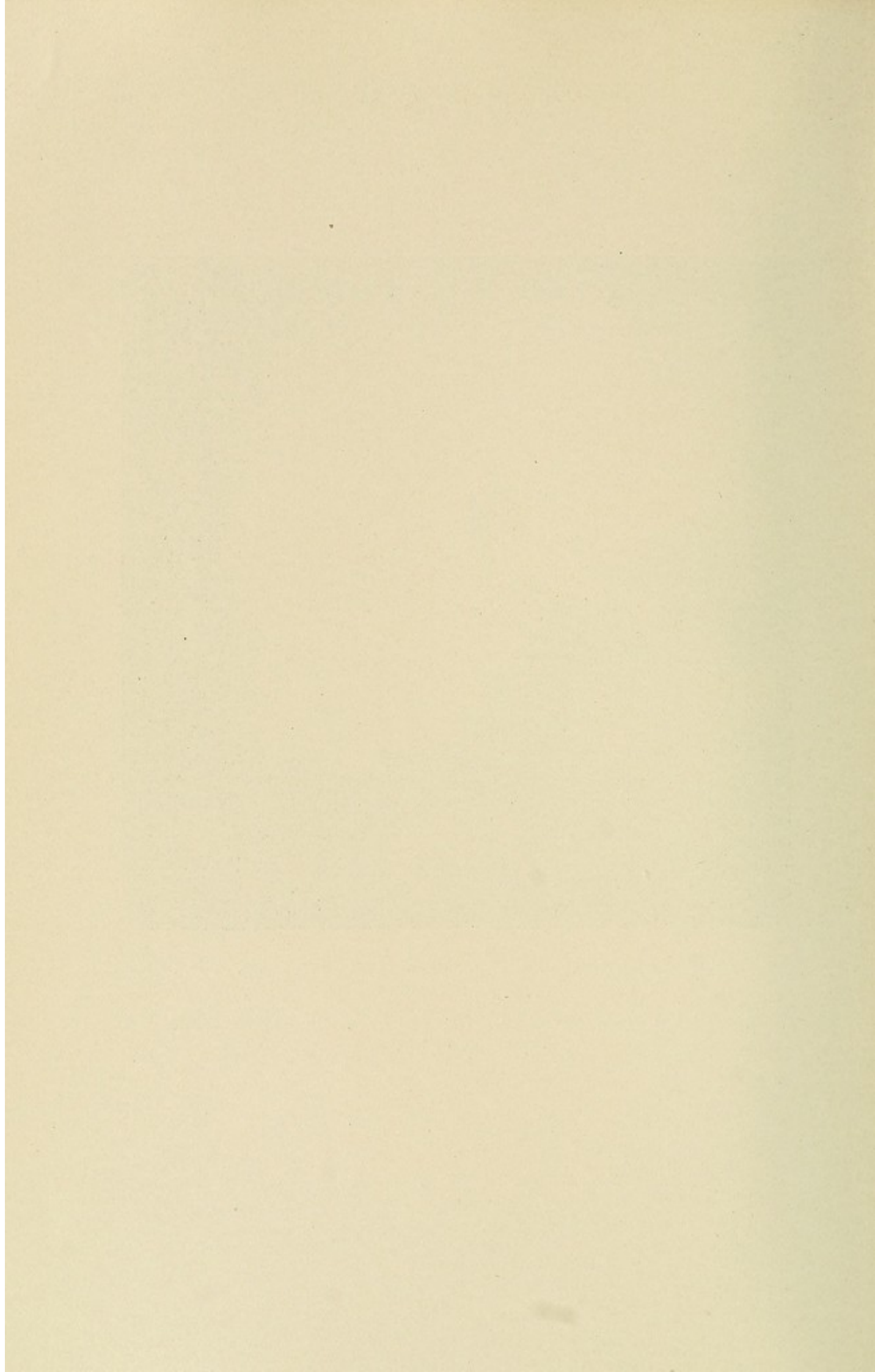


FIG. 38.—Rectal injection of colon and appendix. Patient of Dr. G. H. Noble.
(*Dr. John S. Derr.*)
A, Appendix; *B*, transverse colon; *C*, cecum; *D*, splenic flexure; *E*, sigmoid.
Marker on umbilicus.



ical composition, being composed of cholesterin, biliary pigment, biliary acids, etc., which, owing to their great transparency to the X-rays, show but little contrast to the abdominal opacity. In rare cases, however, calcium salts are added to these organic substances in such proportion as greatly to increase the density of the calculus. Between the cholesterin type and the calcareous type are a great number of intermediary forms, varying in the proportion of salts which they contain. The presence of calcium is, indeed, the sole condition of visibility. Other factors also may interfere with the radio-diagnosis, as the presence of bile in the gall-bladder, its concentration, and the thickening of the vesicular walls attenuate the contrast of the image, and may entirely efface it where the opacity of the calculus is not great."

The matter is rendered even more difficult by the situation of the bile ducts on the lower surface of the liver, where they are easily confounded with the shadow of the hepatic parenchyma and the abdominal organs. To this there is, however, one exception—the common bile duct. This is frequently the seat of biliary calculi, and its image may always be clearly separated from that of the liver. Muscularity of the abdominal walls and obesity add greatly to the difficulties, but notwithstanding all the disadvantages mentioned, a radiographic examination should never be neglected when practicable, since a certain, although limited number of cases yield a positive diagnosis.

The further we go down the digestive tract and away from the stomach, the less useful in some respects are the X-rays for diagnosis. The topographical aspect of the small intestine is made out with great difficulty, the hardest part of all being the duodenum.

In stenosis of the duodenum the pylorus may be seen open and pulled down. Under normal conditions only the pars superior horizontalis is seen in the duodenum, and at no time are there contractions visible; but in the case of

stenosis we sometimes get the entire duodenum filled, and visible peristalsis.

Haudek claims that autopsy findings have established the fact that whenever the symptoms of ulcer of the stomach were associated with hypermotility of the stomach during life, the ulcer was usually found at the duodenum.

The course of the rest of the small intestine soon after a meal is seen only in a few bismuth spots in the hypogastrium; later larger masses, resembling caluiflower, are seen. In the majority of cases we observe only individual curls resembling the small intestine.

Gross, with his intestinal tube, has succeeded in getting 250 cm. of bismuth injected, and has outlined the small intestine fairly well. Novak has shown that the existence of small helminthiform masses in the region of the small intestine indicates stenosis.

The Colon.—The position of this gut is best studied by the bismuth bolus enema. For the functional test of the intestines the use of the Rieder meal, and watching the progress of this meal through the entire intestinal tract is more satisfactory. The distention of the colon by air is troublesome to the patient, and gives a blurred picture. The colon is usually recognized by the haustra, and the cecum cannot be separated from the ascending colon. The transverse colon does not run horizontally, but runs in a line with the greater curvature of the stomach, and the haustra are specially well marked in this portion of the gut.

From the splenic flexure the descending colon takes a straight downward course, with a slight narrowing at the sigmoid flexure. The entire colon in its normal condition is quite movable.

The passage of food in the presence of normal motility varies considerably, but, according to the consensus of opinion, may be located in its onward course about as follows: The small intestines are seen from a half hour after the meal is taken up to four or five hours; the cecum and colon are seen about four to six hours after the meal;

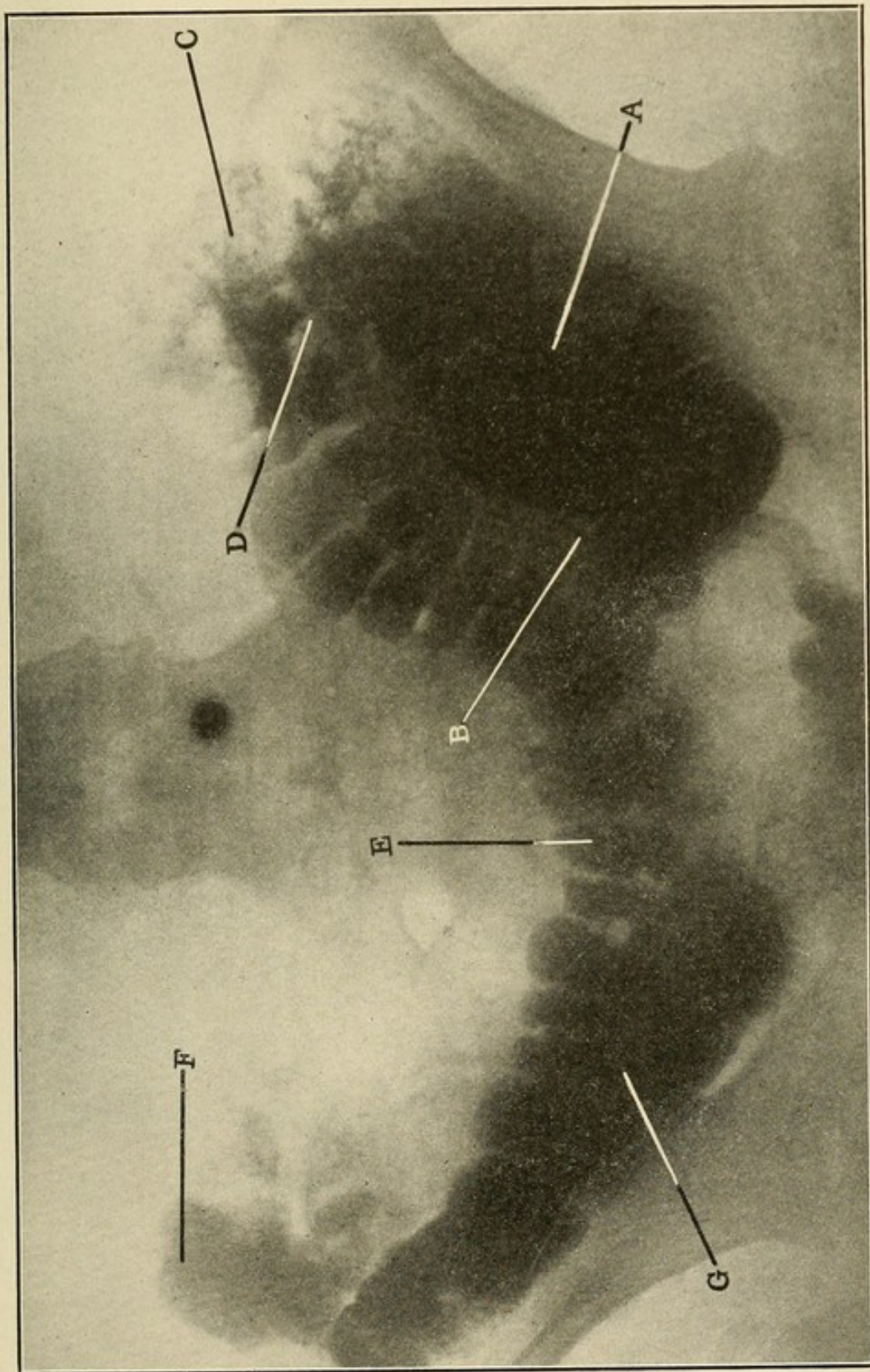


FIG. 39.—Coloptosis (complete). (*Made in the X-ray laboratory of Dr. Anthony Bassler, New York City.*)
A, Cecum, Dilated and prolapsed; B, diseased appendix, shown by irregular and short lumen; C, prolapsed, transverse colon; F, prolapsed, splenic flexure; G, sigmoid. Markers at the ensiform and umbilicus.



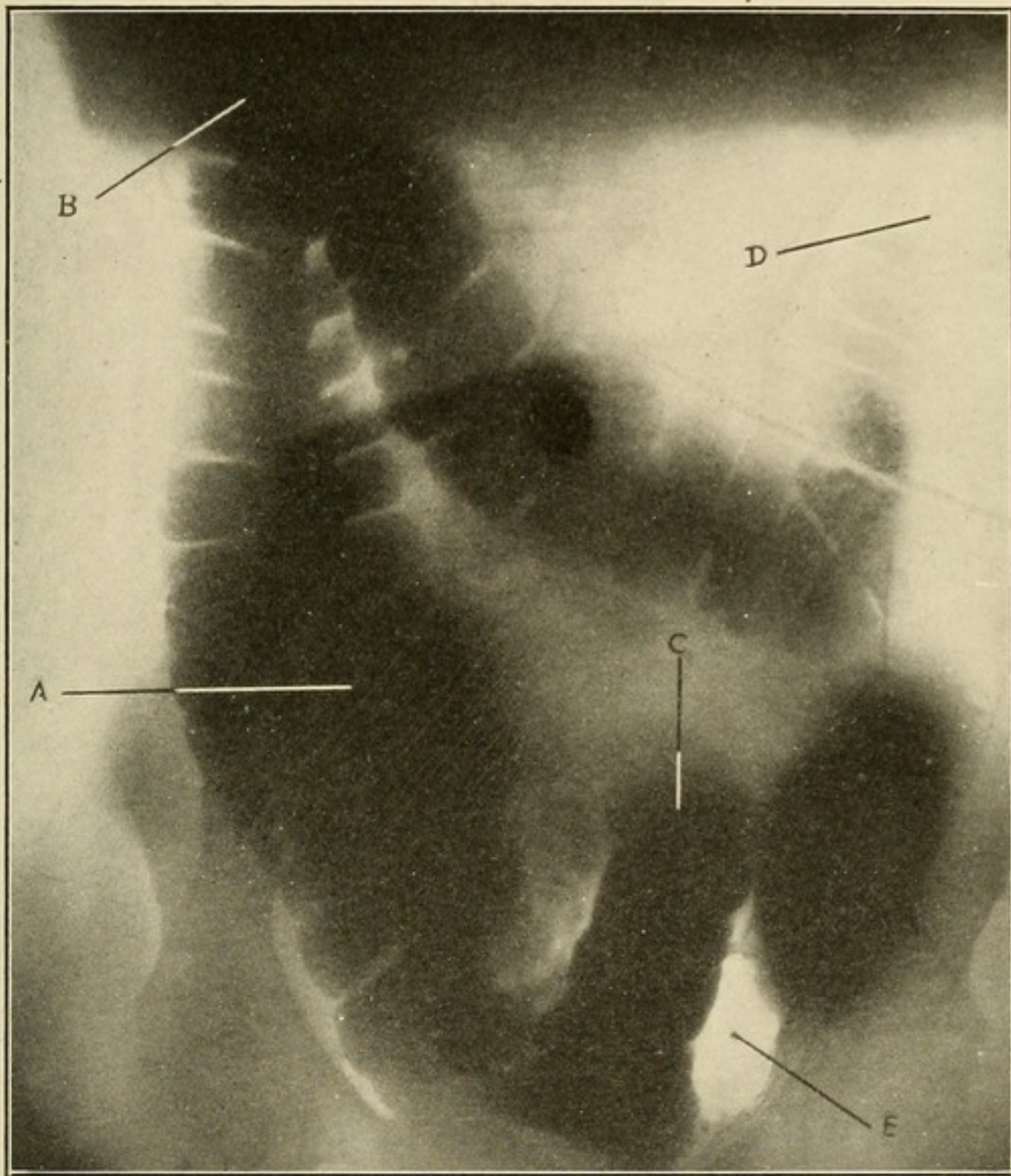


FIG. 40.—Rectal injection showing dilatation and atony of cecum, kinking of splenic flexure of sigmoid. Operated on successfully by Dr. J. N. Ellis (*Dr. John S. Derr.*)

A, Cecum; B, hepatic flexure; C, sigmoid; D, splenic flexure filled with gas; E, gas in kinked sigmoid.



the transverse colon ten to twelve hours, and it may be sometimes observed at the ampulla of the rectum for as much as twenty-four hours.

To make out the position, shape and size of the colon, as well as to discover any other pathologic states there, such as constricting bands or kinks, it is necessary to fill this gut with a bismuth or barium suspension.

The technic of this procedure, though simple in details, requires considerable tact and patience in order to fill the colon without so rapidly distending and disturbing it that the contents are ejected before a satisfactory radiograph can be made.

The method, as described to me by Dr. J. S. Derr, is as follows: Four ounces of barium sulphate is placed in about 2 quarts of good buttermilk of a homogeneous character. The lumpy buttermilk, or what which is stale will not answer. The buttermilk is warmed to a body temperature and the barium thoroughly mixed with it. The patient is placed on the left side, and the milk slowly injected from either a fountain syringe or a porcelain douche container hung at not too great height. It should flow through a colon tube carefully and gently introduced. As the injection proceeds, the patient is placed in the knee-chest position, and kept there until the colon is fairly well filled. He is held in this position for a few minutes and then gradually "eased down" on his right side. Then in a brief space of time the exposure is made with the patient prone, face downward.

In many instances an X-ray examination of the abdomen will disclose various abnormalities of the enclosed viscera, as to position (especially ptosis), changes in the relative position of one organ to another, and other disclosures of interest. These disclosures will in many cases clear up an obscure, perhaps vexed diagnosis, making plain many symptoms not previously understood.

On the other hand, in closing this chapter, let me caution the reader that many apparently pathologic conditions of

the abdominal viscera, as disclosed by the Roentgen ray, give a history of no subjective symptoms, nor is there that distress present which the radiographs would lead the observer to expect.

After all, the X-ray is one of many aids to diagnosis, and, while it marks a wonderful advancement in our knowledge in gastrointestinal ailments, and is invaluable in some pathologic conditions, it must not be depended on entirely, to the exclusion of other and well-tried methods.

CHAPTER V

IS THE CASE STRICTLY SURGICAL?

This treatise does not purport to be a work on abdominal surgery. There are some gastrointestinal conditions requiring surgery and that alone, and in the presence of which, temporizing with internal or palliative methods may lose for the patient his "day of grace."

Of necessity, many of these conditions cannot be gauged by any inflexible or arbitrary rule, and consequently some of the decisions are colored by the personal equation or personal bias of the physician or surgeon.

Instances are numberless in which, after some competent and conscientious surgeon had advised immediate operation, in order that life might be saved, the patient afterward recovered without the operation, perhaps outliving the surgeon.

On the other hand, mournfully many are the procrastinating invalids, who put off from time to time the inevitable operation, until, when the abdomen is opened, there can be absolutely nothing done.

Then, there are the many "border-line" cases, which puzzle both the internist and surgeon, and which, in spite of the closest consideration, may remain puzzles for months and years.

The conclusions advanced in this brief chapter may not meet with the approval of all its readers, and I fully realize my inability to prove some of the deductions herein contained. I might affirm, however, that each statement is based on actual experience or observation, and not on hearsay.

EARLY MALIGNANT GROWTHS IN THE STOMACH OR INTESTINES

Such patients, when this condition is diagnosed, should be urged to undergo operative interference without delay. Palliative measures of the internist are permissible only to prepare for the operation, or, when, for some reason, surgery cannot or may not be undertaken.

In some cases, where previous malignancies have been in evidence, it is not wise to wait even for a positive diagnosis, but surgery should be recommended at the first suspicious symptom.

There consulted me several months ago a widow of fifty, who had previously had her breast extirpated for a cancerous growth. There was no tumor, but little epigastric soreness, and she did not look specially ill. A test-meal disclosed nothing of importance, while an X-ray gave only a faint irregularity of the lower stomach-line, an unimpaired "duodenal cap," and practically no six-hour residue.

On the other hand, she showed a decided cachexia, she had lost 10 pounds in weight within six weeks, and she had an indefinite and constant sensation of ill-being in her stomach. No one could have diagnosed cancer of the stomach *de novo* in such a case, but, taking her history and other collateral circumstances, I urged an immediate operation.

This operation disclosed a small, malignant infiltration of the greater curvature of the stomach, hardly large enough to be denominated a tumor, but which had thoroughly implanted itself, and was making rapid headway. It was removed, and at present she is enjoying comparatively good health.

LATE MALIGNANT GROWTHS

These, especially in persons of advanced years, are often difficult to rightly decide. In positive diagnoses, where the cachexia is marked, where the digestion is with difficulty

furnishing adequate calories, where there are either patent metastases or reasonable suspicion of their presence, the internist should be cautious in advising any radical operation with the hope, implied or expressed, of lengthened days. While at best the outlook is dark for these sufferers, surgery of any sort seldom brightens it.

In such gloomy conditions, I often lay before the patient in as tactful a manner as possible both sides of the question, advising him to also discuss the situation thoroughly with a competent surgeon, and permit him or the responsible members of the family to make the decision.

About one year ago, there came under my observation a lady of forty-eight, who, four years previously, had had her left ovary removed, and her right kidney suspended. The kidney promptly became loose again. She had a suggestive family history, her mother and her two sisters having died from uterine cancer.

She was extremely cachectic, had lost much weight, had decided anorexia, and complained of a dull but constant pain in her stomach. Palpation revealed a tender and indurated growth occupying apparently the whole of the greater curvature of the stomach.

An X-ray picture showed a jagged, irregular greater curvature, and obliteration of the "duodenal cap"; also a decided six-hour residue.

A test of her stomach contents disclosed no free hydrochloric acid, positive occult blood, lactic acid, and Boas-Oppler bacilli in abundance.

The diagnosis of malignancy being positive, the question at once arose whether or not the case was strictly surgical.

Knowing that, upon operation, a gastric tumor generally proves larger than the palpating fingers would indicate, and noting her rapidly deepening cachexia, I hesitated urging upon her an operation which my better judgment said would be futile. On the contrary, realizing human fallibility, I could not dissuade her from taking the only chance, though desperate, that lay open to her.

Under these circumstances I rather left it with her and an intelligent sister, and they consulted a surgeon, who insisted that a speedy operation was indicated, intimating that my hesitation was quite uncalled for.

She elected to have her abdomen opened, but exploration showed an inoperable growth.

In her reduced state, she never fully reacted, living less than ten days.

NON-MALIGNANT GROWTHS OF THE STOMACH, PYLORUS OR DUODENUM

In some of these cases, surgery wins its brightest laurels. When the patient is comparatively young, when there is little or no cachexia, but where the symptoms point to plain obstruction from cicatricial growth, surgery should be sought without hesitation.

Drs. Max Einhorn and J. W. Weinstein, of New York, recently informed me that in their opinion, the presence of a marked seven-hour residue in the stomach, after a fairly liberal meal, called for surgery in nearly every instance.

Where the pyloric outlet is greatly stenosed, it is useless for the internist to continue medical treatment, with the expectation of notable improvement, though some of the symptoms may be ameliorated for a season.

Again, there are occasionally sudden and acute kinks of the duodenum, which, for a time, as effectually close the pyloric outlet as if a growth were there.

Eight months ago, I saw a physician of thirty-five years, who was *in extremis* from inanition. When his stomach became overdistended, he would simply let it overflow, and then would ravenously call for more food or drink.

An acute kink of the duodenum, brought about by a ptosed stomach was diagnosed, and his head was lowered, his body and feet being elevated to an angle of about 45 degrees. The vomiting at once ceased, he readily

retained nourishment, and he was kept in this position for nearly a week, when he was thought strong enough for surgical intervention. His stomach was suspended by Dr. E. G. Jones and from that day to this, he has never suffered a digestive qualm, having gained about 60 pounds.

CONFIRMED ATONY AND DILATION OF THE STOMACH

Sometimes these cases need to come to surgery, but often a better result may be accomplished by other means.

Extensive adhesions and constrictions of the bowels, with marked visceroptosis are sometimes quite a problem.

Massage, abdominal supports, hydrotherapy, electricity, etc., are in many cases sufficient to bring on such a state of comparative relief that surgery need not be recommended. Occasionally, however, this offers the only tangible aid.

An extremely small woman consulted me some months ago for obstinate constipation, coupled with lancinating pains at every act of defecation. She was found to have a general ptosis of all the abdominal viscera, her intestines seeming to be inextricably twisted together in her pelvis.

Possessing ample means, she had employed every known measure except operative, and, even in her sad condition, she submitted to the operation with reluctance. The procedure was entirely successful, and her bowels soon began moving naturally and effectually, just as soon as the many and tortuous kinks were rectified.

APPENDICITIS, ACUTE OR RELAPSING

There are probably no inflammatory conditions of any sort in the abdominal cavity, which tax the discriminating judgment of the internist as do the various appendiceal manifestations. Were it always possible to immediately place the patient in a hospital, where he could be under the constant scrutiny of practised eyes; where frequent leuco-

cyte counts could be made by competent microscopists; and where trained abdominal surgeons were ready at a moment's notice, the problem would be greatly simplified.

Unfortunately, the majority of acute appendicitis occur in those who, of necessity, must depend on the judgment of the general practitioner, and who find themselves in that dangerous channel between the Scylla of surgery and the Charybdis of delay.

Let me affirm that but few cases, unless they be of the fulminating type, require operative interference during the first attack. In this opinion many surgeons will not concur. Furthermore, if all of the facilities above mentioned are available, the attending physician can better afford to await developments, than in a case in some isolated locality, where delay might force a hurried operation by inexperienced hands, or might necessitate a journey to a city, coupled with all the dangers incident to the moving of a patient in such a precarious condition.

Let me lay down a few general rules to be considered, no one of which can be taken too literally.

If it is possible to have frequent blood counts made, the result will be helpful, but not necessarily conclusive. If the differential count is not marked and does not increase, but rather diminishes, and the symptoms gradually defer-
vesce, an operation during the acute attack is probably not indicated.

Dr. E. E. Smith has shown that the differential blood count is an indicator of the *activity of the process* and not *invariably of gangrene*; but if the absolute leucocytosis is low (below 15,000), with high polynuclears, it is probably gangrene.

Dr. Charles Langdon Gibson holds that the greater the disproportion, the surer are the findings, and in extreme disproportions the method has proved itself practically infallible. As the relative disproportion between the leucocytosis and the percentage of the polynuclear cells is of so much more value than the findings based on the leucocyte

count alone, this latter method should carry more weight when performed by a competent microscopist.

Dr. George H. Noble has well said, however, that the differential blood count is only one among many other factors in determining as to the surgical indications, and too much stress should not be accorded it alone.

If the patient shows decided symptoms of acute peritonitis when first seen, or they come on suddenly, with marked general muscular rigidity, exquisitely tender abdomen, tympanites, with drawn and anxious features, an operation is urgently indicated.

If there be found on careful palpation an area of resistance in the right iliac fossa, and this increases along with the general symptoms for twelve hours, especially with slight chilly sensations, an operation is indicated.

If there is a disproportion of the pulse rate with the temperature—either a rising temperature with a slow pulse, or a normal or sub-normal temperature with a rising pulse rate, an operation is probably indicated.

Should there be symptoms of abscess or should the case not improve in a few days, with the suspicion of complications, an operation is probably indicated.

If even there is diminishing tenderness in the abdomen, with normal temperature and pulse, but the patient's facial expression is drawn and pinched, while an indefinite sense of ill-being is constantly present, the internist had best keep in touch with a surgeon, for appendicitis is one of the most treacherous of diseases, and some symptom of fatal import may appear at any time with kaleidoscopic rapidity.

Should the first attack pass over in safety, no operation is called for unless the trouble shows a tendency to recur. If the second attack is milder than the first, delay may be allowed, but if the exacerbations are inclined to increase in severity or frequency, an interval operation is highly advisable, lest the patient be suddenly stricken when surgical aid is not promptly available.

These general suggestions cannot take the place of sound

and discriminating judgment, which must be exercised in every instance, whereby each case is decided on its own merits, after conscientiously weighing every symptom, for and against.

GASTRIC OR DUODENAL ULCER

Some of these cases come to surgery after internal treatment has proved unavailing. As to whether a chronic ulcer in the stomach or duodenum should be given up by the internist, depends greatly upon the intelligence and mental attitude of both the patient and physician.

Should the patient willingly submit to thorough and adequate treatment, allowing plenty of time for Nature's recuperative work, and submitting with equanimity to the probably rigorous measures indicated, the chances for a cure are fairly bright; and, if proper dietetic and hygienic precautions are faithfully adhered to, the dangers of a relapse are proportionately lessened.

If, on the contrary, the patient is high-strung and irritable, with perhaps bad habits, and no special pertinacity in following out a set course; if he claims pressing business engagements that will infringe on the time needed for his treatment, trying to force the physician to make unreasonable promises, as has often occurred in my experience; and if the case gives a history of frequent relapses after longer or shorter periods of comparative health, with some indications of impaired gastric motility, or pyloric patency, the internist should be most cautious in holding out assurances of permanent improvement, except through surgical means.

Many of these "ulcer cases" habitually go from one internist to another, seeking relief, but they are unwilling to furnish the time, patience and co-operation, which should balance the science, thought and forbearance required of the physician, consequently nothing tangible or lasting is accomplished.

Such as these are best referred to the surgeon at once,

for to the internist, they are simply "a weariness and vexation of spirit," adding nothing to either his reputation or purse, and demanding much valuable time that could be better spent with more hopeful conditions.

HEMORRHAGES FROM THE STOMACH OR UPPER ALIMENTARY TRACT

No hemorrhage from the body is more dramatic or exciting than from the stomach, when there well up quantities of dark, grumous blood. Fortunately the first hematemesis is seldom fatal, and only when there are frequent repetitions, is surgery required.

Were it certain that the blood came from one or perhaps only a few frankly bleeding spots, the situation would be different. Often, however, there are multiple erosions, or even a deeply congested gastric mucosa from which the blood oozes in countless minute streams. Apart from clearing out the coagula, so as to permit of gastric contraction, and the use of direct astringent measures, surgery can do but little in these fulminant cases. Furthermore, what is done, must be done quickly and expertly, and, unless the patient can be placed in the hands of one absolutely skilled in abdominal surgery, with trained assistants and every possible facility, I would certainly hesitate at advising any patient to have his abdomen opened up for a gastric hemorrhage.

This conclusion, which will probably not be accepted by some estimable surgeons, has been forced upon me by somewhat extended observations.

CHRONIC AND INDEFINITE ILLS THAT HAVE RESISTED ALL INTERNAL TREATMENT

This may include a heterogeneous mass of "old and experienced invalids," who are really ill, and whose digestive discomforts arise from material causes.

Sometimes an exploratory laparotomy will disclose the

chief lesion, and perhaps point the way to an absolute cure. Again, the necessary quietude and rest to the abdomen and alimentary tract following an operation will often exert a far-reaching good effect, augmenting many-fold the actual benefit conferred by the surgical procedure. I might mention, also, that, even when nothing of consequence is done by the surgeon, the operation itself, with the opening of the abdominal cavity, may put into action the most marvelous train of psychic sensations, and an apparently permanent improvement ensues.

Two years ago, a lady of forty-five came under my care for stricture of the intestines, non-malignant in character. Thinking that perhaps the one or more strictures were close enough together to permit of a resection, I advised an operation, and the abdomen was opened by Dr. E. C. Davis. Inspection showed extensive strictures situated at short intervals throughout probably 10 or 15 feet of the small intestines, rendering resection impracticable. The abdomen was closed, and the patient put back to bed. The recovery from the laparotomy was uneventful, but she complained no more of the terrific cramps, which before were the bane of her existence. Her intestines were kept distended by agar agar, and freely lubricated by olive oil and liquid albolene, so that she had fairly satisfactory fecal movements daily. She soon began to brighten up, to take an interest in affairs of life, to eat heartily and, with it all, developed a cheerful, optimistic frame of mind that kept her happy and contented.

With the exception of a marked tendency to constipation, which she overcomes by constant care, she is at this time a fairly normal woman. She was never informed as to what was *not* done in her abdomen, and to this day she considers herself a living monument to surgical achievement.

So, after all known medical and internal means have been exhausted without avail, it may be well to suggest to have the abdomen thoroughly explored, with the hope of Micawber that "something may turn up" that can be remedied.

We should remember, however, that there are surgeons and surgeons, and, unless it is practicable for our patients to command the services of those adept in surgery of the abdomen, we should be quite slow to recommend radical measures with the implied hope of marked improvement or cure. Otherwise, we might suggest to our long-suffering dyspeptics that perhaps it would be preferable to "bear those ills they have, than fly to others that they know not of."

CHAPTER VI

THE STOMACH-TUBE

Although there were some random attempts to explore the stomach by the use of a tube before the days of Kussmaul, it was he, who in 1867 first inaugurated intelligent and systematic methods. In 1871 Leube also began to demonstrate its use, and to these two notable men we owe much of our present-day knowledge concerning this useful diagnostic and therapeutic instrument.

Unfortunately, the prevailing attitude of the public toward the stomach-tube is anything but favorable—in many instances amounting to an actual repugnance. I have known many patients, who have spent sleepless nights in awesome anticipation of the trying ordeal, and others, who would suffer for months, rather than submit to what they considered a horrible torture. So often do I hear some intelligent patient say—"Doctor, I would have been to you for aid long ago, had I not dreaded to take that awful stomach-tube."

The reason for this is not hard to find. It lies in the careless, inexperienced, or principally *slow* technic of those who have introduced the tube, and have inflicted upon patients such needless discomfort, that they have not only become themselves prejudiced, but have spread abroad the evil tidings. Candidly, I cannot blame them, and it is the duty of the physician of this day to learn how to introduce a tube so deftly that this prejudice will be overcome.

There are certain contraindications to the employment of the stomach-tube, and these I will first make plain:

(1) **Pregnancy**, especially if advanced beyond the fifth month. The first few months should make no difference, and even the later months, if the patient is accustomed to

the tube, and the operator is expert. If, however, the patient has not taken the tube before, the risk is grave.

Several years ago in a New York clinic I saw a tube introduced into the stomach of a Jewish woman apparently eight months pregnant. She struggled violently, and when she arose there was about half a pint of amniotic fluid in the bottom of the chair.

(2) **Organic heart disease with broken compensation.** To this may be added so-called cardiac neuroses, angina pectoris, real or pseudo, myocarditis, or any condition where the heart seems decidedly below par.

In some of these conditions, where the cardiac lesion does not appear to be acute, if the patient is quite phlegmatic, or if the operator is expert, a risk may be taken, but the physician should realize that it is somewhat of a *risk*.

(3) **Aneurysm of any of the large arteries.** This condition absolutely contraindicates.

(4) **Recent hemorrhages of any kind.** This heading may include hemorrhage from the stomach, intestines, lungs, bladder, uterus, apoplexies, or hemorrhagic infarctions.

A fairly good rule is to permit from ten days to two weeks to elapse after one of these hemorrhages, before attempting to pass the stomach-tube.

(5) **Advanced pulmonary tuberculosis, or advanced pulmonary emphysema with bronchitis.** The evident condition of the patient in these advanced pathologic states will generally show the inadvisability of attempting to pass a tube.

(6) **Advanced arterio-sclerosis.** The tube is generally contraindicated in these cases, whether or not the blood pressure is abnormally high. Even under the most favorable psychic conditions, they seldom take the tube kindly, and it is seldom wise to attempt it—especially if the blood pressure is high.

(7) **Advanced cachexia from any cause.** In some of these extremely enfeebled states, any manipulation entail-

ing the slightest shock may turn the scales unfavorably, and the introduction of the tube should not be attempted, unless for very strong reasons.

(8) **Evidences of erosions of the gastric mucosa, either malignant or non-malignant.** In this may be included palpable carcinoma of the stomach or pylorus, accompanied by vomiting of coffee-ground material. These symptoms being present, the introduction of a tube, no matter how carefully performed, may cause serious damage. It is unwise also to explore the stomach with a tube when there are strong indications of either a single open ulcer or multiple erosions, even though they be shallow.

(9) **Acute febrile conditions.** All of these may not constitute a bar to the use of the tube, but the operator will find these patients very unresponsive, and, unless great benefit is likely to be accomplished, he will find that more discomfort is inflicted than good is accomplished.

(10) **Those rare and peculiar conditions, where upon the slightest touch of the tube against the epiglottis the larynx spasmodically closes, and the patient becomes blue.** These conditions have not been explained, but they occasionally are in evidence, and must be taken into account. This does not mean those nervous, struggling patients, who vow they are choking, when they are not, and who need only to exercise self-control. It means those who, in calmness try faithfully and intelligently to swallow the tube, but whose whole respiratory machinery automatically closes upon the slightest touch of the tube, while the face becomes livid, if the effort is continued. These individuals simply possess an idiosyncrasy against the tube, and it is useless to attempt to force it upon them.

(11) **Those patients, who are violently nauseated at the merest touch of the tube upon the tongue, epiglottis or any part of the fauces, or who incline to vomit at the sight or mention of it.** There are some hyper-sensitive individuals, who really seem in good faith unable to bear the sight, mention or touch of a stomach-tube, whose very nature revolts

against its use, and who cannot help this feeling. I have seen a few such curious individuals, and can affirm that scarcely any diagnostic information will recompense the physician for the strenuous efforts required to extract a test-meal from their frenzied stomachs.

The choice of a tube is quite important. The size for an adult should vary from 18 English or 30 French to 20 English or 32 French. Smaller than this renders the tube rather small and soft. Larger numbers are used by some, up to 24 English, and while an ordinary esophagus can accommodate them comfortably, the size is inclined to be alarming. To

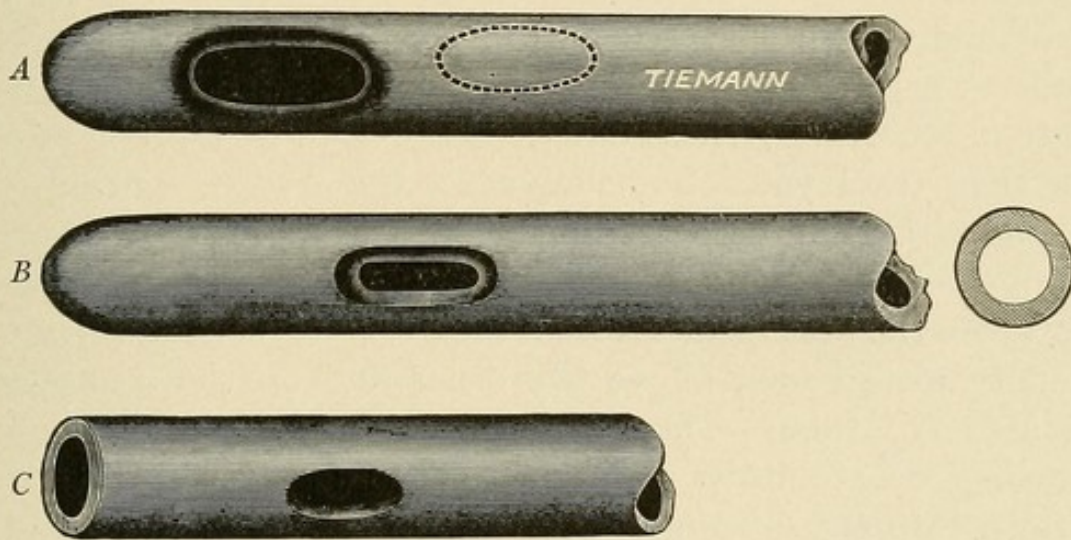


FIG. 41.—Stomach-tubes. *A*, proper tube, large smooth eye, sufficient caliber; *B*, improper tube, eye too small; *C*, improper tube, eye sharp and small.

a fearful patient a tube always looks really larger than it is, and if he catches a glimpse of a "24," he will probably be unduly alarmed. It is much easier to use a smaller tube than to quiet his perturbed feelings.

For children, tubes may be used as small as 12 English or 21 French, or best 15 English or 25 French. The latter can be inserted into the esophagus of a four-year old child, and it is rarely necessary to introduce a tube in a younger patient.

The tube should be of red rubber, and fairly stiff. When lacking in a certain amount of rigidity, it is liable to coil up

in the mouth instead of passing on down the esophagus, and later on, when the esophageal muscles or the cardiac opening of the stomach are resenting its onward progress, it is liable to "buckle," to the discomfort of the patient and the inconvenience of the physician. The use of a wire or any other appliance to stiffen the tube, I have not found helpful.

Up to a few years ago, the imported were much the best, but at present tubes can be obtained in America, fashioned and moulded to suit the most fastidious.

In regard to the number, size and character of the openings of the lower end of the tube there is some difference in opinion, though all unite in condemning that abomination, the tube with a sharp-edged opening in the center of the end. There is no estimating the damage done to delicate gastric mucosæ by these dangerous tubes, and such should never be employed. Some advocate tubes with from three to eight, or even more openings near the end for the extraction of test-meals. In my experience, however, I have obtained the best results from a tube with two openings, one about half an inch above the other and on the opposite side of the tube. These openings should be of "velvet finish," so as to inflict no injury to the mucosa, should it be drawn into the openings by force of aspiration. The end of the tube should be closed, smooth and round.

Lavage tubes should possess from two to five openings, though I consider five about the proper number. Where the tube is to be used in an empty stomach, a great number of very small openings is feasible; but generally there are remnants of food or shreds of mucus to be removed through the tube, and then the small openings are unsatisfactory.

As a general rule the lavage tube should be a little larger than the one for extracting a test-meal. In the first place, more room is required successfully to clean the stomach, and besides, the patient has learned more about the tube and can be induced to swallow a larger one without serious objection. Judgment, though, must at all times be exercised in the choice of size to be employed.

For lubricating the tube plain water is by far the best. Glycerin, oils of various sorts, cream and a host of other agents have been advocated, only to be discarded. The supremacy of water admits of no argument.

Many efforts have been put forth to render insensitive the throat and fauces. There have been recommended a 3 per cent. solution of cocaine, or a 5 per cent. solution of orthoform to be sprayed over the fauces. Even a spray of ether or ethyl chloride has been attempted. Others have painted the throat and fauces with collodion, or a solution of adrenalin, or even a 5 per cent. solution of nitrate of silver. Let me deprecate the use of all these methods. None of them can take the place of skill and celerity in introducing the tube, and none or all of them can atone for the lack of these attributes on the part of the physician.

When the physician prepares to extract a test-meal from a patient who has never undergone the experience, he should enter upon his task with kindness, gentleness, and patience. He should spend several minutes in reassuring the patient, calming his fears, and soothing his hyper-sensitive nerves. The doctor should inform him that the information to be obtained is likely to prove of the utmost value in diagnosis and subsequent relief of symptoms, and that the slight inconvenience will be more than compensated by the insight afforded into obscure ills. The patient should always be interrogated as to false teeth, and, if worn, they should be removed. This inquiry should never be omitted, for occasionally very young persons have them, and they are fitted so naturally, that their presence is not suspected.

There are different methods employed to protect the patient and his clothing while a test-meal is being extracted, some of them most cumbersome and fear-inspiring. Too many "protectives," rubber aprons, etc., are not advisable, in my opinion, and I have come to use two plain towels, one around the neck, and one in the lap. A plain wash basin may be placed in the lap, or a small porcelain basin. Too many preparations will certainly alarm the patient.

Should there be an assistant at hand, the patient need only hold the basin, otherwise he is instructed to hold the glass retainer in his left hand, and the basin in his right, the operator admonishing him to hold on tightly to both, and on no account to drop them.

Up to this time the patient has not seen the tube, nor should he be permitted to see it until the instant it is to be used. If he has opportunity to gaze on it too long, he may refuse altogether to swallow it.

Now as to the actual method of introducing this tube: I realize that the methods are legion, and that some operators get satisfactory results by means that would give no results whatever to others.

I will briefly mention some of these methods, and then give in detail the one that has proved the best in my hands.

Dr. Max Einhorn stands directly in front of the patient, tells him to open his mouth, presses down the tongue with two fingers of his left hand, puts in the tube, and has it in the stomach in an incredibly short space of time. This answers in Dr. Einhorn's skilled hands, but would not in one less practised, for there is nothing to prevent the patient from pulling back and escaping from the tube, if he so desired.

Others stand either in front of the patient, or slightly to the left, and attempt to start the introduction of the tube at the proper place by the aid of sight, as the mouth is widely opened. This has proved a poor way, for here again the physician has but little control of the patient, who, with his mouth wide open and his head thrown back, is more apt to be nauseated than when his mouth is nearly closed.

The best way is to stand at the right of the patient, with the left arm of the physician lightly placed around the neck, and the left hand in front of the mouth so as to guide and control the tube. Asking the patient to slightly (not widely) open his mouth, the tube is gently but quickly inserted between the lips, and pressed back against the

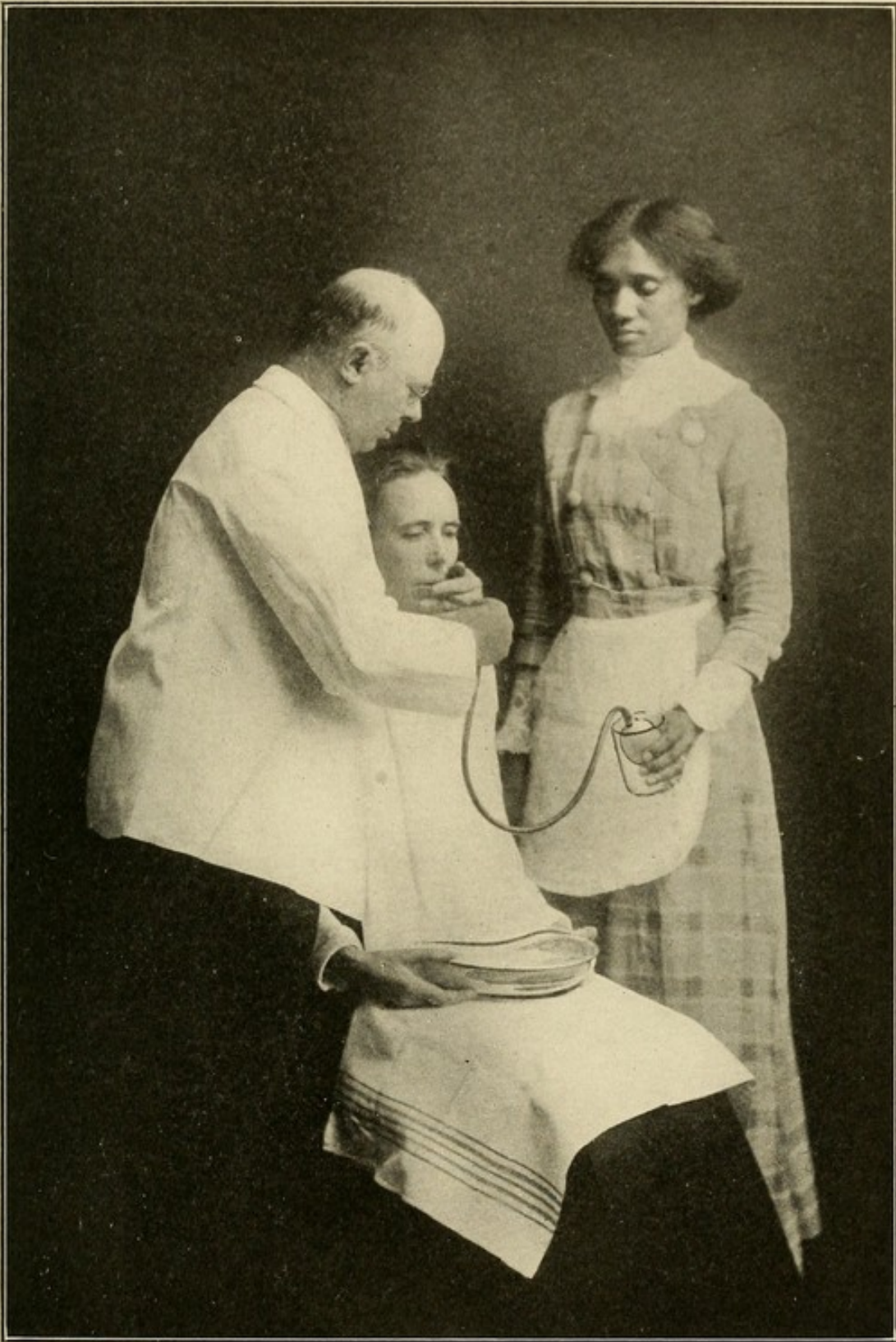
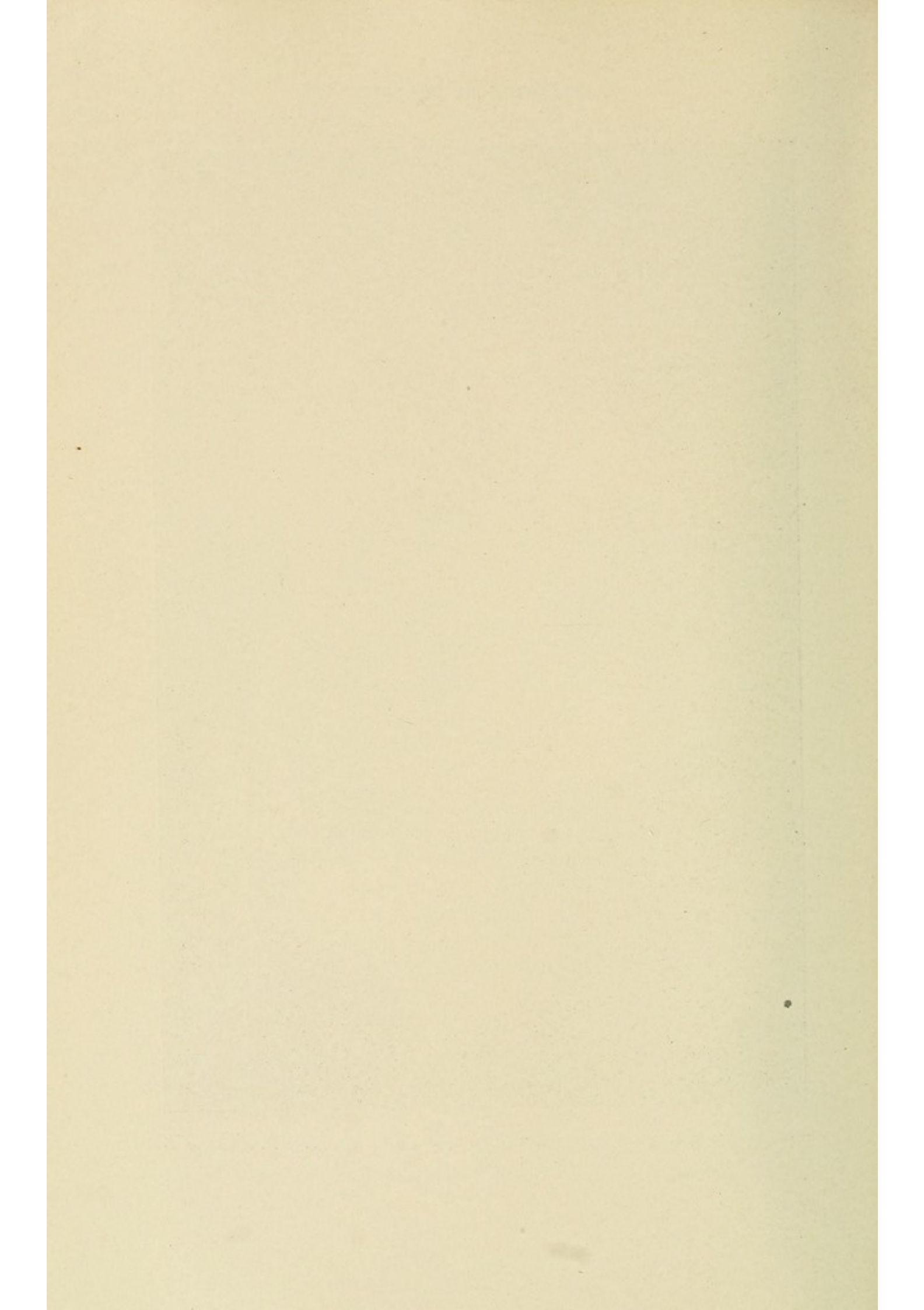


FIG. 42.—Correct position of operator and patient for introduction of stomach-tube.



epiglottis. This is done by the right hand of the operator, while the tube runs between and is steadied by the two fingers of his left hand that are directly over the patient's mouth. The patient is then gently asked to swallow, and the gentle injunction is repeated several times until he makes the effort to swallow. Just as he does this, the tube will slip by the epiglottis and down the esophagus—not the larynx, for it is almost an impossibility for the tube to penetrate there. Should, at this instant, the patient complain of choking, admonish him to swallow again, and when he finds he can do so, he will have no fear. In the meantime the tube is being rapidly propelled down the esophagus, and generally a little sound of escaping gas can be detected as the tube slips through the cardiac orifice.

Ordinarily a distance of 20 or 21 inches will put the tube sufficiently into the stomach, but there are many variations to this rule. Tall patients, or those with prolapsed stomachs will require more inches, while I have had diminutive patients whose stomach cavities were but little over 18 inches from the teeth.

I well remember one tall and slender old lady, with relaxed abdominal parietes and a stomach ptosed practically into her pelvis, who required nearly 30 inches of tube in order to either aspirate or irrigate her stomach.

At this time the patient should sit erect, with the head slightly inclined forward, as this position minimizes the nausea. This may require some reminding or gentle urging, for nearly every one under the circumstances, is inclined to lean back, with the head thrown still further back, and the mouth wide open, all of which tends to augment instead of decrease the discomfort.

It is well at the very first to introduce the tube just a little further than is necessary, so as to permit of gradually drawing it out during the aspiration, should the end of the tube not engage itself in the stomach contents at once.

As to the methods of aspirating the contents, they, too, are legion.

The "expression method" consists of directing the patient to place his hands over his stomach, and with both external pressure and abdominal contraction, as in the effort to empty the intestines, the contents of the stomach may be forced out of the tube. This is a good method when it succeeds, but it rarely succeeds, and moreover entails too much effort on the patient's part.

Others use a large Politzer bag, aspirating the contents into this bag. The objection to this lies in the fact that the operator cannot know how much of the contents he has obtained, and also, if he is not careful, he is liable, as he squeezes the bag, to force the contents back into the stomach as fast as he aspirates them out.

By far the best method in my hands is the simple, valveless bulb, known as the Lockwood bulb, and furnished by Tieman & Co., of New York. This is made of good rubber, is highly resilient, and, possessing no valves, either end can be inserted into the end of the tube. In aspirating the stomach contents, the bulb is compressed and one of the operator's fingers is placed over the open end, acting as a valve. The pressure being quickly removed from the bulb, it expands and reassumes its form, creating a vacuum, and drawing up the contents of the stomach. The finger is then removed from the end, and the next pressure empties the contents of the bulb into the waiting receptacle. This can be rapidly repeated, and any operator can soon acquire the "knack." Should the tube seem clogged, by placing the finger over the open end, and quickly compressing the bulb, air is forced through the tube, and the obstruction easily cleared.

Should the efforts at aspiration fail to bring anything, it is well to gently and slowly draw forward the tube, while these efforts are kept up, as sometimes the end of the tube is not in the fluid contents at the most dependent part of the stomach. Should it be drawn on out until, by the easy escape of air, the operator knows that the tube has almost left the stomach, it may be pressed downward again, and



FIG. 43.—Aspiration of stomach contents.



the same manipulation repeated. This may be done several times until either the efforts are successful or the operator is convinced that the stomach is empty.

Occasionally in stomachs of irregular conformation, the contents are extremely hard to locate, and it will require considerable patience on the part of the physician to guide the end of the tube into the small space where it may become engaged. Intelligent effort, however, assisted by forbearance and co-operation on the part of the patient, will nearly always result in success.

In cases of very patulous pylorus, or hypermotility of the stomach, the viscus may be absolutely empty, and of course efforts at aspiration will be futile.

It is seldom necessary to attempt to thoroughly evacuate the stomach when getting a test-meal. From 15 to 20 c.c. are sufficient for any ordinary quantitative tests, and it is not wise to needlessly prolong the operation. Under favorable circumstances, from two to four expansions of the bulb will aspirate this quantity and then the tube should be rapidly drawn from the stomach with *one* gentle but firm pull. The two fingers of the operator that grasp the tube should also compress it, so that no random drops of fluid may run out on the floor or clothing of the patient as it emerges from the mouth. This little precaution is worth noting.

Though considerable space has been taken in describing these various manipulations, the act of introducing a tube into a patient's stomach, aspirating a test-meal, and withdrawing the tube should require but a few seconds. I have many times completed the whole act in from four to six seconds, and, unless some hindrance intervenes, it should nearly always be completed inside of thirty seconds. If the operator finds that it is taking him longer than this, he should endeavor to hasten the different steps, so as to come within this time limit.

There is no procedure in the whole range of therapeutics wherein deftness and celerity on the part of the physician

are more appreciated than in the introduction of the stomach-tube. Let me, therefore, urge my readers to painstakingly practise this really simple operation, so that the people at large may lose that fear and horror of the stomach-tube, and may, instead of looking upon it as an instrument of torture, accord it the place it deserves as a most useful adjunct in the diagnosis and treatment of diseases of the alimentary tract.

CHAPTER VII

GASTRIC LAVAGE

Among the methods of treating the stomach locally, gastric lavage has held and will necessarily hold an important place. Since it was first scientifically championed by Kussmaul, the use of this procedure has waxed and waned through successive decades, until at present it has won its proper and definite place; and, though not universally advocated, is at least respected.

Like many other somewhat radical measures, gastric lavage has been sadly abused by some of its overzealous friends, and this abuse has built up against it many prejudices, some of them founded upon just cause, which will take years to overcome. On the other hand, when judiciously employed, under proper conditions, and with good technic, it will yield the most gratifying results, accompanied by a minimum of discomfort.

INDICATIONS FOR GASTRIC LAVAGE

(1) **In all cases of poisoning.** Some clinicians, with an excess of caution, have advised against the use of this procedure after the ingestion of acids or corrosive alkalies, fearing that the tube might perforate the eroded and weakened gastric mucosa. This caution should be disregarded, for the good to be attained by washing from the stomach the poison, before it can be absorbed or sent onward into the small intestine, will immeasurably overbalance any supposed danger of perforation.

(2) **In acute vomiting.** Very often a lavage, repeated two or three times daily for just a few days, will exert an almost magic effect in this trying class of cases.

(3) **In chronic gastritis, with an excessive production and collection of mucus in the stomach.** This statement will, I am sure, excite dissent on the part of some conscientious observers. They will point to many patients who have used lavage constantly for years without apparent benefit—perhaps being worse off than when they began. To these I would admit that the tube can be greatly abused, but that in all probability other factors were responsible for the retardation of improvement.

Gastric lavage, with suitable astringents, antifermentatives, or sedatives, when employed not over two or three times weekly, I have very many times seen accomplish marked improvement in these conditions, diminishing stomach distress, aiding the nutrition, clearing up the skin, and in other ways exercising a real and tangible good effect on the dyspeptic and discouraged patient.

(4) **In dilatation of the stomach (atonic type), with impaired motor power, delayed evacuation and fermentation.**

(5) **In dilatation of the stomach (stenotic type), with motor insufficiency, gastritis and periodic vomiting.** In no class of cases is gastric lavage more fruitful of benefit than in these two last conditions. I have several times seen patients in an almost moribund state, with foul, fermenting stomachs that had not been emptied entirely for weeks, soon brighten up, take on renewed strength, and live in comparative comfort for many months, principally, if not entirely, from the benign effects of frequent and adequate lavages of their unclean stomachs.

(6) **In acute dilatation of the stomach from any cause.**

(7) **In post-operative vomiting, especially with reversed peristalsis.** Lavage in such conditions must be used with caution, and with the assent of the surgeon. I have, however, in more than one instance seen it apparently save patients, who without it would have probably died.

(8) **In post-operative intestinal paresis** (according to Kemp, gastrointestinal paresis) lavage should be employed together with enteroclysis.

(9) **In intestinal obstruction, especially intussusception,** frequent lavage sometimes greatly relieves abdominal distention above the point of obstruction, aiding both directly and indirectly its spontaneous reduction.

(10) **Ice-water lavage.** The recommendation that lavage of ice water may be used in severe hemorrhage from ulcer or gastric erosions, is put forth by some writers. This does not meet with my approval.

(11) **Vomiting in peritonitis.** Some recommend it for this, but only at the direct request of the surgeon in charge should it be employed. While it might be of doubtful benefit, it could also work considerable harm.

Some of the uncalled-for and misdirected efforts to wash out the stomach have been largely responsible for the prejudices against this really useful therapeutic procedure.

The contraindications to the use of gastric lavage are in the main the same as those against the use of the tube for the aspiration of a test-meal, except that it must be remembered that the tube must remain in the stomach somewhat longer than when only a few centimeters of fluid contents are to be extracted, consequently the operator must make due allowances for this prolonged time, and govern himself accordingly.

In regard to the tube itself this was practically covered in the preceding chapter. It might be permissible, however, to say again that the size of the tube should run from 18 to 24 English—seldom larger, and that five velvet-finished “eyes” should be placed at near intervals on opposite sides and near the end of the tube. There should be no opening in the end of the tube.

Most tubes are marked at about 20 inches from the distal end. Should they not be marked, it is well for the operator to make a circular mark at this distance with indelible ink. It is ordinarily about 16 to 18 inches from the teeth to well within the stomach—the distance being regulated by the stature of the individual and the position of the abdominal organs. If the physician will insert the tube 1 to 3 inches

beyond where he thinks is necessary, he will then have sufficient slack to permit of a gradual retraction of the tube, should the return current not come as freely as it should.

The same general directions as to inserting the tube are applicable as were previously described. Some operators insert the tube into a bowl of cracked ice or very cold water just before introducing. Others have advocated an "introducer" or guide, as devised by Dr. M. Knapp, of New York. These various methods I have found to be time-consuming, and without appreciable value.

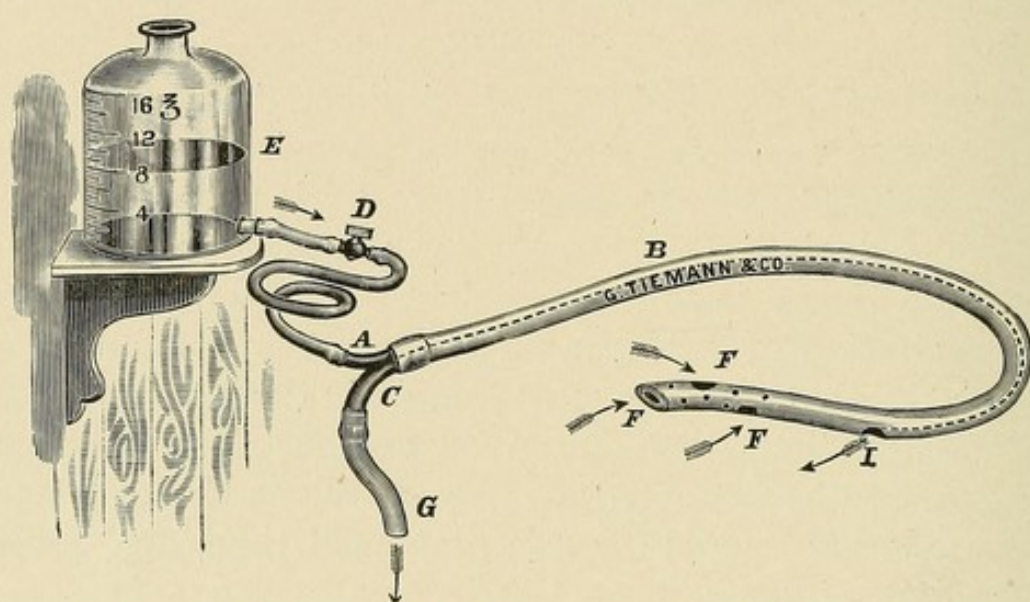


FIG. 44.—Hemmetter's double-current stomach lavage-tube.

Many forms of apparatus, more or less complicated, have been used in gastric lavage, some of them being so involved that the slightest untoward incident would impair the smooth working of the whole.

I shall briefly describe some of those in regular use, and then at more length describe the method I have found most efficacious.

Irrigation of the stomach by means of a glass Y or T.

This has generally been known as the "Leube-Rosenthal" method though some Americans, among them being Dr. R. H. M. Dawbarn, claim to have used it fully as long as the Germans.

A large glass irrigator, of two or more quarts capacity, is suspended slightly above the patient's head. This irrigator should be plainly marked in cubic centimeters or ounces, so the operator can know just how much he is introducing into the stomach. This irrigator is connected with a long soft rubber tube by means of a Y- or T-shaped

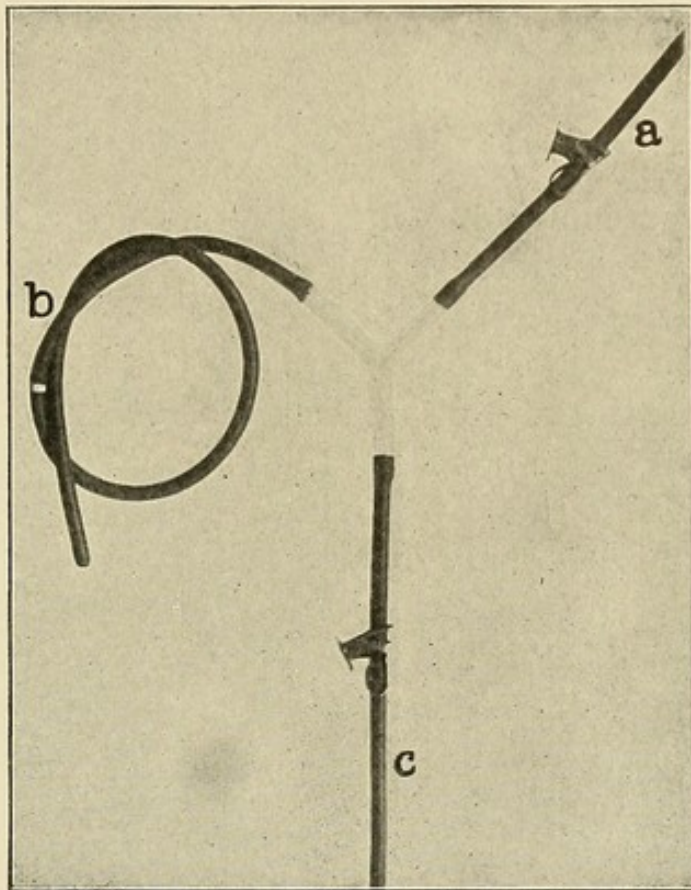


FIG. 45.—Leube-Rosenthal method of gastric lavage. (*Bassler.*)
a, Tube leading from the irrigator jar to the glass Y; *b*, stomach-tube; *c*, drainage tube leading to basin on floor.

glass connection; one branch of the glass connection being inserted into a stomach-tube, the other into a carry-off tube that extends into a pail or basin.

Here let me insert an earnest word of caution. Be sure that the stomach-tube is safely fitted to the end of the glass connector, and further more, that the end of this stomach-tube is never free from careful observation. Should by any reason the tube become disengaged, and accidentally slip

down the esophagus into the stomach of the patient, a serious dilemma is at hand. This tube in all probability will be extricated from the stomach only after a gastrotomy, and in addition, if the patient falls under bad influences, the physician may face a suit for damages. That this is no fanciful picture, the records of our courts will verify. Let the operator always be sure that the tube is thoroughly safe and under his control, and this distressing accident will never occur.

The irrigator tube should be closed with a clamp, which should remain in place until the stomach tube is fully inserted. A second clamp is needed on the outflow tube, so that, after the current is started, it can be regulated by these two clamps.

The stomach-tube being in place, the irrigator tube is opened, while the outflow tube is clamped. This continues until about 10 or 12 ounces of fluid are introduced into the stomach. While the flow is still entering the stomach, the outflow tube is suddenly opened and a part of the current diverted, thus starting the siphon action. The inflow tube is then pinched, allowing the outflow tube to siphon out the stomach. When the stomach is empty, the outflow tube is pinched, the inflow is opened, and the same process continued until the lavage is complete.

Some operators have a double, or even a triple glass T-tube, connecting with several glass containers, in which are various medicaments, arranged so that by the simple opening of a clamp the stomach may be laved with any one of them. Some of these contrivances are more spectacular than useful.

Another of the old methods is the Friedlieb apparatus, consisting of a rubber funnel, a long rubber tube, in the middle of which is a bulb, with or without valves. The supposed advantage of the bulb lies in the ability of the operator to force air through the tube, or to aspirate air upward in it, should any obstruction occur.

All things considered, I have found a modification of this

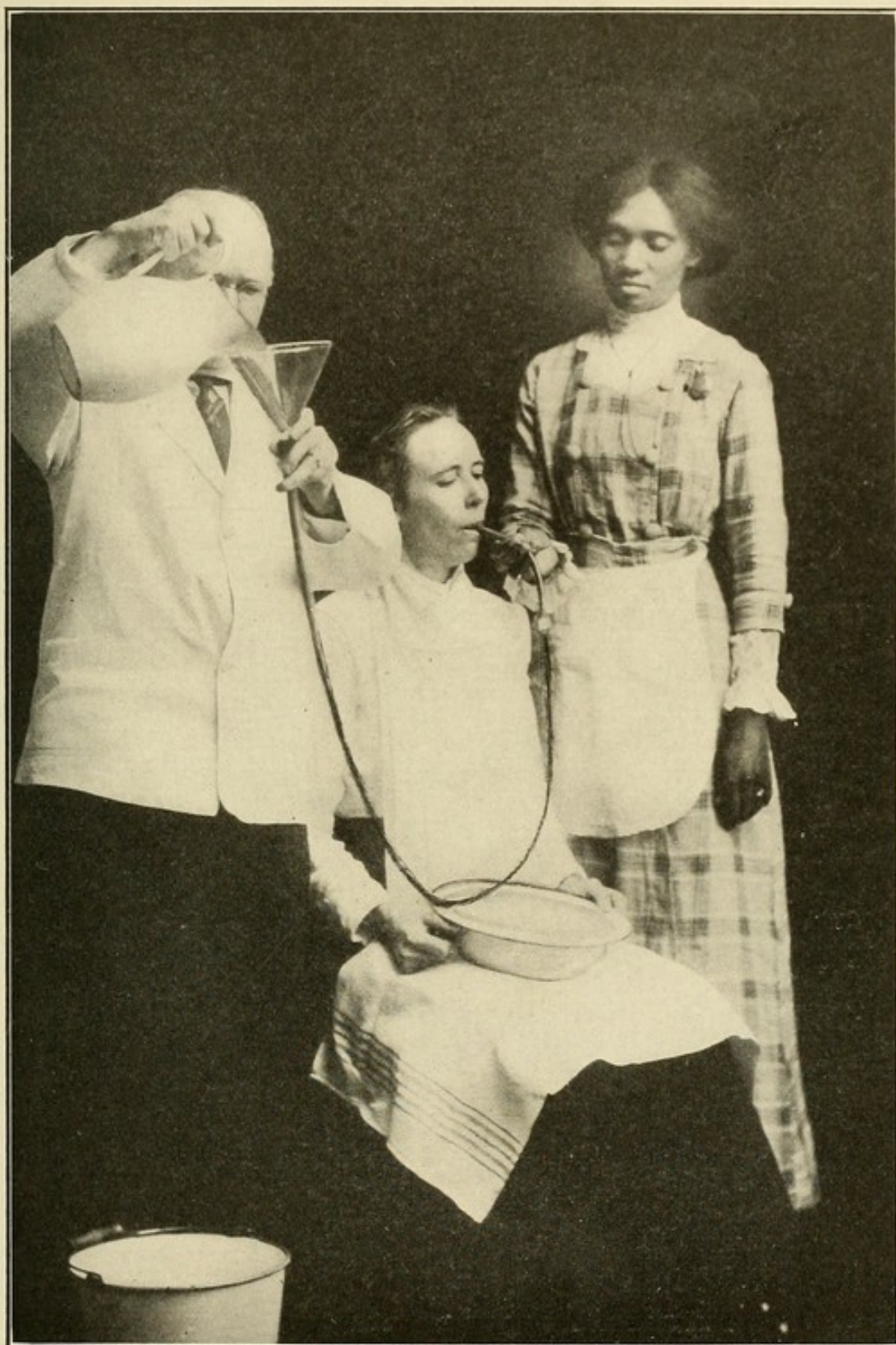


FIG. 46.—First step in gastric lavage.



Friedlieb apparatus the most practicable for lavage purposes. The apparatus I prefer consists of a glass funnel, of 10 to 16-ounce capacity, a good, resilient red-rubber tube about 24 English size, and 3 1/2 feet long, and a glass connection, made from plain glass tubing, with the ends rounded by the flame of a gas or Bunsen burner. This glass tube should be about 2 1/2 to 3 1/2 inches long, sufficiently large to allow a lumen as large as the stomach-tube, and the space between its fixation in the tube connected with the funnel. Its insertion in the stomach-tube should be

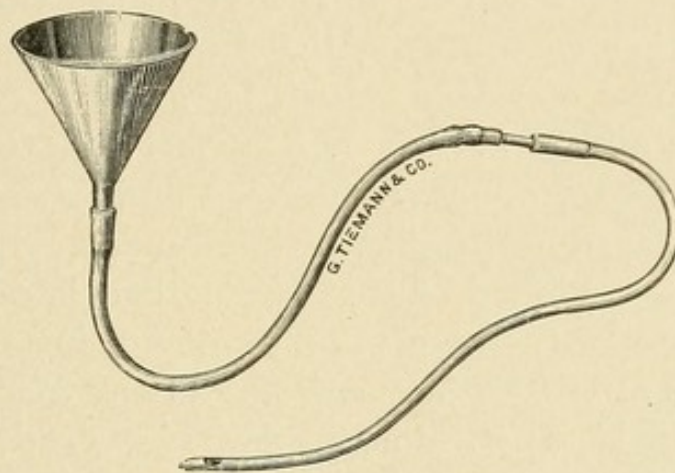


FIG. 47.—Lavage apparatus.

sufficiently long to allow the operator to observe the direction of the fluid current, its gross contents, its free flow, or its obstruction.

I prefer that the funnel should be of glass, which permits better observation of the movement of the fluid current. Care should be taken that the glass outlet tube from the funnel be ample in size. Many good operators prefer a hard rubber funnel, both because of its lightness and of the lessened liability to breakage. This is merely a matter of preference.

The proper lavage tube having been safely affixed to the glass connecting tube, it is introduced into the esophagus, as described in the previous chapter.

It is occasionally necessary to have the patient a little more thoroughly protected than when a test-meal alone is

to be extracted, but I seldom find it needed, the two towels being ample.

The lavage tube being in the stomach, the glass funnel should be filled with plain water, held up, and the water allowed to flow into the stomach. Just as the water is disappearing from the bottom of the funnel, the funnel should be quickly lowered, so as to get the siphon action of the water. Holding this funnel down just clear of the basin or pail, and considerably below the level of the stomach, the water should flow back promptly, unless obstructed by lumps of undigested food, or a kink in the tube. If the water does not come freely, the funnel should be raised, about 6 ounces of water poured in, and the effort made again to get a return flow. If necessary, the tube may be slightly retracted, or moved upward and downward until its end is engaged in the fluid in the stomach. Be sure that the tube is not kinked or that the patient is not involuntarily biting it. In the great majority of instances, after one to three attempts the water flows back freely, and the lavage can be kept up as long as desired. While it is going on, the patient should sit erectly, the head thrown a little forward, and should breathe deeply and rhythmically. This will facilitate the treatment.

Should it be found that the lavage tube is tightly clogged, so that the return siphonage cannot clear it, I occasionally slip out the connecting glass tube, insert my Lockwood bulb, and with two or three quick pressures, with my finger closing the outlet, I drive through the tube enough air to clear it. During this procedure, I am particular never to loose my hold on the end of the lavage tube, lest it escape and be swallowed. Having cleared it, I replace the glass connecting tube, and continue as before.

Should the patient find the ordeal somewhat trying, as is often the case at first, it might be well for the operator not to attempt a thorough lavage, until the tube is better tolerated. Unwise efforts, colored more by zeal than discretion, have in many instances prejudiced patients against

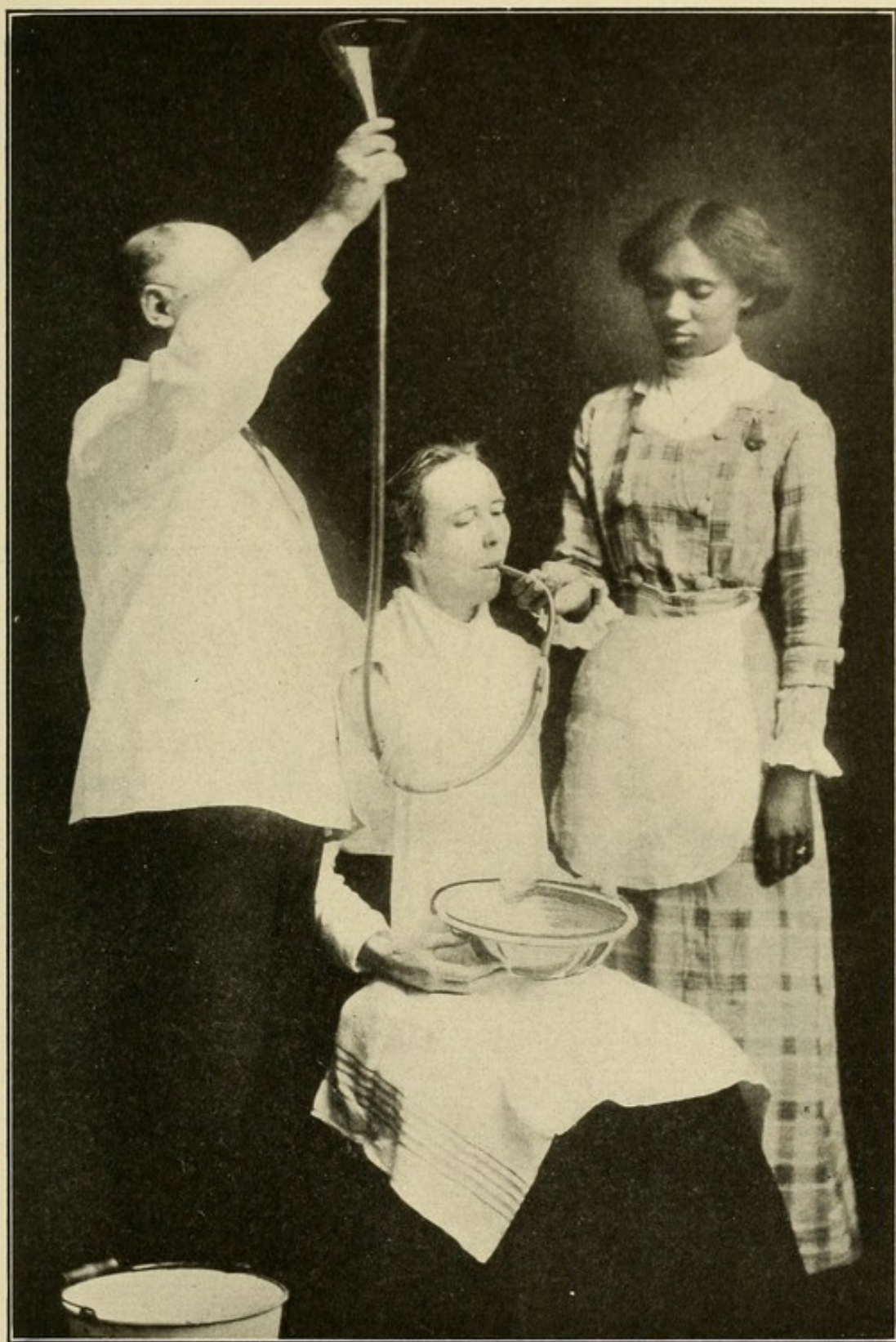


FIG. 48.—Second step in gastric lavage.



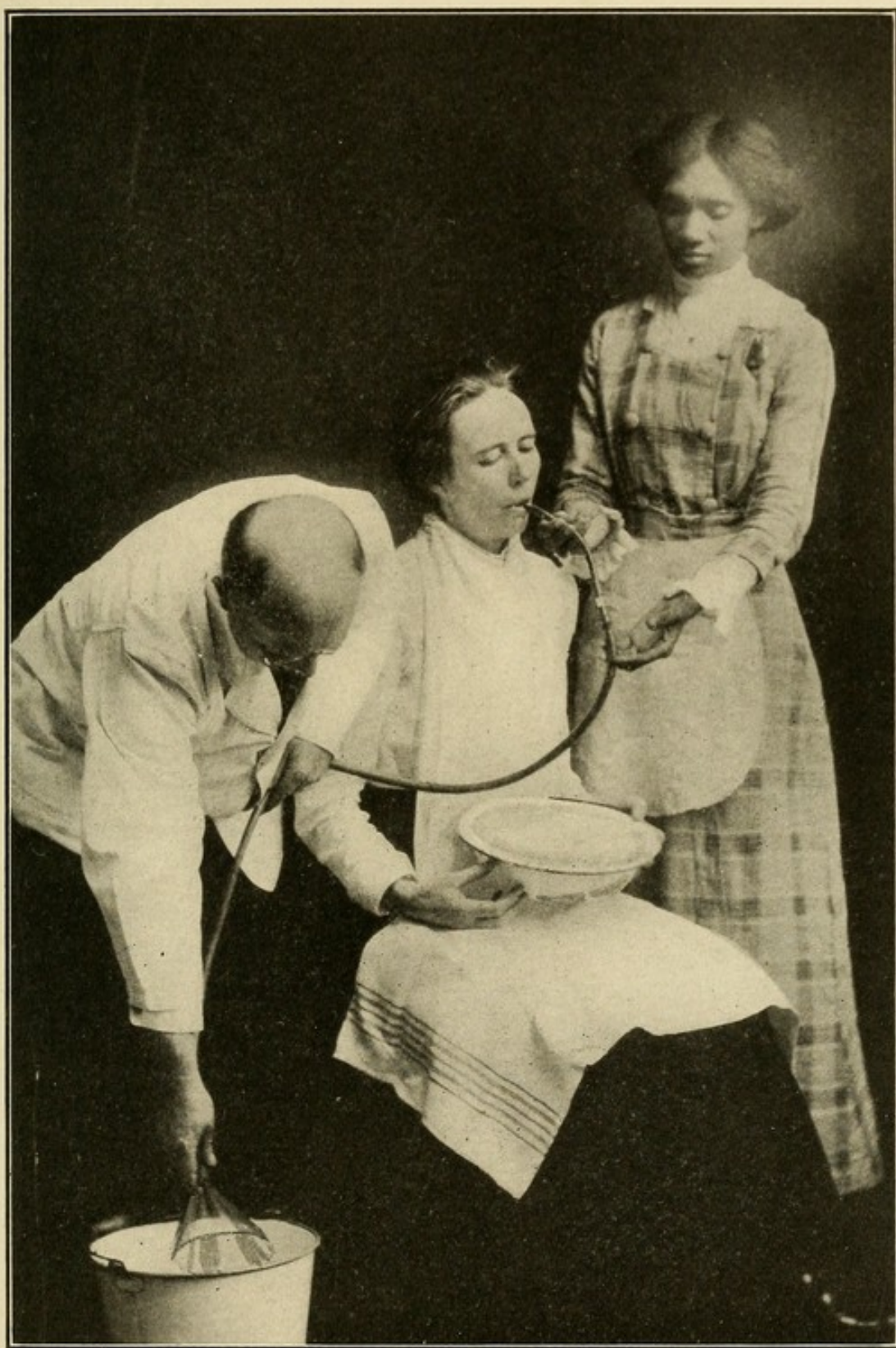


FIG. 49.—Third step in gastric lavage. (Siphoning out the lavage liquid.)



this procedure, when, if the operator had used more of both time and patience in accustoming the irritable epiglottis and stomach to endure the tube, results would have been more satisfactory to all concerned.

I have in many instances at the first attempt, siphoned out only one or two funnels of fluid, so as to permit the patient to discover that gastric lavage was not so horrible as pictured. After the patient's mental attitude has become favorable, the lavage can then be made just as thorough as desired.

The temperature of the lavage fluid should be in the neighborhood of 100 to 105° F. Cold water is nearly always disagreeable to the patient, and very hot water, apart from the danger of burns, makes the patient uncomfortably warm—sometimes bringing on faintness.

There are quite a number of medicaments used in the lavage water, and I shall briefly mention some of them that are the most useful and rational. It would be impossible to name all that have been recommended, for some have been as freakish as the charms and philtres of the middle ages.

The medicament to be employed is of course governed by the gastric condition, whether there be irritation of the mucosa, atony, stagnation of the contents, fermentation, hyperacidity or hypoacidity, or abnormal states brought about by anatomic lesions, malignant or otherwise.

It is well to always use plain water until the return flow is established, and continue until the stomach is fairly clean. The medicated solution may then be used, followed by the plain water. Occasionally some medicated solution is left in the stomach at the close of the lavage.

Among the agents used are boric acid, simple salt, bicarbonate of soda, nitrate of silver, ichthyol, permanganate of potash, peroxide of hydrogen, carbolic acid, subnitrate of bismuth, calcined magnesia, etc. Another preparation possessing a wide range of usefulness is the alkaline antiseptic liquid (National Formulary) which is inexpensive, and adaptable to nearly all fermentative states.

The operator should have on a table, convenient to his hand, a pitcher containing from $1/2$ to 1 gallon of warm water. A larger pitcher is too bulky and hard to manipulate. He should also have a pint receptacle in which is his medicated fluid. There can be on the table calcined magnesia, bismuth, soda, or any other powder, which may be indicated. All these should be ready for when he starts the lavage he should be prepared to go through with it expeditiously. To stop right in the midst of a lavage to look for something or to complete some unfinished preparation, is vexatious both to the physician and patient.

Should there be an irritable condition of the gastric mucosa, calling for nitrate of silver, the pint receptacle may be filled with a 1 to 500 solution, which may be employed midway of the lavage. Should there be a fermentative or stagnated condition of the stomach, requiring efficient cleansing, either ichthyol, to a mahogany color, permanganate of potash, 1 to 1000, or alkaline antiseptic liquid may be employed in the medicated solution.

Should there be an extremely acid state of the stomach, there can be used in the larger pitcher, either common salt, soda, or calcined magnesia. The last named, will not dissolve, but can be kept in suspension by agitation, and is most useful.

After the medicated fluid, plain water should follow, and the lavage should be kept up till the water returns clear, unless there is a good reason for stopping.

At the close of the lavage, it is often advisable to leave some agent in the stomach. In acid conditions, with constipation, I frequently leave a funnel of water in which is placed one or more heaping teaspoonfuls of calcined magnesia. This not only neutralizes the present hyperacidity, but also exerts a pleasant hydragogue effect in a short while. Should there be erosions of the gastric mucosa, I often leave in the stomach a liberal teaspoonful of bismuth mixed in half a funnel of water.

The best time of day for gastric lavage is governed by

circumstances. Unless it is to rid the stomach of undesirable contents, the lavage is best performed on an empty stomach, preferably in the morning before breakfast. In atonic conditions of the viscus, the lavage should be performed the last thing before the patient retires, if possible, as both the cleansing and rest do their respective parts. Dr. J. W. Weinstein, of New York, is quite insistent as to this detail, claiming excellent results thereby.

So far as practicable, the time should be arranged so that the patient will not lose the large part of a meal by lavage. Most of these patients are illy nourished, and the loss of a liberal part of a meal every one or two days constitutes quite a caloric item.

Should it not be convenient to irrigate the stomach before the morning meal, I generally try to have such patients come in about noon or a little later, as an eight o'clock breakfast will have been fairly well disposed of by that time. It is much easier for both the subject and physician to have the stomach as empty as possible, for the washing out of great masses of undigested aliment before the purposeful lavage begins, is provoking and time-consuming.

The frequency with which lavage can be profitably and harmlessly repeated is another mooted question. I know of one busy gastroenterologist who is reputed to often wash out the same stomach daily for several months. From this I dissent. Unless there is a decided interference with the proper emptying of the stomach, whereby there is a fermenting residue present, a daily lavage is seldom wise. Many of these cases really do better with lavage on alternate days. In the presence of a hyper-sensitive gastric mucosa, lavage should be performed with caution and not too often. An occasional application of nitrate of silver to the hyper-sensitive surface is beneficial, when not too often applied. Constant and persistent lavage in such cases generally works more harm than good.

In chronic gastritis, with excessive mucus, a lavage

two to three times weekly is generally of aid. Daily lavage tends to produce irritation.

The "lavage habit" into which some patients (occasionally physicians) lapse, is a most unfortunate one. These individuals, having learned to use the tube themselves, and finding that the emptying of an overdistended stomach will bring about relief from epigastric distress, make it a practice to hasten for the tube, and wash out the stomach with the first qualm. Some of these misguided sufferers wash out their stomachs from two to four times daily, bringing their bodies to the verge of caloric bankruptcy by their unwise zeal. It is allowable under certain circumstances to teach the patients how to administer to themselves a gastric lavage, as when they live in isolated localities, or when it is impracticable to see the physician at the proper time. Such instruction, however, should be given only for good and sufficient reasons, and the patient should be admonished of the dangers that lie in wait for those who fly to the stomach-tube not wisely but too often.

If, therefore, gastric lavage is employed for a definite purpose, under proper restrictions, in a deft manner, and not as a routine measure, it may be productive of great benefit; otherwise it is liable to cause harm, and to bring it, as a therapeutic method, into disrepute.

CHAPTER VIII

VARIOUS METHODS OF LOCAL TREATMENT OF THE STOMACH, INTERNAL AND EXTERNAL

Many have been the methods devised for local treatment of the stomach and abdomen, some rational and logical; some irrational, illogical, and even bizarre. That some of these latter have apparent cures to their credit may be to a large extent attributed to psychic influence, or to novel sensations that would give the patient's mind some change from his constant introspection.

The Stomach Douche.—This should be employed only when the stomach is empty, the object being to lave the gastric mucosa with plain water or a medicated solution. The tube for this should have at its end many small openings, mostly lateral, and the fluid should flow into the stomach with considerable force.

To properly douche the viscus, the tube should be first introduced only about 17 or 18 inches, and the douche applied. When the stomach has taken 12 or 16 ounces, the tube should be slipped down 3 or 4 inches, and the contents siphoned out. The tube should then be retracted, and the douche applied as before. It will be readily seen that no douche can effectively reach the stomach walls while the organ is full of fluid.

Turck has devised a double-flow stomach douche, consisting of two rather small tubes cemented together; one being longer than the other, serves to siphon out the fluid, while the short one, with many small openings, allows the fluid to strike the stomach walls in numerous small jets.

The Gastric Spray.—This consists of an ordinary spraying apparatus, to which is connected a soft stomach-tube, containing a fine flexible tube. This smaller tube has on

its end a nozzle, through which the fluid may be sprayed into the stomach as do the laryngologists. Einhorn, who devised this method, recommends it highly, as but a small amount of fluid is required, and no toxic manifestations are liable when rather strong solutions are used.

The spray is best employed after a previous lavage. The bottle is filled with the required solution, the tube dipped in water, and introduced in the usual manner. The spraying should be begun when the tube has entered from 16 to 18 inches, and during its continuance the tube should be gently put in further and retracted several times so as to more thoroughly reach the whole gastric surface. It appears that the insufflation of air along with the fine spray distends the stomach, permitting the medicated fluid to reach all of the rugosities. This spray is useful to disinfect the mucous membrane, for which gentle antiseptics may be employed. It is also recommended in simple erosions of the stomach, in chronic gastritis, with excess production of mucus, in hypersecretion and hyperacidity with gastralgia. It seems especially efficacious in the treatment of gastralgia, with or without erosions.

Stomach Powder-blower.—This apparatus for spraying the stomach with insoluble substances in powder form was first devised by Einhorn. His instrument consists of a flexible rubber tube about 28 inches long, the distal end of which connects with an air suction bulb. The extremity of the tube is attached to a hard-rubber piece, which is hollow and has quite a number of lateral openings. This is provided with a screw thread. To this is attached a capsule with many side holes, capsules of several sizes being furnished. A capsule is filled with powder and screwed on to the tip piece. It is well to lubricate the latter with vaseline to prevent too early entrance of moisture. The tube is dropped into water and inserted in the usual way. The bulb is then quickly compressed several times, and the air drives out the powder, after first loosening up the thin layer of vaseline.

During the spraying the tube may be gently moved upward and downward, as previously suggested.

This device may be appropriately employed in several conditions, with various powders; in ulcer of the stomach, employing bismuth subnitrate or subgallate; in gastralgia, orthoform or chloretone; and in erosions, using protargol, suprarenal powder or tannigen.

Its use for ulcer would call for very careful manipulation, and not too soon after any hemorrhage.

ELECTRICITY

Clinical observation and experience have demonstrated that electricity in various forms exercises an actual and tangible effect upon the secretory and motor functions of the stomach, and also, to a certain extent, on its sensibility. As Kemp wisely remarks, however, physiologic experiments and clinical experience do not always agree.

At the present time there is much controversy concerning the real effect of electricity intragastrically employed, some physiologists decrying its value, while competent clinicians are reporting marked benefit in numerous cases. Even among stomach workers there is diversity of opinion. Einhorn believes that the faradic current promotes secretion, and the galvanic impedes it; Hoffman, that the galvanic current increases secretion, and Brocci that the faradic augments both secretion and peristalsis. Bassler believes that the effects of the galvanic current are of a sedative nature in the relief and control of abnormal disturbances of gastric sensation, and that it has a mild inhibiting effect upon some stomachs on the hydrochloric acid secretion, but not as often on the quantity of enzymes; and that the faradic current is of value in the myasthenic states of the muscular tissue of the stomach, provided the pylorus is patent, and also if the deficient musculature has not gone on to paralytic atony. Added to this is an effect (probably complex in its nature) on the abdominal sympathetic sys-

tem, in which the nutrition of the stomach wall as a whole is improved. Whether this is due to the massaging of the stomach walls by the contracture of the muscle fibers from the current, or is due to some direct action of the current on the nerve endings and centers in the posterior abdomen, Bassler does not attempt to say. Furthermore it has a somewhat mysterious, but none the less beneficial effect in perhaps a suggestive manner upon many individuals, suffering from gastric troubles of possibly a neurotic character. Because we cannot fully explain its action, is no reason why we should not avail ourselves of its aid.

Bassler reports two most instructive cases, studied by him per X-ray, in which he proved that the faradic current increases peristalsis, and causes the entire stomach to become smaller in size. One was a case of gastropotosis in a young woman, and the other a simple atony following the taking of too large quantities of fluids in a young man, who worked as a coal stoker in an engine room. His observations were conducted with bismuth subnitrate and water in an otherwise empty stomach, when he noted distinctly a mild running peristalsis in the lower half of the stomach in both instances. After the electrode was introduced, and before the faradic current was turned on, the peristalsis was somewhat more marked; possibly due to presence of the cord and end piece within the organ. When, however, the faradic current was delivered to the tolerance of the person (external electrode at the sides of the neck) and evident contraction of the entire organ took place, it was followed by a less degree of relaxation and increased peristalsis.

Speaking somewhat generally, I might say that the best results are obtained in atonic stomachs with sluggish motor power, by the use of the faradic current, with the positive end of the current discharged within the stomach, and the external electrode (negative) on the back or preferably on the epigastrium.

In regard to the power of the current no inflexible rule can be laid down. It should be given to the *comfortable*

tolerance of the patient, and not pushed to discomfort. Nearly every patient will display a difference in tolerance, and each one must be a rule unto himself. From 5 to 20 milliamperes is an average requirement.

Numerous intragastric electrodes have been devised, of which the most practical are Bassler's, Lockwood's and Einhorn's.

Bassler's seems to possess some advantage in the "introducer," which is withdrawn after the bulb enters the stomach. Some patients find it rather difficult to swallow the rubber, fenestrated capsule.

The electric treatments should last from eight to twelve minutes, though the faradic can with propriety last some-

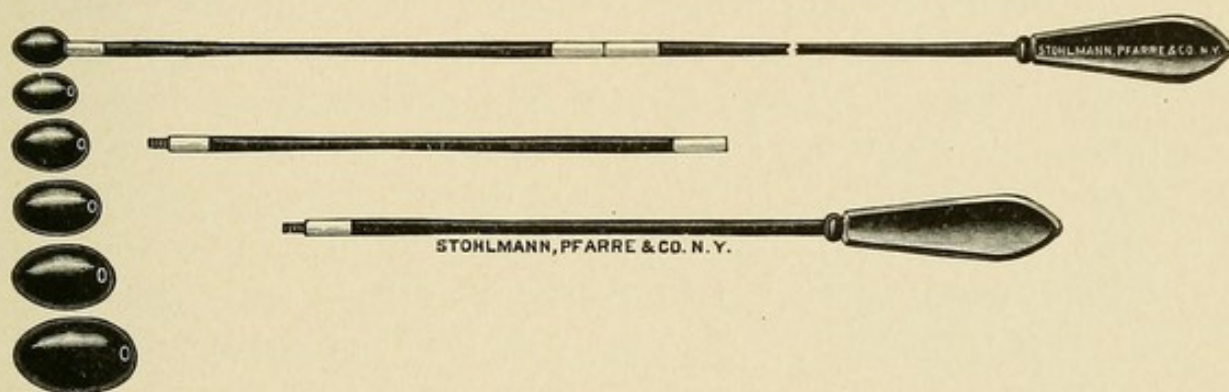


FIG. 50.—Einhorn's divisible esophageal bougie.

what longer than the galvanic. The patient should always have one or more glasses of water in the stomach. The external electrode may be gently moved about, and the current may be gradually increased from time to time. Should the patient become nervous or ill at ease, the treatment should be cut short, for it can do no good under such circumstances, and might do harm. Care should be taken that the current is not painful, and the operator should remember that the wetter the sponge, the greater is the intensity of the current.

When it seems desirable to permit the current to flow to a large external area (the back) the large external electrode may be used in place of the hand instrument. In cases of vague pains in the back, associated with loaded

colon, autointoxication, gastric neuroses, etc., it is of much value to place the large electrode over the area corresponding to the great sympathetic plexuses in the upper abdomen.

As to frequency of treatments, I usually administer intragastric electricity every second day for one to two weeks; then two or three times weekly for two more weeks; then once a week for as long a time as may be indicated. This schedule is modified at all times by the patient's temperament, convenience, sometimes inclination, and by the results apparently attained.

Percutaneous Electricity.—Some patients do not seem able or willing to undergo intragastric electricity, and with these it is sometimes advisable to administer it entirely from without, with the idea that the current employed will course directly through the body and therefore through the desired viscera. There is probably no branch of therapeutics in which we get more contradictory reports than concerning electricity, and many of these reports are colored with an optimism that would make the late Sinbad the Sailor open his eyes in surprise; while others, with just as much pessimism, find absolutely no benefit from any kind of electricity.

Having had occasion to use electricity quite often in gastrointestinal work, and with apparent benefit, I have come to certain conclusions, which I will briefly state.

By the use of a fairly large epigastric electrode, which is placed over the stomach or lower down over the abdomen, and a smaller electrode, placed on the spinal column directly opposite, a current will be sent through the organs desired. This current may be regulated according to the sensibility and comfort of the patient, making it distinctly perceptible, but never uncomfortable. The patient should generally lie on the side in an easy position, and can assist the operator by holding one of the two electrodes. The treatment may last from six to twelve minutes.

Apart from the general rule that the currents will connect through the shortest distance, we cannot be sure as to the

special conductivity of any particular organ, and we therefore have to rely on a certain amount of diffusion of the electricity as it courses through the body.

I have principally employed this form of electricity in the various so-called gastric neuroses, gastropotosis and enteropotosis, dilated and atonic stomachs, flabby and incompetent abdominal parietes, chronic colitis, mucous colitis, gastralgias, nervous anorexia, and the many vague epigastric and abdominal discomforts, in which the patient cannot give a succinct description of his troubles, but constantly and bitterly complains.

In many of these patients the electricity is employed somewhat empirically, but none the less successfully. Just how much of the improvement is brought about by psychic means I am unable to say. Probably much of the benefit should be attributed to the novel sensations which start a favorable "wave of improvement" deep down in the sub-conscious personality, which in turn exerts a beneficent influence on the sensory centers. This I admit is to a great extent speculative, and I simply state that in many chronic cases, where various forms of rational and logical treatment have been without avail, electro-therapy has wrought most satisfactory results.

Its use should not be condemned because we do not thoroughly comprehend its action, but from its many apparent good results, we are justified in availing ourselves of its possible advantages.

Static Electricity.—This has been recommended in much the same types as call for faradic or galvanic electricity. It has been found useful in flabby and dilated stomachs, and in gastric and intestinal neuroses. Especially favorable has been the effect of static electricity in the run-down class of "nervous dyspeptics," whose minds continually dwell on their digestive organs, and whose waking thoughts are entirely introspective. In these cases the static current administered rather energetically for ten or fifteen minutes daily seems to act quite favorably, exciting a new train of

sensations, and steadying the somewhat unstable nerves. In cases of nervous indigestion, wherever practicable, I always avail myself of the static current. Unfortunately, this procedure is available in only a limited number of cases.

Before passing on, I wish to very briefly mention electrical treatment in esophageal diseases. For esophagismus or cardiospasm electricity is often indicated, and will in some instances afford brilliant results. Other disorders of the esophagus, when reflex or apparently neurotic in origin are amenable to this agent. I wish to caution my readers, however, as to expecting any material improvement from electricity in cicatricial stenoses of the esophagus with malignant tendencies. The dissolving of cicatricial tissues or the relief of stenosis by electrolysis has not proven effective, and instead has changed ill-advised hope into black disappointment many times. It would be most unwise on the part of the internist to hold out to a patient with a stenosed esophagus any strong promises of either ultimate or lasting improvement by electricity in any form.

X-ray Therapy.—Some years ago several observers reported flattering results from X-ray treatment of malignant stomach affections. Further investigation of this agency has not proved its merits, and it is now seldom depended on in such conditions. I may say that it is now the general opinion among conservative students that the X-ray is absolutely of no value in the cure of gastric carcinoma, sarcoma, and even those slower types of malignant disease following chronic ulcer. In some of the late cases of carcinoma, liberal use of the rays may, for the time being, apparently stay the onward progress of the growth, but in reality the benefits are derived mainly from suggestion. Some patients aver that pain is ameliorated by the rays, but the anodyne effect falls far short of morphine. It may be worth while to employ these rays in far-advanced, inoperable cases, where the patient demands that some form of therapeutic procedure be persistently

followed, but no sanguine hopes should be built upon such desperate means. As to its use in early malignant disease, it cannot be too strongly deprecated. By depending upon such fallacious methods, valuable time may be wasted, time which may spell to the patient the difference between life and death.

As an auxiliary to the medical treatment of acute gastric and duodenal ulcers, after these patients have left their beds, the X-rays have a probable useful field. Dr. Bassler uses this means quite frequently, and seems to feel that he has achieved positive good results. He says—"I am quite sure that the number of cases of half-healed ulcers, spasmed and irritative states of the stomach are fewer with me to-day than they were several years ago, and this I do not attribute particularly to any improvement in plan of any medical treatments I now employ. I am inclined to believe that the rays stimulate the mucosa to a better repair of the ulcer, and that the resulting scar is not so stiff. The rays should be used in these cases as one of the last measures of routine treatment, after the bed, dietetic, and medicinal care for the acute stage of the ulcer are concluded."

Radium Therapy.—This agent was first used by Einhorn in 1904, and for a time promised flattering results. He first employed for the stomach a hard-rubber capsule that could be unscrewed, and which contained a glass radium flask (Curie 20,000 strength). To the rubber capsule he attached a silk thread, in which several knots were tied indicating the distance from the lips to the cardia and how far the capsule lay from the cardia. The capsule was introduced in a similar manner to the stomach bucket. When the capsule has descended as far into the esophagus or stomach as desired by the operator, the thread is tied to the lobe of the ear, and the capsule left in the stomach an hour or more. Dr. Einhorn has not as yet formed definite conclusions as to the tangible benefits from radium, though he thinks he has observed some palliative effects in a few cases. Kemp reports serious burns from prolonged exposure, and

therefore does not consider the likelihood of improvement commensurate with the possible dangers incurred. Bassler reports the assiduous treatment with radium of seven cases of gastric and four cases of esophageal carcinoma, and confesses to a general failure in all of them. Other writers express the rather unanimous sentiment that radium as a therapeutic agent in gastrointestinal diseases is of no real service.

Vibration.—This method of treatment has been extremely popular, and many forms of vibrators have been devised, some of them quite expensive. They have varied from the simple hand-vibrators, costing but little up to the elaborate and expensive contrivances. Many of the patented machines which have been extensively advertised, and foisted upon the public as wonderful discoveries, were in reality only vibrators masking under high-sounding names. It must be admitted that vibration, when properly applied, does exert a beneficial effect upon certain disorders of the alimentary tract, and the subject will be briefly discussed.

There are several hand vibrators on the market (The Vedee and the Eureka) which can be used where electricity is not available. There are many others that can be attached to the street current in the patient's residence or in the physician's office.

There are other small hand vibrators now manufactured and also small vibrators which can be run by a portable storage battery, thus making them available to all.

Vibratory massage should be given from left to right over the stomach for three to five minutes, then two to three minutes to the left of the seventh dorsal vertebra, and then about two minutes more over the stomach.

When vibrating over the colon, the general course of the large intestine should be followed, giving most of the vibration over the sigmoid. In the early morning hours, or before breakfast is the best time to vibrate the intestines, while later in the day, after nourishment has been taken, is

the better time for thus stimulating the stomach and nearby viscera.

Bassler has recently devised an electrovibrator, which seems to combine the benefits of mechanical vibration and electricity. He has employed this method in disturbed states of motility, sensory and secretory conditions of the stomach, and claims better results than with the single forms of physical treatments. The best results in his opinion were attained in those cases in which the gastric disturbance was secondary to enteric disturbance. Bassler sums up his experience in a broad way, and I quote him at some length, as his views express in a fairly complete manner the indications and contraindications for electrovibration:

"Electrovibratory massage is of value in the therapy of abdominal conditions in all motor, some sensory and a few secretory disturbances of the intestines, both locally and as they may directly or reflexly affect the stomach or other parts of the body; that it is a measure of value in the disturbed states of local nutrition of the reachable abdominal organs, and in the abdomen as a whole—its influence here is to better the general state of health, and favorably influence those catabolic and neurasthenic conditions which take their origin in the abdominal cavity; that it is the best single medical measure we have to-day in the treatment of exudates and fibrous adhesions found about the abdominal portions of the alimentary canal; that in those mysterious tardy forms of intestinal indigestion, and also in the long-standing catarrhal conditions, it might be employed with satisfactory benefit to a patient; that it is the best form of percutaneously applied physical treatment we have for abdominal conditions, ahead of hand massage, vibration, or the externally applied battery current; that its use should always be preceded by an accurate diagnosis, since in some of the conditions of the gastroenteric tract it might do positive harm (malignant disease, ulcers of any type, acute catarrhal and suppurative states); that follow-

ing a plausible indication for its use, it should be employed by the physician himself, or under his immediate direction, in suitable combination for the case in the way of the plan of massage and selection of the current; and that, lastly, it should be employed with a consistent and, if needs be, long-kept-up effort to accomplish these ends."

In applying vibration the patients should lie at ease on a long table and the skin should be dusted with some prepared chalk or talcum powder, so that the instrument will move easily on the surface. The patient should relax the abdominal walls as much as possible, and should assume a comfortable position, so that none of the muscles are taut. The treatment may last from three to ten minutes, regulating both the rate of vibration, the strength of current, and the force of pressure according to the susceptibility of the patient.

I have used this method in quite a number of selected cases, and feel that Dr. Bassler has not claimed too much for it. Apart from any real therapeutic effect it may possess, it certainly exerts a powerful psychic influence, and few there are, who after being electrically vibrated for a time, do not report tangible sensations of braced and steadied nerves, plus a much more comfortable abdominal feeling.

Massage Roller.—This consists of a revolving cylinder, which can be filled with hot or cold water, and which is furnished with a battery attachment. Heat or cold, or with an instrument attached to each battery pole, alternating heat and cold, combined with electricity, may be applied.

This method can be employed to advantage in chronic constipation from atonic intestinal musculature, in the dragging-down feeling accompanying relaxed visceral supports, in vague abdominal pains so bitterly complained of by neurasthenics, and in epigastralgia.

Turck's Gyromele.—Dr. Fenton B. Turck, of New York, has devised an ingenious instrument, which he calls a

gyromele, and which is intended for local treatment of the stomach. It consists of a cable with a sponge attachment, which can be made to revolve within an outer stomach-tube. This revolving sponge can be spun around in the stomach with greater or less rapidity and the sensations elicited are described by the patients as weird in the extreme. There is an arrangement connected with the gyromele whereby medicated fluids can flow into the stomach through the outer tube, and also an attachment by which it can be connected to a battery and an electric current sent into the stomach while the sponge is rotating. Turck advocates

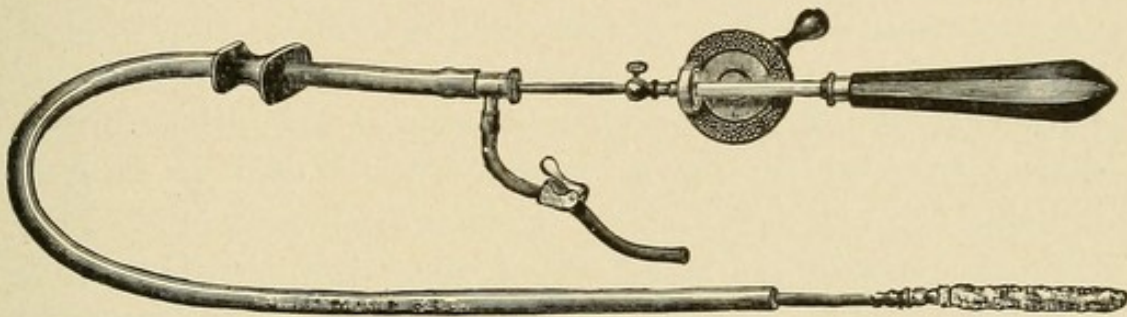


FIG. 51.—Turck's gyromele.

its use in catarrhal gastritis to cleanse the mucous membrane, or in atonic stomachs of poor motor power for general cleansing purposes. It has not come into wide use, and I would hesitate to recommend it. Its inventor claims that he has obtained some most satisfactory results from its intelligent employment.

Local Counter-irritation over the Epigastrium or Abdomen.—In many of the painful and acute disorders of digestion, as well as in some of the chronic affections, not only amelioration of the painful symptoms may be obtained by counter-irritation, but actual curative results.

The entire basis for the employment of counter-irritation rests upon reflex action, or the conduction of a nervous impulse to a center which, when so stimulated, sends out an impulse to the part of the body which is diseased.

The indications for counter-irritation in this class of dis-

orders are three—for the relief of pain; for favorably affecting inflammations or congestions; and for causing the absorption or removal of inflammatory deposits after the active inflammation has ceased.

For acute pain in the stomach or abdomen the surface may be quickly reddened by the local application of chloroform, having a handkerchief or cloth saturated with it, and covering the cloth with another to keep out the air. As one area gets too hot, the handkerchief may be removed from place to place, and often this will be sufficient to relieve an acute epigastralgia. Not quite so prompt, but perhaps more efficacious is a mustard plaster, made by mixing powdered mustard with warm vinegar or water, plastering it over cloth or paper, and applying it to the desired spot. Should it be advisable to weaken the plaster, this can be done by the addition of a varying amount of flour while it is being mixed. This mustard plaster can remain on until the skin is well reddened, or, if wished, until a blister is produced. When it is not desired that the mustard should be applied directly to the skin, the plaster proper can be covered with a thin piece of linen or cheese-cloth, which will to an extent protect the skin. There are also ready-prepared mustard plasters which are easily procurable, and can be cut into any shape or size indicated, moistened and applied to the needed location.

Among other methods of using gentle counter-irritation and heat to the surface are poultices, made from various materials, such as meal, tender leaves of plants or trees, kaolin or feldspar. The last named has been exploited in this country to a stupendous degree and has a wide sale at an exorbitant price, but in reality has no more virtue than any other poultice. The heat and moisture contained in poultices produce the good effects and they should be frequently changed, so that both these properties may be present at all times they are used. Nothing is more useless or irritating than a cold or dry poultice.

Turpentine stupes are often helpful, and, when kept hot

and moist like poultices, possess all the virtues of the latter plus the counter-irritating effect of the turpentine.

Hare highly recommends the spice plaster as an eligible poultice in abdominal discomfort. This is made by mixing equal parts of allspice, cloves, cinnamon and nutmegs, and adding thereto one-half part of black pepper. These constituents are made into a homogeneous mass by using a knife-blade to mix them, and are then sewed in a bag, which is quilted to prevent sagging of its contents. One side of the poultice is now wetted with warm brandy, whiskey or vinegar and applied to the part desired. If the skin is tender, the proportion of the pepper or cloves should be decreased. This plaster may be allowed to remain over the affected part for hours or even days, provided it is frequently moistened, and is quite useful in the treatment of chronic gastric catarrh and abdominal discomfort. It is also grateful to those dainty neurasthenics, who abhor a sticky poultice, or whose olfactories will not bear with comfort a turpentine stupe. These patients will find the spice poultice pleasant to use, cleanly to manipulate, and mildly counter-irritant and analgesic in its effects.

There are numerous methods of applying plain or dry heat to the abdomen, some of them quite simple, but none the less efficacious. A plain rubber hot-water bag can be found in nearly every household and will always be grateful in its effects, when not too full of water, and therefore too heavy. When the bag is not convenient, a porcelain plate may be heated over a lamp or gas jet, and quickly applied over a painful area. I have also seen tin buckets or pans filled with hot water and brought into use for local counter-irritation, when no other means were at hand.

There are a number of agents which are useful in abating pain or soreness in the abdomen when either painted on or rubbed in. Tincture of iodine alone, or diluted with one part of tincture of belladonna to three of the iodine is an eligible local application. I order it painted on with a camel hair brush, making several applications as each coat

dries. It seldom burns the first time, but after several "paintings" have been applied, it burns energetically. This may be applied once daily for three or four times, and then it will be necessary to leave it off for several days until the epidermis peels off. Iodine seldom blisters, but the epidermis desquamates, leaving quite a tender surface, which requires several days to become normal. For chronic abdominal soreness or tenderness, the iodine is beneficial, but is not prompt enough in its action for acute affections.

"Rubbing" with various liniments is an ancient method, but in some conditions useful, nevertheless. There are many drugs, pungent, volatile or oily that are of use in this manner. Turpentine, chloroform, capsicum, menthol, oil of cloves or sassafras and many others. Then there are ointments of vaseline or lanolin as a base that have in them capsicum or menthol and are quite efficacious when applied locally. There is at present on the market an ethical preparation, called methyl salicylate ointment, which comes in a collapsible tube. This can be rubbed over the surface *ad libitum*, and often affords relief to either acute or chronic pains.

Another point to be considered in the use of local applications or liniments in gastrointestinal disorders is the fact that it gives the patient or attendants something to do, and when something is being constantly or frequently done, there is a more satisfied frame of mind, and the patient can wait with more equanimity the period when perhaps more logical measures have had time to take effect. This may be considered small and unimportant by some, but in the management of this class of cases, nothing that promotes the comfort or contentment of the sufferer should be overlooked. This view partially includes psychotherapeutic management, and will be discussed at length in a subsequent chapter.

The Cannon Ball.—This has been advocated as a form of massage peculiarly suited for atonic constipation. The patient lies on his back, and rolls the ball about over his

abdomen, trying in a general way to follow the course of the colon. Its real utility is doubtful, but it is not liable to inflict any damage, and it may serve as a psychic stimulant at least to idle and neurasthenic individuals, who need something of this sort to keep them contented.

Abdominal Massage.—Views as to the efficacy of this means of treating abdominal disorders, adhesions, inflammations or displacements are widely divergent, some lauding and some condemning.

As to massage in stomach troubles proper, I am uncertain regarding its benefits. I have employed it in many instances in dilated, stagnating stomachs, with poor motor power, and myasthenia, and have been disappointed in results. That the fault was not in the application was certain, as I availed myself of the services of expert and conscientious masseurs, and am sure that nothing proper or necessary was omitted. One case that afterward developed malignancy was, I fear, made worse by the manipulation.

Except in somewhat chronic conditions, where there is but little soreness, and there seem to be present perigastric adhesions, I would not recommend massage, and shall dismiss it with this brief allusion, as unsuitable for gastric disorders. Functional troubles of the stomach will probably be made worse by its use.

In the intestinal cases of chronic atonic constipation, relaxation or incompetence of the abdominal parietes, bearing-down sensations from enteroptosis, vague neuralgic pains from dragging and torsion of the intestines, and the cutting and "pulling" pains from old perienteric adhesions—in all of these conditions have I noted apparent benefit following intelligent and persistent massage.

In most of these, there were also employed passive exercise and various forms of scientific gymnastics.

Massage, according to Boas, is contraindicated in all recent cases of ulcer with adhesions, in which cases even its cautious application may cause a perforation of the ulcer

and consequent disastrous effects. It should not be employed in any acute inflammatory conditions of the gastrointestinal tract, nor in any acute states accompanied by fever or excessive accumulation of flatus. I might add that it is generally accepted that massage is not indicated in conditions of accelerated peristalsis, or where, upon manipulation, the circular muscular fibers of the intestines tend to assume tetanic-like contractions. Malignant trouble, or the presence of metastases, or when the test for occult blood in the feces is positive, contraindicate. Boas also advises against it in the treatment of patients above forty years of age, in whom the symptoms of gastric diseases have appeared suddenly, unless malignancy can be positively excluded.

A detailed description of the many methods and movements of massage is not feasible in a work of this scope, as it is a science within itself. Briefly, it may consist of rubbing, kneading, tapping, or rolling motions, beginning at the upper part of the abdomen, and following the general course of the large intestine, descending. The small intestine should be manipulated as well as the abdominal muscles. Illoway recommends massage for five to fifteen minutes in adults and three to five minutes in children, at least every other day for a period of six weeks, and then if there is improvement, at longer intervals, but for a long period of time. It should be given preferably in the early morning in the fasting condition. A patient can practise automassage in the following manner: Sitting upright, with the right hand he should stroke the abdomen from the caput coli to the hepatic flexure, and then along the transverse colon. With the left hand, he can then massage down the descending colon. Circular stroking movements should then be made over the median abdominal region. This can often be conveniently carried on while he is sitting on the toilet endeavoring to have his morning evacuation of the bowels. The massage may last from five to ten minutes.

Where trained massage is not available, gentle rubbing or kneading with hands previously warmed, will prove both grateful and soothing, where there is no acute soreness. The physician can give directions and demonstrations sufficient for attendants of ordinary intelligence to comprehend and carry out, and though no brilliant results may be attained, patients often desire it and claim to experience decided relief from even untrained manipulation.

Each of the methods mentioned have a place in the treatment of gastrointestinal disorders and some particular one, though unimportant in itself, when properly employed, may spell the difference between success and failure in the management of a discouraged invalid.

CHAPTER IX

ORTHOPEDIC METHODS OF SUPPORTING THE ABDOMINAL WALLS AND VISCERA

Before and since the advent of the X-ray in diagnosis it has been realized by many thoughtful observers that much comfort could be given, and in some cases absolute relief, by the employment of proper supportive measures in gastroptosis, enteroptosis, or relaxed and incompetent abdominal walls.

As to the latter condition, many do not realize the malign influence exercised upon the orderly functions of the stomach and intestines by flabby and incompetent abdominal parietes.

There are two classes of individuals in whom this condition is most frequently found: middle-aged or elderly women, who have borne several children in close succession, and whose domestic duties have so pressed them that they have never permitted the abdominal walls sufficient quiet and rest to bring restored tone; the other class includes elderly men, of previously strong physique and liberal deposition of fat in the abdominal cavity and parietes, who have lapsed into feeble health from any cause. Both of these classes complain of a sense of weight and "dragging-down" while they are in a standing position, and suffer from many indefinite ailments, which may to some extent be traced to the ptosed viscera and the lack of support given by the abdominal walls.

I have under observation at present two cases, each representing a class. One a woman of forty-eight, the mother of seven children. This woman, whose circumstances in life have been trying, has a relaxed and pendulous abdomen, which, without a support renders her almost

helpless. With a well-fitting abdominal supporter she can be up and about, attending to her duties with comparative comfort. The other, a man of sixty-two years, weighing 235 pounds, with a rather weak and degenerated heart, finds that without the supporter for his pendulous and bulky abdomen, he could not be up at all with comfort.

The present-day straight-front corset is a marked improvement over the wasp-like corsets formerly worn, and, when properly fitted, they exert a really helpful supportive influence upon the abdominal walls and their contained organs.

Another condition to which undue prominence has been given is the "floating kidney." The wave of surgical zeal, during which every palpable kidney was "tacked up" has happily passed, and we now understand that the majority of these loose kidneys can be sufficiently steadied by outside supports to afford the patient relief from most of the symptoms caused thereby.

In persistent and uncontrollable vomiting, either in pertussis, or pregnant women, or from any other cause, external abdominal support is often grateful, and efficacious in controlling the paroxysms.

Some years ago T. W. Kilmer devised a belt for the relief of pertussis, but his belt has found a larger field. The original consisted of a stockinet band applied so it would extend from just above the pubes to well above the epigastrium. It is prevented from slipping down by two bands over the shoulders.

Recently Kilmer has reported a simplified belt made of linen with strips of elastic webbing inserted on either side, and laced up the back like a corset. The belts should measure 2 or 3 inches less than the circumference at the umbilicus, though the degree of constriction should be gauged to each individual case, and not be made burdensome. This belt is valuable in the vomiting of seasickness and nervous vomiting, and is prized by some as an abdominal supporter also. The cost is slight, and I have in a number of instances

had them made at home by some female member of the family.

In nearly every city can be found makers of abdominal belts, who can so fit and adjust them that material support is afforded. In addition to the support, an amount of counter-pressure is exerted, which prevents to some extent the evil effects of gravity in producing a lowered blood pressure when the patient stands. In order that the belt may serve its purpose, the physician should note whether or not it is well fitting and really *supports*. Most of the belts that are kept in stock by the instrument and wholesale drug houses are simply broad elastic belts, surrounding the hips, and pressing backward upon the abdominal walls without any traction upward.

The illustration of Dr. Lockwood's belt shows one which serves the desired purpose. This belt is so constructed that it lies low in front, and rises high in the back, so that pressure is not only backward but upward. Perineal straps seem to be necessary, as otherwise the belt rides up in front, yielding no upward traction. Dr. Lockwood advises that the belt be adjusted before the patient rises in the morning, so as to retain the organs as far as possible in the position which they assume during recumbency. The belt should be worn continuously during the day. If it is well fitted, the use of hernial pads, to which so many patients strenuously object, may be dispensed with.

Some well-fitting straight-front corsets are fitted with an inner belt of elastic webbing, which greatly augments their supportive efficiency. In these, however, as in all devices for holding up prolapsed organs and incompetent walls, the principle of *upward* and not horizontal pressure must be kept in mind.

Pads of various kinds, shapes and sizes are used as accessories to these various belts and corsets, many of which are a detriment instead of an aid. Many are devised with the idea of holding in position a floating kidney, and have an extra pad fixed to some part of the belt, or slipped

loosely inside of it, depending on the tight constriction of the encircling band to hold it in place.

Most of these are worse than useless, acting in some cases like the ill-fitting truss that not only fails to confine the hernia, but keeps it forced outside the canal. I have never yet seen a kidney really steadied or kept in place by one

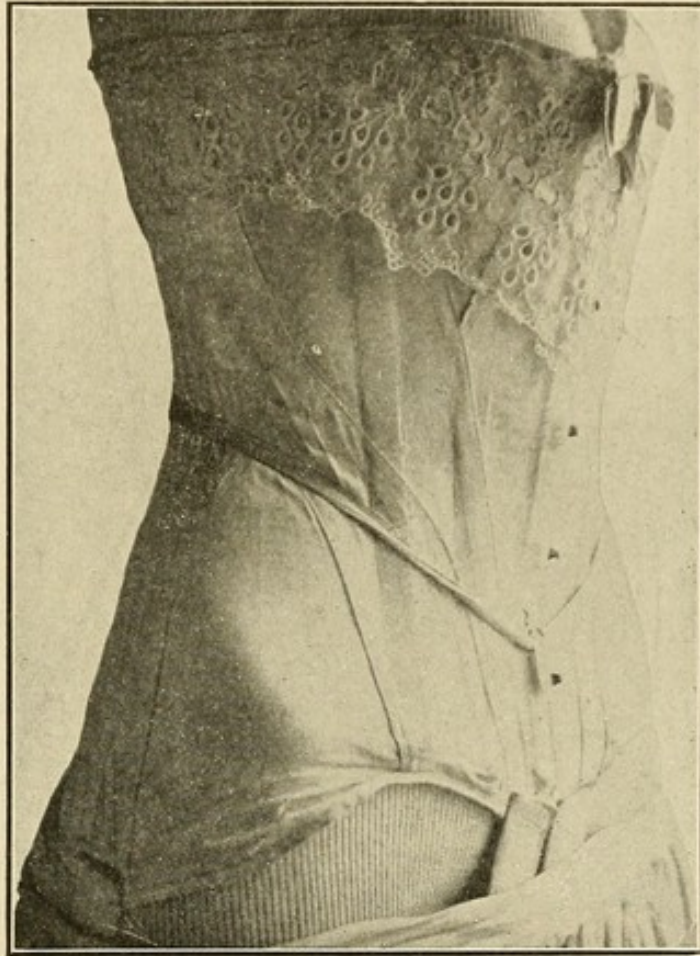


FIG. 52.—Bassler's corset on an extreme case of gastroptosis in a medium-sized young woman in whom the corset raised the pyloric portion of her stomach eight centimeters with almost immediate relief of the gastric distress after eating, complete relief of constipation, and marked subsequent benefit to her general health.

of these pads, nor have I seen a ptosed stomach raised one iota by their employment.

Of some use to men or women with pendulous or incompetent abdominal parietes, and who cannot afford to have properly fitted bandages or corsets adjusted, is a large-

sized pad, which fully and adequately covers the whole lower abdomen, and can be worn under a belt or a straight-front corset. Bassler has used with satisfaction in such patients a pad made of thin but sufficiently stiff leather to give it form, and on which the side next to the abdomen is a cushion of curled horsehair covered with kid.

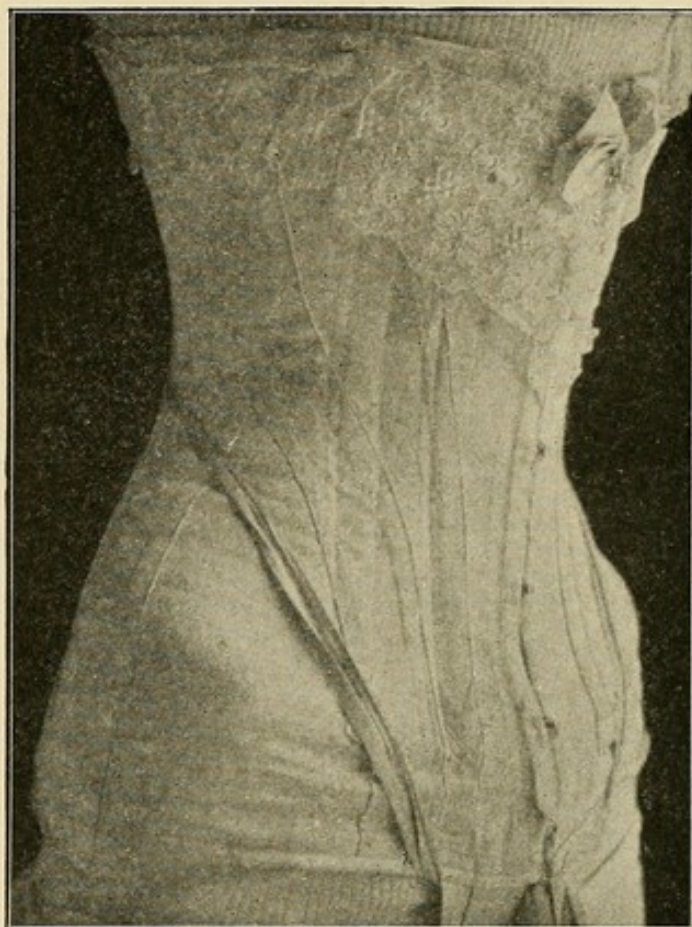


FIG. 53.—Bassler's corset with medium curvature on a case of gastropnoxis with palpable and movable right kidney in a very slim woman, who was 5 feet 11 inches in height and weighed 110 pounds. The pyloric extremity of her stomach was raised five centimeters, with relief of her gastric symptoms and a gain in her general health and weight amounting to 12 pounds in the first 2 months, and 17 pounds in 5 months.

I have modified this by using, instead of the horsehair, cotton batting, and, instead of the kid, several thicknesses of cotton flannel.

The lower edge of this pad fits into and just above the arch made by the anterior superior spines of the ilia,

Poupart's ligament, and the umbilicus, and the lateral edges well over the sides of the abdomen. The cushion is thicker at its lower edge than above; it is soft and pliable, and readily adjusts itself to the body and outside support. It is quite comfortable to wear, though rather warm for summer use. It can be fastened securely inside of the belt, or one half of it can be attached to one side of the corset. Usually with ordinary corsets or with a tight-fitting belt it remains well in place.

When the circumstances of a female patient permit intelligent fitting of a corset, the following facts should be borne in mind: It should be long enough to come well down over the pubic bone and outward curve of the hips, should not extend too high on the thorax, should be loose enough above the level of the umbilicus to allow full play to lungs, diaphragm and other organs that move with respiration, and should give to the wearer an *actual sense* of comfort, support and restfulness. Any corset that exerts a constriction at or near the epigastric region interferes with the normal change in size and position of the stomach when it is distended with food, and by this baneful pressure causes either a crowding or displacement of other adjacent organs. Pressure at the sides rather low down on the thorax may be allowed with safety, but such narrowing should be allowed for by a corresponding increase in the anterior dimensions of the corset.

Women present infinite variations in the contour and size of their bodies, and corsets should be made to suit with exactness each individual figure.

Gallant, of New York, has suggested a corset built on the lines of a perfectly fitting garment. This is quite stylish, and for that reason particularly liked by most women, but in many instances it fits too tightly over the hips, as it binds the lower body and squeezes the flabby subcutaneous tissue found in many of those who have lived well and exercised but little.

Corsets, belts and abdominal supporters, and other

devices along these lines have their proper and useful place in persons of generous proportions, or those with full or protruding abdomens. There is another class, however, in which all these devices are utterly without benefit, and in whom the best-fitted corset or abdominal supporter would afford no good service in lifting prolapsed organs.

Take the slender unmarried women, or the slim and medium-built individuals, with abdomens absolutely flat, and hips almost on a line with the smallest part of the waist, or those emaciated individuals, who have perhaps been on a rigorous diet for many months, and who present a depression where a rounded contour should be. These are not fit subjects for abdominal supporters, though many of them suffer from the most pronounced forms of gastropotosis and enteroptosis, and few there are in whom it has been found that properly adjusted bandages of adhesive plaster do not exert a tangible and beneficent effect.

To Dr. Achilles Rose, of New York, must we accord credit for the first useful and scientific method of applying adhesive plaster for supportive purposes. Kemp first suggested zinc oxid plaster on moleskin, and made some modifications in the method of applying the "Rose belt," which added to its efficiency. After applying many of these belts, I have found that several small reinforcing pieces of the plaster still further enhance their usefulness, and the completed method, as now employed, will be presently described.

As in practically all appliances of worth there are certain disadvantages, this is no exception, and they will be mentioned first. The adhesive plaster, having to remain constantly in place, prevents thorough bathing, which in itself is a deprivation to many people. In hot weather, and with some in any weather, there comes on the surface of the skin covered by the bandage an almost intolerable itching, which, in nervous individuals, is a serious matter. Some skins are so sensitive that the adhesion and tension of the bandage brings about quite a severe dermatitis, and

occasionally there occurs a localized infection in the hair follicles, which may produce a number of small but painful furuncles. Lastly, I have encountered a few neurotic invalids, or "pseudo-invalids," who, claiming that the ever-present constriction made them excessively nervous, complained continually until it was removed.

The advantages of this appliance lie in the fact that it can be accurately adjusted to the most slender person, that it holds its position constantly, and that steady upward traction can be maintained with a minimum of discomfort.

It should be applied as follows: Zinc oxid adhesive plaster on moleskin 6 or 7 inches wide, the latter being for taller patients, should be employed. A measurement may be taken of the waist, and the plaster cut 1 or 2 inches longer than this measurement. The plaster is laid in its central part over the lower abdomen, and two curved lines, as indicated by the illustration, are drawn, these lines clearing in a curved line the crests of the ilia. This point should not be overlooked, lest the plaster impinge on these bony prominences, causing considerable irritation thereby. The lateral pieces are narrowed slightly, and are used to reinforce the main piece of the plaster.

The patient's abdomen is cleaned, first with water and soap, then with alcohol or chloroform, as otherwise the oleaginous secretions present on the surface would lessen the adhesive power of the covering. The upper part of the pubes is shaved (it is not necessary to shave the whole of the pubes), and, if there is any hair on the abdomen, that should be shaved also.

In application of the bandage, I endeavor to have the hips so elevated that the body and limbs assume almost, if not quite, an angle of 45 degrees. This is accomplished by placing under the buttocks an ordinary porcelain wash-basin or other vessel, upside down, with a thin towel between the naked skin and the cold surface of the basin. The patient is instructed to relax the abdominal muscles, and the operator may with gentle downward manipulation,

aided by gravitation, press the formerly prolapsed organs out of the lower abdomen into the upper. The bandage is then applied, and by gentle but firm stroking is closely adapted to the surface of the skin all around the body, care being taken to avoid wrinkles. The reinforcing pieces are then put on, letting them begin down near the center of the most dependent part of the abdomen, and extending around the waist line in an upward direction. As these sharp ends do not generally quite meet in the back, it is well to let a short piece of the plaster extend well over each end, thus binding them together, and greatly adding to the efficiency of the whole bandage. Also in front, where the several parts of the bandage superimpose each other, the addition of a few small pieces will prevent later slipping, keeping the whole bandage intact for a much longer period.

To avoid irritation of the umbilicus, some advise that a notch be cut out where the bandage covers that part of the anatomy. This I have seldom found necessary.

The bandage should remain on as long as it is tight and efficient, and by the occasional use of small reinforcing pieces, where it is inclined to give way or become loosened, it will serve its purpose much longer. Three or four weeks is the average life of a Rose belt, though Kemp claims that many of his last six weeks.

To remove the bandage, it may be softened by applying a 10 per cent. ointment of wintergreen at night, and the following morning it will come off easily. The removal may also be facilitated by applying at the time either oil of wintergreen, ether, or gasoline.

After the belt has been removed, if there is irritation, the skin should be thoroughly bathed with soap and warm water, then gently rubbed with alcohol, and well dusted with talcum powder. The application of the alcohol and talcum may be repeated several times daily with benefit, if it is desired to reapply the plaster speedily. When it is intended to put on another Rose belt, an interval of twenty-four or thirty-six hours, seldom more, is sufficient.

Where it is not practicable to obtain the wide plaster, a number of narrow strips may be used up to the required width, making a fairly good substitute.

Dr. Rosewater has advocated the employment of a strip of zinc oxid plaster 2 or 3 inches wide and of sufficient length, which is fastened to the abdomen just above the pubes. This is drawn upon upward, and fastened above to the lower end of the sternum. Diagonal strips crossing the lower end of the vertical strip, overlapping behind at the spine, are then applied. A horizontal strip is fastened to one hip and stretched across the pubes to the other hip, overlapping the ends of the other plaster, and acting as an additional girdle.

Numerous modifications of the various methods of strapping have been suggested. Some have applied the plaster to the abdomen, and fastened it behind by tapes running through eyelet holes, so as to loosen the constriction at night. Most of these modifications have not proved helpful, and the ones described may be considered as the most practical and dependable.

The sense of strength, comfort and general well-being bestowed by a well-adjusted Rose belt is sometimes remarkable. It has been demonstrated in many instances by the X-ray that the stomach can be raised and held up from 2 to 4 inches above its former level, while the intestines are also raised and the prolapsed and floating kidney or kidneys materially steadied. Patients whose abdominal viscera are thus supported find that they can walk erectly and firmly, and lose to a decided extent that sense of dragging-down, weakness and malaise so generally present in conditions of splanchnoptosis. I have seen several who for a long time would not go without the belt, except for the brief period necessary to quiet the irritative dermatitis.

While the belt is on every effort should be exerted toward the deposition of fat in the abdomen, as well as other parts of the body. A liberal and well-balanced dietary, coupled with requisite rest and other helpful influences will often

enable these weak and melancholy semi-invalids to put on an amazing amount of adipose tissue, which in itself will steady and support the ptosed and poorly supported viscera, while the general bodily strength will indirectly bestow tone to the flabby and relaxed abdominal parietes.

Often, also, I have observed stubborn constipation, evidently due to ptoses, kinks and torsion of the intestines, give way with surprising quickness after the application of a well-adjusted Rose belt.

This method, apart from the inconvenience previously mentioned, is both scientific and safe, and is commended as worthy of trial in all cases of gastropptosis, enteroptosis or nephroptosis in slender or emaciated patients. It can do no harm, and will more probably, especially, if properly adjusted, bestow a decided amount of comfort and actual benefit.

CHAPTER X

LOCAL TREATMENT OF THE INTESTINES

Concerning the examination of the lower intestinal tract, the same may be said as of that of the feces—it is too infrequent and cursory.

There are several reasons for this unfortunate state of affairs: For many years diseases of the rectum and lower bowel have not been looked upon by the general practitioner or internist as within the limits of his legitimate field. He is inclined to leave them to the surgeon or rectal specialist. Then, too, the medical profession, as a whole, has never been properly instructed in the diagnosis and non-surgical treatment of this class of diseases, most of the lectures and available literature dealing with the surgical aspect in its most radical sense. Furthermore, many physicians consider a rectal examination as a procedure disagreeable to them and repulsive to the patients.

Answering the above, I may say from personal observation and experience that there are many pathologic conditions of the lower bowel not calling for surgery, but which can be alleviated or cured by non-surgical means; that the rectum under fairly normal conditions is not filthy; and that the vast majority of patients both welcome and appreciate a thorough rectal examination. Few indeed there are, either male or female, who, upon being told of the advisability of such an investigation, enter any objection.

The indifference and neglect of this branch of therapeutics by the rank and file of the profession has sent many a sufferer into the clutches of the quack and the charlatan, and has lost to the regular physicians many a patient who should have rightly been treated by them.

The proper examination of the lower bowel will be briefly covered.

A thorough examination implies inspection of the external and internal parts, the latter with the aid of a suitable speculum, combined with a careful exploration of the interior with the forefinger. The patient should not lie on the back, but on the side, with the legs moderately flexed, the exposure in this position being but slight.

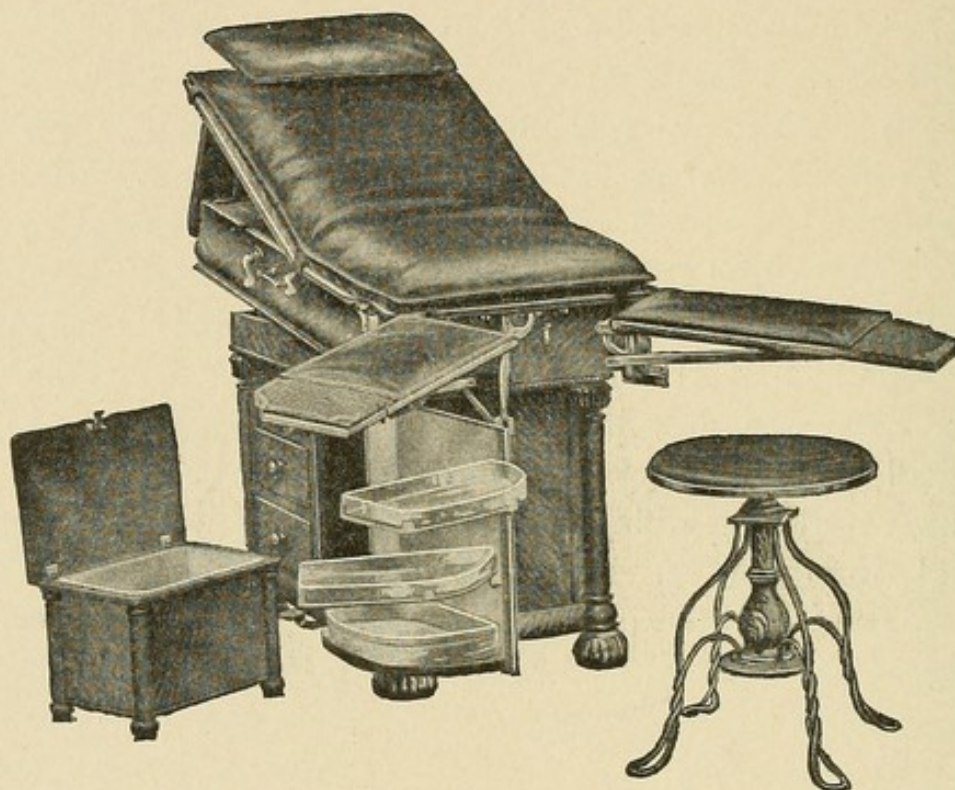


FIG. 54.—Allison physicians' table, No. 36. Especially adapted to the needs of rectal therapeutics, separable leg rests furnish support to patients in the Sims position. Foot stool and waste receptacle. Top covered with corrugated rubber; contains removable metal waste receptacle. Adjustable operator's stool. Made by the W. D. Allison Co., Indianapolis.

An inspection of the external parts will enlighten the observer as to the general appearance, color and contour; the presence of external hemorrhoids, skin tags or other growths; abrasions due to scratching, fissures, eczema, syphilitic eruptions, external openings of fistulas, marginal ulcers, or excoriations from a discharge.

Next comes the digital examination, for which the finger may be lubricated with lard or petrolatum. It is best

from an aseptic standpoint to lubricate the finger from a tube. In inserting the finger, it should be pointed slightly anteriorly while passing the sphincter ani, after which it should be directed backward. A slight rotary motion as the finger enters will facilitate its progress. This digital manipulation will inform the physician of the tone of the sphincters, whether relaxed, constricted or hypertrophied; or if there is painful spasmodic contraction. The presence of an anal fissure may now be discovered, and in some instances the whole cause of an obstinate and painful constipation may be disclosed.

As the finger enters the rectum, a stricture located within its reach would be encountered. The condition of the rectal ampulla should be noted, whether the mucous membrane is moist or wet, or gathered into doughy folds, indicating a catarrhal condition with hypertrophy. If the membrane is dry and harsh, with here and there small particles of dry feces, it is an evidence of atrophy, or at least serious interference with the normal secretions of the parts. Ulcerated spots or clean-cut ulcers may be recognized in most instances, likewise the presence of a polypus. Hemorrhoids may sometimes be felt, but not so readily as one would suppose, considering their prominence when protruded, or when seen through an instrument that affords some degree of compression to the tissues surrounding them. The hard, tortuous tract of a fistula can be felt, when its course runs close to the rectum. When examining men it is good practice to palpate the prostate before withdrawing the finger. After withdrawing the finger, it should be examined for blood, mucus, or shreds of tissue, noting also if the peculiar odor of malignant disease is in evidence (Albright).

Instrumental Examination.—The prerequisites for a satisfactory ocular examination are good light and a properly constructed speculum. When obtainable, sunlight is always best. Gas also furnishes a satisfactory light when augmented by the incandescent mantle now in

use and sent into the rectum by means of a reflector placed in the rear of the operator. Electricity, too, is now easily obtained, and, where there is no street current available, a good light may be readily obtained from a dry-cell battery. Many use the electric head-light, as is employed by the rhinologists and aurists. For high rectal

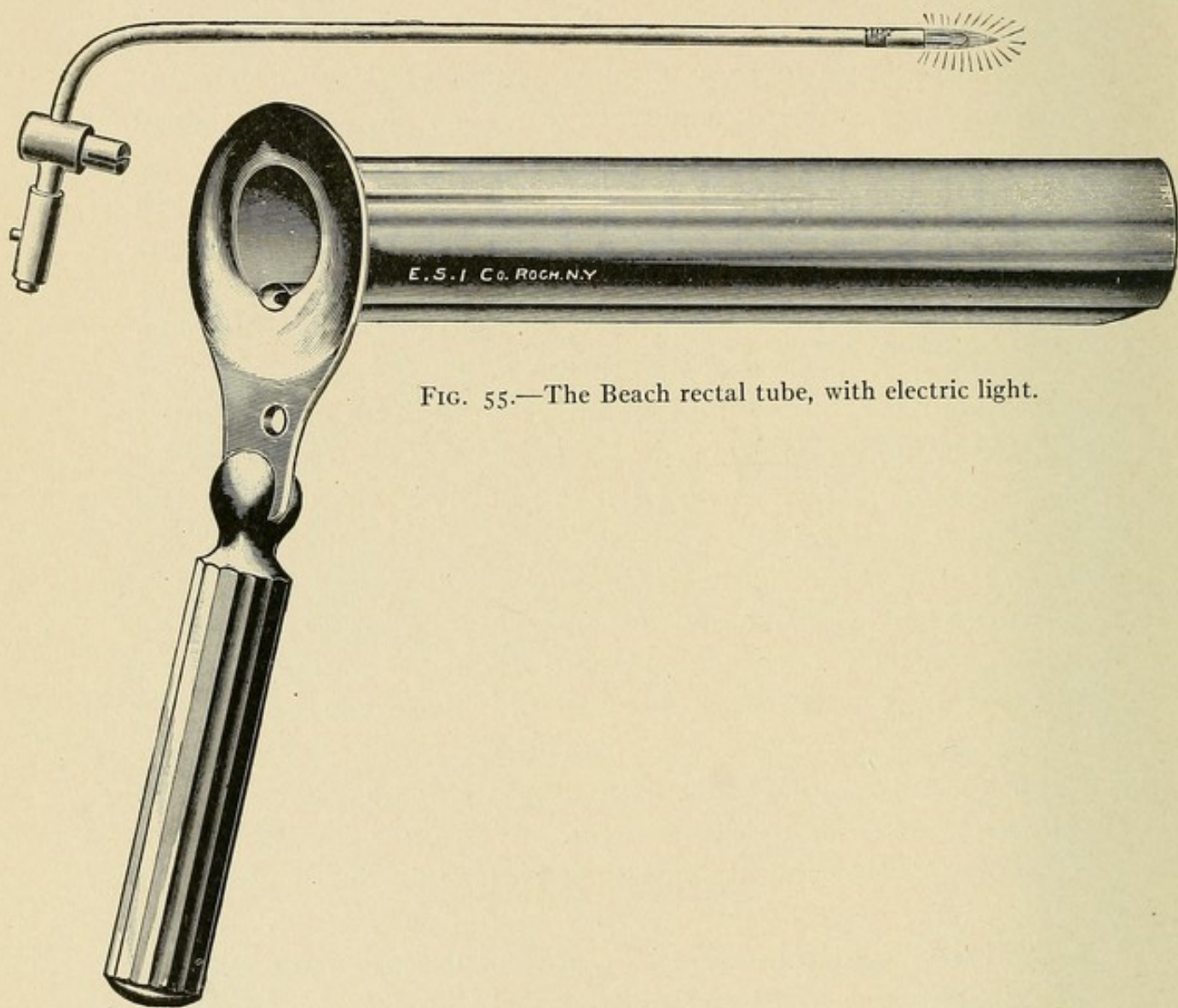


FIG. 55.—The Beach rectal tube, with electric light.

examinations the pneumatic proctoscope, with the same means of illumination, is satisfactory. This instrument permits of an inflation of the rectum with air, while *in situ*, thus permitting a thorough inspection of the walls.

All instruments should be warmed before inserting them into the bowel, as apart from giving the patient an un-

pleasant sensation, cold instruments are provocative of spasm of the parts.

There are numberless rectal specula, many of which vary in only minor particulars. As the best which has come to

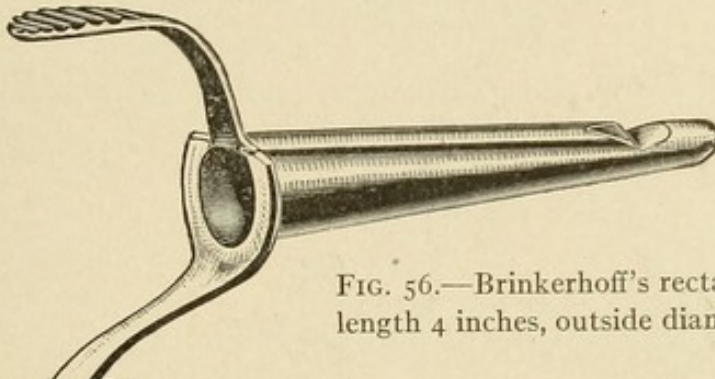


FIG. 56.—Brinkerhoff's rectal speculum, length 4 inches, outside diameter $\frac{7}{8}$ inch.

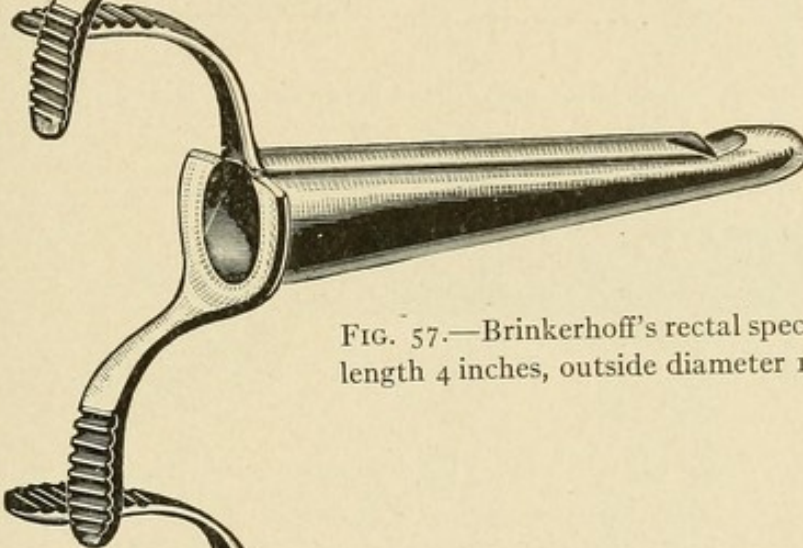


FIG. 57.—Brinkerhoff's rectal speculum, length 4 inches, outside diameter 1 inch.

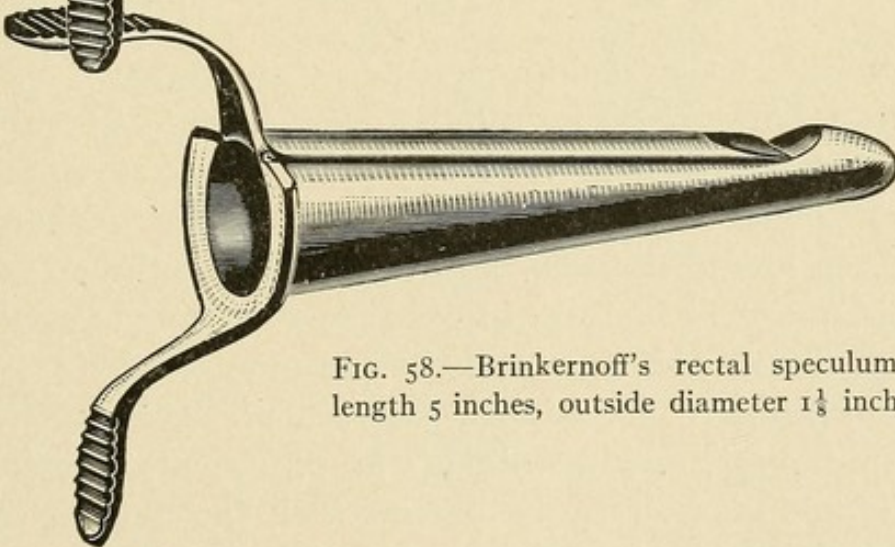


FIG. 58.—Brinkerhoff's rectal speculum, length 5 inches, outside diameter $1\frac{1}{8}$ inch.

my notice, and which I used practically to the exclusion of others is the Brinkerhoff speculum, which is conical, tubular in form, and with a removable slide through which

the interior of the rectum can be readily brought into view. They run in different lengths, and Jamison has had some special sizes made as long as 10 inches. This speculum may also be obtained with an electric light attachment. Gant's bivalve examining speculum is useful, where it is desired to dilate the external parts rather widely.

In examination for rectal disease, the patient should lie on either side with the legs flexed, and supported on a wing of the table.

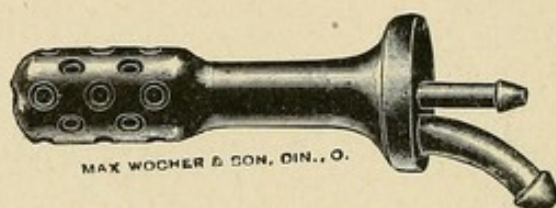


FIG. 59.—Albright's small hard-rubber rectal irrigator.

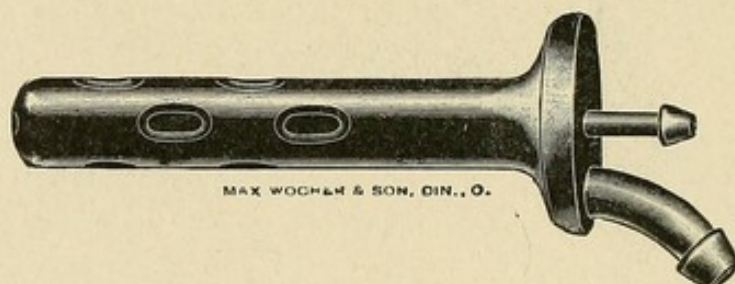


FIG. 60.—Albright's large hard-rubber rectal irrigator.

In using the sigmoidoscope a certain amount of both skill and patience is required. It is important that the sigmoid should be empty, and this is seldom the case unless the portion of the gut has been previously flushed out. Laxatives are unsuitable, as after their employment, the sigmoid is apt to be full of liquid feces, or some is liable to descend during the course of the examination.

An anesthetic is seldom necessary. The knee-chest position is best, but in women who object to this position, the sigmoidoscope may be passed with the patient on the left side in an exaggerated Sims position.

The instrument having been warmed, the obturator is placed in position, and the whole well oiled. It is also helpful to inject some oil into the rectum and to thoroughly

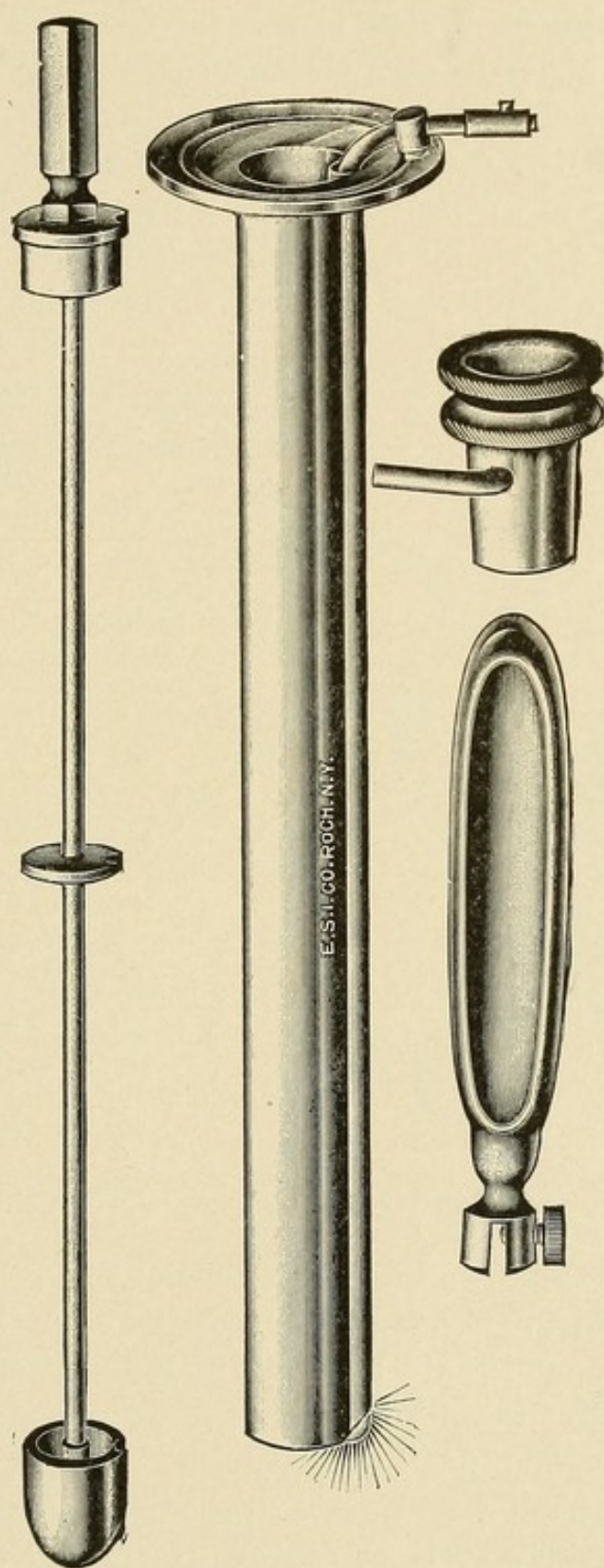


FIG. 61.—Tuttle's pneumatic sigmoidoscope.

anoint the anal region. The sphincters are easily passed, after which the obturator is removed, the window plug inserted, the air bulb and electric attachment connected, and the light turned on. The inflation is now gently begun, and as the rectum balloons out, the instrument is gradually passed upward without, if possible, touching the rectal walls. Thus, by keeping the lumen of the rectum well in sight, and dilating it in advance of the progressing

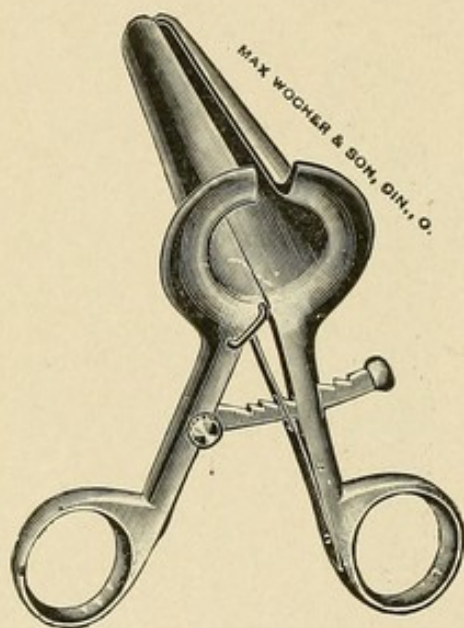


FIG. 62.—Gant's examining speculum.

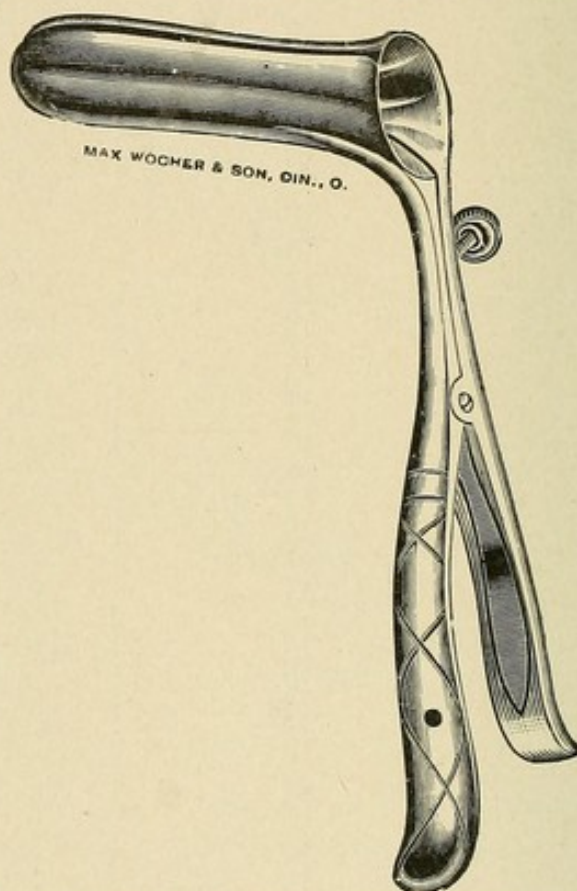


FIG. 63.—Pratt's bivalve speculum.

sigmoidoscope, the sigmoid can generally be entered without pain or injury. The following points as to the direction of the instrument should be noted: First, it should point anteriorly, until the sphincters are passed; second, it follows the coccygeal curve until the promontory of the sacrum is reached, and from this point, third, it again points anteriorly, rather more so than during its passage through the sphincters, and, as the desired depth is reached, the outside portion will press hard against the posterior commissure of

the anus. The point of greatest difficulty is at the recto-sigmoidal junction, and one must not lose sight of the fact that here the sigmoid drops to the left; and to the view it appears as though the rectum ended in a blind sac, yet, by sufficient dilatation, a few folds may be seen just below the end of the instrument, and it is through these that it must pass (Albright).

Should the difficulty continue, the patient may be moved slightly, or the upper part of the body may be lowered, so as to encourage the intestines to gravitate somewhat away. After successfully introducing the sigmoidoscope, it may be

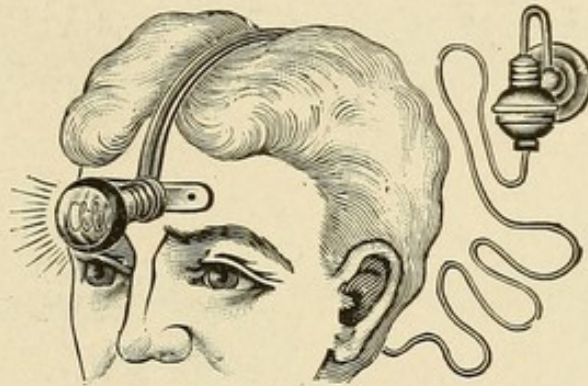


FIG. 64.—Electric head-light.

withdrawn gradually, and, as it comes out, the whole mucous surface may generally be well inspected. The normal color of the rectal mucosa is a light pink by sunlight, and appears somewhat more accentuated in color by electric or gas light.

In acute catarrhal proctitis the membrane appears bright red in color in the early stage, at which time it is also swollen; but it soon becomes darker, secreting at the same time a thick, sticky mucus, which, when disturbed, appears like a part of the real membrane.

In hypertrophic catarrhal proctitis and sigmoiditis the mucous membrane is pale, edematous, and bulges into the opening of the instrument, unless the bowel is inflated. This pale membrane can also be observed lying in concentric folds ahead of the instrument, lessening to a marked extent the lumen of the gut. Mucus accumulates

over the diseased area, appearing as a sticky coat, whitish in color and granular in form.

In the atrophic form of proctitis the mucous membrane is red and smooth, the mucous folds are contracted, the surface is somewhat dry, and shows a tendency to adhere to the instrument or finger, unless well lubricated. As this

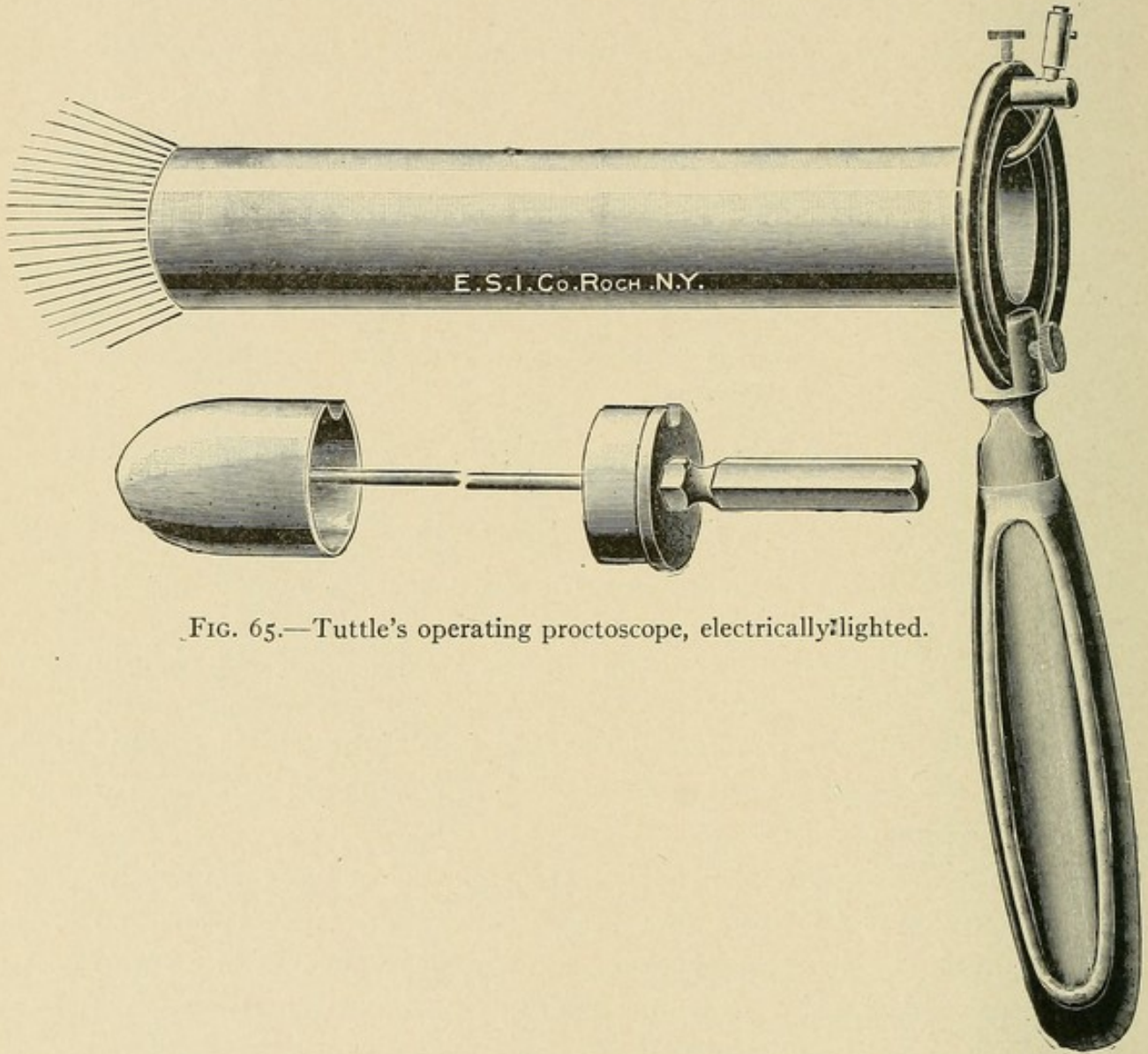


FIG. 65.—Tuttle's operating proctoscope, electrically lighted.

condition interferes with the free passage of fecal matter, small specks and particles may be seen about on the rectal mucosa. Shallow ulcers and erosions may also be observed, due to abrasions caused by the passage of hard feces or sharp substances contained therein.

In ulcerative colitis the mucous surface of the upper

rectum and sigmoid is congested, granular, dry and glistening. The ulcers may be seen, and are generally shallow, irregular in shape, without well-defined edges, a deeper red than their surroundings, bleeding freely when touched, while the patient complains bitterly of the pain brought about by passage of the instrument.

In mucous or membranous colitis there are no characteristic gross changes upon the mucous surface. There may be some congestion and thickening, and even sometimes ulceration, but it is impracticable to diagnose this disease by examination alone.

In early malignant disease the thorough examination of the lower bowel is most important, as early recognition will afford the patient a "day of grace" in which operative interference may relieve certain conditions which would otherwise terminate fatally.

LOCAL APPLICATIONS

These may consist of powders, astringents, sedative solutions, caustic solutions, or irrigations in which are placed various medicaments.

Among the powders suitable for application to the inflamed or irritated rectal mucosa are aristol, acetanilid, euophen, boric acid, bismuth, powdered corn starch or powdered slippery-elm. These may be applied to the inflamed parts by means of a powder-blower.

There are many local applications in liquid form which are both suitable and beneficial in pathologic conditions of the lower bowel.

For ulcerated areas, the first, and probably most useful application is hydrogen peroxid, which oxidizes the putrid matter, leaving the floor of the ulcer surgically clean. Other of the potent applications are pure phenol, a 20 per cent. solution of silver nitrate, bichlorid of mercury solution, 2 grains to the ounce, nitric acid, 30 drops to the ounce, tincture of iodine, and a 25 per cent. solution of aromatic

sulphuric acid. Where the application can be sharply limited, the lunar caustic may be used in solid form. This leaves a white coagulum of albumen, promoting the healing process.

These powerful agents are not suitable for application to extensive areas, not so much from the danger of absorption, as the difficulty in limiting their escharotic action. Their

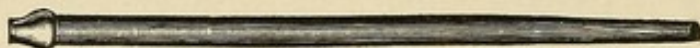


FIG. 66.—Albright's sinus irrigator; hard-rubber.

unwise application may result in the formation of undesirable scar tissue, and obstructive constrictions later on.

Irrigations.—Direct irrigation of the duodenum has been employed by Gross with his duodenal tube. He first introduces the liquid, then siphons it out. This method has not come into general use.

Dr. Ernest Jutte has succeeded fairly well in his efforts toward transduodenal lavage, and his technic will be described, as set forth in his article in the *Journal of the American Medical Association*, Feb. 22, 1913.

Transduodenal lavage, according to Dr. Jutte, is to the small intestine what an enema is to the large, the aim being to bridge the stomach, so that the irrigating fluid does not escape into that viscus, but enters directly into the bowel.

The outfit required consists of 1/16-inch thin rubber duodenal tube, with perforations near, and an olive at the end, an aspirating bottle, a suction pump or an ordinary syringe, an irrigator and rubber connections, and, if swallowing the tube is difficult, a thin wire or urethral catheter, which fits into the hollow stem of the olive to serve as an introducer. The last-named auxiliary I have never found necessary.

The patient with his stomach empty, swallows the tube, lies down on his right side on a table, and drinks a tumblerful of water. In this position gravity brings the olive near the

pylorus, and peristalsis soon pushes it through along with the water. Marked stenosis of the pyloric outlet of the stomach of course renders the passage difficult or impossible. When the tube has been in a sufficient length of time, some of the secretion is aspirated, and, if alkaline, it may be assumed that the tube is in the duodenum. (A possible exception is the presence of achylia gastrica.)

In deciding this question the litmus-paper test has been found unreliable, for regurgitation of duodenal contents into the stomach may give a bluish tint to the paper; on the other hand, the duodenum may have been reached, and

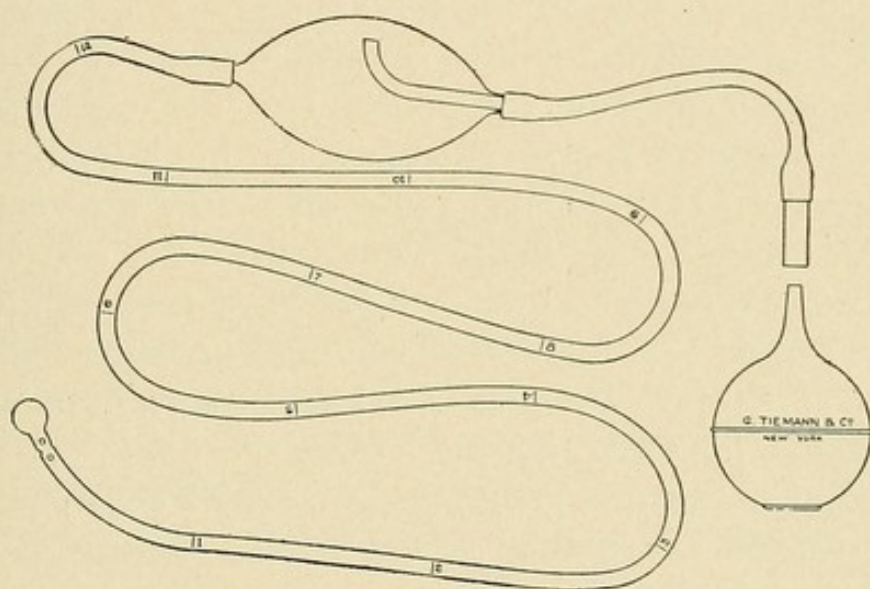


FIG. 67.—Gross duodenal tube.

the red paper not have turned blue, because an acid reaction in the first portion or the duodenum is not infrequent. Fortunately the physical appearance of the aspirated fluid is generally sufficient to remove doubt. A slight stringiness or tenaciousness indicates its intestinal origin, except in cases of marked gastric catarrh.

When the operator is satisfied that the olive is in the right place, lavage may be begun. The duodenal tube is disconnected from the rest of the apparatus, and attached to an ordinary irrigator or rubber bag containing about 2000 c.c.

of irrigating fluid. The patient turns on his back, and from 1000 to 1250 c.c. are allowed to trickle into the bowel. About ten minutes' time is enough for this quantity to run in and to allow peristalsis to gradually push it onward, so that there will be no undue distention of the duodenum. To make certain of this, the flow can be interrupted once or twice by a few minutes' wait. Light abdominal massage or gentle vibration will stimulate peristalsis, if sluggish. After enough fluid has run in—1000 c.c. are easily born—the tube is slowly withdrawn, and the patient allowed to rest a while.

The case will determine the nature of the irrigating fluid. In nervous disorders, general malaise, anemia, rheumatism, indicanuria, or any condition where it is desired to thoroughly clean out the bowels, Dr. Jutte uses a normal saline solution, 9 grm. to 1000 c.c., at body temperature. To flush out the kidneys, plain distilled water causes a copious diuresis. In icterus and when fat digestion is impaired, the addition of 7 or 8 grains of pure castile soap (0.5) to 1000 c.c. of saline solution is beneficial. Occasionally the use of soap is followed by slight nausea or headache. To withdraw fluid from the body, a stronger solution than normal saline will be found efficient. It is thought that astringents added to the saline might be helpful in catarrhal enteritis, and quinine in amebic dysentery. This, however, has not been proved by experience.

Perspiration, temperature, pulse and tension remain practically unchanged during this irrigation, though an increase of the fluid temperature above that of the body will cause a corresponding increase in pulse and tension. This might be of advantage in some conditions, but should be avoided in chronic nephritis and similar ailments. This lavage is contraindicated in aortic aneurysm and uncompensated heart lesions. It seldom causes any discomfort, but is generally followed by a feeling of buoyancy and well-being, probably due to flushing out the intestinal toxins.

Enemas.—The various methods of injecting fluid into the bowel come under this term, though there are many variations in method and indication.

The principal methods consist of:

1. The simple enema, where fluid is injected into the lower bowel.
2. Irrigation with a single tube.
3. Irrigation with a double-current tube or other special appliance.
4. Proctoclysis by the drop method of injection.

There are quite a number of indications for the employment of enemas, or intestinal irrigation, some of which are:

For local treatment of diseased conditions of the gut, as catarrhal colitis.

In proctitis, prostatitis, or any acute inflammation in the pelvic region.

For the relief of pain and irritability in the anal region, as in spasm of the sphincter.

To aid in the absorption of inflammatory products in the pelvis, as of post-uterine adhesions.

To replace the loss of fluid in the body, as in cholera, or after severe hemorrhages.

To dilute the poison of disease and promote diuresis, as in uremia.

To check hemorrhage by the local effect of fluid either very cold or very hot, as in hemorrhage from ulcers in the rectum.

To assist in emptying the bowel, either by direct irrigation, or by the presence of the fluid, to stimulate the gut to expulsive efforts, as in constipation, or obstipation from retained masses of hardened feces.

To affect the heat centers, as by hot irrigations in lowered temperature from shock, or cold irrigations in high fever.

To exert an antispasmodic effect, as in colic.

To aid in the expulsion of gas, as in excessive tympanites.

To exert a mechanical effect, as in intussusception.

To employ the fluid as a vehicle for the introduction of nourishment, as in nutritive enemata.

There are few simple mechanical procedures in the realm of therapeutics that admit of the display of more tact, ingenuity and skill than in the administration of enemata. To inject into the bowel a sufficiency of fluid to meet a given indication, without pain or discomfort to the patient, so that it can be retained long enough to accomplish the desired purpose, is not such an easy matter as some would suppose.

The necessary apparatus for enemata may consist of a 1 to 4-quart fountain syringe of rubber, or an irrigating jar of glass or porcelain with an opening at the bottom. This is connected with rubber tubing which may have at its end nozzles of various sizes and shapes, or the part intended to be introduced into the bowel may consist of a colon tube, a tube with recurrent flow, or a soft-rubber catheter.

Either hard-rubber nozzles or soft-rubber tubes are preferable, as, in the injection of hot fluids, a metal nozzle becomes unduly heated and uncomfortable to the patient.

The amount of hydrostatic pressure to be exerted requires judgment. In irritable conditions of the intestinal mucosa, the flow should be slow and gentle, perhaps frequently interrupted, so that the sensitive bowel will not spasmodically contract, and expel the fluid too soon. Under such conditions, the container need be only 1 or 2 feet above the buttocks of the patient. Ordinarily the bag or container may be held or hung from 2 to 5 feet above the patient. Higher than that, unless extreme hydrostatic pressure is desired, as in intussusception, is fraught with danger. I might state, however, that Dr. A. B. Jamison, who has had much experience in intestinal irrigation, permits in many of his patients the water to enter at "hydrant pressure," claiming that in no instance has harm been inflicted. Individually, I would hesitate to recommend such force.

Quantity.—The amount of fluid to be injected depends upon the results desired. To simply stimulate lagging peristalsis, a pint, or even less, is usually sufficient. Many individuals are slightly inclined toward constipation, and need only a gentle stimulus to “wake,” as it were, intestinal contractions. Many of these have in the toilet a convenient fountain syringe, which is brought into use, should the regular daily evacuation be tardy. The employment of a small enema of warm water under such circumstances causes practically no disturbance of the alimentary tract, and is greatly preferable to the constant and promiscuous self-administration of laxatives.

Enemas intended to flush the colon, or to dislodge fecal accumulations higher up, may consist of a quart and a half, or even two quarts. The last I consider a maximum. The practice of introducing into the bowel vast quantities of water—1 or 2 gallons, or even more, is reprehensible, and liable to cause dilatation, with later on paralysis of the bowels.

A number of years ago a well-meaning but ill-informed individual promulgated a theory that, by frequently flushing the colon with enormous quantities of warm water, many of the ills of life might be mitigated or cured. This fad, like many others containing some elements of truth, became quite popular for a season, to the great harm of some of its devotees. As a sad commentary, it is reported that the originator himself died from the effects of dilated and atonic bowels.

Let me insist that *several* enemas of 1 quart each are infinitely better than one enema of *several* quarts. If this book convinces its readers of this *one* basic fact, my efforts will be well repaid.

Many times, if the first enema is fruitless, the water returning clear, if repeated one or more times, peristalsis will be set up, the hardened contents will in the meanwhile be softened, and satisfactory fecal results will ensue. The mere fact of repeated injections need cause no more appre-

hension than the mere fact of repeated ablutions to the surface of a soiled and crusted skin.

Temperature.—Cold enemas are indicated only in the presence of hemorrhage or hyperpyrexia. Their use is limited, and generally, any benefit which might be attained by the injection of cold fluid into the bowel, is more comfortably and safely accomplished by other means.

Generally speaking, the fluid should be about the body temperature—perhaps a little warmer. For the relief of inflammation in the intestinal mucosa or adjacent structures, the water may be quite hot. Albright advocates a temperature of 120° F., while Jamison advises a temperature of 135 or even 140° F. I would hardly advise an irrigation with a temperature above 125° F.

The irrigating tube must never be removed while the hot solution is in the *rectum*, as, should it come in contact with the anus, it would cause decided pain. It must be remembered that the interior of the rectum will comfortably bear a degree of heat that the anus cannot endure, so the instrument should not be withdrawn until after the fluid ceases flowing through it, and then slowly.

Lubrication.—It is always conducive to the comfort of the patient that the nozzle, the entering tube, or the colon tube be well lubricated. Vaseline, olive oil, castor oil (warmed), or even toilet soap will answer the purpose. Laundry soap, or the cheap grades of turpentine soap are useful in the water, but are unsuitable to lubricate a tube that passes over a possibly tender or excoriated surface.

Preparation of the Irrigating Fluid.—A simple enema for gentle stimulation of peristalsis may consist of warm water alone.

The so-called S. S. enema consists of warm water into which sufficient soap is rubbed to form a liberal amount of soapsuds. In such an enema laundry—or turpentine—soap may be used, as this soap exerts a slightly stimulating effect.

The saline enema (normal) consists of one teaspoonful of common table salt to the pint of water.

An oxgall enema contains one teaspoonful of oxgall to the pint of water.

The Hare enema consists of magnesia sulphate, one tablespoonful, glycerin, 1 ounce, water, 2 quarts.

Various carminative enemas may be prepared by adding to the water one or more tablespoonfuls of milk of asafetida, to the quart of water, one teaspoonful of powdered alum or powdered borax to the quart, or a weak infusion of camomile.

Emollient enemas contain corn starch in sufficient quantity to thicken the fluid; or flaxseed meal or slippery elm bark, with the water strained. Gum arabic or tragacanth is also used.

Antiseptic enemas may contain permanganate of potash, one to two or five thousand, nitrate of silver, 15 grains to the quart, phenol, 30 grains to the quart (being sure that it is all returned), chlorinated lime, half teaspoonful to the quart, commercial sulphuric acid, 1/2 dram to the quart, or the liquor alkaline antiseptic (N. F.) 1 or 2 ounces to the quart.

For softening and healing enemas there may be employed several of the oils. These are also employed in the treatment of constipation, and, when rightly used, are successful in a large per centage of cases. For healing an irritated intestinal mucosa, there may be added to the oil a small amount of phenol, 1 dram to the pint, tincture of iodine, the same amount, or bismuth subnitrate in any quantity desired, so the oil is not made too thick by its addition. For inflammatory conditions, when pain or tenesmus is present, and the oil is not expected to remain in the bowel any great length of time, the amount injected may vary from 8 ounces to a quart, or even more.

In constipation, the method is different. The oil should be placed in a glass or hard-rubber irrigating jar, as its frequent use rots the bag of a fountain syringe. Not over

3 ounces should be injected the first time, though, as the patient finds the bowel will retain more, this amount may be increased up to 8 ounces. When injecting the oil, the bed should be protected by a rubber sheet or other covering. The patient should lie on his left side with his legs flexed and his hips slightly elevated. The rectal tube is slowly introduced, and, as the oil flows in, is gently pushed up until it enters as much as 8 or 10 inches. After the oil flows in the tube is withdrawn, and compressed by the finger during its exit to prevent the escape of random drops. The patient should remain on his left side for twenty or thirty minutes, and, if possible, the oil should remain in all night. This usually is accomplished, except in rare instances of extreme irritability of the rectum, or where the anus is patulous, allowing it to escape during sleep. This injection of oil is generally followed by a satisfactory evacuation of the bowels the following morning; but, if not, a small S. S. enema, or a glycerin suppository, will set up enough intestinal contractions.

This method is specially applicable to those forms of constipation characterized by hard and dry fecal masses, with a tendency to accumulation of scybalous collections high up in the large intestine.

The Kind of Oil to be Used.—Some writers advise the pure olive oil, which is both expensive and hard to obtain in many instances. Hemmeter has observed occasional irritation from fatty acids in the oil, and advises shaking the oil with hot water, as the latter takes up the fatty acid. Rosenheim adds a little bicarbonate of soda to neutralize the acid. Either of these procedures I have never found necessary or expedient. Linseed oil has been advocated by some, but when warm it is so fluid, that it tends to run out of the bowel, unless the sphincters are quite efficient.

The best and most satisfactory oil in my experience is the *cotton-seed oil*, especially after it has been refined for cooking purposes. The various cooking oils are cheap, easily obtained at the nearest grocery store, and answer every

purpose that can be attained by pure and expensive olive oil.

When it is considered that most of the so-called olive oil now on the market is adulterated with cotton-seed oil, the reader may see that it is unnecessary to have the patient pay a large price for supposed olive oil, when the pure cotton-seed oil is fully as suitable for the desired purpose, and much cheaper.

The Colon Tube.—When it is desired to carry the injected fluid high up in the bowel, a colon tube may be employed. This may be of hard rubber, about 18, English size, and fairly stiff. A tube that is unduly flexible is worse than useless. Colon tubes are also furnished in metal, made in sections, but these are not satisfactory. There are few appliances more deceptive than this, and, unless the operator is careful, the tube will bend upon itself in the ampulla of the rectum. The proper method of introducing a colon tube is to press it upward gently as the water flows, allowing in the meanwhile rather more hydrostatic pressure than is exerted in a simple enema. The flow may be interrupted whenever there is discomfort or tendency to expel the fluid, so as to allow the bowel to adjust itself to its contents. The operator will have to judge by both the sense of touch and the freedom of flow of the fluid as to whether or not the tube is really high up in the bowel.

Irrigation of the Large Intestine.—This is accomplished by several methods. To irrigate with a single tube, a colon tube or even a hard-rubber nozzle may be attached to a rubber tube about 2 feet long, which is surmounted by a funnel. The water is poured in the funnel, sent into the bowel from an elevation of about 2 feet, and siphoned out by suddenly lowering the funnel, as in gastric lavage. This method is not very satisfactory, and is useful only to remove softened feces or small shreds of mucus, or in the absence of better appliances.

The best and most scientific methods of irrigation lie in

the several forms of recurrent tubes, in which the water flows out as fast as it enters, there is no straining or tenesmus, and the temperature of the fluid can be absolutely regulated. By this method also an unlimited quantity of the irrigating fluid may be made to lave the intestines, and besides mechanically cleaning them, the flatus is relieved by the suction of the return flow.

I prefer the Kemp flexible recurrent irrigator and the Albright small hard-rubber irrigator, though Tuttle, Hemmeter and several others have devised successful instruments for this purpose.

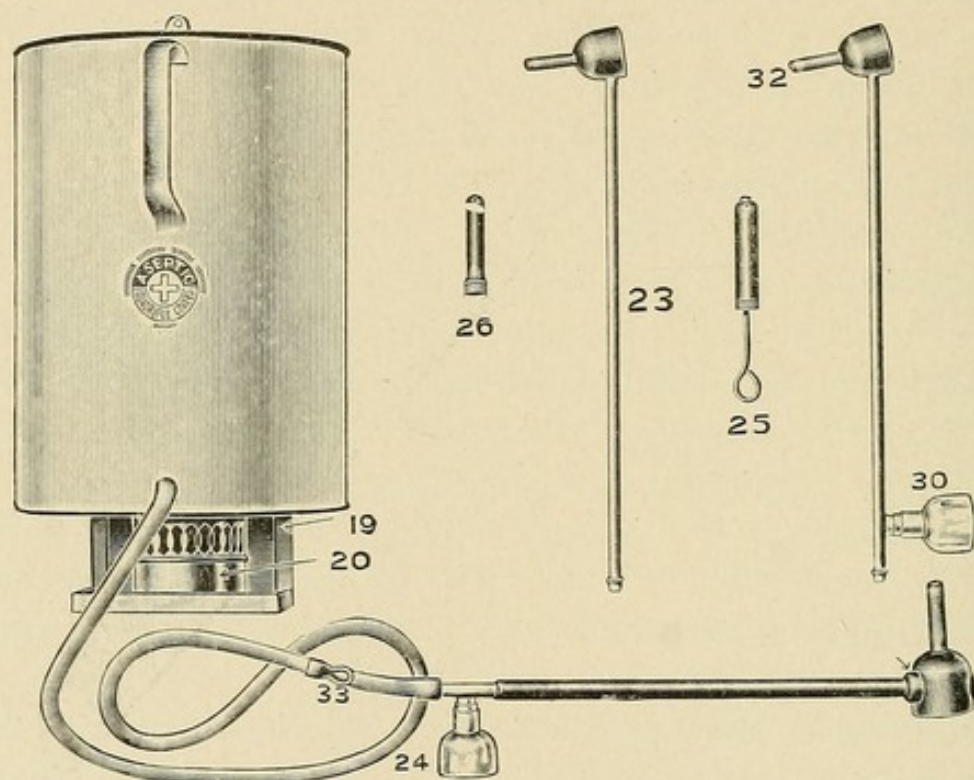


FIG. 68.—Jamison's irrigator.

The principle is simple, being a double, rigid tube, where the fluid enters by a central tube, while the outflow is carried off by the outer tube into which the fluid flows by lateral orifices. The illustration will make this plain.

Dr. A. B. Jamison has contrived an ingenious irrigating outfit, which he calls the "Niagara Fountain Syringe." This is taken by the patient in the sitting position, and

when the bowel is full, a simple half-turn of a hard-rubber tube opens a valve, and releases the water. The illustration will make the principle clear.

In using the double-current irrigating tube, the patient may be either on the back or side, just so the hips are elevated. The height of the douche bag or irrigating jar should be from 3 to 5 feet above the patient. There are several precautions advisable, which will facilitate every step of the irrigation: Allow the fluid to flow from the tube before insertion, so as to force out the air, and then check the flow, then renew the flow as the tip of the instrument passes well through the spincters, so as to force the mucosa away from the irrigator and lateral fenestræ.

The instrument should be well lubricated (the flowing fluid will warm it), inserted with a gentle rotary movement with the tip directed slightly back toward the sacrum. Do not use force in entering, nor press the tip of the tube against the intestinal walls. Should the flow cease, rotate the tube slightly, or withdraw it some while rotating, and then push it gently backward and forward till the flow resumes. Occasionally, where there are much hardened fecal contents present in the bowel, the larger masses need to be cleared with a soapsuds enema, after previously softening them with oil or glycerin. The irrigator should be introduced to one-half its length in prostatic cases, and full length for high irrigation.

Should the tube encounter an obstruction, a rectal examination will disclose the cause, such as a possible enlarged prostate, uterine fibroids, redundant hemorrhoids, etc. These, however, can generally be passed with the tube, after their location and size are known. When withdrawing, bring out the tube with a gentle rotary pull, lest the mucosa catch in the fenestræ.

When it is desired to thoroughly irrigate the whole colon, the irrigation may be started with the patient on the left side with his hips elevated; as the irrigation proceeds, he is gently rotated to the dorsal position, then to his right side.

As the irrigation is still kept up, he may be rotated in the opposite direction, and the procedure concluded after he is returned to the left side. It is also of assistance to raise the shoulders while on the right side, as this tends to make the fluid gravitate into the caput coli.

Temperature of the Irrigating Fluid.—This may vary from 100° F. to 105° F. in intestinal catarrh to 110° F. in typhoid fever or any toxic condition, as this higher temperature increases its eliminative effect. Jamison uses irrigations as hot as 125 to 135° F.

Solutions Employed.—Thin flaxseed tea, normal saline solution with spirits of peppermint or cinnamon or fennel, plain water with milk of asafetida, soda, boric acid, tannic acid, tannin, or alum, the latter six medicaments being used in strength of 1 dram to the quart. Others are the solutions of silver nitrate, potassium permanganate and alkaline antiseptic liquid, as previously mentioned.

One more irrigating fluid I wish to specially mention as worthy of use—the plain kerosene or coal oil of commerce. Its amebacide effect will be considered later, but as an irrigating fluid in chronic proctitis and colitis, where there are old and unhealthy ulcers, with superficial sloughs, and perhaps a chronic diarrhea, an irrigation of one quart on alternate days, until about three or four irrigations have been given, will in most cases yield gratifying results. There seems to be no danger of toxic effects, for in several instances quite a residue of the oil has been retained one to three hours before escaping, and in no instance have any evil or disquieting symptoms ensued. I commend this unhesitatingly.

Proctoclysis.—By this is meant the injection of normal saline or other solution into the rectum by the drop method, as first suggested by Dr. J. B. Murphy, of Chicago. This procedure is of special value in sepsis, and is of use as an adjunct to other treatment in post-operative shock, intestinal dilatation and atony, and uremia. In septic conditions, it is well, however, to first thoroughly irrigate

the colon with a saline solution at 120° F., then follow with proctoclysis.

One of the main difficulties in the administration of a solution by the drop method, is the maintenance of a constant temperature. There have been several methods suggested, but probably the most simple and satisfactory is the employment of a vacuum bottle, as directed by Kemp.

His method is as follows: Through a screw cap, which closes the bottle, passes a small hard-rubber connecting tube, to which is attached the outflow tube. Parallel with this is the filiform tube, which allows the entrance of a fine column of air, so as to render the flow possible. This last tube passes through the solution to within about one eighth of an inch from the bottom of the bottle. As the instrument is inverted when in use, it would correspond to the same distance from the top of the bottle. This filiform tube is of hard rubber externally where exposed to the air, as a non-conductor of heat. The part lying within the bottle is purposely made of metal, so that it is rapidly heated from the surrounding solution, and the entering air is thus also heated.

A series of experiments have demonstrated that there is a loss of only 1 or 2° F. in the temperature of the solution in the bottle during the administration of proctoclysis lasting half an hour to an hour. The screw compression valve is applied close to the bottle attachment, so as to avoid as much as possible the solution cooling in the soft outflow tube. This outflow tube is joined to the catheter by a short piece of glass tubing for the purpose of observing whether the flow is constant. The catheter for rectal injection passes through a self-retaining rectal tip, and this catheter and tip can be inserted any length desired. The conducting tube is quite thick. An asbestos tube surrounds the conducting tube from its junction at the bottle to the catheter. This lessens the dissipation of heat, and is greatly preferable to the use of cumbersome hot towels.

The asbestos wrapping can be occasionally slipped off the glass connecting joint, so as to observe the flow. The vacuum bottle is filled in the usual manner, and the special cap with attachment screwed on. The bottle is then inverted, and suspended by a sling. A small amount of fluid will escape from the bottle by the filiform air tube until the solution reaches the level of the tube, which is now near the top of the bottle. The bottle is now suspended about 6 inches above the rectum, or higher, if desired, and the flow tested for proper speed before inserting the rectal tip or catheter. If flatus occur, lower the reservoir for a short time to below the level of the abdomen, so the gas may escape into the bottle. Should this not be adequate for the escape of the flatus, it may be necessary to remove the tube for a short period.

At the start the speed of the drop is more rapid, and though gauged to, say, fifteen drops per minute, may, in the course of two minutes drop to five. A test of two to three minutes should be made, therefore, before inserting the catheter, so as to insure a constant flow at the desired rate. Other special apparatus for the maintenance of heat consists of gas or oil burners under the container, or electric heaters.

Needle Douche; Nebulizer; Colonic Massage Bags.—These instruments have been devised by Dr. Fenton Turck, of Chicago, and may possess some value. The colon needle douche is a double-current tube, slender, and about 12 inches long, with the inflow tube fitted with an orifice through which the fluid escapes in a fine, needle-like stream. The nebulizer is an ordinary instrument of this sort attached to a rectal or colon tube, and is recommended by its inventor for spraying oil of cloves or cinnamon into the colon for their antiseptic effect. He also recommends distensible bags for the inflation and massage of the rectum and colon. These bags are of doubtful use, and I would hesitate to advocate them.

It will be observed from the various methods discussed

in this chapter that a considerable portion of therapeutics directed toward alleviation of gastrointestinal ailments may be properly placed under the caption of "Local Treatment of the Intestines." Let me, therefore, urge my readers to not underestimate the importance of thoughtful consideration and care of the intestines, especially the colon and rectum, for in many instances the etiologic key lies here, and here also, by the exercise of suitable measures, may be discovered a solution of the whole pathologic problem.

CHAPTER XI

HYDROTHERAPY IN GASTROINTESTINAL DISEASES

Water, the cup that cheers but not inebriates, the universal solvent, has claimed attention from earliest antiquity. As a therapeutic agent it has proved most efficacious, and since Naaman, the Syrian, was healed of his leprosy by bathing in the river Jordan, even to the present moment, there has been no lack of earnest adherents to the various methods of hydrotherapy.

The literature on the subject is voluminous, a search of the list of references in the Surgeon-General's Library, Washington, revealing 32 volumes with 640 citations devoted to hydrotherapy alone.

The students and investigators of the Old World have been most industrious in the elucidation of this broad subject, while in the United States we are greatly indebted to Dr. Simon Baruch, of New York, and Dr. J. H. Kellogg, of Battle Creek; though their labors have been ably augmented by a host of other earnest workers.

I may properly say that there is no phase of hydrotherapy more important than its application to gastrointestinal diseases, and an attempt will be made to cover the practical indications for and methods of its employment.

First I desire to discuss the much misunderstood subject of drinking water with meals, for with a few exceptions, but scant attention has been accorded it by writers on digestive problems, who allude to it in a careless and perfunctory manner.

There is a widespread idea (happily being now somewhat abandoned) that the habit of imbibing water or any other

fluid as food is being taken is harmful to digestion; that it dilutes and weakens the gastric juices, thereby interfering with the satisfactory functioning of the stomach, and the orderly progress of digestion. This idea is by no means confined to the laity, for the medical profession almost unanimously advise strongly against the drinking of large amounts of water at meal time, and as a matter of routine prohibit the practice. I have now at hand the printed diet list of a prominent stomach specialist, bearing the injunction—"Do not take more than one and one-half glasses of fluid with any meal."

This wholesale indictment is radically wrong; it is based on erroneous physiologic conclusions, and perpetuated by tradition. As a shining instance, however, of one who could cast aside tradition, and utter words almost prophetic, let me quote the late Prof. Austin Flint, who, in a lecture delivered twenty-eight years ago, said, "Gentlemen, *theoretically*, the ingestion of much water would dilute the gastric juice, and impair the digestion, but *practically* this does not seem to be the case."

The older works on physiology taught that the contents of the stomach were kept in a general rotary movement, so as to become more uniformly mixed; that each portion of the stomach contents was thoroughly "churned," as it were, so that the gastric juice would quickly and effectively permeate the whole mass; that the salivary digestion of starchy foods ceased as soon as the stomach was reached; and that the musculature of the stomach had a decided triturating power.

In recent years the subject has been investigated with great care by means of X-rays, on the excised stomach, and by means of tambours introduced into that viscus to measure the pressure changes. These researches all unite in emphasizing one fundamental fact—mainly, that the fundic end of the stomach is not actively concerned in its movements, but serves rather as a reservoir for retaining the bulk of the food, allowing the ptyalin more time to

continue its work, and by the normal tone existing in the fundus, as well as in the whole organ, to gently force its contents down into the main body and pyloric region of the stomach, as is required by orderly digestive progress. Furthermore, the observations of Cannon, Grutzner and Pavlov indicate that the successive portions of a meal as taken, instead of being speedily mixed, are arranged in definite strata. The food first taken lies next to the walls of the stomach, while the succeeding portions are arranged regularly in the interior in a concentric fashion. This is readily understood, when one recalls that the healthy stomach has never any empty space within; its cavity is only as large as its contents, so that the first portion of the food eaten entirely fills it, and successive portions, finding the wall layer occupied, are received into the interior. The ingestion of much liquid into an atonic stomach would, therefore, interfere somewhat with this stratification, but not so in a stomach of normal tone.

As to the order in which the different elements are evacuated from the stomach, it has been demonstrated by Cannon and Pavlov that, when liquid food alone is taken, it can be forced into the duodenum in a few minutes, and that when a mixed meal is taken, the liquid part is first expelled, then the major part of the carbohydrates, then the major part of the proteins, and last the fats. Fats remain long in the stomach when taken alone, and when combined with other food-stuffs markedly delay their exit through the pylorus. On account of the stratification of the food as it occupies the stomach, that taken first has the position of advantage. If it is carbohydrate, it is promptly ejected into the intestine; but if it is protein or fat, the passage of the carbohydrate will be delayed. Water, though, finds a ready exit when taken at any stage of a meal.

There are a few conditions, nevertheless, in which much water with meals is contraindicated: In gastropptosis, on account of the weight of the water, which drags heavily on the already relaxed and inefficient gastric supports; in

dilated or atonic stomachs—those where splashing sounds may be easily elicited, because there is not enough tone to the musculature to promptly evacuate the contents, and an excess of water added to a meal would promote further atony and dilatation; in patients with weak hearts or uncompensated valvular lesions. Occasionally, where there is a marked tendency to colic, or spasm of the pylorus, water should be drunk moderately with meals. I might mention also that copious draughts of ice-cold water gulped down during fatigue or profuse perspiration are both unhygienic and dangerous.

On the other hand, I find that a large proportion of patients coming under my notice, who suffer from poor nutrition, constipation, intestinal toxemia, and numerous other states of disordered digestion, are those who drink no water with meals, or if at all, very sparingly.

Desiring some additional data on this interesting but neglected subject, in November, 1909, I enlisted the aid of sixteen young men, sophomore students at the Atlanta School of Medicine, who cheerfully agreed to submit for eight days to a series of experiments along this line.

These young men were of healthy physique, and, with one exception, reported daily evacuation of the bowels. Their ages ranged from twenty to thirty-three, their weights from 124 to 168 pounds. All had normal hearts, lungs and kidneys, and their stomachs were of proper size and correct position. Each one was in the habit of drinking one or two—not more—glasses of water or other fluid with each meal.

Eight of the young men were instructed to drink no water or other fluid with meals, and between meals to drink no more than demanded by actual thirst. The other eight were instructed to drink four glasses or 1 quart of water with each meal, and between meals to drink it or not as was desired.

These young men were carefully watched, regularly weighed, and each symptom recorded as it appeared.

Omitting the detailed reports, I summarize the results as follows:

Of the eight who drank no water, all lost in weight—from 8 ounces to 2 pounds—with one exception. This exception remained at exactly the same weight, and it might be mentioned that this young man was holding a position as railway mail clerk in addition to his college work, and that he was so accustomed to irregular habits that cutting off his water did not affect him like the others. In addition to the loss in weight, each one complained of headache and more or less constipation. Only their loyalty made them hold out to the end of the term of days, and they all seemed glad to return to their accustomed allowance of water.

The eight who drank four glasses at each meal fared much better. One of them said that four glasses rather distended his stomach, but did not cause any marked discomfort. Of these eight, all gained weight—from 4 ounces to 2 $\frac{1}{2}$ pounds, except one, whose weight remained the same. Not one reported headache, constipation, nor any form of digestive discomfort, and the single one who was constipated at the beginning of the experiment, found his bowels more regular in five days. Not one of the eight suffered a single qualm of indigestion.

A more detailed and exact experiment as to the effects of copious water-drinking has been reported by C. C. Fowler and P. B. Hawk, who placed a young man on a normal, constant diet, and by means of a preliminary period of sufficient length, he was brought to a condition of approximate nitrogen equilibrium. At that point, 1000 c.c. of water was added to each meal, and continued thus through a period of five days. Immediately following this period came a final period of eight days, during which the original normal diet was again maintained, and the after effects of copious water ingestion observed.

The urine was collected in twenty-four-hour samples, while the feces were collected in period samples. The foods with the exception of milk were analyzed before the ex-

periment began, after preparing a satisfactory sample of each of the foods to be used. The milk was analyzed at frequent intervals during the experiment. Thus, accurate knowledge of the income and outgo of nitrogen being obtained, reliable conclusions were made possible.

These observers followed up this experiment assiduously, and brought out a wealth of detail not before equalled by any similar effort. Their conclusions, which seem well borne out by their figure indicate that the daily drinking of 3 liters of water *with meals*, for a period of *five days*, by a man twenty-two years of age, who was in a condition of nitrogen equilibrium through the ingestion of a uniform diet, was productive of the following findings:

(1) An increase in body weight, aggregating 2 pounds in five days.

(2) An increased excretion of urinary nitrogen, the excess nitrogen being mainly in the form of urea, ammonia, and creatin.

(3) A decreased excretion of creatinin and the coincident appearance of creatin in the urine. The decreased creatinin output is believed to indicate that the copious water drinking has stimulated protein catabolism. The appearance of creatin is considered evidence that the water has caused a *partial* muscular disintegration resulting in the release of creatin, but not profound enough to yield the total nitrogen content of the muscle. The output of creatin is, therefore, out of all proportion to the increase in the excretion of total nitrogen.

(4) An increased output of ammonia, which is interpreted as indicating an increased output of gastric juice.

(5) A decreased excretion of feces and of fecal nitrogen, the decrease of fecal nitrogen being of sufficient magnitude to secure a lowered excretion of both the bacterial and the non-bacterial nitrogen.

(6) A decrease in the quantity of bacteria excreted daily.

(7) An increase in the percentage of total nitrogen appearing as bacterial nitrogen.

(8) A lower creatinin coefficient.

(9) A more economical utilization of the protein constituents of the diet.

(10) The general conclusion to be reached as the result of this experiment is to the effect that the drinking of a large amount of water with meals is attended with many desirable and no undesirable features, except in certain indicated exceptions.

Noting the decrease in the excretion of both bacterial and non-bacterial nitrogen in the feces during copious water-drinking, followed by a further decrease during a post-water period of low water ingestion, a series of studies were entered into by W. M. Hattrem and P. B. Hawk to demonstrate in an exact and scientific manner the effect of copious and moderate water-drinking with meals upon intestinal putrefaction.

The salient features of these studies, as reported in the *Archives of Internal Medicine*, will be given.

Experiments of three kinds were conducted. The influence of copious water-drinking with meals was first investigated, followed by a study of moderate water-drinking, and finally copious water-drinking in a man accustomed to drink large quantities of water at meal-time.

The urine during this experiment was examined for indican according to the quantitative method of Ellinger, and for ethereal sulphate according to the method of Folin.

Omitting the very extensive and convincing tables of these investigators, which show "an infinite capacity for taking pains," their conclusions are as follows:

(1) The drinking of copious (1000 c.c.) or moderate (500 c.c.) volumes of water with meals *decreased* intestinal putrefaction as measured by the urinary indican output.

(2) Copious water-drinking caused a more pronounced lessening of the putrefactive processes than did moderate water-drinking.

(3) In copious water-drinking the total ethereal sulphate output was increased coincidently with the decrease in the

indican output. This observation furnishes strong evidence in favor of the view that indican has an origin different from that of other ethereal sulphates, and that they cannot be correctly considered as indexes of the same metabolic process.

(4) When Ellinger's method is employed, the determination of indican should be made on fresh urine before any preservative has been introduced. Especially is this true when thymol is to be used.

(5) The decreased intestinal putrefaction brought about through the ingestion of moderate or copious quantities of water at mealtime is probably due to a diminution of the activity of indol-forming bacteria following the accelerated absorption of the products of protein digestion, and the passage of excessive amounts of strongly acid chyme into the intestines.

I have entered at length into the discussion of these experiments and the deductions to be drawn from them because of their great practical importance. The presence of an abundance of water during the busy period of digestion is as necessary in efficient "bodily housekeeping" as it is to the housewife in her domestic housekeeping.

This error concerning the influence of water-drinking at meals is widespread and firmly entrenched, and should be combatted by every earnest physician.

As the first principle of hydrotherapy, therefore, each patient should be instructed to drink copious amounts of water with each meal, unless it is positively and logically contraindicated. With this injunction should be given an explanation of the reason, as well as an assurance that the water will not be harmful, otherwise some disciple of the ancient traditions against water will frighten the patient by dire prophecies of the danger that will ensue, so that the liberal amount will not be drunk, or, if it is, will be taken with a mental attitude of apprehension.

The uses of water in lavage and intestinal irrigation have

been described, and the reader is referred to previous chapters.

A few of the more exacting methods of hydrotherapy in digestive diseases can be employed only in a properly equipped institution and with trained assistants. Most of them, however, are available at home, and, by the use of some ingenuity on the part of the physician or patient, can be successfully applied.

Nausea.—In nausea arising from an overloaded stomach, or where an excess of sticky mucus is constantly rising in the throat, the ingestion in rapid succession of several glasses of tepid water so that it will be expelled with some force, will give much relief. The patient should be admonished not to be afraid to drink enough (three to six, or even ten glasses), for when sufficient has been drunk, it will be evacuated. Sometimes, where the emesis does not prove too exhausting, this procedure may be repeated several times until the water comes back clear. This is a substitute for gastric lavage where the latter is not available.

This method of "washing the stomach" is also useful in the nausea following an alcoholic debauch.

After the stomach has been completely emptied, there may be then given either small pieces of ice, or very hot water may be sipped slowly. The application of towels wrung out in ice water, and frequently applied to the neck is a domestic remedy, but a good one. Hot moist compresses applied to the epigastrium are helpful, and a hot foot bath often has a quieting effect on the upset stomach.

Quite useful is the alternate douche, which resembles the Scotch douche in that it employs both hot and cold water; but differs from it in that the Scotch douche consists of a single application of water at each temperature—first hot then cold—while in the alternate douche, hot and cold water are repeatedly applied in alternation. This alternation may be continued as long as may be thought necessary, and is indicated in nausea from nephritis or the nausea in nervous anorexia.

This is quite an energetic procedure, and judgment must be exercised as to the temperature of the alternating currents of water and the relative length of application of each.

Another valuable aid is found in the employment of cold abdominal compresses, sometimes called "Neptune's girdle," in which the abdomen is encircled by a thick towel of liberal proportions, saturated with cold water. This may be removed and resaturated every one or two hours. Ice-water compresses or ice bags to the epigastrium may be used for nausea in robust patients, but where there is weak heart action, or where the cold is disagreeable to the patient, the hot applications are generally preferable.

It may be advanced as a general principle in hydrotherapy that the sensations of the patient should form an important criterion in choosing the hot or cold applications. Some there are whose very nature seems to revolt at the use of cold, and it is harmful to force them to endure it. Others find cold applications both soothing and comforting, and these will be benefitted by such. As the physiologic effect of the extremes of heat and cold are practically the same, this choice is logical and permissible.

In some of these patients who are hyper-sensitive to cold, the alternating douche may be first used with the warm current greatly in preponderance; gradually increasing the cold interval until they become accustomed to it.

The alternate douche is probably the most exciting of all hydropathic procedures, combining with the heat the secondary stimulating effects of the cold, and, through the removal of the heat accumulated by the skin during the hot application, the susceptibility of the skin is renewed, its reflex activities maintained, and thus the excitant effect of the hot applications are intensified and prolonged.

Anorexia.—This condition, especially the nervous variety, may be aided by an ice-bag over the stomach half an hour before meals, followed by cold-mitten friction, if it can be administered by one of experience. Hot and cold gastric lavage, as advocated by some, is, in my opinion, rather a

drastic procedure, unless called for to meet other and more pressing conditions.

A very small cold enema, or cold rectal irrigation before breakfast is recommended in some instances by Dr. Kellogg, but the good effect, if obtained, is probably psychic.

A thorough gastric lavage with a nitrate of silver solution (1 to 5000) on alternate days has seemed to exercise a decidedly good effect in several cases of obstinate anorexia under my observation.

Acute Gastritis.—In some of these acute irritative states of the gastric mucosa, no water or any other substance will be retained, and it is necessary to use enemas for several days for both food and water. During this time, however, much may be accomplished by hot compresses over the bowels every two hours, and by both hot foot baths and hot leg packs at intervals of every three to six hours.

The vomiting of acute gastritis calls for much the same hydrotherapeutic procedures as vomiting from other causes. In addition may be employed the hot and cold trunk pack, and, if the patient is not averse, an ice-bag to the spine opposite the stomach. An excellent measure also is the revulsive compress. This differs from the alternating hot and cold application in that the hot compress is kept on from four to five minutes, while the cold is permitted only fifteen or twenty seconds.

Where the gastritis is accompanied by fever, the hot blanket pack, followed by a cold half-pack is generally helpful. Cold applications alone are seldom indicated.

Chronic Gastritis.—In this pathologic condition hydrotherapy finds a useful field. For the excessive accumulation of mucus, a gentle lavage once daily, lessened to once on alternate days, as improvement sets in, is nearly always indicated.

For the local discomfort there may be given hot fomentations or compresses several times daily, with a Scotch douche once daily, if the patient is robust. For the flatu-

lence and gaseous eructations, either hot or cold compresses to the epigastrium may be employed, with an ice-bag to the spine two or three times daily in addition to the lavage. Occasionally a pint of quite hot water, sipped half an hour before meals prevents the flatulence. Abdominal flatulence is generally controlled by hot compresses over the whole abdomen, and an occasional asafetida enema, sent rather high up the bowel.

Achylia Gastrica. (Hypochlorhydria).—Cold douche over stomach, and cold percussion daily, if the patient can stand it. Cold wet girdle over epigastrium half an hour before meals, and kept on about fifteen minutes. A small cold enema to be retained, and taken two hours after eating, is said to increase the motility of the stomach (Kellogg).

In addition, other procedures, mechanical and electrical are indicated for diminished or absent gastric juice.

Hyperchlorhydria.—This is generally a symptom of an underlying lesion, but hyperchlorhydria itself, whether primary or secondary, can be greatly helped by rational measures of hydrotherapy, while many of the distressing manifestations of hyperacidity may be alleviated.

The procedures are nearly opposite those in the previous condition. Revulsive compresses once or twice daily, an hour before eating, or, if this is not agreeable, a continuous heating compress over the epigastrium. Cold douches over the stomach or spine opposite the stomach are contraindicated, though a hot douche or fomentation over the spine is serviceable. Hot water in limited quantity may be sipped a short time before each meal.

For the pain, which accompanies the excess of free acid, hot fomentations may be applied for fifteen minutes when this appears, followed by hot compresses to be worn until the next meal.

The bowels should be kept freely open with warm enemas given daily.

Gastroptosis or Enteroptosis.—This calls for general tonic measures, combined with massage and supportive ap-

pliances. The fan douche may be used two or three times daily, and is a modification of the jet douche, attained by placing the thumb over the nozzle delivering the jet, breaking it into a fan-shaped stream. This is usually cool or cold.

Dr. George R. Lockwood advocates the following procedure:

About 11 o'clock a. m. a warm or hot bath is given for five minutes. This is followed by a spinal douche at 100° to 102° F. for ten minutes at 15 to 20 pounds pressure. The patient is then placed in bed and a hot wet flannel compress or one of spongiopiline sufficiently large to cover a good portion of the abdomen is placed on the epigastrium. This is kept hot by a covered electric pad, and is changed every two hours by day and once at night. The whole application is to be tightly applied by an electric binder.

Dilatation of Stomach.—Avoid drinking large quantities of fluid at meal-time or any other time. This is one of the few conditions where large draughts of water are contraindicated, as the relaxed and atonic walls of the stomach are unable to evacuate the fluid promptly.

Lavage once daily is indicated, and if possible the patient is to eat a rather early supper and have the stomach thoroughly cleaned of all food accumulation just before bedtime. The rest overnight will greatly help. This rest in the empty state for eight or ten hours is strongly advocated by J. W. Weinstein.

Externally the cool or cold fan douche is indicated, with cold epigastric compresses, without impervious covering, changed every three or four hours. In addition there may be applied once daily a hot blanket pack, followed by a short, cool fan douche.

Should there be hiccough due to either irritation or stasis of food, in addition to faradization with one electrode over the spine and the other over the stomach, there should be employed hot and cold alternate gastric compresses, followed by an ice-bag to the epigastrium and back of neck.

The patient may also slowly sip 1/2 pint of ice-cold carbonated water, holding the breath for half-minute periods, and with pressure of hands over the stomach force it up against the diaphragm.

Constipation.—In few digestive disorders does hydrotherapy exercise a more happy effect than in this. Apart from the various enemas, which have been described, the following procedures, as suggested by Hinsdale, may be used:

In fairly robust individuals, whose circulation is good, the application of a cold pack or compress to the abdomen every morning may be given a preliminary trial. This cold compress should be changed once or twice during the ten or fifteen minutes of the application. Where there are suitable appliances, a cold douche at 65° or 60° F. may be applied for fifteen or twenty minutes with about 20 pounds pressure. This will probably give better results in obstinate cases than the compress or pack. The reaction which ensues is accompanied by an increase of blood in the abdominal vessels, thus favoring functional activity.

In patients not so robust, and with sluggish circulation, a hot douche or warm compress may be made at first, and later on the temperature may be gradually lowered from day to day.

Compresses are more suitable for old and feeble patients than the more energetic treatment by douches. The cold thick compress, or "Neptune's girdle" placed over the abdomen, and renewed every four hours, affords quite a marked stimulus without discomfort or depression.

In that form of constipation denominated *spastic*, accompanied by muscular rigidity, hot fomentations must be employed. They should be of generous dimensions, extending well beyond the borders of the irritable and painful area, should be wrung dry to avoid blistering, and should be changed every five or ten minutes. They should be covered with rubber or any material that will retain the heat. One, two, or more layers of thick cloth, flannel, or

felt, make a satisfactory medium to carry the water. When, in addition to heat, a counter-irritant is desired, a small amount of turpentine or mustard may be added to the water for the fomentations. A hot-water coil or a covered electric compress may be tried, but the heat without the moisture is not so efficacious.

When constipation assumes the chronic form, unless obstructive, it generally resolves itself into one of two forms—atonic or spastic. These two forms require certain variations in their management.

In the atonic variety every measure tending to improve the tone of the muscular system is called for. If possible, the hot-air or electric cabinet should be used to produce perspiration, followed by the circular jet, Scotch, and fan douches. These measures should then be followed up by abdominal and general massage, if skilful services of the sort are available; otherwise, they should not be attempted. Aimless and desultory rubbing of the abdomen accomplishes no good.

Many of these stubborn cases of chronic atonic constipation are really brought about by kinks and torsions on prolapsed abdominal viscera, and in such conditions, mechanical support, or in extreme cases, surgical correction, will be required. After that, hydrotherapy will be of more tangible assistance. To blindly employ this admirable branch of therapeutics in conditions where surgery or mechano-therapeutics is logically indicated, is to court failure, and tends to bring hydrotherapy into undeserved disrepute.

Spastic constipation is found more frequently, if carefully sought. In the female probably 25 per cent. of the cases are of this form; and many of the refractory and persistent instances of long-standing constipation are of this type. As the treatment of spasticity is diametrically opposite to atony, it is not difficult to understand why so many patients are treated for long periods without success.

It is most frequently found in neurasthenic and hysteric

individuals, who are weak, poorly nourished, somewhat pale and anemic, and in the third or fourth decade of life. It also occurs when a secondary enterocolitis, or the abuse of laxatives has irritated the colon, so that a persistent hypertonicity of its musculature has developed. In individuals temperamentally nervous this stage sets in considerably earlier than in those whose nervous systems are well poised.

An intelligent syndrome of the malady should first be obtained in order to outline a rational course of treatment.

As these spasms sometimes develop on the basis of atony, every occasion for exciting them must be avoided. Every irritation of the abdomen, especially massage, which is useful in the atonic form of constipation must be avoided. Warm or hot sitz-baths may be taken for from fifteen to twenty minutes one or more times daily. Frequent hot compresses, applied to the abdomen, lessen the spasm and relieve the colic. Cold applications are generally contraindicated. In this spastic condition the oil enemas, injected at night and retained till morning, bring about most gratifying results. The oil, employed this way, acts as a sedative on the spasm of the intestinal muscles, and should therefore, remain in contact with them as long as possible.

Some instances of severe and obstinate constipation arise in the presence of fissured anus, where the sphincters are spasmodically contracted, and the passage of intestinal contents inflicts agony.

Some of these sufferers, dreading the pain of defecation, put it off for days at a time until the large intestine is packed with a desiccated mass of hardened feces.

These patients should receive first an injection of cotton-seed oil, which should remain in the bowel for three to six hours. This should be followed by several enemas of warm water with soap-suds, so as to soften and bring away the hardened mass. It is very much better to use a number of small enemas than to attempt to flush out the intestine with a single large one. After the patient becomes weary,

another oil enema may be introduced, and this procedure repeated until the colon and rectum are empty.

The fissure should receive appropriate attention, and the patient should be earnestly admonished to keep the stools soft by the use of oil at night and warm water the following morning, until the soreness has disappeared and the spasm completely relaxed.

Nervous Dyspepsia.—This term is at present in dispute, some, especially those with a decided surgical bias, denying absolutely there are ever any marked symptoms of indigestion without underlying organic lesions.

The various forms of nervous and psychic indigestion will be discussed in another chapter, but, admitting that there are certain manifestations of indigestion due to nervous instability or irritability, there will be found in hydrotherapy a potent auxiliary to other methods of treatment.

The symptoms are many, and sometimes shift from one syndrome to another with kaleidoscopic rapidity. It is surprising what incongruous groupings of pains and discomforts are described to the physician, while these neurasthenics almost demand that each pain or ache receives separate and distinct attention. The hydrotherapy, therefore, will be principally symptomatic, and should not displace rational methods, surgical or otherwise, for the cure of actual and tangible disease.

For the general malaise and weakness, graduated cold baths may be administered twice daily, plus a brief percussion douche to the spine. For the spinal irritability, fomentations at night to the back, followed by a heating spinal compress to be worn till morning, is of benefit. "Neptune's girdle" also may be used at times.

For the pyrosis, eructations, and regurgitation of food, there may be given twice or three times daily fomentations over the epigastrium, followed by a heating compress most of the time during the interval, without impervious covering, and renewing every three or four hours.

The cold extremities call for the running cold foot bath, followed by the hot leg pack. Brisk massage of the extremities is also helpful.

The frequent headache, which nearly always accompanies nervous indigestion, generally yields to hot and cold head compresses with massage to head and neck. In this condition the cool compresses are desired more than any other, especially if the face is flushed and hot, and the eyes suffused.

For the abdominal weight and tenderness, which is commonly associated with excessive peristalsis and gurgling, there are indicated a hot fan douche to the whole abdomen, followed by revulsive sitz-bath. These may be followed by fomentations twice daily, or the wet girdle protected with an impervious covering.

It is a very good idea to multiply and prolong these procedures, if the patient has the time, for they take the mind away from its introspective trend, and occupy it with novel and interesting sensations.

The whole rationale of hydrotherapy in nervous dyspepsia consists in improving nerve tone, allaying general nervous irritability, lessening gastric irritation, and improving the general nutrition by generous diet, abundance of fresh air, cheerful environment, and appropriate and well-directed measures, as indicated above.

Acute Dysentery.—The patient should be kept in bed, and there should be applied the hot blanket pack, the hot hip and leg pack, together with hot abdominal compresses. Should there be much soreness and pain, a little turpentine may be added to the water in which the hot compresses are wrung. Some advocate the cold sitz-bath of fifteen to twenty minutes with a simultaneous hot foot bath. This I do not approve. Cold irrigations of the rectum for the tenesmus is another procedure which has not yet yielded good results in my observation. Very hot irrigations— 110° to 120° F., as recommended by Jamison

have proved much more satisfactory, mitigating both the tenesmus and soreness.

Chronic Dysentery.—While in this condition, rest in bed may not be practicable, but a quiet and sedate mode of life will be advantageous. Many of these patients find that their bowels move but seldom when they can minimize their exercise. Generally, also, there are organic lesions of the intestines that require some special treatment before any form of hydrotherapy can be effective. Chronic dysentery from the *ameba coli* may be cited as an instance of the foregoing.

Hot compresses, revulsive sitz-baths, or hot applications of any kind are seldom indicated, unless a hot enema to occasionally clear out the rectum or descending colon. Better are the graduated cold baths twice daily, and the cold rubbing sitz-bath.

For chronic muco-membranous colitis the hydrotherapy is similar to that in nervous dyspepsia, except that the general applications need not include the epigastric region. This condition being to a great extent a neurosis, all measures that make for better nerve and muscular tone, improved nutrition, and more buoyant mentality are indicated.

Cholera Nostras.—In this very acute disorder, energetic hydrotherapy is not only curative, but sometimes actually saves the life of the patient. For the excessive vomiting, there may be administered small pieces of cracked ice, while over the stomach is an ice-bag, and an ice compress to the throat. There may be an ice-bag placed over the spine, but, if weakness supervenes, some of the applications will have to be changed to hot. For the excessive, and sometimes explosive, diarrhea, are indicated fomentations over the abdomen every two hours, each lasting twenty minutes, while between, the heating compress, renewed every twenty or thirty minutes. If the temperature is over 102° , a prolonged neutral bath or hot blanket pack, followed by cold friction or cold towel rub, will bring it down. For the

collapse, which is sometimes grave, there may be employed a hot blanket pack, followed by brief cold-mitten friction, and an ice-bag over the heart, if the latter does not prove uncomfortable to the patient. In the meanwhile other appropriate remedies should be brought into service, for cholera nostras brooks no therapeutic dalliance.

Acute Appendicitis.—Hydrotherapy in this inflammatory condition is of marked benefit, but the physician should be constantly on the alert, lest serious complications requiring prompt surgical intervention suddenly arise.

While keeping in bed, there should be given hot enemas every four hours until the bowels seem fairly empty, fomentations over abdomen for fifteen minutes every hour, with hot compresses in the interval. As the pain and inflammation subside, the intervals between the fomentations and compresses may be prolonged, though fomentations at night, followed by a heating compress over the right iliac region, may be kept up for months, or until every trace of soreness disappears.

Jaundice.—For the pain or uneasiness in the right hypochondriac region, fomentations may be used over the stomach and liver for fifteen minutes every two hours, followed by heating compress. The bowels should be flushed by a copious hot irrigation with a recurrent tube twice daily, followed by an oxgall enema, if the fecal evacuations are scanty. For the relief of the discolored skin, a hot trunk pack, or a hot immersion bath, followed by a cold towel rub is useful. The patient should drink water copiously, and receive once daily either a sweating wet-sheet pack or an electric light bath. For the itching, which is sometimes most annoying, he may receive the neutral saline bath, with very hot sponging. The treatment of the anorexia, nausea, and general symptoms of gastric catarrh are the same as for these symptoms in chronic gastritis.

Gastric Ulcer.—Apart from measures to relieve pain, to tone the patient, and to keep the bowels sufficiently open,

hydrotherapy possesses no very wide range of usefulness in this affection. I say this advisably, notwithstanding some authorities have advocated numerous procedures, as ice in the rectum to arrest hematemesis (it does not), cold water enemas under the same mistaken idea, or ice pills given by mouth, which naturally cause warm water to accumulate in the stomach.

For the gastric hemorrhage, either an ice-bag over the stomach, or, if available, a cold coil over a cold compress is an effectual aid, the flow of ice-water being kept up continuously and the application kept in place over the epigastrium for a week or more, if the patient can bear it. In addition, there may be applied an abdominal pack, changed every three hours, with an occasional coil of hot water inserted in the pack. Early in the morning the body may be rubbed off with a cloth wrung out of very cold water, avoiding the chest and abdomen, followed by a brisk rub.

During convalescence general tonic applications are recommended, but I wish to stress the caution that hydrotherapy should not be relied upon to the exclusion of other approved remedial measures in gastric ulcer or hemorrhage. This also applies to duodenal ulcer.

Peristaltic Unrest.—In this condition known as the peristaltic unrest of Kussmaul, the general hydrotherapy as indicated in neurasthenia and nervous dyspepsia are indicated. The lower bowel should be kept clean with daily hot irrigations, preceded by an asafetida enema, if there is flatulence.

These various procedures can be modified in certain particulars to suit the convenience or purse of the patient, or the facilities possessed by the physician. Ingenuity of the part of the latter can overcome the absence of many special appliances, and, by its exercise, nearly all of the principal hydrotherapeutic measures may be instituted at the patient's home.

The rank and file of the regular profession have long

been indifferent to the beneficent results to be obtained by the rational use of water, thereby permitting many of its most useful potentialities for good to be arrogated by quacks and charlatans.

To Baruch and Winternitz and Kellogg and Hinsdale and a small number of other laborers we owe a debt of gratitude for investigating this subject in a scientific manner; for an unprejudiced and convincing exposition of what hydrotherapy is and is not; and for spreading abroad the sane doctrine that a healthy body needs for its best work an abundance of water internally and externally.

CHAPTER XII

PSYCHOTHERAPY IN GASTROINTESTINAL DISEASES

The mechanical functions of the stomach and intestines as well as the chemical properties of the various digestive juices are fairly well understood, and, though some of the intermediate steps in the metabolism of different food elements are unexplained, we can at least calculate their potential value in Nature's constructive housekeeping.

The influence of the emotions, however, has been a subject of study and comment from the earliest antiquity, for in Ecclesiastes we find that "A merry heart doeth good like medicine," and also "Better a dinner of herbs where love is than a stalled ox and hatred therewith." I might also mention a familiar example in Semitic history—Job, with his cell-exhaustion from mental strain and perturbation, his autoinfection, and consequent malassimilation.

As to the specific influence of the emotions over digestion and nutrition, I might say that our viewpoint has only within the last two decades assumed a scientific aspect. Beaumont accomplished much pioneer work, revealing and making plain many of the digestive phenomena previously misunderstood. It remained to Pavlov and Cannon and Starling and a few other devoted workers in that field, to demonstrate this influence more scientifically, and to elucidate its practical connection with many of the most vital of the bodily functions.

Briefly stated, when food is taken, the secretion first started is due to the sensations of eating and of taste—that is, it is a psychic secretion. I might go further by affirming that the sensations of sight and smell also exert a tangible

influence in the inauguration of digestion, for nothing more favorably promotes the free flow of "appetite juices" than a tastefully arranged meal, clean linen, and other attractive adjuncts, while an agreeable odor alone will cause the "mouth to water" and the digestive glands to pour out their secretion in anticipation of the food that is to come. The afferent stimuli, whose duty it is to transmit messages of gastronomic interest, originate in the mouth and nostrils; while the efferent path, containing the secretory fibers, is through the vagus nerve. This reflex insures the beginning at least of gastric digestion, though its effect is supplemented by further action arising in the stomach itself.

Certain foods contain substances called secretagogues, which are capable of causing a flow of gastric juice when taken into the stomach—for instance, meat extractives, meat juices, soups, highly seasoned food, condiments, etc. Other foods, such as bread and white of eggs, are lacking in these ready-formed secretagogues, and have practically to depend on the psychic secretions for a large part of their digestion. Experiments have shown that such bland articles, when introduced into the stomach of a dog while his attention is diverted elsewhere, or while he is sleeping, produce no flow of gastric juice and are not digested.

In addition, there are substances generated in the intestinal and pancreatic secretions, designated by Starling *hormones*, from a Greek word meaning to arouse or excite. These hormones are influenced by the character of the food ingested, varying from a slight to a potent effect, as required.

I might say, without going further into the physiology of the subject, that each of the digestive juices is to a great extent regulated in this manner, both the amount and specific quality being furnished according to the chemical and mechanical needs, these needs being previously interpreted by the psychic sensations evolved. This being made plain, it is easy to see how the mental state of an

individual may exert a marked effect on both secretion and motility of the digestive organs; how a placid and cheerful frame of mind may aid those organs concerned in the upkeep of the body, or how an unhappy and agitated mentality may set in motion a long train of stomach and intestinal ills.

Instances of indigestion caused purely by nervous or mental disturbance are familiar to every practitioner of experience, and are readily found in literature of both the past and present.

In Burton's *Anatomy of Melancholy*, published in 1621, this occurrence is cited: "A gentlewoman of the same city saw a fat hog cut up, when the entrails were opened, and a noisome savor offended her nose, she much disliked, and would not longer abide; a physician in presence told her, as that hog, so was she, full of filthy excrements, and aggravated the matter by some other loathsome instances, insomuch this nice gentlewoman apprehended it so deeply that she fell forthwith a-vomiting, and was so mightily dis-tempered in mind and body, that with all his arts and persuasions, for some months after, he could not restore her to herself again, nor could she forget nor remove the object out of her sight."

Some years ago there came under my observation a lady, who could not order supplies from the butcher over the telephone, on account of the mental images produced. A few years previously, she had gone on a tour of inspection through some large slaughter-houses in a western city, and the incidents witnessed remained vividly in her memory. When, therefore, she attempted to telephone the butcher, she would at once conjure up lifelike pictures of raw head and bloody bones, while all the loathsome scenes connected with the shambles would so crowd her vivid imagination, that she would be at once seized with nausea and vomiting.

In my early years of practice I attended a primipara, whose husband was a hearty and robust man. He ate a good breakfast, but soon after, on being grieved by her

pains and lamentations, vomited the whole meal, nor could he eat again until she was safely delivered.

Recently there came under my care for chronic indigestion a married lady, who, up to the death of her only infant, which occurred a year before, "never knew that she had a stomach," to quote her own words. Treatment proved unavailing, until the prospects of another offspring changed the tenor of her melancholy thoughts, after which she had no more indigestion.

The stomach is keenly susceptible to the slightest changes in the mental state. The mere sight of a fly in the food is entirely sufficient to cause many persons to vomit forthwith. The thought of an emetic will produce nausea and even active regurgitation in numerous individuals, while the cathartic effect of fear is well known.

That the powers of digestion depend greatly on the state of mind and on the relish with which food is eaten is also well known. On the other hand perfectly good food materials may become difficult or impossible of digestion as the result of learning something about their mode of preparation. Many particular people cannot eat with relish, or digest with comfort, butter, milk, or eggs unless they know that they are clean and fresh. Walsh relates the story of the farmer's wife who wanted to trade her own butter for an equivalent amount made by someone else because she had seen a mouse in the cream, and her children could not, therefore, eat it. On making the supposed trade, she received back her own butter, only in a different crock, and, taking it home, she cheerfully ate it herself and fed it to her children.

That an article may be eaten with relish until its character is known, is illustrated by Max Muller's story of an Englishman, traveling in China. Fearful that he would be unable to obtain food that he cared for, because of his ignorance of the language of the country, he was rather surprised on his first day's journey into the interior, to be served with a stew made of some kind of dark meat that tasted very well

indeed, and with which he was so pleased that he asked for a second helping. Just as he was about to eat the second portion, he thought it well to ask the waiter what sort of meat it was, as he wished to be able to obtain the same kind at other places. He thought that he was eating duck, so, calling the waiter to him, he said, pointing to the dish of meat with a questioning tone, "Quack, quack?" The waiter at once shook his head and said, "Bow, wow, wow!" The Englishman pushed away the second portion, left the table, and with difficulty retained his meal.

Custom and the mental attitude in different parts of the world regulate to a marked extent the digestibility of food-stuffs. Articles that are highly prized delicacies in some countries are abhorred in others. Dog meat, horse flesh, shark fins, etc., are instances of this sort.

In Italy most visitors eat snail soup with relish before they know what it is. It is said that at Marseilles, epicures occasionally eat angle worms, finding them quite an appetizing dish. In all of these things the question of relish, and peaceful, easy digestion depends entirely on the attitude of mind. The first men who ate eels were looked on with suspicion by their neighbors, while it has been said that the man who first swallowed a raw oyster performed as great a feat as some of our famous heroes.

Some articles of food, which excite disgust at first, if continually eaten, and if the mind is constantly inhibited from acting unfavorably on the stomach while it is being eaten and digested, may eventually become valued and prized viands.

That it may be practicable to overcome many of the prejudices under the stress of necessity and the influence of example, was well illustrated during the siege of Paris. The Prussians, though a most particular people in the matter of their food, were able to accommodate themselves to the conditions, and practically every kind of animal was eaten with relish. Before the siege, to most of them it would

have seemed impossible that they should view with complacency the dishes which were afterward so appetizing. At the beginning there was an effort to conceal the eating of rats, mice, cats and dogs under various names, and by modes of preparation intended to disguise their identity. It was not long, however, before there was an end of this pretense, and every animal was eaten under its own name, and gladly.

Idiosyncrasies.—That these do exist, and in some people rest on a real physiologic basis is an undoubted fact. There are many instances on record where the ingestion of certain food-stuffs, wholesome and nutritious in themselves, would set up urticaria, vomiting, diarrhea, headache, or other definite symptoms, even if the patient were unaware of the presence of these food-stuffs in the bill of fare.

I have seen more than one person, on whom eggs acted as a violent gastrointestinal irritant; others who could not eat butter without diarrhea; some with whom milk really disagreed; and many who could not eat shell-fish with safety. I may correctly affirm, however, that these idiosyncrasies are much more rare than are supposed. In the vast majority of these individuals the idiosyncrasy is only a mental attitude which acts so positively in opposition to the digestion of these feared articles, that the proper digestive juices are inhibited, motility is impeded, and digestive disturbances of more or less grave import follow their ingestion.

This fear of, and mental antipathy to special articles of food is denominated *sitophobia*, and this most important psychic manifestation is worthy of the most thoughtful study by every earnest worker in the field of dietetics.

Sitophobia.—This term, signifying a morbid fear of food is of somewhat recent use, though the condition is an ancient one, being the exhibition of those peculiar "distempers," in which certain foods were repugnant or even dangerous, and in which the horror of some highly esteemed viands was ascribed to demoniac possession.

In the same class of phobias as comes the fear of high places, or open places, or closed rooms, etc., may be placed sitophobia, with its fixed and often apparently causeless antipathy to some foods. Frequently this phobia is confined to a single viand. Probably every physician who reads this will call to mind a patient, who fancies that some ordinarily harmless article contains for her or him a dreadful potentiality for evil. The patient will explain that since a child this article has been tabooed, and to eat it would invite direful consequences. Close inquiry may elicit the admission that the aforesaid article has not been eaten since childhood, perhaps never, but it had disagreed with him at the time, or had disagreed with some member of his family, and the inference has been drawn that it would necessarily act as a poison to this particular individual.

I have in mind a traveling salesman, who is morbidly afraid of butter or any dish prepared from it. The sight of butter on the table before him fills his mind with fearful forebodings, while much of his pocket money is spent in tips to waiters and cooks that nothing may be served him containing this evil agent.

A sitophobia may arise from some disgusting incident in the past connected with a particular dish, as the following will illustrate: Some years ago a gentleman went fishing in a Southern river at a time when the waters were high. Finding a promising eddy in the stream, he began fishing, and soon caught an amazing number of large catfish. Two days later he decided to again fish there, but when he arrived, the now fallen waters disclosed the carcass of a cow, entangled in the debris collected by the eddy, and he quickly understood why he had caught so many fish. From that day he has never been able to eat catfish, nor can he enjoy a meal when this fish is on the table.

Another etiologic factor in producing a sitophobia is a disagreeable or painful personal experience with some food or food product, as the following illustrates: A lady of

mature years informed me that when a small girl she was inordinately fond of apple dumplings, thinking she could never get enough. On one occasion, however, the cook made a special baking of this coveted delicacy so as to permit this youthful epicurean to have her fill. The result was a severe attack of indigestion, leaving in its wake a phobia for apple dumpling that time has not erased.

Another fruitful cause of sitophobia lies in the writings of self-appointed health teachers who, with lurid philippics, couched in attractive language, bolstered up specious arguments, and hurled at some of our most wholesome articles of food, create injurious dietic fears and fads.

Many of the cults and isms, and schools of "new thought," by their fallacious doctrines cultivate in the minds of their devotees genuine phobias for elements and articles of food that are important to bodily strength and welfare.

Suggestions of Indigestion.—As brought forward forcibly by Walsh, an unfortunate state of the public mind with regard to indigestion in general has been cultivated by many publications on the subject. People dread its occurrence, and fear that the first sign of discomfort in their gastric region is the signal of the beginning of a progressive affection. They fear the worst, and the consequence is a reaction quite out of proportion to the gravity of the ailment. So much has been said and written concerning mistakes in diet, that just as soon as they feel, or rather think they feel, the first symptom of beginning dyspepsia, they begin to study how to modify their diet so as to check its progress. They first begin to eliminate various supposedly indigestible foods, and usually among the first are the fats and some of the starchy vegetables. These people have generally heard also that it is harmful to drink fluid with meals, so they eliminate a great part of their wonted allowance of fluid. Leaving out of their dietary one article after another, they seldom realize the expediency or necessity of replacing the eliminated foods with others so that the caloric balance may be kept up. Consequently, many of these self-made

invalids suffer for long periods of time, not so much from faulty digestion as from chronic starvation.

I have observed, in a surprising number of instances, weak and emaciated individuals, who had been on a rigorous diet for months and years, in whom the original disorder for which the diet was instituted had long since disappeared, but who, with a tenacity worthy of a better cause, would cling with mistaken fortitude to a dietary totally inadequate to the legitimate caloric requirements, and which would inevitably bring them to a state of physical bankruptcy.

Recently there came under my care a woman of fifty-eight years, who had been on a diet of toast and tea for fifteen years. The physician who originally put her on this was long since dead, and she adhered to this unsatisfying and monotonous diet only because she feared that any other food would give her *indigestion*. She was thin, tremulous, emotional, and the constant gnawing pangs of hunger, which she misinterpreted as the pains of disease, were ever with her.

An examination disclosed a sufficiency of gastric juices in her stomach, while no diagnosis of an organic malady could be made.

Much persuasion and many reassurances were needed to get her back on a well-balanced and satisfying diet, but this was finally accomplished. She gained 28 pounds in three months, and at present seems in good health.

Another point to be considered is the influence of a diet on the mind of a susceptible patient. Everything connected with a particular or restricted diet tends to center the thoughts on the stomach, and the patient finds it ever present in his waking meditations. It tends to permeate his daily conversation, and he finally becomes almost if not quite obsessed on the theme of his digestion. Can we wonder that such people suffer from a psychic form of indigestion?

A case is related by Dr. Sadler of a woman who had an attack of "acute indigestion" some eight years ago, and

ever since had been a constant sufferer from a most obstinate and refractory form of indigestion, which had withstood all efforts toward a cure. Her mind was ever on her stomach, and she could talk of but little else. A careful chemical examination of the contents of her stomach failed to disclose anything radically wrong; to say the least, not enough to account for her symptoms.

It was not considered best to present the full facts to her at once. She had nursed her complaint entirely too long and too lovingly ever to be persuaded that her indigestion actually existed primarily in her mind, and that her stomach disorder and distress were but the reproduction of her own mental disorder. In other words, she was entirely too self-centered to be convinced that her difficulty was of a psychic nature.

The following plan was adopted: She was told that an exact diagnosis of her stomach trouble had been made; that the laboratory findings were explicit and positive; that at last we knew the precise condition of her stomach, and that we were also able, as far as physicians ever are, to promise her that she would make a speedy and complete recovery under the proper treatment and diet, and that, in all probability, she would be entirely well within thirty days.

She was utterly dumfounded at this promise, and replied that it was too good to believe—too much to expect, after all the years she had suffered, whereupon, we replied that absolute trust—implicit faith—was required on the part of the patient in the treatment of all such forms of stomach disorder; and that if she continued to harbor distrust, it would give rise to such a nervous state as would effectively counteract the curative powers of our diet and other treatment. The latter consisted of the following: A general course of baths, massage, and electricity calculated to rest and soothe both mind and body, together with a graduated scheme of diet, arranged so as gradually to restore all the numerous wholesome foods which she had discarded on the

supposition that they did not agree with her, or that they aggravated her indigestion.

Day by day she had restored to her diet those supposedly harmful articles of food, while day by day we assured her that they would not disagree with her; and day by day she ate the prescribed diet, and it really did not disagree. At the end of a week, she began to gain in weight and to gain strength and courage. She actually got the hope in her mind that she was going to get well. Her appetite began to improve; she began to smile and talk about her wonderful recovery, saying she believed the secret of her case had at last been discovered, and that she was assuredly going to get well. Within four weeks the battle was practically won, her long struggle with "nervous dyspepsia" was over, and she has ever since rejoiced in the blessing of good health and a sound digestion.

The psychic influences concerned in the production of "appetite juices" have been discussed, but the power of these influences over the motor functions of the stomach is of the utmost importance. With the aid of the X-ray the movements of the digestive organs have been plainly disclosed, and the effect of the emotions over the musculature of the stomach and intestines has been graphically demonstrated. The rays have further proved that faith and courage—the normal mental state—favor strong and regular contractions of the stomach muscles, with rhythmic contraction and relaxation of the pyloric outlet, while fear, or anger, or disgust either weaken or inhibit these muscular phenomena, exercising a corresponding hindrance to proper and comfortable digestion. This, being repeated sufficiently often, can interfere so seriously with the normal digestion, that actual disease may be started, and the foundation laid for later organic changes.

A number of years ago I had the opportunity of witnessing one of the first of these experiments which were so epoch-making. A cat was fed, and while quietly digesting the meal, was gently stroked until she began to purr. A

fluoroscopic inspection showed her stomach contracting and emptying itself with regularity, while the peristaltic waves of her intestines could be distinctly seen. Her tail was then pinched until she became angry, and at once the whole stomach and intestinal movement ceased, nor was it again renewed until she was in a good humor once more. This inaction may last for half an hour or more, and in extreme anger may extend to reversed peristalsis or emesis, as has been noted in some persons who vomit when violently angry.

In view of these scientific experiments and disclosures respecting the mental influences which are able to hasten, retard, or inhibit digestive activity and muscular work of the stomach and intestines, we should be better able to understand how so many downcast, complaining, and sordid people are continual sufferers from some form of digestive discomfort. Fully as much, too, are disorders of the digestive tract brought about by ill temper, anger, and dissatisfaction with one's station in life. The chronic grumbler and fault-finder, the overparticular person, who will not eat with equanimity unless the food is prepared exactly to suit him, is much more prone to dyspepsia than the cheery optimist, who looks at the bright side, who makes allowances for small shortcomings in the meals or in those who prepare them, and who can rise superior to the little, nagging worries of every-day life.

Even where the progress of digestion is not completely stopped, unfavorable mental states may retard and render it difficult all through the digestive period.

Constipation.—Analogous to Pavlov's ingenious experiments, with regard to the influence of the emotions over the digestive secretions in the stomach, are Kronecker's experiments at Berne upon the motor functions of the intestinal tract. Pavlov showed by "sham meals" in which a dog was fed, while the food escaped through a fistula without entering the stomach, that the juices flowed from the gastric glands practically as freely as if the food had

really reached its proper destination. He also demonstrated that the appetite depended, not on physical conditions so much as on the mental state of the animal and its desire for a particular kind of food.

Kronecker, by isolating a loop of the intestine in which a metal ball was placed, showed that it was possible to modify peristalsis very materially by affecting the psychic condition of the animal. There was a distinct difference in the movements of the intestines, in the passage of a metal ball, when the animal was called, and expected to go for a walk with its master, and when it was threatened with punishment, or scolded. In even the more intelligent animals, the emotions play a very subordinate rôle in stimulation and inhibition compared to that exercised by man's higher nervous system, since in the latter the psychic function of the organism is so much more developed than in the animal. The condition of the human mind in its possibilities of unfavorable influence over the intestinal motility, is, therefore, extremely potent.

The more we investigate the actual power of the mind even over so material a function as intestinal peristalsis, the more are we convinced of the necessity of a properly disposed mental attitude toward intestinal evacuation, if it is to be accomplished with regularity and without disturbance.

The bowels are markedly under the influence of the sub-conscious personality of every individual, and respond readily to autosuggestion as well as suggestion from outside sources. Boris Sidis tells the story of a man who used to have a brief siege of diarrhea at every new moon, as the result of his memory, acting unconsciously, reminding him of his mother's habit of giving him a purgative about that time.

The oft-told joke among the laity about "bread pills" and their cathartic effect has its foundation in fact, as is shown by the following which came under my observation a number of years ago: A planter in a Southern state, who came in contact with a large number of negro farm laborers

was continually annoyed by their requests for cathartic pills. A druggist in a neighboring town had a large glass globe containing probably a gallon of immense but *inert* pills, which were sent by a manufacturer of pills simply as an advertisement. The druggist gave these to the planter, who in turn gave them to the laborers when they wished cathartic pills. To his surprise, in nearly every instance the pills moved the bowels profusely, and the negroes esteemed them as a new pill of wonderful efficacy.

As mental influence and autosuggestion can readily set up increased peristalsis and diarrhea, so can they interfere with the regular movement of the bowels. Markedly so are the evacuations regulated by habit, and the presence of feces in the rectum serves as a gentle stimulus. As we have an appetite for dinner at the appointed time, though not exhausted by labor; and as our eyelids grow heavy at the time we habitually retire to bed, even though the day has not been strenuous; and, as when our meal-time has been passed without eating, we lose our appetite, or our bedtime has been passed without retiring, we lose our ability to fall asleep promptly, so it is with the function of defecation. A change in regular habits, or a neglect to heed the sub-conscious call to evacuate the bowels will tend to the constipated habit.

The neglect to heed the call of Nature until necessity forces it, is a common fault with young girls, and is the prime cause of a constipation which often follows them through life. Others bring constipation upon themselves by a poor choice of the time devoted to this function. It might be at an hour when duties were pressing, and sufficient time could not be spared to obey the call. The next day perhaps the need was felt again, and again resisted. Later, the intestines, whose calls and warnings were unheeded would fail to send the call, the sub-conscious personality would fail to sound its "still, small voice," the bonds of habit would be broken, and the unfortunate bonds of constipation established.

A *regular* and convenient time for going to the toilet should be chosen, and the individual should go and make a determined effort.

Dubois has grouped together several reasons why a rather early morning hour is advisable. To quote him, "I chose the morning because it is the time when we are freer to attend to these hygienic cares, and because normally, during the long night, the slow movement of the intestines has brought to the rectum all the waste products of our food. There is, therefore, in the morning an early invitation to go to the toilet which arises from the very accumulation of material."

"The act of waking in itself constitutes a second stimulus. I know a number of people for whom the awakening of peristaltic movements follows the awaking of their person. It is inconvenient, for they are obliged to immediately obey, and to jump out of the bed in which they were so comfortable."

"The act of getting up with the movements of the body which are caused by one's toilet, the movement of putting on one's stockings and of getting into one's trousers have an effect like massage, which is so efficacious that I have had some people complain that they cannot forego the need after having laced their first shoe."

"Here are three invitations which follow one after the other, and which become habitual, especially if the time for rising follows the waking at a fixed time: To take a glass of cold water on getting up is a measure which has often been recommended. Entering the stomach which has been empty the evening before, the water stimulates the movement of the stomach, and the contraction extends throughout the intestine; this is the fourth stimulus. If the patient has noticed that warm or hot water succeeds better, I do not insist on the cold water. If the patient is a smoker who has felt the good effects of a cigarette, I permit him to use it."

"The eating of breakfast, especially if it is quite hearty,

and consists in part of bread and butter, particularly whole wheat bread or graham bread, also stimulates peristaltic movements. Honey may be a useful adjunct when a person can take it."

A short time after breakfast is with many people the most convenient time to go to stool, for the actual peristalsis started by the morning meal, is easily extended throughout the entire intestinal canal by proper effort and mental encouragement. The habit many people have formed of taking with them to the toilet a newspaper or book, is a good one, for it permits of a sufficiency of time to be spent in the effort, while the quiet placid frame of mind, aided by the reading allows the sub-conscious forces to exercise their important functions in inaugurating and promoting the act of defecation.

I may say that by far the most important factor in the psychic management is to impress on the patient the necessity of absolute regularity, to the minute, if possible, in going to the toilet, and next that he should remain there with his mind fixed upon the function, and with every bodily effort brought into play toward that end. If, after a prolonged effort, he fails, it may be best not to go again that day, but, as Dubois expresses it, "Say to your intestines: you would not move at the proper time; now you can wait till to-morrow." In all probability the second attempt at the same time the following day will succeed.

Occasionally it may be advisable to have accessible a small piece of soap, or a glycerine suppository, or even a syringe with warm water, so a small enema may be taken. These may be employed to *start* the act of defecation, but should be kept as a last resort, and seldom employed. If the proper amount of care as to these precautions, coupled with perseverance is entered into, plus proper diet and hygiene, the vast majority of cases of constipation can be cured without the administration of any drugs. This I say, not as a psycho-therapeutic enthusiast, but as one who endeavors to use every method included in rational therapy.

Intestinal Autointoxication.—This is an overworked term, not only among the medical profession, but the laity as well. Much misleading literature on this subject has been written by pseudo-health-teachers, who in picturesque language have described the dreadful condition likely to befall the unfortunate who is afflicted with this awful but indefinite condition.

The idea had often occurred, and had been expressed vaguely in the older medical literature, but it gathered a new impetus when there came into vogue that high-sounding Greek word *copremia*, literally meaning "excrementitious-substances-in-the-blood," in the early part of the nineteenth century. This strong suggestion was immensely strengthened by Bouchard, a generation later, whose convincingly written work demonstrated how much toxic material was reabsorbed from the intestines, as an experiment using the urine for injections into animals. His experiments were open to many objections, and many of his conclusions are now discredited.

Arthur Hertz in his recent book, "Constipation and Allied Intestinal Disorders," reviews the whole subject, and shows that we are without any definite conclusive evidence for what has been talked and written about so much.

Many persons who have read much, and are deeply interested in the subject of autointoxication, become sure that the slightest delay in intestinal evacuation may be serious, or that it may profoundly disturb their physical economy. If, for any reason, they fail to have a movement at the regular time, they begin to worry, and in a few hours they begin to search their feelings for the dread symptoms of autointoxication. After two or three more hours they begin to have a headache, then, perhaps, they feel so badly that they have to give up work for the day. Further worry will cause their sleep to be delayed or troubled, and they wake unrefreshed, while practically, if not entirely, all of these symptoms are due to auto-suggestion.

Regular evacuations of the bowels are necessary, and full and free emptying of the large intestine at frequent intervals is conducive to health, comfort and longevity. This is admitted. While it is the custom of most civilized human beings after infancy to have one movement of the bowels daily, this is not a hard and fast rule. Many there are, who normally evacuate their bowels twice daily, and would suffer some inconvenience if this were interfered with. Many others find that an evacuation every other day is entirely sufficient, and enjoy good health under this habit. There are exceptional instances of individuals who have habitually emptied their bowels at intervals of several days, or weeks, or even months, and have lived long and active lives, seeming, at least, to enjoy a fair amount of health.

I have in mind a man, now over fifty years of age, who states that never since a child has he had a fecal movement more often than once every ten days—sometimes two weeks. He is now an active and successful business man, has had no severe illness in his past life, and his present appearance promises many active years to come.

Walsh relates the case of a French army officer, who, from his earliest years, did not have regular movements of the bowels, but secured evacuation of them by artificial aid once every two months or more. He lived to the age of past fifty, dying from an intercurrent disease not connected with his intestinal condition, having in the meanwhile enjoyed good health. He was able to accomplish his duties as an officer without any special allowances, and was on the sick list much less than many brother officers, whose intestinal condition left nothing to be desired. This man succeeded in doing his life work without his condition being known by others to any extent, and it was only inconvenience and not serious illness that he suffered from. After his death, it was found that certain folds of the lower bowel were so large as to meet across its lumen, making shelves and pouches in which the fecal material accumu-

lated, preventing the movement of the bowel contents above.

In the Orient, it is reported that many, especially of the better class, do not expect to have movements of their bowels every day. Some of them do not encourage this function more often than once a week, or even more seldom. As their diet is more largely vegetable than ours, this is all the more surprising. The average life of such people does not seem to be much below the Occidentals, and the difference is probably accounted for to a great extent by other hygienic practices, rather than this failure to have regular movements. In the meantime, they do not suffer any particular inconvenience, and seem as free from the ordinary aches and pains of life as do the people of the West.

It appears that if such a custom is established in the early life of an individual, that Nature becomes able, by some power of compensation, to either overcome or neutralize the toxins which would tend to be absorbed from the large intestine.

Our patients should be admonished of the great need of regular daily evacuations of the bowels, and should be urged in the interest of their health to pursue this custom, so far as possible, with clocklike punctuality. On the other hand, they should not be permitted to become abject slaves to the fear of intestinal autointoxication, but should be taught some of the lessons I have endeavored to promulgate.

Gastric and Intestinal Flatulence.—Many of the patients who come to the physician seeking relief from supposed heart disease, are in reality suffering from the primary or secondary effects of gastric flatulence. In some the heart tolerates considerable upward pressure on the diaphragm from a distended stomach. In some neurotic individuals, however, distention of the stomach, or any appreciable collection of flatus, either disturbs the heart's action or greatly upsets the patient's mental equilibrium.

The presence of gas in the stomach is a bane to many. It cannot be accounted for by fermentation of food products in the stomach, for it is frequently produced in the presence of a sufficiency of free hydrochloric acid, and where no fermentation can exist. Besides no fermentation could produce the immense quantities which are so explosively eructated by these nervous people.

One lady informed me that she counted the number of eructations after a light meal of toast and tea, and that they numbered one hundred and forty-one.

When uncomfortable gastric flatulence occurs in neurotic people, when the eructations are frequent, explosive, and without much taste or odor, the trouble may generally be ascribed to aerophagia, or unconsciously swallowed atmospheric air.

Bouvert explains the *modus operandi* by which this bizarre phenomenon is produced as due to clonic spasm of the pharynx, while Ewald contends that it is produced by contracting muscles of the neck. Storck agrees with Ewald, and cites some points concerning the differential diagnosis of aerophagia from gastrectasis. In the latter condition the eructations are gaseous in character, are of a decided odor, and contain sulphurated hydrogen and marsh gas. Aerophagia should also be distinguished from the burning eructations accompanying hyperchlorhydria, as well as real fermentation sometimes occurring in achylic stomachs.

Vanderhoof records a case of aerophagia in a hysterical subject, where she belched over five thousand times in twenty-four hours, and the amount of air eructated being measured, was found to exceed 200 liters. It is evident that this quantity of air is many times in excess of that which could be produced by any conceivable process of fermentation; and furthermore this air has been collected and analyzed by several investigators, who have shown that it approaches in composition atmospheric air, being composed almost entirely of nitrogen and oxygen, with an

admixture of but a small quantity of carbon dioxid, the latter being derived from the decomposition of the carbonates in the food or the alkaline saliva.

Carminatives will generally be needed to some extent in the management of these cases, but the main point is to convince the patient that if composure is exercised, and quietude is sought, less air will be swallowed, and most of that present will be unconsciously absorbed and expired with the breath.

Some years ago there consulted me a middle-aged maiden lady of high intelligence, who held an important executive position in a large female college. She complained bitterly of a flatulent condition of her stomach, which would generally come on after supper, especially if the day had been a busy or trying one. When she felt this gas, she would walk the floor and indulge in various gymnastic exercises, feeling that she must get rid of it before she could safely retire. Upon my explanation of the real condition, with the assurance that, if she would sit quietly and placidly, the gas would either pass into the intestine or be absorbed, she took my advice, and soon she found to her surprise that there was practically no gas to expel. In her case, she was swallowing the air as fast, or faster than she could expel it, and in the meanwhile provoking her nervous system almost into a frenzy.

Personally I believe that this condition is always associated with a certain lack of tone in the gastric musculature, and that in individuals with neurotic stigmata it is most probable that certain states of nervousness produce an inhibition of the nerves controlling this normal tone. Certain emotions or reflex agencies bring about a loss of tone in the walls of the stomach exactly analogous to the inhibition of the vasoconstrictor nerves, which induces blushing. In this way, in nervous conditions, there is produced a potential or actual relaxation of the stomach walls, so that the organ is easily inflated by air swallowed with the food or between meals. At the same time that

the explosive eructations are going on, some of the air may be forced through the pylorus, giving rise to intestinal flatulence.

A most annoying trouble due to a neurosis is the passage of air through the intestines, and the accompanying rumbling denominated borborygmus. It is increased under emotional stress like aerophagia, and the anxiety over it increases it still more. Old men seldom complain of it to their physicians, but middle-aged or elderly women find it a keen source of embarrassment. Seldom it is found in young women, except those of extremely neurotic temperament. The older female sufferers are often stout, with relaxed and incompetent abdominal walls, so that the empty intestines do not fall together as they should, but rather tend to lie apart, allowing spaces between which the atonic intestinal walls "balloon", thus favoring an accumulation of gas. Often after these patients have been exercising to the point of fatigue, and sit down inside a warm room, the expansion of air in the intestines quickly leads to rumbling there, with the production of flatus. This experience is quite common with elderly people in cold weather, and the odor of the flatus, when passed, is but slightly offensive.

In young women, when troubled with flatulence or borborygmus, it often makes them so nervous, and leads to such dread, that it hinders their participation in social usages, makes them fear to associate with any but their immediate family, and occasions the most poignant mental suffering. Some young women suffer from rumbling in the intestines whenever more than four hours have passed since their last meal. This phenomenon is more likely to manifest itself when they are nervous and excited, but is specially liable to manifest itself when they are with people whom they desire to impress favorably. Dread and fear play a large part in this nervous rumbling, and it is probably due to an exaggeration of peristalsis, and the crowding into large intestinal spaces small collections of air that under

normal peristalsis would escape from one portion of the gut to another without audible sound.

Moral suasion and encouragement, with the injunction to always eat a light lunch when the slightest sensation of emptiness is felt, will greatly aid this embarrassing condition. It is often necessary to give in addition an alkaline carminative, and to enforce certain hygienic regulations, as there is often a material aspect that psychotherapy alone will not control.

Many individuals, especially women, who adopt a sedentary occupation and lose in weight suffer from both borborygmus and excessive sensitiveness of the intestines. The same management as that just suggested will generally prove satisfactory.

Bad Breath.—Certain odors from the body are unavoidable—they are inherent, a characteristic of physical organization, and a consequence of metabolic activities. Some of the odors peculiar to an individual may be pleasant or otherwise. In the Song of Solomon, that wise old monarch grew enthusiastic over the pleasant aroma emanating from the body of his “beloved.”

In the ordinary intercourse between people, the exhaled breath generally constitutes the most noticeable odor, though in some instances the breath is but one part of a comprehensive effluvia originating from the whole body, as illustrated in pellagra.

To the laity and the superficial student, a bad breath means one of two conditions—an unwholesome oral cavity, or a “spoiled stomach.” There are several other underlying causes for bad breath, such as necrosis of the nasal bones, purulent rhinitis, ozena, septic tonsillitis, Vincent’s angina, etc. Apart from conditions in the mouth, and the causes just mentioned, let me mention absorption from the intestines. When protein putrefaction takes place in the small intestine, or when an excess protein putrefaction occurs in the large intestine, the end products, which

the ordinary emunctories cannot care for, are eliminated through the expired breath.

When, therefore, nervous patients are unduly worried about a bad breath, they should be informed that the stomach proper is seldom to blame, that when their teeth are put in order, when their intestinal tracts are kept normal, when an abundance of water is drunk, and when by a cheerful, hygienic and active life their bodies and minds are placed in what Huxley calls a state of "moving equilibrium," the bad breath will depart with many of the other digestive discomforts.

General Principles of Psychotherapy as Applied to Various Forms of Indigestion.—Let me affirm as a proven fact that there are but few gastrointestinal diseases, no matter how material or far advanced, but what psychotherapy possesses for them a beneficent function. Even where a fatal termination is assured, and nothing can be done for the disease, something may be done for the patient, either by diverting the mind, or keeping alive the spark of hope, without which all would be blank despair. This is the most that can be expected in such melancholy conditions, but because a cure is not in view, the physician should not cease his efforts to infuse courage and cheer into the mind of the invalid. There are several reasons for this. In the first place, there is a possibility that the fatal prognosis is a mistaken one. Many instances are on record in which, after an unfavorable prognosis was given, the patient recovered, outliving the physician who made the prognosis; again, there may be a mistake in the diagnosis, or the patient may possess a recuperative power not realized by the medical attendant. There are many objections to a gloomy prognosis, even under the most unfavorable outlook, and, if the physician will use to the uttermost any little grains of encouragement, while he says as little as possible concerning the less favorable aspects of the case, his influence on the course of the disease

will necessarily be uplifting; and he need not utter a single deceptive word.

The Personal Equation.—Some physicians possess a personality which in itself inspires confidence, though any one has within his power the faculty of cheerfulness and optimism. Undue levity in a sick room is of course to be deprecated, and to laugh at a patient's recital of woes, even though they be ridiculous, is nearly always harmful. Ridicule has no legitimate place in rational psychotherapy. A warm-hearted grasp of the hand on greeting a patient; a cheerful and smiling but earnest countenance, betokening a real desire to be of assistance; a sympathetic interest in the recital of infirmities—all these attributes on the part of the physician, will gain the patient's confidence, and will ensure a receptive attitude for every therapeutic effort that may be later brought to bear. Every one has heard some person remark that a certain doctor's medicine helped him more than some other doctor's, because he had more confidence in the former. This is a simple exemplification of both the influence of the personal equation and psychotherapy itself.

One of the first essentials in entering upon the treatment of a gastrointestinal disease, especially if it be chronic, is a thorough and systematic examination—more thorough, if possible, than any the patient has previously undergone. This has a double advantage—it bestows upon the physician an intelligent knowledge of past and present conditions, and it convinces the patient that a deep interest is being taken.

Another point worth mentioning is the desirability of inaugurating some form of treatment, no matter how insignificant, as early as possible after taking charge of the case. While a leisurely amount of deliberation is necessary and praiseworthy, the viewpoint of the patient is from a different angle, and, if the physician dallies too long, he will lose some of his influence. A placebo can do no harm, and it will keep the patient in a more satisfied frame of mind, until the diagnosis is fully made. When a

patient goes to a physician, he expects *treatment*, and if something apparently tangible is not done very soon, even the most intelligent patient will feel a shade of disappointment or dissatisfaction; and, if less intelligent, may indulge in open rebellion.

There are conditions of this sort that confront every physician, and he can, by the exercise of tact and personality, overcome them with perfect dignity and no stultification of his professional standing. First impressions are often lasting, and that the first impressions in the mind of a patient toward the physician may be those of confidence, is important in the extreme.

Psychotherapy in regard to Diet.—A few patients complaining of digestive disturbances, especially chronic forms, are suffering from excessive eating; rather more from injudicious use of stimulants; while the majority, in my experience, suffer from underfeeding. Practically all of these dyspeptics are on a *diet*, either self-imposed, or instituted by a physician months or years previously. This diet is often totally inadequate to furnish the necessary calories required by ordinary demands of the body, consequently the body is ill-nourished, the nervous poise is rendered unstable by physical weakness, and the patient is still less able to fight the inroads of disease. In many instances the hunger pains, the weakness, the emotional outbursts, and the countless vague discomforts which accompany slow starvation, are mistakenly attributed to *indigestion*, and the diet is still further restricted. These ill-nourished sufferers have generally developed a sitophobia, or fear of food, and it will require every effort of the physician to overcome this fear. If after careful examination, there is found present a working quantity of digestive juices, and the motility is not radically impaired by organic lesions, the dietary should be generously increased, while strenuous endeavors should be instituted to change the mental attitude of fear into one of courage and confidence. Here is the opportunity for psychotherapy.

I often tell these timorous patients that there is *positively* enough gastric juice present for their needs; that if they will eat the food as I urge, I will help them with its digestion; and that they need fear absolutely no evil consequences.

In some cases the digestive organs, which have had nothing to do for so long, will for a while rebel, and the patient will suffer from colicky pains and some soreness. This is explained by the comparison of heavy muscular labor performed by one who has long led a sedentary life and the consequent soreness, which will pass away if the exercise is continued. Thus, after the stomach and intestines have adjusted themselves to the new and more liberal regimen, with increased bodily strength, there will be noted increased nervous stability, a more cheerful view of life, and a general feeling of comfort and well-being.

As an illustration of nearly every point here discussed, I can cite the case of a lady of fifty-eight years, who came under my care nearly a year ago. She was suffering from an organic, but non-malignant stricture of the esophagus, which had so reduced the lumen of that canal, that she could only take liquid nourishment and in teaspoonful quantities at a time.

She was thin, nervous, emotional, constipated, suffering from insomnia, and complaining of constant "indigestion." She was habitually taking medicine for the three complaints—constipation, indigestion, and insomnia. Her esophageal obstruction had been incorrectly diagnosed as a "nervous affection," though never explored with a sound.

The stricture was dilated with comparative ease, until a 20 English sound could be passed with facility. She was then told to increase and diversify her daily bill-of-fare, and a simple alkaline carminative was given her mainly as a placebo. She was quite fearful that her stomach would not "bear" solid food, but having won her confidence, and after earnest assurances that she was able to digest what I recommended, she began to eat.

After about a dozen good meals the pains of the supposed indigestion began to disappear, and in two weeks they were gone. She found, to her delight, that she could sleep without her accustomed "Sleeping draught," her fits of crying ceased, her disposition became bright and happy, and with increased weight and vigor came satisfaction with her daily life. It is still necessary to keep the stricture dilated at intervals, but she has gained about 30 pounds, and at present seems in perfect bodily and mental health.

Another important adjunct to the application of successful psychotherapy in digestive diseases, is to look after the small and intercurrent ills as they arise. If the physician will take sympathetic cognizance of the minor complaints, and will make minor concessions in unimportant matters, he will find that he can better exert his authority in important matters. Chronic dyspeptics have more than the usual share of human frailties, and if the physician attempts to entirely revolutionize their habits and customs, he may so upset and discourage them, that they will not make the proper effort to get well or to co-operate with him.

If they can have their way in non-essentials, they will much more readily yield to advice in essentials.

Change.—This one word sometimes solves the whole therapeutic problem. It is noticeable that one's digestion is always good on a holiday, and many people find that they can with impunity eat articles of food while on a vacation or pleasure trip, which would profoundly disturb them at other times. On such occasions the mind is generally care-free, the thoughts are on external objects, while the attention is diverted from the stomach and all that pertains to it.

It is not always practicable to send a patient on a protracted vacation, nor can we always arrange a radical change in his business habits. When it is possible, however, the greater the change, within the limits of comfort and propriety, the greater the probable benefit. To take

the wearied book-keeper from his desk, and put him "on the road" for a while; to place the road-worn traveling man in the quiet haven of an office; to send the *blasé* city man out among the green trees and meadows of the country; or to take the housewife, who has grown sick and weary under the monotony of life in some isolated community, and let her enjoy the bustle and sights of a great city for a season—all these, and others that ingenuity or practicability may suggest, will in many instances vary the diseased current of digestive thought and banish the introspection, the self-analysis, the self-pity.

Cheerful Companionship and Environment.—When the man of wisdom said, "A merry heart doeth good like medicine," he uttered a truism that applies to twentieth-century civilization, as well as ancient times. The lack of sociability and good cheer at the table predisposes to indigestion, while the business man who eats his breakfast with his face buried in a morning paper, with not a pleasant smile for any one, who eats his lunch in sour solitude and with gastronomic contemplation, is much more liable to the pangs of indigestion than the cheerful one, who intersperses the progress of his meals with pleasant anecdotes or bright and entertaining conversation. If I were asked to advise between a hurried meal with good cheer, or a deliberate meal with anger or disgust as its accompaniment, I would assuredly choose the former for safety.

It is worth the thought and time of the physician to regulate for good, if possible, the environment of every chronic dyspeptic, otherwise many a well-chosen prescription will come to naught in the presence of petty worries and repinings that seem to act with malign force on the digestive organs.

A confrère recently reported to me the case of a young lady who had long been troubled with nervous indigestion, and who was quickly relieved after changing her boarding place which was rather somber, and which numbered among its patrons some crusty and disagreeable individuals

who made her excessively nervous. This physician not only insisted that she make the change, but saw to it that she was established in pleasant and congenial surroundings, and the good results justified his expectations.

The Rest Cure.—This unique method for treating nervous and emaciated invalids we owe to Dr. Weir Mitchell, and, where practicable to carry out, it will sometimes accomplish remarkable results. It consists of a stay of six weeks or two months in a well-organized sanitarium, complete rest in bed for four or six weeks, and complete isolation in the meanwhile. During the greater part of this time the patient, if a woman, is not permitted to even brush her hair or rise for any of her necessary functions. Everything is attended to by a nurse trained for such care. She is told to cultivate an absolute mental vacuity, and, as far as possible, she should lead a vegetative existence.

During the first five or six days nothing but sweet milk is given, beginning with 24 ounces, divided into eight portions, given two hours apart from 7 a. m. to 9 p. m., and increased to 60 ounces, divided into equal portions, and given at the same hours. The milk should be either fed to the patient from a spoon or slowly sipped. Sometimes I give it hot. On the seventh day the regimen changes abruptly, and without transition may be prescribed for breakfast 12 ounces of milk, with bread and butter, honey or preserves. At ten in the morning a full glass of milk. For dinner (or lunch) a full meal of tender vegetables, roast meat, or fish, with bread and butter, some light dessert, and a glass of milk. At four in the afternoon give a full glass of milk. Supper (or dinner) may consist of one or two eggs, bread and butter or jelly, and a glass of milk. At nine o'clock a final glass of milk should be taken, preferably hot.

There may be some fulness, and perhaps distention, the first two or three days of this liberal regimen, but if the patient is put in the proper mental attitude, the discomfort

is minimized. The physician must dispel the fears of indigestion, and insist upon the necessity of overfeeding in order to quickly get her out of the sad condition of malnutrition. If the patient says she cannot eat because she is constipated, explain that an abundant diet will overcome the constipation; that the residue of the food left in the intestines will stimulate action, and that large eaters are never constipated. If the bowels do not move sufficiently at first, give one or more small enemas, until fecal results are obtained. This may be kept up for a few days if necessary, but, if the proper efforts are made, natural movements will soon be attained. For the distention of the abdomen, which sometimes is annoying for a few days, there may be applied hot moist compresses or turpentine stupes, and, when absolutely demanded, not by the patient but by the symptoms, there may be administered a few doses of some simple carminative. The last-named measure, however, should be avoided, if possible, for it is expedient to get the patient's mind and body entirely away from the thought and habit of taking medicine for the abdominal hyperesthesia.

If the physician will enforce this regimen, and fortify it with positive and courageous psychotherapy, the overfeeding will be well endured in the vast majority of cases.

The effect of this treatment, from the point of view of nutrition, naturally varies according to cases. The first week, when the food is insufficient, does not generally show any increase of body weight. Patients who ate heartily before, grow thin. They may lose in the first seven days from 1 to 7 pounds. Some remain stationary, their previous insufficient diet being equivalent to the milk diet. Only those who are much emaciated succeed in gaining as much as two or three pounds during the first week. The result of the first week is not important, but it is wise to have the patient forewarned, so that discouragement will not add to the other burdens.

At the end of the second week there should be a marked increase in weight and the greater it becomes the more it affects the mental and physical well-being. This increase may vary from 5 to 7 or 8 pounds a week, and Dubois reports one patient in whom there was an increase in weight of $11\frac{1}{2}$ pounds in one week.

As the time goes on, the physician should congratulate the patient on every gain, should keep up flagging courage, and, if there is any failure to attain desired results one week, should redouble every effort toward attaining success the next week.

This method of treatment will require time, patience, tact, and co-operation on the part of a good nurse, but, if carried out, the results are most brilliant and lasting.

Dubois says "The physician should not only be a wise man who practises on his patient a sort of vivisection, but he ought to be, before all, a man of heart who knows how to put himself in the place of those who suffer. In the domain of nervousness this fallacious precision of diagnosis is dangerous. I have said that the idea and the mental representation play an important rôle in the genesis of all the psychoneuroses, and the physician runs a great risk of confirming the hypochondriacal condition of the patient. He should avoid this danger by developing these qualities of the observer in learning to judge his cases as a whole, without the need of exhausting all methods of research."

I might add that pithy proverb, "Observations are not to be numbered, but weighed."

The psychoanalytic method, as advanced by Freud, has not as yet been applied very extensively to the management of gastrointestinal disorders. It is to be hoped, however, as psychoanalysis becomes more understood and appreciated, that its uses may be broadened, and that it may be found a useful ally to other methods of psychotherapy.

Finally, I might say, that in the exercise of this refine-

ment of therapy, cognizance should generally be taken of tangible bodily ailments, and a certain amount of appropriate medication has its important place even in the exercise of psychotherapy. He, though, who attempts to reach the shifting and evanescent psychoneurosis of digestion by a strict system of dietetics, stomachics, digestants, tonics, or any other adventitious aids, will be foredoomed to failure. Along the line of uplifting suggestion the "isms" and cults have won some of their spectacular victories, and the medical profession has been far too slow to gather from these erratic creeds the few real jewels they contain.

When, therefore, by means of both material and psychic therapy, intelligently and energetically applied, the minds of these sorrowful invalids are taken from their stomachs; when their daily thoughts are lifted out from introspective grooves; when their ill-nourished bodies are furnished sufficient food, and their desiccated tissues laved with an abundance of water—then can the vicious circle be broken, and the psychic aids to digestion resume their normal place in the bodily economy.

CHAPTER XIII

GENERAL CONSIDERATIONS OF DIET

The health and welfare of individuals and of peoples depend on right methods of living, and of all methods of living the most momentous are those relating to the upkeep of the body by alimentation. It is food that supplies the material for that perpetual series of transformations in which life consists, and it must be adequate in quantity and suitable in quality if these transformations, of so many different kinds, in so many different organs, are to proceed with that nicely balanced adjustment that is known as health. Fuel for heat and energy, material for repair in proportion to work done and waste incurred, must be requisitioned, if a man is to live and prosper, and any excess or deficiency in these is followed by impairment of strength and vigor, by tissue-degeneration and by diminished resistance to the inroads of disease (Crichton-Browne).

The principles of nutrition, are therefore, important not only in preventive medicine, but in therapeutics as well.

The study of foods is a most complex one, and many experiments are being constantly made throughout the world to the end that the principles of diet may be lifted out of the realms of both empiricism and obscurity, and placed where they may be easily understood and intelligently followed.

Food Classification.—Foods may be classified according to: (1) Their physical properties. (2) Their source. (3) Their composition. (4) The functions they perform in the animal body.

(1) They may be divided into solid, liquid, semi-solid, fibrous, gelatinous, starchy, oleaginous, crystalline, and albuminous foods.

(2) Foods are derived from the animal and vegetable kingdom. Of the former are meats, fowl, fish, shellfish, crustaceans, insects and their products (honey, for instance), eggs, milk, milk products, animal fats, gelatin. Of the latter, are cereals, vegetables, fruits, sugars, gums, vegetable oils and fats.

As to the chemic classification, the simplest is that by Von Liebig, who divided them into nitrogenous and non-nitrogenous.

The present generally accepted chemic classification consists of proteins, carbohydrates, fats, inorganic salts, and water.

The proteins include all nitrogenous food substances, examples of which are the lean fiber of meat and the gluten of grain.

The carbohydrates contain no nitrogen, being composed of carbon, hydrogen, and oxygen, and include the starches, sugars, and vegetable fiber or cellulose.

The fats serve the same purpose as carbohydrates, but are more concentrated, though less easily utilized. Fat is found in animal foods, as meat, fish and butter, and in the vegetable kingdom, as oils, in the various cereals, and in the kernels of nuts.

The inorganic salts, as calcium phosphate, and the various compounds of potassium, sodium, magnesium, and iron, furnish neither heat nor energy, but are necessary to life and health.

Water enters into the composition of every tissue of the body, and forms more than 60 per cent. of the entire body weight of an adult man. It is not burned up in the metabolic processes of the body, but is essential to life.

Proteins are of the greatest importance to the body, for without them, or in insufficient quantity, the body wastes, and malnutrition takes place. They help to build up new

tissue, and repair the waste of the old; they are also consumed in the body, being valuable as a source of energy and heat. Further, they may be converted into fat, and stored in the body for future use in emergencies of nutrition. This last function is of somewhat minor importance.

Carbohydrates are burned up in the body, and their energy is changed into heat or used up in muscular work; they may also be converted into fat, and stored up in the body. Starch forms about 1 per cent. of the body weight, and the carbohydrates, on account of their easy digestion and availability, are the most prolific source of heat and energy.

Quantity of Food Required in Health.—This varies as to age, occupation, and condition of body. A man naturally requires more than a child, a man at work more than one at rest, etc.

Voit insists that the ideal diet consists of the smallest amount of protein food, together with non-nitrogenous food, that will keep the body in a state of vigor. He holds that a healthy adult of average weight should ingest 100 grams of albumen, 50 grams of fat, and 450 grams of carbohydrate in twenty-four hours. Others place the protein requirement somewhat higher, and I am inclined to think that 120 grams of this element constitute a more suitable number.

A small proportion of the food serves for reconstructing tissue waste, while the major part is used for generating the heat required for the maintenance of life, and to furnish energy for the functions of life. It is, therefore, customary to speak of the number of heat units (calories) necessary during the twenty-four hours instead of the quantity of food.

A calorie (or heat unit) may be defined as the amount of heat required to raise the temperature of 1 gram of water 1° C. This is a small calorie. A large calorie is the amount required to raise the temperature of 1 kilogram of water 1° C. Therefore a large calorie equals 1000 small

calories. This distinction should not be forgotten, otherwise great confusion may arise.

From Rubner's investigations we learn that

| | |
|---------------------------|-----------------|
| One gram of protein | = 4.1 calories. |
| One gram of fat | = 9.3 calories. |
| One gram of carbohydrates | = 4.1 calories. |

In order to calculate the caloric value of any food, the number of grams of albumen contained in it are multiplied by 4.1; the grams of carbohydrates by 4.1; and the grams of fat by 9.3. These being added together, give the total caloric value of the food.

Riegel holds that a human being at rest demands about 35 calories per kilogram of body weight, and one performing light work about 40 calories per kilogram. From [his estimate the caloric value of the food of an individual weighing 50 kilos is from 1750 to 2000 calories.

Hutchinson gives the following:

| | | | |
|---|---------|----------------|------|
| The quantity of protein consumed daily is | 100 gm. | $\times 4.1 =$ | 410 |
| The quantity of carbohydrates daily is | 500 gm. | $\times 4.1 =$ | 2050 |
| The quantity of fats, daily is | 50 gm. | $\times 9.3 =$ | 465 |

2925

The average number of calories required daily by an individual, according to this calculation, is approximately 3000, and is more suited for the needs of an active man than Voit's.

The question of the appropriate protein daily intake is one that is met by divergent opinions. Rubner claims that the different articles of food replace each other according to their caloric value, and it is immaterial in what form the calories are taken into the body. This is true only within certain limits.

Russel H. Chittenden has demonstrated to his satisfaction, by experiments carried on under favorable circum-

stances, and assisted by colleagues of high scientific attainments, that the recommended dietary standards are excessive in quantity, especially in regard to proteins.

Briefly stated, his conclusion is that the daily amount of protein or albuminous food required for the maintenance of health and vigor is not more than one-half that hitherto regarded as necessary. Observations upon groups of professional men, army volunteers, university athletes and animals have satisfied Chittenden that for a man weighing 70 kilograms, or 154 pounds, there would be required daily 59.5 grams—say 60 grams of protein food to meet all the needs of the body. To quote him—“These are perfectly trustworthy figures with a reasonable margin of safety, and carrying perfect assurances of really being more than sufficient to meet the true wants of the body, adequate to supply all physiological demands for reserve protein, and able to cope with the erratic requirements of personal idiosyncrasies.”

It is impossible and out of place to here systematically review Chittenden's work, or even to follow up his experiments and show where, notwithstanding the careful precautions taken, possibilities of fallacy exist, or to point out in what directions further investigation is advisable. It must be admitted that he has made out a strong case, and has shaken to its base the fabric of established opinions on food questions on the physiologic side, but he has not yet overthrown it, and I submit that we should pause before accepting his views *in toto*, or proceeding to revise from the foundation, our whole system of practical dietetics, and to cut down by half the ordinary meat ration.

If Chittenden is right, the whole dietetic system has been wrong from the foundation of the earth, and while the triumphs of modern science in revolutionizing our ideas as to diphtheria, typhoid fever, malaria, etc., may be cited, there is a scant analogy between the cases. In the one, science is dealing with an accidental and external cause of disease; in the other with a universal and constitutional

habit. If Chittenden is right, then all the world, with the exception, perhaps, of a few supposed faddists, has been wrong. The nutrition of man involves an intelligent appreciation of the needs of the body, under different conditions of existence, and constant modification and adaptation to changing environment, and states of age, occupation, and health. Science has certainly not spoken her last word respecting it, but deep down beneath all superficial changes and gradual evolutions, there are certain fundamental nutritional demands that cannot be varied without risk. These are embodied in ancient traditions and customs, and one of these customs is the demand for a protein intake much more than double what Chittenden says is a sufficiency.

"The generalized food customs of mankind," said the late Sir William Roberts, "are not to be viewed as random practices, adapted to please the palate or gratify an idle or vicious appetite. These customs must be regarded as the outcome of profound instincts which correspond to certain wants of the human economy. They are the fruit of colossal experience accumulated by countless millions of men through successive generations. They have the same weight and significance as other kindred facts of natural history, and are fitted to yield to observation and study lessons of the highest scientific and practical value."

I have given this viewpoint a rather full discussion for the reason that so much is just now being written concerning dietetics, and so many fads are being promulgated, that the unwary student is liable to unwittingly subscribe to some dietetic fad to the disadvantage of himself and those who come to him for advice.

The conclusions of Chittenden cannot be lightly cast aside, but their application to patients suffering from digestive disturbances, especially where there is any tendency to malnutrition, is fraught with danger, and should not be adopted without a weighty reason on the part of the physician.

In health it is a fairly safe rule to follow, that, provided the individual partakes of a varied diet of the generally accepted foods of value, his supply, in so far as their quantities and character are concerned, may to a great extent be regulated by his appetite. Such articles should be chosen that include both animal and vegetable foods, and the quantities should correspond to a certain extent to the amount of physical or other labor that he performs. Regardless of all that has been said or written in advocacy of certain unique dietetic fads, like vegetarianism, fruitarianism, avoidance of flesh proteins, etc., it may be said that in the main a mixed diet affords the greatest amount of health and strength, though in some it may not give the best results. It may be also said in a general way that most sufferers from indigestion do not err so much in variety as in aggregate quantity of food consumed. That this is often too high can be proved by computing the total calories of the foods, and comparing their value with the amount of work this person performs. In such diseased conditions of the body as uremia, gout, obesity, chronic rheumatism, arterio-sclerosis, chronic interstitial nephritis, chronic myocarditis, diabetes, and similar conditions, the low protein ration according to Chittenden has a range of usefulness; also in the excessive putrefactive changes in the intestines, concerning which we are not sure, it is well to be on the safe side with the protein intake. If, however, the body is in a fair state of health, and the digestive organs seem to perform their duties with no distress to the individual, it is a fairly safe rule to permit the appetite to have its sway, within reasonable limits.

In illness of the body in general, and of the digestive organs in particular, it is necessary that we be more definite, and this requires certain fixed dietaries to meet certain pathologic conditions. In the fixing of dietaries to meet diseased or incompetent states of the digestive organs, there are many considerations involved, and it is therefore imperative that we have standards to go by,

even though some of those standards are somewhat arbitrary. These standards should keep in view two main indications—the maintenance of the body heat without depriving the tissues of their component structure, and the supplying of sufficient calories to meet the demands that are made upon the body for manual or mental labor (potential energy). Certain other considerations depend upon the climate, or even severe weather in a temperate climate.

The supply of nutrition in the body is derived from physiologic oxidation of the carbohydrate, hydrocarbon and protein contents of the food. In the making up of dietaries for the sick, 2750 calories are about right for a man of 140 pounds, or about 100 calories for each 5 pounds of body weight. Thus, understanding the conditions that are to be met by the designation and quantities of food, their selection according to the caloric method of feeding is not only scientific and easy of application, but is also practical and safe. In this we are dealing with a definite scale, like definite doses of medicine, which we can keep at an equilibrium, decrease, if it be required, or increase up to the limit of tolerance, if it be desired to crowd over the normal physiologic need when it is wished to add an extra amount of weight, energy or heat.

For the purpose of a definite start in the construction of dietaries, some standard must be accepted as the proper amount of food components best suited to the needs of the body, and in the main, the dietaries given here will approximate in value the requirements as indicated by Rubner. In his classic experiments with foods that were oxidized outside the living body in the calorimeter, he proved that the oxidation of the same foods in the living body produced practically the same amount of heat. It must be remembered in this connection that a portion of food is lost to the general body, not being utilized, and escaping with the feces. This on a mixed diet may be estimated as 8 per cent., and this allowance must

be made in reckoning the needed supply of calories in a diet list.

While many of the published experiments deal in the small calories, it is better in making up diet lists to employ the large calories, and in addition to build up a scale upon the basis of 5 pounds of body weight requiring 100 calories daily.

The average quantities of foods required daily by a man weighing 140 pounds would be, according to Rubner:

| | |
|-------------------------------|------|
| At rest..... | 2303 |
| At slight manual labor..... | 2445 |
| At moderate manual labor..... | 2668 |
| At hard manual labor..... | 3662 |

This cannot be taken as an absolute standard, because there is no one schedule that would properly fit all individuals, even of the same weight and amount of physical exertion daily. In a general way it may be stated that in ordinary work between 2500 and 3300 calories would adequately supply a 140-pound man, and that, on a diet containing more than that number of calories, he should be reasonably expected to improve in nutrition, strength, and weight.

The diet being established, and being strictly followed by the patient, the practical means of ascertaining its success is by means of the frequent use of the scales for the first two weeks. While it is, of course, wise to note any feelings of weakness, faintness, or hunger that may be complained of by the patient, they need not cause any great apprehension if the weight is steadily increasing, the heart action is good, and the general appearance of the individual, as seen through the practised eyes of the physician, is favorable.

Furthermore, it is of great assistance in carrying out the dietetic regulations so as to enable the patient to consume with ease the requisite amount, that attention be paid to arranging a dietary pleasing to the appetite. By

this means the beneficent influence of the hormones are brought into action, the various psychic aids are unconsciously enlisted, while the food-stuffs will be eaten with more pleasure and be more thoroughly oxidized.

Because of the compensatory functions of the alimentary canal in its different parts toward various foods, it is not conducive to the best results to build up the diet list on the supposed periods at which certain foods leave the stomach. There are so many influences that modify the exit of foods through the pylorus, that a calculation along this line should not enter much in the building of a dietary. This phase of the subject of nutrition should be considered in connection with abnormal local conditions or symptoms, and when the medical attendant is attempting to better nourish the whole body, it is generally safe to depend upon the compensatory power of the small intestine to make up for most deficiencies in the saliva or gastric juice.

The following table, modified from that of Koenig and others, gives the chemie compositions of most of the foods used and the heat units they produce. More complete tables can be obtained, if desired by application to the United States Department of Agriculture at Washington, D. C.

CHEMIC COMPOSITION OF COMMON FOOD SUBSTANCES

I. *Meats and Game*

| | Per cent. nitrogenous (proteid) | Per cent. fat | Per cent. carbohydrate (nitrogen free) | Calories per 100 |
|----------------------|---------------------------------------|------------------|---|---------------------|
| Beef (very fat)..... | 17.19 | 26.38 | ..... | 315.81 |
| Beef (lean)..... | 20.78 | 1.50 | ..... | 99.15 |
| Veal (fat)..... | 18.88 | 7.41 | 0.07 | 146.61 |
| Veal (lean)..... | 19.84 | 0.82 | ..... | 86.97 |
| Mutton (fat)..... | 14.80 | 36.39 | 0.05 | 399.31 |
| Mutton (lean)..... | 17.11 | 5.77 | ..... | 123.81 |
| Pork (fat)..... | 14.54 | 37.34 | ..... | 406.88 |
| Pork (lean)..... | 20.25 | 6.81 | ..... | 146.36 |
| Westphalia ham.... | 23.97 | 36.48 | 1.50 | 453.69 |
| Salted ham..... | 22.32 | 8.68 | ..... | 173.23 |
| Smoked beef..... | 27.10 | 15.35 | ..... | 253.76 |
| Smoked beef tongue. | 24.31 | 31.61 | ..... | 393.64 |
| Pulverized meat.... | 64.5 | 5.24 | 2.28 | 322.53 |
| Sweetbread..... | 22.0 | 0.4 | ..... | 93.92 |
| Chicken (fat)..... | 18.49 | 9.34 | 1.20 | 167.58 |
| Chicken (lean)..... | 19.72 | 1.42 | 1.27 | 99.10 |
| Capon..... | 23.32 | 3.15 | 2.49 | 135.11 |
| Duck (wild)..... | 22.65 | 3.11 | 2.33 | 131.36 |
| Partridge..... | 25.26 | 1.43 | ..... | 116.85 |
| Pigeon..... | 22.14 | 1.00 | 0.76 | 100.02 |
| Hare..... | 23.34 | 1.13 | 0.19 | 107.08 |
| Venison..... | 19.77 | 1.92 | 1.42 | 105.44 |

II. *Fish*

| | Per cent. nitrogenous (proteid) | Per cent. fat | Per cent. carbohydrate (nitrogen free) | Calories per 100 |
|--------------------|---------------------------------------|------------------|--|---------------------|
| Eel..... | 12.83 | 28.37 | 0.53 | 312.93 |
| Pike..... | 18.34 | 0.51 | 0.63 | 83.57 |
| Carp..... | 20.61 | 1.09 | ..... | 94.64 |
| Shellfish..... | 17.09 | 9.34 | ..... | 156.93 |
| Halibut..... | 11.94 | 0.25 | 0.45 | 53.66 |
| Salmon..... | 15.01 | 6.42 | 2.85 | 132.93 |
| Sardellen..... | 22.30 | 2.21 | 0.45 | 113.83 |
| Oysters..... | 4.95 | 0.37 | 2.62 | 34.39 |
| Fresh herring..... | 10.11 | 7.11 | ..... | 106.15 |
| Salt herring..... | 18.90 | 16.89 | 1.57 | 247.61 |
| Caviar..... | 31.36 | 15.61 | 2.23 | 279.76 |

III. *Dairy Products*

| | Per cent. nitrogenous (proteid) | Per cent. fat | Per cent. carbohydrate (nitrogen free) | Calories per 100 |
|-------------------------|---------------------------------------|------------------|--|---------------------|
| Cows' milk..... | 3.41 to 4.3 | 3.0 to 3.8 | 3.7 to 4.81 | 56.41 to 71.93 |
| Cream..... | 3.61 | 26.75 | 3.52 | 276.01 |
| Buttermilk..... | 3.0 to 4.0 | 0.93 to 1.3 | 3.0 to 4.0 | 33.08 to 43.63 |
| Whey..... | 0.85 | 0.23 | 3.03 | 18.0 |
| Kumyss (cows' milk). | 3.65 | 2.07 | Lactic acid, 0.7; alcohol, 1.9; carbonic acid, 8 | 32.99 |
| Butter..... | 0.5 | 90.0 | 0.5 | 823.1 |
| Cheese (cream).. | 16.28 | 41.22 | 1.90 | 449.54 |
| Cheese..... | 34.99 | 11.37 | 5.40 | 269.06 |
| Eggs (hens')..... | 12.5 | 12.1 | 0.5 | 165.0 |
| White of egg..... | 12.67 | 0.25 | ..... | 54.22 |
| Yolk of egg..... | 16.24 | 31.75 | 0.12 | 355.99 |

IV. *Cereals and Vegetables*

| | Per cent. nitrogenous (proteid) | Per cent. fat | Per cent. carbohydrate (nitrogen free) | Calories per 100 |
|-------------------|---------------------------------------|------------------|--|---------------------|
| Wheat bread.... | 6.0 | 0.75 | 52.0 | 245.0 |
| Rye bread..... | 6.11 | 0.43 | 46.0 | 217.56 |
| Sago..... | 0.5 | traces | 86.5 | 356.70 |
| Wheat flour.... | 8.5 | 1.25 | 73.0 | 345.78 |
| Rye flour..... | 10.0 | 2.0 | 69.0 | 342.50 |
| Cakes..... | 11.0 | 4.60 | 73.30 | 387.09 |
| Roll..... | 6.82 | 0.77 | 43.72 | 213.87 |
| Zwieback..... | 9.5 to 13.0 | 1.0 to 3.0 | 75.0 | 356.0 (average) |
| Cauliflower..... | 2.0 to 5.0 | 0.4 | 4.0 | 35.0 |
| Potatoes..... | 1.5 | ..... | 20.0 | 88.0 |
| Asparagus..... | 2.0 | 0.3 | 2.5 | 20.0 |
| Carrots..... | 1.04 | 0.21 | 6.74 | 33.85 |
| Rice..... | 5.5 | 1.5 | 76.0 | 348.10 |
| Beans..... | 19.5 | 2.0 | 52.0 | 311.75 |
| Peas..... | 19.5 | 2.0 | 54.0 | 319.95 |
| Spinach..... | 2.49 | 0.58 | 4.44 | 33.67 |
| Oatmeal..... | 12.05 | 5.26 | 66.77 | 338.80 |
| Barley meal.... | 8.31 | 0.81 | 75.19 | 323.0 |
| Brussels sprouts. | 4.83 | 0.41 | 6.22 | 49.05 |
| Cabbage (white) | 1.89 | 0.20 | 4.87 | 29.52 |
| Pickles..... | 1.02 | 0.09 | 0.95 | 8.81 |

V. *Soups and Beverages*

| | Per cent. nitrogenous proteid | Per cent. fat | Per cent. non- nitrogenous carbohydrate | Calories per 100 |
|--------------------------------|---|------------------|---|---------------------|
| Meat broth..... | 0.4 | 0.6 | ..... | 7.10 |
| Meat juice (expressed). | 6.0 to 7.0 | 0.5 | 0.5 | 31.20 (average) |
| Beef-tea..... | 0.5 | 0.5 | ..... | 6.6 |
| Leube's meat solution | 9 to 11 albu- men and 1.7 to 6.5 pepton | ..... | ..... | 86.5 (average) |
| Malt extract..... | 8.0 to 10.0 | ..... | 55.0 | 258.30 |
| Milk soup with wheat flour. | 5.0 | 3.25 | 15.0 | 112.0 |
| Barley soup..... | 1.5 | 1.0 | 11.0 | 60.96 |
| Rice pap with milk... | 8.8 | 3.5 | 28.6 | 182.61 |
| Coffee..... | 3.12 | 5.18 | ..... | 59.92 |
| Tea..... | 12.38 | ..... | ..... | 50.75 |
| Beer..... | 0.5 | 5.25 | 0.3 | 51.0 |
| Porter..... | 0.7 | 6.0 | 0.3 | 60.0 |

VI. *Fruits, Nuts, and Sugar*

| | Per cent. free acid | Per cent. nitrogenous proteid | Per cent. fat | Chiefly sugar | |
|-----------------|------------------------|-------------------------------------|------------------|---|---------------------|
| | | | | Per cent. non- nitrogenous carbohydrate | Calories per 100 |
| Apples..... | 0.82 | ..... | ..... | 7.22 | 29.6 |
| Pears..... | 0.20 | ..... | ..... | 8.24 | 33.78 |
| Plums..... | 1.50 | ..... | ..... | 4.68 | 19.18 |
| Peaches..... | 0.92 | ..... | ..... | 7.17 | 29.39 |
| Apricots..... | 1.16 | ..... | ..... | 4.69 | 19.22 |
| Grapes..... | 0.79 | ..... | ..... | 14.36 | 58.87 |
| Strawberries... | 0.93 | ..... | 0.45 | 6.78 | 31.88 |
| Chestnuts..... | ..... | 5.48 | 1.37 | 38.34 | 192.11 |
| Cane-sugar..... | ..... | 0.35 | ..... | 93.33 | 382.65 |
| Beet-sugar..... | ..... | ..... | ..... | 99.75 | 408.97 |
| Honey..... | ..... | 1.20 | ..... | 73.22 | 305.22 |

I. *A Chiefly Milk Diet with Addition of Carbohydrates in Liquid Form*

| | Albumen (per cent.) | Fat (per cent.) | Carbohydrate (per cent.) | Calories per 100 |
|---|------------------------|--------------------|-----------------------------|---------------------|
| Milk, 1700 cc..... | 70.2 | 66.3 | 69.7 | 1295 |
| Soup of tapioca flour, 30 gm. and 10 gm. albumose ¹ | 10.0 | ..... | 30.0 | 164 |
| Soup of 40 gm. wheat flour, with some of the milk, 10 gm. sugar, and one egg. | 7.0 | 5.5 | 40.0 | 244 |
| Total..... | 87.2 | 71.8 | 139.7 | 1703 |

II. *A Diet Rich in Proteins*

Breakfast.—Corned-beef hash, oatmeal, toast, eggs, bread and butter, coffee or tea, and milk.

Dinner.—Soup, roast beef, potatoes, rice, turnips, toast, pudding and milk, bread and butter.

Supper.—Cold roast beef or pressed corned beef, bread and butter, coffee or tea, and milk.

III. *A Chiefly Milk Diet with the Addition of Carbohydrates and Fat in Mushes and Soups*

| | Albumen (per cent.) | Fat (per cent.) | Carbohydrates (per cent.) | Calories per 100 |
|---|------------------------|--------------------|------------------------------|---------------------|
| Good milk, 1500 cc..... | 62 | 58.5 | 63 | 1056 |
| Soup of 15 gm. sago, 10 gm. butter, 1 egg, 10 gm. al- bumose. | 17 | 13.5 | 15 | 257 |
| Pap of 80 gm. corn flour, 1 egg, 10 gm. sugar (two meals). | 7 | 5.5 | 90 | 398 |
| Total..... | 86 | 77.5 | 168 | 1711 |

¹ Ten gm albumose is contained in 90 cc. (3 ounces) of Denayer's peptone preparation, in 22 gm. (3vss) of Kemmerich's, or in 30 gm. (1 ounce) of Koch's.

VI. *Milk Diet with Addition of Solid Food, Pastry, and Broths, leaving little Residue*

| | Albumen (per cent.) | Fat (per cent.) | Carbohydrates (per cent.) | Calories per 100 |
|---|------------------------|--------------------|------------------------------|---------------------|
| Milk, 1250 cc..... | 51 | 49 | 52 | 878 |
| Meat broth with 1 egg, 10 gm. of butter, 50 gm. of fine toasted wheat bread (or softened). | 10 | 14 | 30 | 294 |
| Cakes 70 gm., butter 15 gm. | 5 | 12 | 50 | 337 |
| Soup of 30 gm. tapioca flour, 1 egg, 10 gm. butter. | 7 | 14 | 30 | 282 |
| Total..... | 73 | 89 | 162 | 1791 |

Diet in Digestive Disorders.—In considering the feeding of those suffering from gastrointestinal disorders, and in constructing a rational dietary, there must be taken into account the advancing, lowering, or level maintenance of their nutrition, supplying the proper number of calories to furnish heat and energy commensurate with the pathologic state, and at the same time so regulate the character of the nourishment ingested as to meet, without irritation or disturbance, the disordered powers of digestion. Sometimes, when the body as a whole is far below par in nutrition, or when there are specific demands for certain food elements, it is allowable to disregard the disturbed gastric digestion, paying the most attention to strengthening of the body as a whole. On the other hand, there may be present certain abnormal conditions of the digestive organs, which if disregarded, will prevent recovery, and perhaps, by failure of digestion, will cause the undigested food to act as a foreign body, not only increasing local disorder, but also provoking general harm. As examples of this may be mentioned the errors of gastric and small intestine digestion, causing decreased secretions in these organs (such as organic disease of the glandulature of the stomach, pancreas, and

small intestine), where there is much toxogenic decomposition of the proteins and fats due to bacteria in the canal, or where the albumen loss of the whole food is constantly great.

In the construction of a dietary to meet abnormal conditions of the digestive tract, especially in the presence of emaciation or lowered states of nutrition, I wish to warn my readers not "hew to the line" too closely, for if a mistake is made, it will be better for the patient to make it on the side of too much food than too little; and in this connection I wish to reiterate the statement previously made that I have seen many patients brought to a dangerous state of malnutrition by an unwisely restricted diet, even though such a diet may have been logically indicated by local or general disease.

It might be well also to remind the reader of the fact that proteins may be markedly increased, yet the quota of circulating proteins be maintained by the carbohydrates, and that these, under conditions of good starch digestion, can be considerably increased without the causing of local distress; and further that the entire canal is decidedly compensatory in its digestive power to all distinct food substances.

When digestion in the stomach is slow, as in the primary atonies, pylorospasm, nervous hypermotility, chronic gastritis, or pyloric stenosis, it is well to select such foods that require but little from the stomach proper, but quickly pass out of it. By so doing, we prevent to a degree subjective distress, check the tendency to gastric fermentation or stagnation, and directly assist in systemic nutrition.

The following table from Penzoldt gives a fairly good idea of the time that definite quantities of various foods leave the stomach in health. As all fluids pass through the stomach quickly, they have not been included. It might be well, however, to mention that later physiologic experiments show that the presence of fats have a decided influence in delaying evacuation, and that in hypermotility, the addition of a rather large content of fats will prevent the

carbohydrates and proteins from leaving the stomach too quickly.

PENZOLDT'S TABLES

From one to two hours:

- 100 to 200 grams of milk, boiled.
- 200 grams meat broth (no addition).
- 100 grams eggs, soft.
- 200 grams beer.

From two to three hours:

- 200 grams cocoa with milk.
- 200 grams light wines.
- 400 grams beer.
- 300 to 500 grams milk, boiled.
- 100 grams eggs in any style.
- 100 grams beef sausage, raw.
- 200 grams fish, boiled.
- 75 grams oysters.
- 150 grams cauliflower, boiled.
- 150 grams potatoes, boiled or mashed.
- 70 grams light bread, fresh or stale.
- 50 to 70 grams biscuit, zwieback, or crackers.

From three to four hours:

- 230 grams spring chicken, partridge, or squab, boiled.
- 190 grams spring chicken, partridge, or squab, broiled.
- 250 grams beef, raw or cooked.
- 160 grams ham, boiled.
- 100 grams roast veal.
- 100 grams beefsteak, raw-scraped or chopped.
- 100 grams roast beef.
- 200 grams fish, boiled.
- 150 grams breads, biscuit, cereals, vegetables and fruits.

From four to five hours:

- 210 grams squab, broiled.
- 250 fillet beef, beefsteak, broiled.
- 250 grams beef tongue.
- 250 grams ham, broiled.
- 250 grams goose, roasted.
- 280 grams duck, roasted.
- 150 grams lentils, purée.
- 200 grams peas, purée.
- 150 grams string beans, boiled.

The above is lacking in many of the foods ordinarily eaten, but will give a fair idea of the time required for most of our commonly used articles to leave the stomach. It is

often necessary, in cases where dietetic regulations extend over a long period, to use much ingenuity in selecting the articles, for the patient becomes wearied, and, unless some attention is paid to the demands of the palate or desires of the appetite, there will not be enough food ingested, and bodily malnutrition supervenes.

In pyloric stenosis, a liquid or semi-liquid diet is best on account of the difficulty experienced by the more solid foods in passing through this narrowed channel; also in hyperesthetic conditions, or post-ulcer states, in order to minimize irritation from the presence of foods; or in prolonged gastric digestion in the presence of ulcer, multiple erosions, gastrorrhagia, etc., the patient should be placed upon a liquid diet for a while at least.

There is still some divergence of opinion concerning the proper diet in hypersecretion of gastric juice. In hyperchlorhydria, some advocate a high protein diet to bind the acid, while others recommend a bland carbohydrate regimen to both bind and eventually control its formation. This question cannot be settled by any hard and fast rule, but modifying conditions must be taken into account, such as the amount of mucus, the enzymotic power present in the gastric juice, the present state of nutrition of the patient, and the facts pertaining to the healing of gastric, duodenal ulcers, etc.

A very good general rule, as employed by Bassler, is as follows: Where the acid is higher than the amount of enzymes, the use of a high flesh protein diet is worthy of attention, and is often beneficial to the patient. Care must be exercised, however, that in our efforts to bind the extra acid, we do not stimulate the stomach to develop more coaptation secretion of HCL, and thus later cause an aggravation of the original disturbance. In the working up of the diet to a safe meeting point to the acid, it is well to employ the heavier vegetable proteins, though the animal proteins should form the main stay to just short of the enzymotic content. But when there is but little

mucus in the stomach, and the acid content deficient, a diet mixed in variety, but with a heavier proportion of the vegetable proteins, will generally afford better results eventually.

With uncomplicated hyperchlorhydria (some are doubtful as to this condition ever being present) it is well to ascertain whether the high acid index is due to a nervous exacerbation alone, as is seen in the neurotics of young adult or middle life, or whether it is a well-established high or continually running acidity. In the former a high protein diet to bind the excess free acid for a short while is indicated; while in the latter and more chronic condition, a continued high protein diet prolongs the hyperacidity.

In acute ulcer of the stomach, each case must be dieted according to the conditions present. Where the acidity is very high, all irritations, whether mechanic, chemic, or thermic, must be avoided, and the fluid must be bland, and neither too hot nor cold. A milk and egg diet best fulfills this requirement. To this may be added later vegetables in the form of pureés, but meat and other solid foods are best excluded until very late in the course of the treatment.

In the different conditions of deficient gastric secretion, as hypochlorhydria, achylia gastrica, and atrophic gastritis, it is advisable to control the amount of total proteins, and sustain nutrition more with carbohydrates and fats. Meats should not be excluded altogether, because, if they are finely cut up or well masticated, the intestines, in their compensatory function, will take care of them.

In the sensory disturbances of the stomach, much depends upon whether they are primary in that organ or secondary to neurotic conditions elsewhere in the body. In the primary type, which, as I have said, many doubt (gastralgia, or local hyperesthesia) light and bland food, free from chemic or thermic irritation should be enjoined; also there should be a prohibition as to carbonated drinks,

alcoholic stimulants, and highly seasoned foods. Where the condition is apparently set up by reflexes from other organs, for instance, the crises of locomotor ataxia, or cyclic vomiting, the same rule holds good in pronounced cases, though the general state of the body should be taken into consideration, and a diet as nourishing as possible should be recommended.

Mastication.—The chewing of our food is a subject of more or less interest to us all. Beginning with precepts inculcated in every nursery, we are constantly admonished throughout life that thorough mastication is a prerequisite to health; while a rather recent school of thought contends that the whole process of bodily nutrition is markedly affected by the preliminary treatment of food in the mouth.

Mastication is an entirely voluntary act, while the performance of swallowing is a complicated reflex movement, initiated voluntarily, but for the most part completed independently of the will. Under normal conditions the presence of moist food on the tongue seems essential to the completion of this act, and I might add that a pleasant taste, coupled with a favorable mental attitude, still further facilitates the passage of food down the esophagus.

Too rapid eating, or *tachyphagia*, is a frequent fault, and has no doubt caused many digestive qualms, besides being the starting-point of many chronic disorders of the alimentary tract. This I admit, but do not admit the necessity for slow, deliberate and systematic mastication as a *sine qua non* for health in every individual, irrespective of temperament or station in life; nor do I believe it conducive to the best work of the digestive organs that a hard-and-fast rule be enjoined, whereby a certain stated period must be devoted to the mastication of a meal, regardless of the pleasure or inclination of the person.

From time to time apostles of deliberate mastication, or *bradyphagia*, have appeared on the horizon, the most prominent of these being Mr. Horace Fletcher, whose work "THE A. B. C. OF OUR NUTRITION," is so largely devoted

to this topic, and who so well pleads its cause, that slow and continuous mastication and insalivation until the food is liquefied in the mouth and almost imperceptibly swallowed, is called "Fletcherism."

The history of Mr. Fletcher and his movement is known to most of my readers, and need not be repeated here, but in regard to his doctrines in general I wish to enter a note of protest.

Concerning the protein constituents of food, insalivation exerts but little effect. We well know that either the pepsin and hydrochloric acid in the stomach or the trypsin beyond will attend to them, if they are decently comminuted, and their stay in the mouth need be only long enough to originate those psychic impulses which Pavlov has shown us regulate the subsequent flow of digestive juices. Carnivorous animals habitually bolt their food, and zoologic history shows that they come to no harm thereby. The essence of salivary digestion is the transformation of starch into sugar by the action of the ptyalin, and that process, though inaugurated in the mouth, continues until the whole of the stomach contents become acid. The time of salivary digestion is brief, and to be effectual should be energetic. No more should be expected of it than a preliminary act. The pancreas and other juices beyond the stomach will care for the starches, if only the psychic centers forward the proper impulses as received by the gustatory senses.

As to the method or comparative rapidity of chewing, I might say, and say correctly, it is to a great extent temperamental. As some people can perform a stated task, and perform it well, in half the time required by slow-moving individuals; and as some people move quickly, speak quickly, and think quickly, so they also chew quickly, but well. By those ardent and strenuous spirits who are happiest when in the busy turmoil of competitive struggle, the act of mastication is performed briskly, but none the less adequately. To that other class, who desire to meander

through life in a leisurely way, or to those semi-valetudinarians whose gastronomic powers are under constant mental scrutiny, Fletcherism comes as the promised fountain of youth.

Another objection to interminable mastication is the brevity of life. In one place Mr. Fletcher relates that one-fifth of an ounce of a young onion required 722 chews before it disappeared through involuntary swallowing, and Dr. Kellogg mentions a patient who cheerfully spent never less than an hour and a half in masticating his one small daily meal. To insist that busy men, those whose shoulders and minds bear the burdens and cares of government, commerce or literature; whose eager intellects are conquering the earth, the sea and the air—to insist that these should be subjected to a wearisome mastication of inanimate food, is a delusion and a snare, an anachronism in our twentieth-century civilization, and a frittering away of priceless time.

A certain amount of necessary chewing is advisable, as evidenced by the conformation of the human teeth. If the chemic functions of the stomach are deficient, or if the outlet is greatly constricted, fine mastication and thorough insalivation are highly beneficial. To the great majority of every-day Americans, however, a simple injunction as to good teeth and ample mastication is entirely sufficient, and the magnification of any division of the digestive organs at the expnse of another will nearly always result in direct or indirect harm.

ARTIFICIAL FOODS

By the term artificial foods is meant the proprietary or patented foods that are employed for feeding the sick or undernourished. They comprise many forms, dry, liquid, alcoholic, etc., and are recommended for those who are for any reason not able to partake of regular substantial foods; for irritable stomachs, or severe vomiting; for

administering proteins, carbohydrates, or fats in a concentrated or easily digestible form; and as a supplemental form of alimentation.

The Council on Pharmacy and Chemistry of the American Medical Association, in its reports has done much to dispel the glamor thrown about some of the alcoholic proprietary food as well as the dry foods, which have been placed upon the market with such misleading claims.

Its report concerning a number of these predigested foods is as follows:

"In order to get a fair conception of the actual value of these various preparations, it is desirable to make some comparison which can be readily understood by every physician. The amount of good milk necessary each twenty-four hours to sustain the vitality of a patient during a serious illness is not less than 64 ounces, or approximately 2000 c.c. The food value in calories represented in this amount of good milk may be placed at 1430 calories. This includes not only the protein and carbohydrate matter, but the fat as well. By comparing the available potential energy with the total energy of the predigested foods under consideration, it can be readily seen that if a physician depends upon the representations made by manufacturers, and feeds his patients accordingly, he is resorting to a starvation diet. The largest number of available calories, including alcohol, present in any of the recommended daily doses, is less than one-fifth of the number of calories represented by 2000 c.c. of milk; and the calories represented by the daily dose of the preparations poorest in food products is only one-twenty-fifth of the amount present in 2000 c.c. of milk. These figures tell their own story. Making 2000 c.c. of milk the basis of calculation, and estimating the amount of the various preparations required to yield this number of calories, it is found that the quantity to be administered daily to supply 1430 calories, including alcohol, varies from 7162 to 1506.2 c.c. In other words it will be necessary in order to supply

1430 units of energy per diem, to administer the amount of the various products in quantities found within the above limits. In many cases the amount of alcohol exhibited by these quantities would keep the patient in an alcoholic stupor continually. The cost necessary to supply this energy varies from \$1.48 to \$3.39. Compare these prices with the 2 quarts of milk. Is further comment necessary?"

The dry proprietary foods, too, in adequate quantities will often disturb the digestion more than the ordinary wholesome foods, while the caloric value claimed for them is unreasonable. Dr. David Edsall recently weighed a specimen of one of these dry foods, and reported that if all its weight were nutritive material (a liberal estimate), it was so light that it would take \$1.25 to \$1.50 to buy an amount equal in food value to a five-cent loaf of bread.

Dr. John Howland in a late paper on proprietary and predigested foods, showed by calculation that two of the most representative and widely used infant foods have little more than twice the value of whole milk, and that without the alcohol they contain the same nourishment as milk. The dose of these foods advised for a child of six months is a teaspoonful every four hours, which would give the infant the munificent equivalent of 2 ounces of milk daily! Dr. Howland further says: "Assuming that such a food could be ingested without grave gastric, intestinal or other disturbance in sufficient quantity to nourish a six-months-old infant, it would cost about a dollar a day, and would, moreover, require the child to take in twenty-four hours alcohol equivalent to 6 ounces of brandy, enough to terminate his short life or keep him in a state of alcoholic coma."

Another greatly overrated class of foods are the meat juices (not meat extracts), for which fabulous powers have been claimed. Well-expressed juice obtained from freshly chopped beef may contain a fair amount of actual nourishment in the form of coagulable proteins and meat bases, and is useful to tide over emergencies, or to satisfy

the patient that he is being fed. As to the meat extracts alone, however, they are a delusion. To quote Dr. A. L. Benedict, "A meat broth prepared at a temperature above 160 F., the coagulation point of albumen, contains salts, extractives, which are mainly excrementitious, and a little gelatin, as well as some melted fat, although the fat is often skimmed off. In so far as protein is concerned, a meat tea made by boiling cannot be more nourishing than egg tea, that is to say the water in which eggs are poached, or in plain words, it contains no protein nourishment at all, and is, barring certain qualitative and quantitative differences, of the same dietetic value as urine."

On such a regimen the patient may be fairly waterlogged with soup, and still get less than a hundred calories daily. If strength holds up under such feeding, it is from the reserve protein and fat stored in the body, and not from any decided nutritive virtue in the soup. Let me insist, therefore, that the caloric requirements be either met with the well-known substantial foods, or the artificial foods, when given, be calculated at their proper value, and not by excessive estimates made by interested parties. There are some proprietary foods that are useful, non-irritating and convenient to administer. They should be used with discretion, and not blindly, lest the patient be brought to a dangerous state of malnutrition, as I have witnessed in not a few instances.

DUODENAL ALIMENTATION

Duodenal alimentation means feeding the patient directly into the duodenum in such a manner that the stomach is kept empty. This is accomplished by the introduction of the duodenal tube, the method of which has been previously described. In this manner we have the patient always ready for feeding, independent of his desire to eat or his aversion for food.

This method of alimentation was originated by Dr.

Max Einhorn, and it has been used by him and many others with satisfactory results in properly selected cases.

After the tube has been introduced into the intestine, it should not be removed except for cause, being securely

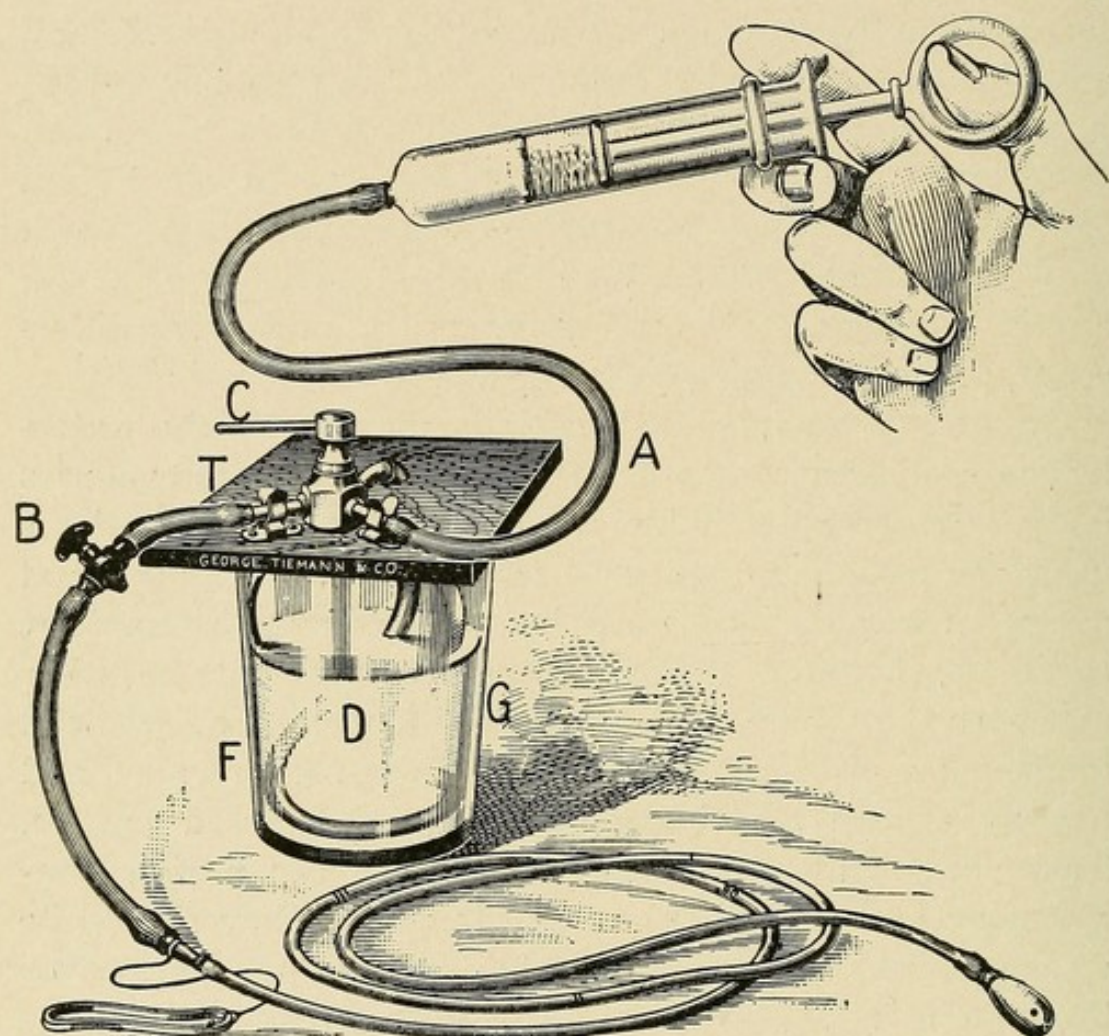


FIG. 69.—The duodenal feeding apparatus, with table support. A, tube leading to syringe; B, tube leading to duodenal pump; C, crank; D, tube leading to fluid; F, fluid; G, glass; T, table support or shorter support. When crank C is turned parallel to A, fluid can be aspirated from the glass into the syringe. When C is moved parallel to B, the fluid from the syringe can be emptied into the duodenum. (*Einhorn.*)

fastened to either a garment by a safety pin or to the ear by a silken thread attached to the rubber tube.

The food is usually given every two hours, eight feedings a day, though the first two or three days it may be wise to limit the number to seven or even six. The standard food is milk (7 or 8 ounces), one egg, and a tablespoonful of lactose. Should the lactose cause diarrhea, it should be

either lessened or omitted. In cases where the patient is emaciated, or it is essential that no loss of flesh ensue, 1 or 2 drams of melted butter may be added to every feeding. Occasionally a patient cannot stand the milk, being generally those with whom milk habitually disagrees. In this event, instead of milk, water with barley or pea flour may be substituted. Whatever is fed to the patient must be of blood temperature—neither cold nor hot—and it must be given slowly.



FIG. 70.—Patient being fed through the duodenal tube. (*Einhorn.*)

Dr. Einhorn first attempted the use of an irrigator, letting the fluid run in by gravity, but this proved inconvenient, because the temperature could not be well maintained, and the flow was either too quick or too slow. He then devised a syringe with a three-way stopcock, and with a little table. With this there is no need of loosening the syringe from the tube each time the former has to be filled, and the feeding can be made slow or fast as wished. The patients usually prefer to have it given slowly, for, if given quickly they often complain of ill-defined qualms of discomfort. It seems at first a tedious performance, but most of the patients learn to feed themselves, and they take

an interest in thus occupying their time. It requires twenty or more minutes for each feeding, and that repeated eight times daily gives them something to do.

A few supplementary points in regard to technic will not be amiss. The tube is put into the throat of the patient, and he swallows it with water. He should not swallow too quickly, lest the tube rotate on itself, but by swallowing deliberately, the tube will be taken straight into the stomach. Then, a little later, liquid food is given by the mouth, and tests are made from time to time through a syringe attached to the tube to see what can be obtained. If the end of the tube is still in the stomach, an acid liquid appears easily and quickly by aspiration. If it has passed the pylorus and is well into the duodenum, the aspirated fluid comes only drop by drop, and generally shows an alkaline reaction, besides being somewhat stringy. Another point in differentiation is that if we force air in through the syringe, the patient feels it immediately, if the pump is in the stomach; otherwise, there is less conscious sensitiveness in the duodenum, and the patient does not feel the air at all. In cases of achylia gastrica, or absence of gastric secretion, it is more difficult to be sure that the tube has entered the duodenum. As there is no acid secretion in the stomach, it is then necessary to use different colored fluids. For instance, a patient who had no milk, but only bouillon or tea, may be given a white-colored fluid, such as milk. If we then aspirate, and obtain a fluid that is not white, we know that the tube is beyond the stomach. If the patient has had milk, we can give him black coffee, or any colored fluid that is not white.

Usually it takes two or three hours for the tube to enter the duodenum, but in many cases requiring feeding there is present a pyloric spasm, and then it takes much longer. In some cases I have had to wait twenty or twenty-four hours, and Einhorn reports a patient, in whom thirty-six hours was required. While waiting for this, the patient may be fed by the mouth with liquid diet, and tests are

made from time to time. In cases of achylia gastrica with relaxed pylorus, the tube may find its way into the duodenum very quickly—sometimes in as short a time as five or ten minutes.

When ready to feed, the temperature must be just right, and the food should be invariably strained, because in passing through such a long fine tube any particles would block the tube, if precautions were not taken. Another quite helpful rule is that, after each feeding, a little plain water should be thrown in and then a little air, in order to keep the tube always empty. If these preventive measures are not taken, the tube becomes clogged in a day or two, and the tube has to be taken out and replaced, with much trouble to the physician and inconvenience to the patient. While the patient has the tube in, the mouth should be frequently cleansed with some good mouth wash, for while nothing is being eaten there is nothing to keep the surface of the tongue clean.

The tube is left in during the course of the treatment. Beside the feeding, the patient is given a pint of saline by the duodenal tube, and this may be given either through the syringe or by connecting an irrigator to the tube. If the patient objects to this, it may be given in the rectum by the Murphy drop method, for the bowels absorb saline readily.

The weight of the patients should be watched closely. Some of them lose, not real flesh, but water, for the nitrogen examination generally shows that under this regimen they are able to add to their nitrogen balance. It is well to make them gain a little weight, but more necessary to keep them from losing it.

Duodenal alimentation keeps the stomach empty, and so gives it perfect rest. The principle of rest is an important factor in curing disease, and this is an ideal method of accomplishing it. Another point in its favor, as claimed by Dr. Einhorn, is the accomplishment of a change in the size of a dilated stomach, which, when rested, tends to return to its normal size.

There are several objections to duodenal feeding, which will be mentioned. The constant presence of the tube acts as a foreign body with some, and the stomach becomes intolerant of it. Should the tube impinge against an eroded or ulcerated spot, the irritation produced will render the retention of the tube impracticable. Again, there are occasional cases in which vomiting sets up on the introduction of the tube, and does not cease until it is removed. Occasionally the intestine seems intolerant of the feeding, but this can generally be overcome by introducing the fluid more slowly.

The indications for duodenal alimentation, as claimed by its originator, are: First, ulcerations of the stomach or duodenum. Second, a great many cases of dilatation of the stomach, without organic obstruction; extreme atony, no matter whether there is pyloric spasm present or not. Third, in cases where nutrition is difficult, nervous vomiting, vomiting of pregnancy, etc. Fourth, disease of the liver. Fifth, inoperable cancerous condition of the stomach or cardia, where the stomach is not closed up and the duodenum can be reached. In the last-named condition, this method may bring a certain amount of comfort to the patient.

There are great possibilities for good in this form of alimentation, and in cases where the tube is well borne the results are sometimes most satisfactory.

RECTAL FEEDING

The administration of food by the rectum is a method that dates back into antiquity. *Ætius* and others mention it, and writers of the middle ages refer to it, though not in satisfactory terms, as they probably did not obtain success on account of their imperfect technic. *Voit* found that a dog's rectum would not absorb egg-albumen and water unless sodium chlorid were mixed with it.

Later *von Leube* advised the use of albumen to which

chopped pancreas had been added. Ewald, however, showed that this was unnecessary, and that albumen, neither peptonized nor pancreatinized, could be absorbed, especially if a small amount of salt was added. The presence of salt seems to cause reverse peristalsis, and Grutzner has demonstrated that substances introduced with the salt solution may later be found in the stomach.

Many varieties of food may be utilized in rectal alimentation. Protein may be supplied in the form of predigested meat or egg-albumen, to which salt has been added. Of the carbohydrates, grape-sugar seems the most available, though not more than 6 ounces of a 10 to 20 per cent. solution should be allowed, as it tends to provoke looseness of the bowels. Starch has been used in many forms, solutions containing it being readily digested and absorbed. Fat also may be used, but not more than 1/2 ounce in the twenty-four hours is advisable. Such fats as cream or oil may be employed, but I prefer melted butter added to the enema. Should rectal feeding be kept up for some time, it will be best to combine different articles, as well as to change the form of administration.

Bauer believes that but one-fourth of the nutriment required by the body can be absorbed by the rectum, and both he and the earlier writers placed the limit of time during which rectal feeding was practicable at two weeks. Later writers have placed the caloric absorption by the rectum even lower, and it is now a fairly well-established fact that under ordinary circumstances the rectum cannot be expected or made to digest and absorb more than 300 calories daily. Therefore, while this method of alimentation is a most useful adjunct, and is of great help in tiding a patient over an emergency, the physician should not feel that he is in any sense adequately supplying the needed daily calories.

The successful administration of nutrient enemas depends on knowledge and care. With careless or faulty technic, the food is not retained, the rectum and anus become ir-

ritated, and failure is the result. In hospitals, or where a specially trained nurse is at hand, the physician may give general directions, but in the absence of these, very explicit directions are requisite.

Method.—The rectum should be cleansed well by a rather high enema of normal salt solution at least once daily. Cleansing before each feeding, as some recommend, is too often. Should the rectum be inflamed, a solution of boric acid may be used instead of the salt solution, and if there is much stringy mucus, a solution of sodium bicarbonate—a teaspoonful to the pint of water—is helpful. If there is an inclination toward tenesmus, a return flow catheter or recurrent tube should be used for the cleansing enema. The temperature of the cleansing enema may be as hot as 95° F. to 105° F., but the nutrient enema should be strictly between 90° and 95° F., as solutions too hot or cold are promptly rejected.

Unless prevented by some condition of the disease, the patient should lie on his left side with his hips well elevated. A rectal tube or large catheter may be employed, not too large, though; a tube about 16 or 18 English is proper, smaller ones being needed for children. The tube should be well lubricated, but not with glycerin.

As the tube is introduced, it should be rotated slightly, and if any folds of the rectum impede its progress, a little fluid should be allowed to flow. This will "balloon" the rectum, and allow the tube to advance easily 8 or 10 inches, or even more. It is well for the tube to ascend as high in the rectum as is practicable, but if efforts are put forth to carry it too high, the tube is liable to double upon itself in the distended rectum, and the inflowing current, instead of pointing up, will point down.

The enema should be allowed to flow in slowly from a funnel or fountain. The former Davidson syringe, in which the fluid was sent in by intermittent jets, did not give satisfaction. Air should not be injected with the fluid. Should the patient complain of a desire to evacuate the

bowel, the flow should be discontinued until the desire abates, and then slowly resumed. By tact and patience the enema may be injected with perfect comfort generally, but if the nurse is hurried or the patient fretted, the fluid will in all probability be ejected in a short while.

After the injection the patient should lie as quietly as possible for an hour or more, and be instructed to use every effort to retain the enema. A pad or towel may be pressed over the anus for about twenty minutes, and in the meanwhile, if the nurse will divert the patient's mind from his rectum, the uncomfortable sensations of fulness there will soon cease. If the rectum is very irritable, the nutrient enema may be preceded by a small suppository of opium and belladonna, or a very small rectal injection of warm starch water containing about fifteen drops of the tincture of opium. The frequent use of opium, however, is to be deprecated. Should hemorrhoids complicate the situation, they may be painted with a 2 per cent. cocain solution previous to introducing the tube, and a soothing ointment may be applied between times.

The amount to be given at each injection is important, and should be regulated with judgment. As a rule it is not well to exceed 8 ounces, and 6 are generally better. Should this be retained with difficulty, a smaller amount should be used.

The interval of time between enemas, and the number daily will depend on the condition of the rectum. For a few times it is feasible to administer nutrient enemata four hours apart, but it is seldom that a rectum will bear them long unless about six hours are allowed to elapse between. About four times daily will be generally found the limit, if this method of feeding has to be kept up for an extended period.

Indications for Nutrient Enemata.—(1) In extremely weakened conditions, as in fevers or other exhausting diseases.

(2) In obstruction of the pharynx or esophagus, where the patient is unable to swallow food.

(3) In organic diseases of the stomach (malignant or non-malignant), where it is desired to give that organ a complete rest. Also, though rarely, in severe vomiting from irritable stomach, of nervous origin.

(4) In delirious, comatose, or insane persons, where it is impracticable to feed through the mouth.

RECIPES FOR NUTRIENT ENEMATA

Egg-and-milk Enema.

| | |
|------------------------------|--------------|
| Eight ounces sweet milk..... | 170 calories |
| Three eggs..... | 200 calories |
| Half teaspoonful of salt, | |
| | <hr/> |
| | 370 calories |

Starch-and-milk Enema.

| | |
|------------------------------|--------------|
| About two ounces starch..... | 250 calories |
| Eight ounces sweet milk..... | 170 calories |
| | <hr/> |
| | 420 calories |

Sugar-and-milk Enema.

| | |
|------------------------------|--------------|
| Two ounces grape sugar..... | 246 calories |
| Eight ounces sweet milk..... | 170 calories |
| | <hr/> |
| | 416 calories |

Von Leube's Milk-peptone Enema.

| | |
|------------------------------|--------------|
| Eight ounces sweet milk..... | 170 calories |
| Two ounces peptone..... | 100 calories |
| | <hr/> |
| | 270 calories |

Singer's Nutrient Enema.

| | |
|----------------------------------|--|
| Four ounces sweet milk. | |
| Four ounces wine. | |
| Yolks of two eggs. | |
| Half teaspoonful salt. | |
| One teaspoonful Witte's peptone. | |

In addition, the enemata may be thickened with a little mucilage, or a few drops of tincture of opium may be added. Should the rectum be extremely sensitive, the enema may consist of plain warm water, to which is added the albumens of two or three eggs. It is the custom to add to these

enemata various predigested foods, alcoholic or otherwise, and they seem to be borne quite well, though their supportive value is problematical.

OTHER METHODS OF NOURISHING THE BODY

Food suppositories have been suggested, but have not proved of any real benefit.

Nutrient inunctions with oils or cocoa butter have been used in conditions of great emaciation with some apparent benefit. The pediatricists esteem these inunctions highly, and, whether or not the oily substance is absorbed to any great extent, it aids in keeping the skin soft and pliable.

Intravascular feeding has been suggested by some for states of sudden and extreme exhaustion, as in Asiatic cholera or cholera nostras. The injections have consisted of milk, or milk and peptone solutions. This method is not to be recommended, and the employment of normal saline solution, when it is urgently necessary to get fluid into the body, is preferable in every respect.

Saline Infusions.—These are given subcutaneously, and are indicated in conditions where rectal saline irrigations cannot be utilized, as in certain intestinal diseases where a quick affect is desired, as collapse from hemorrhage or shock. Saline infusions are also of use when large quantities of fluids have been lost by the body, as in excessive diarrheas of cholera or dysentery. They are sometimes employed in uremic coma, or in suppression of urine.

The most eligible location for administering the infusion is between the chest wall and the mammary gland, or less preferably, deep in some muscle, as in the lumbar region, abdominal wall, or buttocks. The injection should be given under careful aseptic precautions. No special apparatus is required beyond a fountain syringe, to which is attached an aspirating needle. The various complicated devices for saline infusions are prone to get out of order, and are more liable to carry infection.

The infusion should be warm, and should be allowed to run in slowly and without force. Sometimes as much as 1 or 2 quarts can be injected into one place. The mixture should be the normal salt solution, 0.6 per cent.

The physician who carefully and zealously protects at all times the upkeep of the body, who, if he errs, does so on the side of a liberal regimen, who realizes that primarily the bodily furnace must be systematically "stoked" lest the units of heat and energy fail to be provided, will hold a much superior tactical position over the one, who, though skilled in all other therapeutic procedures, loses sight of a rational and sustaining diet.

CHAPTER XIV

DRUG THERAPY IN DIGESTIVE DISEASES

There are many diseased or disturbed conditions of digestion in which, by proper and logical drug medication, the symptoms are alleviated or the abnormal condition relieved. Drugs can never take the place of hygiene nor diet, but they hold certain logical indications in disease, and, when properly administered, afford tangible and potential benefit.

Alkalies.—There is some divergence in views as to the effects of alkalies upon digestion. According to Jaworski, small doses of bicarbonate of soda or other such alkalies (15 or 20 grains) would first decrease gastric acidity for a short while, and then increase it. On the other hand, if sufficiently large doses of these alkalies (two or three teaspoonfuls) are given for a sufficiently long time, the decreasing effect would persist without interfering with the motor power of the stomach. Furthermore, it seems that when the alkali reaches the duodenum, the secretion of bile increases, and when quite large doses are given, the intestinal contents are liquefied, and peristalsis somewhat increased.

When small or large doses of alkalies are given immediately or a short time before meals, they seem to stimulate the compensatory powers of the oxyntic cells of the stomach, and increased acidity results. Waters containing alkaline salts, when taken warm and one hour before meals for several weeks, tend to decrease acidity, and exert the effect of stomach lavage.

Bicarbonate of soda, while a dependable and non-irritating alkali, gives off carbon dioxid in the stomach, causing distention, and in some sensitive patients, real distress.

Calcined magnesia will neutralize acidity in rather smaller doses than the soda, causes but little if any distention, and gives a slight laxative effect.

Where the bowels are inclined to diarrhea, the heavy calcined magnesia, or magnesia ponderosa, will control the acid without upsetting the bowels. It might be mentioned that calcined magnesia, in large doses and taken for a long time, has been reported to accumulate in the intestines, forming concretions. This, I consider quite improbable, as an experience of many years with the administration of this alkali has caused no such trouble in cases under my observation. Carbonate of magnesia, and carbonate of calcium are also employed as antacids, but are less efficient. Bismuth in its different salts is an eligible antacid, possessing besides both an antidiarrheal effect and a sedative effect by its mechanical properties, which will later be discussed.

In prescribing alkalies, they may be given in powder, in solutions with water, or in suspension in some liquid. Both magnesia and bismuth can be obtained as milk of magnesia or bismuth, and in this form are sometimes more easily given than in the dry powder. It has also been demonstrated that when several non-irritating alkalies are combined, the antacid effect desired is obtained by somewhat smaller doses. Cathartics, antifermentatives, carminatives, astringents, sedatives, or other medicaments may be combined with alkalies in various ways, as dictated by the judgment of the physician.

Suggestive combinations of alkalies, etc.:

- R. Magnesiae ustae,
 Sodae bicarb. aa ʒvi
 Ext. belladonnae gr. i
- SIG.—One teaspoonful either dry on the tongue and followed by water, or stirred up in half glass water.
- R. Magnesiae ustae,
 Sodae bicarb.,
 Bismuth. subnit. aa ʒvi.
- SIG.—One teaspoonful one to two hours after meals.

| | | |
|----|--------------------|---------|
| R. | Magnesiæ ustæ, | |
| | Sodæ bicarb. | aa 3vi. |
| | Pv. rhei, | |
| | Sacch. lactis..... | aa 3ii. |

SIG.—One teaspoonful one or two hours after meals.

This prescription is useful where there is hyperacidity with constipation, but the dose must be reduced, if the bowels become too loose.

| | | |
|----|-----------------------|---------|
| R. | Magnesiæ ustæ, | |
| | Sodæ bicarb. | aa 3vi. |
| | Pv. carbo. ligni..... | 3i. |
| | Cretæ preparatæ..... | 3iv. |

SIG.—One teaspoonful one or two hours after meals.

This prescription is indicated in acidity combined with a frothy diarrhea with much gas.

| | | |
|----|-----------------------------|---------|
| R. | Cerii oxalatis, | |
| | Bismuth, subcarbonatis..... | aa 3ii. |
| | Bismuth, subgallatis, | |
| | Cretæ preparatæ..... | aa 3iv. |
| | Carbonis lig..... | 3i. |

SIG.—One teaspoonful stirred in half glass of water a half to one hour after meals, and repeated if necessary.

This prescription will be found helpful in the pain due to hyperchlorhydria, and may be repeated several times at half-hour intervals till the acidity is corrected.

The ingredients in the above prescriptions may be varied in quantity, especially the rhubarb or the belladonna. Where the patient desires a change, but the physician considers no change is needed, the addition of one or two grains of carmine, or a few drops of oil of anise or fennel will decidedly change the appearance or taste, while the therapeutic effects remain the same. These changes exert a certain psychotherapeutic effect, and should not be disregarded. It is not well to give a patient one formula too long. The digestive organs tend to become habituated to it, while the patient may feel that perhaps the physician is not following up the case with sufficient care and interest.

When alkalines are to be administered in liquid form, the milk of magnesia or milk of bismuth is the most satis-

factory. Lime water may be added to milk, but taken alone, does not taste well nor seem to exert a pleasant antacid effect. To these milky preparations may be added a variety of flavoring agents, carminatives, or laxatives, in proportions to suit each individual case.

Tonic, stomachics, or stimulants should not enter into the composition of antacid prescriptions, for they are antagonistic in their very nature.

The following are good antacid prescriptions in liquid form:

- ℞. Spts. lavandulæ co..... ʒi.
 Lactis magnesiae..... q.s. ad ʒiv.
 SIG.—Two teaspoonfuls a half to one hour after meals.
- ℞. Tr. cardamomi co..... ʒii.
 Lactis magnesiae..... q.s. ad ʒiv.
 SIG.—Two teaspoonfuls after meals.

When the bowels are too loose, or the above exert a too laxative effect, the following may be substituted.

- ℞. Spts. lavandulæ co..... ʒi.
 Lactis bismuthi..... q.s. ad ʒiv.
 SIG.—Two teaspoonfuls after meals.

Where there is much flatulence, the addition of a small amount of resorcin and spirits of anise or fennel will be most helpful.

- ℞. Spts. anisi..... ʒii.
 Resorcinolis..... gr. xv.
 Lactis magnesiae..... q.s. ad ʒiv.
 SIG.—One or two teaspoonfuls after meals, and repeat at half-hour intervals, as needed for flatulence.
- ℞. Spts. fœniculi..... ʒii.
 Resorcinolis..... gr. xv.
 Lactis magnesiae..... q.s. ad ʒiv.
 SIG.—One or two teaspoonfuls as needed for flatulence.

Where, in stagnation, there is great fermentation and much excess of organic acids, this may be used:

- ℞. Creosoti (beechwood)..... gr. vii.
 Sodii bicarb..... ʒii.
 Pv. acaciæ..... ʒi.
 Spts. lavandulæ co..... ʒi.
 Aquæ..... q.s. ad ʒiii.
 SIG.—One teaspoonful after meals.

In the presence of nausea combined with the flatulence and heartburn, of which some patients complain so bitterly, use this:

R. Spts. amygdalæ amare..... ℥ii.
 Resorcinolis..... gr. xx.
 Lactis magnesiæ..... q.s. ad. ℥iv.
 SIG.—One teaspoonful after meals, and repeat as needed.

Where there is painful flatulence, Lockwood suggests this:

R. Orthoformi,
 Bismuthi subcarbonatis..... āā ℥ii.
 Mist. cretæ co..... q.s. ad. ℥iv.
 SIG.—One teaspoonful in a little water as needed.

For a simple antacid, which may be given somewhat in the nature of a placebo, to perhaps keep the patient satisfied while investigations proceed, this will answer:

R. Mist. rhei et sodii,
 Lactis magnesiæ..... āā ℥ii.
 SIG.—One or two teaspoonfuls after meals.

As a stimulating carminative, a small amount of spirits of ginger may be included, or where a decided carminative is needed, the milk of asafetida, either alone, or in equal parts with the milk of magnesia may be given at frequent intervals.

Alkaline Waters.—These have their useful place, but through seductive advertising, many patients take them without proper advice, and with more injury than benefit.

Should atony, gastroptosis, or pylorospasm be present, these waters should be allowed in minimum doses, if at all.

The best alkaline waters are Saratoga, Vichy, or in Europe, Fachingen, Giesshubel, or Vichy. I have noticed occasional good effects from these waters, when taken before breakfast, and as a temporary means of relief, but they possess no advantage over the alkaline powders and liquids ordinarily prescribed for the same purpose.

In many instances a sojourn at a health resort, where alkaline waters are freely ingested, proves highly beneficial,

but not so much from the water, as from the rest, the change of food and environment, and the filling of perhaps a morbid mentality with new thoughts and sensations.

Carlsbad water is sometimes of service in hyperacidity due to ulcer, gall-bladder infections, or chronic gastritis. In such conditions a glass of Sprudel, as hot as can be swallowed, may be slowly drunk on arising. Another glass may be taken before supper, but not enough to cause undue looseness of the bowels.

The artificial Carlsbad Sprudel salt may be obtained, and in teaspoonful doses, diluted in hot water, answers the purpose quite well. Sodium chlorid waters, such as Hathorne and Congress water in this country, or Kissingen and Wiesbaden in Europe, do harm, and should not be prescribed.

Acids.—When there is a deficiency or absence of hydrochloric acid in the gastric secretions, some form of acid, preferably hydrochloric, is indicated. It should be understood, however, that by internal administration we can not equal in quantity or character the normal secretion, and the most we can do is to aid and supplement the depressed or waning digestive powers. Again, in some individuals whose stomachs secrete absolutely no acid, the gastric mucosa is intolerant of hydrochloric acid, even in diluted form, and suffers much discomfort or pain if its use is persisted in.

Hydrochloric acid should always be given in its dilute form—never chemically pure—should be further diluted with sufficient water, and if continued for any length of time, should be taken through a tube so as not to injure the teeth.

Hydrochloric acid, in doses of ten to twenty drops, may be mixed with a half or two-thirds glass of water, and sipped during a meal, or taken soon after. It may be combined with pepsin, though the glamour once connected with pepsin has been practically dispelled. Pepsin serves well as a vehicle for the administration of acids and several other

medicaments, but alone has little or no effect on gastric digestion.

The following are suggestive prescriptions containing this acid:

| | | |
|------|--|---------------|
| R. | HCl. dil..... | ℥iv. |
| | Ess. pepsini..... | ℥iiss. |
| SIG. | —One teaspoonful in water half hour after meals. | |
| R. | HCl. dil..... | ℥iv. |
| | Elix. enzymis..... | ℥iiss. |
| SIG. | —One teaspoonful in water half hour after meals. | |
| R. | HCl. dil., | |
| | Tr. nucis vom..... | āā ℥iv. |
| SIG. | —Ten drops in water half hour after meals. | |
| R. | HCl. dil..... | ℥iv. |
| | Tr. nucis vom..... | ℥ii. |
| | Tr. gentianæ co..... | q.s. ad. ℥iv. |
| SIG. | —One teaspoonful in water after meals. | |

The last prescription may be varied by substituting for the gentian, compound tincture of cinchona, or some of the aromatic elixirs, as elixir of calisaya.

Occasionally, after the hydrochloric acid has been given for some time, it is advisable to vary it for a time with dilute phosphoric acid. This acid, however, is useful mainly as a substitute, and should not displace the hydrochloric acid for too long a period.

Oxyntin, a proprietary acid albumin, is sometimes helpful in antacid states. A teaspoonful of the powder may be taken either in wafer paper or placed in sandwich form between two small slices of bread and butter, and taken at meals. Two grains of oxyntin are about equal to 1 minim of dilute hydrochloric acid.

Another preparation now on the market, and of seeming value, is a tablet called acidol. These tablets come in two strengths, one representing 2 minims of the dilute acid, the other representing 8 minims. They may be dissolved in water and taken at meals, and are especially useful in senile achylia.

Other somewhat vaunted preparations are gasterin and hepatin, which are obtained from the gastric juice of dogs

through gastric fistulas. These preparations are active digestants, but are expensive, must be obtained fresh, and are not easily kept in an efficient condition.

Stomachics.—These are agents intended to stimulate gastric secretion, and with it to sharpen the appetite. Stomachics are seldom indicated in hypersecretion, but in sluggish secretion, deficient acidity, or achylia gastrica. They should be given before meals, and preferably on an empty stomach.

The dilute acids in 1 to 2 minim doses, well diluted with water, exert a moderate stomachic effect, but the bitter tonics are more efficient, and to them may the acid be added.

Among the most representative of this class, are condurango, quassia, cinchona, nux vomica, gentian, hydrastis, and calisaya.

The following are useful stomachic prescriptions:

| | | |
|------|--|---------------|
| R. | Tr. condurango..... | ℥iii. |
| | Tr. nucis vom..... | ℥ii. |
| | Tr. Gentianæ co..... | q.s. ad. ℥iv. |
| SIG. | —One teaspoonful in water half an hour before meals. | |
| R. | HCl. dil..... | ℥i. |
| | Tr. condurango..... | ℥iii. |
| | Tr. gentianæ co..... | ℥iiiss. |
| SIG. | —One teaspoonful in water before meals. | |
| R. | Tr. nucis vom..... | ℥ii. |
| | Tr. quassiæ..... | ℥iii. |
| | Tr. cinchonæ co..... | ℥ii. |
| | Aquæ..... | q.s. ad. ℥iv. |
| SIG. | —One teaspoonful in water before meals. | |
| R. | Spts. Lavandulæ co., | |
| | Tr. condurango..... | āā ℥iv. |
| SIG. | —Twelve drops in water before meals. | |
| R. | Hydrastinæ..... | gr. i. |
| | Sacch. lactis..... | ℥i. |
| | Fiat capsulæ..... | 20. |
| SIG. | —One capsule half hour before meals. | |

Orexin is a useful stomachic, not being as well known as it should. This drug is in powder form, and may be prescribed in 3-grain capsules, about two hours before meals.

It is indicated in anorexia with low or absent hydrochloric acid secretion, and is contraindicated in hyperacidity or any inflammatory states of the gastric mucosa.

Artificial Ferments.—Ptyalin, the starch-splitting ferment of the salivary glands, acts in alkaline media, becoming inert in the presence of an acid reaction. This ferment in an artificial form has been recommended in doses of 7 to 15 grains, combined with an alkali, in disease of the salivary glands and deficient starch digestion. This does not seem to give practical results, and the abnormal conditions in which it has been used can be better controlled by other means.

Diastase, or Taka-Diastase (the latter being perfected by Takamine) are isolated ferments in powder form intended for the artificial digestion of amylaceous foods, and holding the same relation thereto that pepsin does to the proteins. Taka-Diastase can be obtained in a liquid form, however, though this is hardly as efficient as the powder. This powder, in 2- to 5-grain doses, may be given soon after meals, and is useful in amylaceous dyspepsia.

Pepsin is seldom indicated alone, though it seems to exert a useful influence when given with hydrochloric acid. Though it holds a strong place in the minds of the laity as a digestant, it really possesses but little efficacy when given alone.

Papain, a ferment from the juice of the papaw fruit, exerts a disintegrating rather than a completely digestive action upon the proteins and starches. Its action upon the proteins takes place in alkaline and neutral media, as well as slightly acid ones. In doses of 2 to 5 grains it has been employed in conditions of subacidity where hydrochloric acid was not well tolerated, but with rather problematical results.

Pancreatin, an extractive from the pancreas, transforms starch into sugar, emulsifies fats, and peptonizes albuminoids. It acts in alkaline or neutral media only, and should be administered in capsules, which do not dissolve in the

stomach. The dose is 1 to 5 grains. A preparation, pancreon, is a combination of pancreatin with gallic acid, the latter protecting the former from being destroyed in the stomach. This ferment is given to aid intestinal digestion, should be combined with alkalies, and administered at least two hours after meals.

Cathartics.—This term is modified in degree as to the amount of intestinal peristalsis produced, a mild amount being termed *laxative*, a greater amount *cathartic*, while one producing a severe and perhaps exhausting peristalsis, is termed a *drastic* cathartic. The *degree* of intestinal peristalsis produced by an agent or drug defines it, and, therefore, no drug may be termed any one of these unless the dose is taken into account.

The cathartic effect may be produced by direct stimulation of the nerves of the intestines, by irritation of the intestinal mucosa, by osmosis, by liquefying the intestinal contents, or by stimulating the central nervous system.

Eserin exerts its laxative effect by stimulating the central nervous system, and has been used subcutaneously. Its action is somewhat uncertain. The dose is from 1/100 to 1/50 grain.

Hormonal, a peristaltic hormon isolated from the spleen, is reported as having exerted strong and effective peristalsis in several cases of post-operative intestinal paralysis. It should be injected into the muscle in doses of 5 to 20 c.c. This should be followed with castor oil a few hours later.

The cathartic agents, medicinal and otherwise, are legion, and only those will be mentioned which are specially useful in digestive disorders.

Among the mildest laxatives are compound licorice powder, one or two teaspoonsful being given at bed-time, powdered rhubarb, 5 to 20 grains at bed-time, and aromatic fluid extract of cascara, of which one teaspoonful may be given. These preparations, in the doses mentioned, usually

move the bowels in eight or ten hours, without pain or discomfort. Much like these is the fluid extract of senna, though slightly stronger.

Phenolphthalein is a most eligible cathartic, acting much in the same manner as the salines, but seldom causes griping, tenesmus, or other disturbance. The dose varies from 1 to 5 grains, and it is frequently combined with other cathartic drugs with advantage. The good and reliable effects of this drug have been utilized by the manufacturers, and many preparations with phenolphthalein as their active principle, are available. Some of these are attractive in appearance and pleasant to take, but possess little advantage over capsules or tablets containing the plain powder.

Calomel has been highly esteemed for many years, but lately it has been the subject of iconoclastic attacks, and at present its only secure place in gastrointestinal conditions is to thoroughly evacuate the bowels. It can be combined to advantage with phenolphthalein, podophyllin, rhubarb, and others, and is best given in divided doses about an hour apart.

The bitter fluid extract of cascara is more energetic, and in doses of ten to thirty drops may be depended on to evacuate the bowels, unless there is some mechanical obstruction.

If a somewhat decided, even drastic effect is desired, there may be given powdered extract of colocynth, $\frac{1}{2}$ grain, aloin, $\frac{1}{2}$ to 2 grains, resin of podophyllin, $\frac{1}{4}$ to 1 grain, or resin of jalap, $\frac{1}{4}$ to 1 grain. As these drugs are likely to cause much griping and pain, it is well to combine with them as a corrective a little extract of belladonna or Dover's powder.

Castor oil is a reliable and efficient evacuant, probably being more used by the laity than any other. It acts both by intestinal irritation and lubrication, and in doses of two teaspoonfuls up to 2 ounces, or even more, will generally empty the bowels, unless there is some decided

obstruction. When a very large dose is given, the excess is carried off with the feces practically unchanged. Because of its nauseous taste, many object to it very strenuously, but this may be disguised fairly well with a little whiskey, wine, or extract of sarsaparilla.

Liquid albolene, an oily hydrocarbon, holds a useful place as a mild laxative. It may be given alone or combined with aromatics in doses of 2 to 6 drams, or even more, and when taken regularly in small doses for several days, gives good results in spastic constipation or constipation from strictures in the intestines. A very good way to administer liquid albolene is in two-teaspoonful doses, three times daily, half-hour after meals, until movements of the bowels set up, when the dose may be gradually reduced. Occasionally, in obstinate constipation, a larger dose may be required, and may be given without fear of untoward consequences.

Liquid paraffin, another similar oily hydrocarbon, is an efficient evacuant, and may be taken in as large doses as necessary. It may be given either in small doses before meals, or in a half-ounce up to 4- or even 8-ounce doses at bedtime.

I recently saw a patient of Dr. Bassler, who was suffering from multiple strictures of the small intestine, and nothing would produce for him an evacuation of the bowels except 8 ounces of liquid paraffin taken at bedtime.

Croton oil, in one-drop doses, may be given in an emergency, but is too severe and drastic for ordinary use.

Agar-agar, first introduced by Adolf Schmidt, acts by virtue of its power to absorb water, and also as a mechanical stimulant. In the form of "Regulin" it may be easily obtained, and given either alone, or preferably with such foods as cereals, as it is tasteless. Its administration should be preceded by a single dose of castor oil or compound licorice powder, after which a full teaspoonful may be given three times daily until regular evacuations set in, and then gradually reduced.

Following are a few eligible cathartic prescriptions:

R. Pv. aloes..... gr. xx.
Ext. belladonnæ,
Ext. nucis vom..... āā gr. iii.
Ft. pil. No. XX,

SIG.—One or two pills at night.

R. Aloini..... gr. $\frac{1}{3}$
Strych. sulphatis..... gr. $\frac{1}{60}$
Est. belladonnæ..... gr. $\frac{1}{8}$
Pv. ipecac..... gr. $\frac{1}{12}$
Ft. pil. I,

SIG.—At bedtime.

R. F. E. Cascaræ arom.
F. E. Sennæ..... āā ʒi.

SIG.—One or two teaspoonfuls at bedtime.

R. F. E. Cascaræ..... ʒi.
F. E. podophyllin..... ʒii.
F. E. sennæ..... ʒvi.

SIG.—One teaspoonful at bedtime. (Quite energetic.)

The various salines and saline waters have their uses, generally as hydragogue cathartics, and are best administered on an empty stomach. The Epsom, Rochelle and Glauber's salts are well known, and most of the highly vaunted laxative salines, either in solid or liquid form, now on the market, owe their virtue to the presence of these three.

The granular effervescent preparation of phosphate of soda is most useful, combining both hydragogue and chologogue properties. It is indicated in autotoxic conditions and catarrhal inflammation of the gall-bladder or duct.

Where it is desired to give a saline for some time, the following will be found efficient, causing neither griping nor distress and producing copious watery evacuations:

R. Magnesiae sulphatis,
Potassii bitart. (C. P.)..... āā ʒii.

SIG.—Two to four teaspoonfuls in half glass water on arising. (This will need to be reduced in a few days.)

Carminatives.—Very many patients suffering from digestive disorders complain of distressing flatulence after meals or at other times, and the physician is called upon to give remedies for this.

Some flatulence is caused by fermentation, but much of it is due to swallowed atmospheric air, as previously stated in this book.

Carminatives may be given in the form of an infusion, as is the frequent custom in Germany, or added to various alkalies, and should be prescribed so they can be frequently repeated, for flatulent patients are generally nervous, and are not satisfied unless they are taking something.

In flatulence and meteroism the following combinations may be used to advantage:

| | | |
|-----|--------------------|--------|
| R̄. | Magnesiæ ustæ..... | ʒi. |
| | Bism. salicyl..... | ʒi. |
| | Pv. mentholis..... | gr. v. |

SIG.—One teaspoonful after meals, and repeat if needed.

| | | |
|-----|----------------------|--------|
| R̄. | Ol. fœniculi, | |
| | Ol. mentholis, | |
| | Magnesiæ ustæ..... | aa ʒi. |
| | Ext. belladonnæ..... | gr. i. |
| | Ft. pil. No. 100. | |

SIG.—Two or three pills after meals.

| | | |
|-----|--------------------|---------------|
| R̄. | Spts. anisi..... | ʒiv. |
| | Resorcinolis..... | gr. xv. |
| | Lac. magnesiæ..... | q.s. ad. ʒiv. |

SIG.—One teaspoonful as needed for gas.

| | | |
|-----|---------------------|---------------|
| R̄. | Spts. fœniculi..... | ʒiv. |
| | Resorcinolis..... | gr. xv. |
| | Lac. magnesiæ..... | q.s. ad. ʒiv. |

SIG.—One teaspoonful as needed for gas.

| | | |
|-----|-----------------------|-------|
| R̄. | Spts. zingerberi..... | ʒiv. |
| | Lac. magnesiæ..... | ʒii. |
| | Lac. bismuthi..... | ʒiss. |

SIG.—One teaspoonful as needed for gas.

| | | |
|-----|-----------------------|---------------|
| R̄. | Tr. cardamomi co..... | ʒiv. |
| | Resorcinolis..... | gr. xv. |
| | Lac. magnesiæ..... | q.s. ad. ʒiv. |

SIG.—One teaspoonful as needed for gas.

Intestinal Antiseptics.—This term is a misnomer, for the intestinal tract cannot be rendered aseptic under any circumstances. Under conditions, however, of protein putrefaction in the small intestine, or excessive protein putrefaction in the large, in which the patient feels uncomfortable in the abdomen, with bad breath, coated

tongue, and general malaise, the following prescriptions seem to exert a decidedly beneficial effect.

R. Ichthyolis,
Taka-diastase.....aa ʒii.
Ext. nucis vom.....gr. iv.
Altheæ rad.....q.s.
Fiat capsule No. 30.

SIG.—One capsule two and a half hours after meals.

R. Fel bovis purif.....ʒiii.
Magnesiæ carbonatis.....ʒi.
Resin podophyllin.....gr. ii.
Ol. anisi.....gtt. iii.
Fiat capsulæ No. 30.

SIG.—One capsule two hours after meals.

There are several preparations marketed by pharmaceutical houses containing glycocholate and taurocholate of sodium, which seem to afford some benefit in these conditions. I might mention holadin and bile salts, which come in 3-grain capsules, and should be given two hours after meals, and tablogestin tablets, of which three tablets should be given two hours after meals. The last-named preparation is specially useful in jaundice, or any catarrhal state of the bile-ducts.

Among other antiseptic and antifermentative drugs, may be mentioned salol, guaiacol, thiocol, benzonaphthol, bismuth salicylate, menthol, and magnesia salicylate.

Emetics.—Plain tepid water, if given in sufficient quantity, generally acts as an efficient emetic. In order to get its good effects, however, it should be drunk in quantities of not less than three or more glasses, so that its volume may mechanically stimulate the stomach, enabling that viscus to “auto-lavage” itself. In one instance I gave a patient fourteen glasses of water before emesis occurred. To this water may be added, if desired, a small amount of alum, mustard, or sulphate of zinc, which increases its nauseous effect.

Ipecac in large doses is emetic; in small doses expectorant; in minute doses, antiemetic and tonic. Narcotics inhibit its emetic action. The dose of the powder as an

emetic is 15 to 30 grains, and it may be repeated every half-hour till results are attained. The syrup and wine are eligible preparations specially for children, in whom a quick emetic effect is wished. Either may be given in doses of a half to two teaspoonfuls.

Tartar Emetic.—The use of antimonial preparations as emetics is fortunately obsolete. Their action is slow, and is attended with prolonged nausea and depression, so that other emetic drugs should be selected in their stead.

Apomorphin Hydrochlorid.—This drug is the most prompt and reliable emetic that we possess; moreover it causes comparatively little nausea, and is quickly effective when administered hypodermically. It is useful in poisoning, when swallowing is impossible, or when the state of the stomach is such as to prohibit the use of a mechanical or irritant emetic. In acute alcoholism it is exceedingly effectual, both to empty the stomach and, by its relaxing power, to hasten the coming of soberness. It is never given by the mouth. The hypodermic dose is from $1/20$ to $1/10$ of a grain, and it is better to give the former dose, and repeat, is necessary, than to give the latter, unless quick results are greatly desired.

Antiemetics.—Among these are cerium oxalate, menthol, dilute hydrocyanic acid, creosote, tincture or wine of ipecac in drop doses, and morphin. Few antiemetics are useful when given empirically, and it appears that personal peculiarities and idiosyncrasies govern largely their efficiency.

Chloretone in 3-grain doses, menthol in 1-grain doses combined with some alkali or 10 to 20-grain doses of cerium oxalate may be administered at frequent intervals for nausea and vomiting. The hypodermic injection of morphine generally relieves vomiting for a while, but generally the after-effects make the nausea worse. There is no known infallible prescription for nausea and vomiting, and each case must be managed on its merits.

Sedatives.—These may be local in their effect upon the

stomach and intestines; or general, affecting the whole body. Opium and its derivatives act in both ways, diminishing gastric secretion, and preventing the stomach from emptying itself in the proper time. This drug may be used in acute conditions, but should be avoided, if possible, in any diseases that tend toward chronicity.

One of the best and safest gastric sedatives is belladonna and its alkaloid, atropin. The former is best given in granules containing the solid extract, in doses of one-fiftieth to one-tenth, and on an empty stomach. The atropin may be given in doses of $1/200$ of a grain repeated every four hours until some dryness of the mouth and fauces is noticed. Both of these are valuable as local sedatives in hyperacid conditions of the stomach; while the atropin is indicated in excessive serous discharges from the intestines. The sedative effect from belladonna may also be obtained by using it as a suppository.

Cocain, as a gastric sedative, is inefficient and dangerous, and should be condemned.

Orthoform, a patented product, has no chemic relation to cocain, which it resembles only in its action on the sensory nerve terminations. It is a white tasteless powder, efficient as a local sedative or anesthetic only when it comes in contact with exposed sensory nerves. Internally it may be given in doses of 8 to 15 grains for the pain of gastric ulcer or cancer. It does not relieve the pain of simple gastralgia, and hence has been employed as a test for gastric ulcer. It should not be given in connection with silver nitrate or bismuth subnitrate.

Anesthesin.—This is a white powder, soluble in ether, alcohol, fatty and ethereal oils, but insoluble in water. The hydrochlorid of anesthesin may be given in doses of 5 to 8 grains in conditions of gastric hyperesthesia and pain from ulcer. Doses of 30 grains have not proved toxic.

Many of the bromid salts are not suitable as gastric sedatives, as most of them are intrinsically irritating to the gastric mucosa. The bromid of strontium is perhaps an excep-

tion, while the bromid of sodium is perhaps the least irritating of the others. These two salts may be given in 15-grain doses, best combined with a pleasant syrup or some aromatic vehicle.

Chloral in 1-grain doses exerts a local sedative effect and may be given frequently in gastric neuroses.

The following prescription is a most useful one, and is sometimes employed as a therapeutic test as between organic and nervous affections of the stomach:

| | |
|-----------------------|---------------|
| R. Chloral..... | ℥ss. |
| Strontii brom..... | ℥iiss. |
| Spts anisi..... | gtt. x. |
| Aquæ chloroformi..... | q.s. ad. ℥iv. |

SIG.—One teaspoonful in water four or five times daily.

Among the general sedatives are the hypnotics, anodynes, and narcotics.

The influence of hypnotics on the digestive tract is undoubtedly irritating, and, in dealing with patients who suffer from insomnia in connection with digestive disorders, efforts should be made to overcome the insomnia by other means, if possible. Among the least irritating hypnotics may be mentioned trional, in 20-grain doses, veronal, in 6- to 10-grain doses, and medinal in 6- to 10-grain doses. The last-named preparation is rapidly absorbed and excreted, so that its hypnotic effect is prompt, uniform and reliable, while its cumulative toxic effects are not so liable to occur as with veronal. It may be used hypodermically or intramuscularly in doses of 6 or 8 grains, and is said to be particularly efficient in sea-sickness.

Of late, adalin has been recommended as a mild and unirritating hypnotic. The dose is 7 to 10 grains, and may be employed in peculiarly irritated conditions of the gastric mucosa.

In apparently neuralgic conditions of the stomach or intestines, where in reality the adjacent muscles are generally affected, some of the milder coal-tar preparations are useful, if cardiac strength permits. Among the most

reliable and least irritating, are acetphenetidin (phenacetin), and acetylsalicylic acid (aspirin). These may be given in 5-grain tablets or powders every two or three hours for neuralgic sensations. Any lividity or faintness should cause a discontinuance of their employment.

Astringents and Styptics.—Among these are adrenalin, alum, bismuth subgallate, catechu, tannic acid and its various derivatives, kino, silver nitrate, calcium phosphate, lactate, and salicylate, gelatin, and horse serum.

As an astringent to be used in gastric lavage, nitrate of silver is most useful, in strength of 1:1000 down to 1:10,000.

For internal administration the bismuth preparations are eligible, but should be given in one- to two-teaspoonful doses to be effective. The indications for the bismuth salts are hyperacidity, gastric erosions, and diarrhea.

The tannates which are used internally are tannigen, tannalbin, tannopin, tannoform, tannigenaform, and protan. These preparations are said to pass through the stomach unchanged, and to be gradually decomposed in the intestines, thus exerting an astringent effect upon the entire intestinal canal. The doses are from five to fifteen grains, and any one of these powders may be given in all conditions requiring an intestinal astringent. The tannigen is probably the best of the series, though, should it fail to give results, others may.

The calcium salts are highly esteemed by some as astringents, being recommended in 15 to 30 grain doses. I must confess that I have been disappointed in their use, and do not recommend them, believing other astringents to be far superior.

Gelatin is indicated as an astringent after hematemesis, and is usually given in a 10 per cent. solution, cold, in divided doses of 1/2 ounce, every three hours. Gelatin may also be obtained in sterile tubes—10 c.c. doses—and, given intramuscularly, serves the same purpose.

The use of serum, either from a donor, whose blood has been tested for hemolysis, or rabbit or horse serum, has

been recommended. Unless, however, the patient is so situated that every advantage of experience and technic is at hand, this would best be omitted.

The vegetable astringents, catechu, kino, and krameria, are employed in serous diarrheas with benefit, and may be used as the fluid extract or tincture in doses of ten to fifteen drops, diluted with water.

Opium and its derivatives inhibit every secretion in the body except the perspiration, and may be classed among the astringents for this reason. The tincture or the powdered opium may be employed in serous diarrheas, but their use, except in emergent cases, is to be deprecated.

Digestives.—This term means but little, for hydrochloric acid is a digestive in anacid conditions, while an alkali aids digestion in hyperacidity. The term, therefore, should be relegated to the obsolete.

Anthelmintics.—The principal drugs of this group are kamala, male-fern, pelletierine, quassia, santonin, spigelia, and thymol.

Kamala is obtained from the glands and hairs from the capsules of *Mallotus philippinensis*, a small tree growing in Arabia, China, etc. It is anthelmintic and purgative, sometimes causing nausea and colic, but seldom vomiting. It is used as a teniafuge, and to expel the round and thread worms. One or two drams are given suspended in water, mucilage or syrup, and repeated in four hours, if necessary. As a remedy against tapeworm, it is perhaps next to the male-fern in efficiency, and requires no preparatory treatment.

Aspidium, or male-fern, is the rhizome of *Dryopteris Filix-mas*. An important active principle, which is also teniafuge in character, is filmaron. The dose of the male-fern is from 1/2 to 1 dram in a single dose, fasting, and followed by a brisk purgative. The oleoresin aspidii is the form generally prescribed.

Pomegranate contains an active mixture of alkaloids named pelletierine, which is soluble in water. The decoc-

tion of pomegranate is given with occasional success for tapeworm. It should be followed in a few hours by a cathartic. The pelletierine tannate may be administered in doses of 3 to 8 grains. It should be given fasting, and followed after twenty minutes by a full dose of castor oil.

Quassia in strong infusion is efficacious for pin-worms in the rectum. (*Oxyuria vermicularis*.) It is injected into the rectum, and held there half an hour or more.

Santonin is the active principle of the Levant wormseed, and is given in doses of $1/2$ to 2 grains. It is best given in troches with sugar, or with calomel, at night, and followed by castor oil or a saline laxative the next morning. Following its ingestion, the urine assumes an orange-yellow tinge, and this should be told the patient, lest he be alarmed.

Spigelia, or pinkroot, is anthelmintic against the roundworm, and is in popular use as a vermifuge, administered with senna. In large doses it is an uncertain cathartic, and may produce serious symptoms, as vertigo, dimness of vision, dilated pupils, and convulsions. This will not occur when it is administered with a cathartic, and energetically propelled through the intestinal canal. It is usually given in the form of infusion.

Thymol is a phenol contained in oil of thyme, occurring in colorless crystals, of aromatic odor, pungent taste, and neutral reaction. Thymol is almost a specific against the *uncinaria Americana*, for which it is given in three or four doses of 10 to 30 grains well triturated, in capsules. Care should be taken that no oil nor alcoholic drink be ingested afterward, in order to avoid the absorption of the thymol, and the danger of poisoning thereby.

Tonics.—Drugs exercising a local tonic effect upon the gastric mucosa are included in the stomachics, which have been fully discussed.

When stomachics and other forms of tonics, which exert their effect upon only one or more functions or parts of the body, are excluded, the number is considerably reduced. A general tonic should restore energy and strength to a debil-

itated subject by a scarcely perceptible stimulation of all the vital functions, its effect being apparent in an increased vigor of the entire system.

The most typical of the medicinal agents which impart general tone and strength are strychnin, cinchona and its derivatives, iron, and vegetable bitters; the last-named accomplishing their effects to some extent through their stomachic action. To these may probably be added manganese, the glycerophosphites and hypophosphites, phosphorus, cod-liver oil, and perhaps lecithin.

It is found that the combination of several agents possessing an analogous action is helpful, the combined effects proving more comprehensive. Following are several worthy tonic prescriptions:

R. Tinct. nucis vom..... ʒii.
Tinct. cinchonæ co..... q.s. ad. ʒiv.

SIG.—One teaspoonful after each meal.

R. Arseni trioxidi,
Quiniæ sulphatis,
Ferri et potass. tart.,
Fiat pil. No. 30.

SIG.—One pill after each meal.

R. Tr. ferri..... ʒiv.
Ac. phosphorici dil..... ʒvi.
Syr. limonis..... ʒii.
Syrupi simp..... q.s. ad. ʒiv.

SIG.—One teaspoonful in water after each meal.

R. Ferri sulph. exsic.,
Potass. carbonatis..... aa ʒii.
Syrupi, q.s.,
Ft. pil. No. 48.

SIG.—One pill after each meal, gradually increasing to three. (Blaud's pill.)

R. Hydrarg. chlor. cor..... gr. i.
Liq. acidi arsenosi..... ʒi.
Tr. ferri..... aa ʒiv.
Ac. hydrochlor. dil..... aa ʒiv.
Syr. simp..... ʒiii.
Aquæ..... q.s. ad. ʒvi.

SIG.—Two teaspoonfuls in water after meals.

R. Tr. nucis vom..... ʒii.
Ferri peptomangani..... q.s. ad. iv.

SIG.—One teaspoonful in water after meals.

This tonic is useful in nervous and debilitated subjects:

℞. Ext. sumbul.,
 Ferri sulphatis..... āā gr. xx.
 Asafetidæ..... gr. x.
 Arseni triox..... gr. ss.
 Ft. pil. No. 20.

SIG.—One pill three times daily after meals.

℞. Tr. condurango..... ℥iii.
 Tr. nucis vom..... ℥ii.
 Glycerophos. co..... q.s. iv.

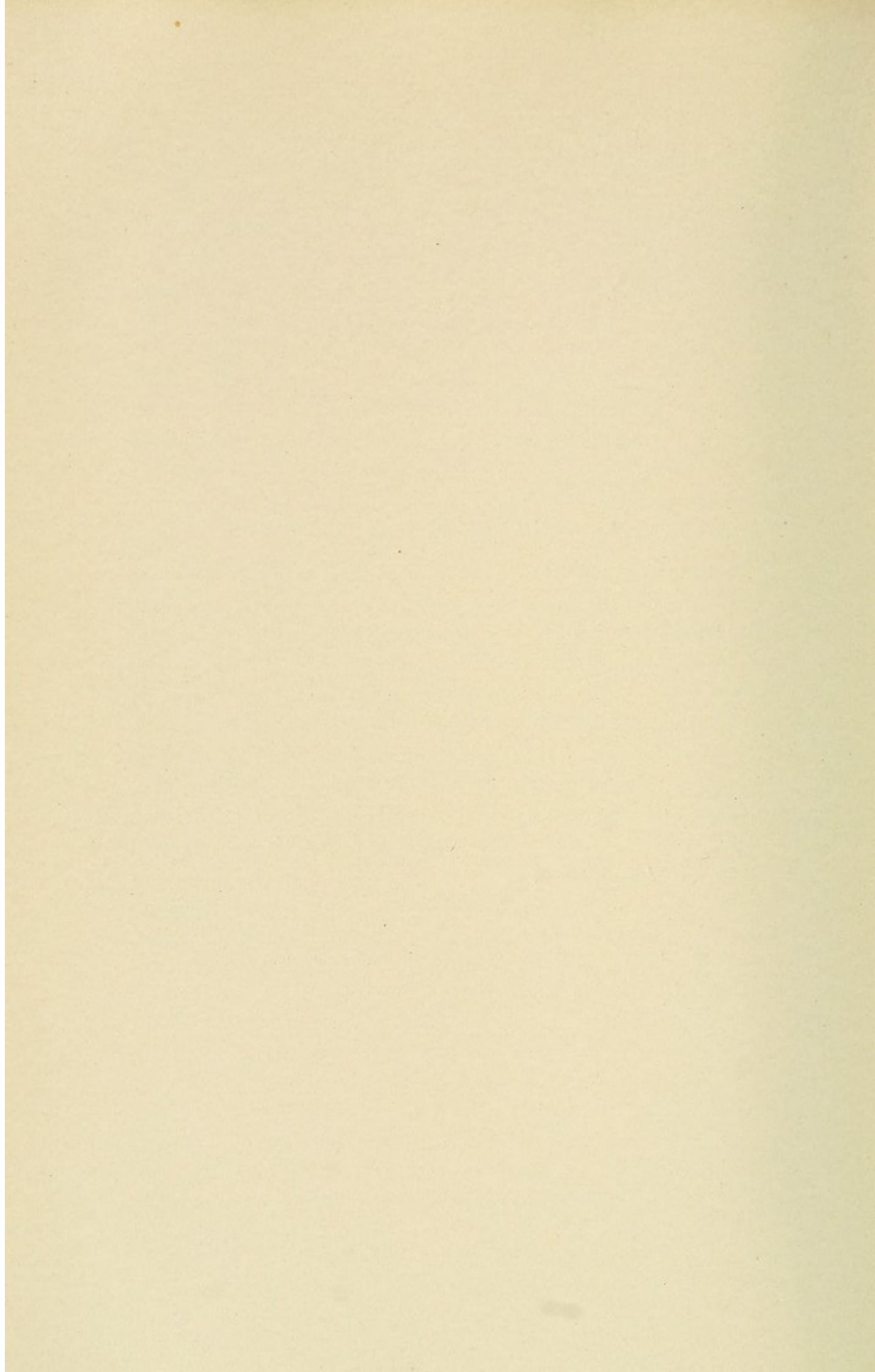
SIG.—One teaspoonful after meals.

℞. Tr. kolæ..... ℥iss.
 Ac. citrici..... gr. xx.
 Sodii arseniat..... gr. i.
 Tr. cocæ..... q.s. ad. ℥iv.

SIG.—One teaspoonful after each meal.

The time is far distant, if it ever comes, when some form of medication will not be required by those who are sick. Those who preach from the housetops and in the most blatant tones against drugs, are often the first to fly to the physician for relief when in real pain or distress. It is incumbent upon every thoughtful physician, therefore, to have at his command a definite and well-ordered knowledge of appropriate medicines and their logical combinations, and, if he will use them with judgment in connection with indicated hygienic and dietetic measures, his efforts will generally bring success.

Patients are not, and probably never will be satisfied with advice alone; they expect some form of medication. To use a witty but true aphorism, "Medicine sometimes cures; it often relieves; it always consoles."



PART SECOND
SPECIAL DIAGNOSIS AND TREATMENT OF
DIGESTIVE DISEASES



CHAPTER XV

NEUROSES, MOTOR, SENSORY, AND SECRETORY

In the older works on digestive diseases, the various neurotic disturbances were given much space, and through the writings ran a note of confidence in the discussion of neuroses. As diagnostic methods have become more exact, and as many of these cases of supposed nervous disorders were followed to surgical operation, only to find that the symptoms rested upon definite and demonstrable organic changes, the tone has become less certain, and we now approach this subject, not only with caution, but with a certain amount of trepidation.

Within the last few years chronic appendicitis, minus the classic signs, has been demonstrated to be the cause of many cases of so-called hyperchlorhydria. Irritation and inflammation of the gall-bladder have been recognized as the origin of apparently gastric neuroses, while former cases of gastralgia and epigastralgia are now referred to gastric or duodenal ulcer. Many other conditions might be cited, but these are sufficient.

The term nervous indigestion, nervous dyspepsia, and psychic indigestion should be used with extreme care, and only after repeated objective and subjective examinations have enabled the physician to rule out underlying lesions.

Cases of true digestive neuroses are almost invariably found in the middle years of life, among those who think for themselves and others. The nerve centers of young children are less impressionable to emotional excitants; while in the years past fifty or sixty, the waning digestive powers, in their halting efforts to produce the needed bodily

energy, have no time to set up fantastic reflexes. Digestive troubles in the two extremes of life are generally due to dietetic errors, while in old people organic and malignant maladies play an important part.

Older estimates placed 50 to 75 per cent. of those suffering from indigestion among the neuroses. These figures were compiled before the days of modern surgery, of X-ray examination, and of systematic investigation of the stomach-contents and feces. Present-day writers estimate the percentage of purely nervous indigestion at about 3 to 5 per cent. in hospital cases, and possibly 12 or 15 per cent. in private practice. Lockwood suggests that an additional 10 per cent. be added, if there be included patients with the enteroptotic habitus and well-developed visceral ptoses. My own records would point to between 5 and 8 per cent. of perhaps uncomplicated neuroses, and generally, in calling any digestive affection a pure neurosis, I do so with a mental reservation.

Diagnosis.—The diagnosis of nervous indigestion should never be made until all diagnostic methods have been exhausted. I have so often had patients to come into my office bringing with them this diagnosis, and learning that no test-meal had been taken or analyzed, nor a thorough physical examination made of the heart and lungs.

A good rule is to arrive at the diagnosis of nervous indigestion or other of the digestive neuroses by the process of exclusion, eliminating one by one underlying organic lesions.

The following rules are adapted from the recent excellent work of Lockwood:

(1) A diagnosis of nervous indigestion should not be made in the presence of more than 30 c.c. of fluid in the fasting stomach, the fluid giving a strong reaction for hydrochloric acid. Hypersecretion is generally an expression of pyloric stenosis, organic or spasmodic, and this is due to an organic cause.

(2) A diagnosis of nervous indigestion should not be made in the presence of persistent hyperacidity accompanied by

epigastric pain. Nervous hyperchlorhydia may occur, but is not accompanied by either pyrosis or pain. The association of either of these latter symptoms should suggest an organic origin for the complaint.

(3) Achylia gastrica may be of nervous origin, but this is not probable when serious motor error is in evidence. Achylia with food-stagnation is strongly suggestive of cancer of the stomach.

(4) Achylia gastrica, accompanied by pain or vomiting, indicates an underlying organic cause.

(5) The diagnosis of nervous indigestion should not be made when recognizable food remains are repeatedly found in the fasting stomach. Under the influence of fear, nervous shock, or vicissitudes of temperature the motor functions may be temporarily interfered with, but this would not be the case permanently.

(6) The diagnosis of nervous indigestion should not be made when epigastric distress or pain occurs regularly at a definite time after eating. The very fact of this disturbance coming on at a definite time argues against a neurosis.

(7) The diagnosis of nervous indigestion should not be made when one symptom alone persists, without other evidences of nervous instability. The presence of one definite symptom in itself presupposes an organic cause.

(8) The physician should be on the *qui vive* for drug addictions, for these habitues can sometimes present a syndrome of symptoms that will puzzle the most experienced.

(9) The diagnosis of nervous indigestion should not be made in persons over forty or forty-five, in whom indigestion is a new symptom. Such patients are usually developing a serious systemic or malignant disorder.

(10) Finally, digestive neuroses and organic diseases may be concomitant, and the presence of either need not exclude the other.

In diagnosing a digestive neurosis the personality of the patient must be taken into account. The symptoms are shifting, variable, and evanescent. The clinical symptoms

bear but little relation to the food ingested, while slight disturbances produce the most bitter complaining. Such patients invariably improve when their occupation or environment is changed, or a vacation is enjoyed. During a vacation trip or a respite from daily cares these people find that they can eat any ordinary food without discomfort, but when they again take up the daily burdens, their symptoms promptly return.

One caution may be here inserted: Under the influence of shock or powerful emotion symptoms of organic disease sometimes disappear for a while. Later, after the emotions have resumed their normal tenor the symptoms naturally reappear. Patients also with serious organic diseases may be greatly influenced for better or worse by extraneous circumstances.

Several therapeutic tests may be tried, and a prompt response to either argues in favor of a neurosis, within reasonable limitations.

First, a gastric sedative may be given for five to seven days, and the results noted. The prescription containing chloral and strontium bromide is suitable for this test, and if decided improvement ensues, it is a strong point in favor of a neurosis.

Second, if the patient, when on a vacation, finds that he can eat without inconvenience ordinary articles of food, but that even a light diet disagrees when he is at home or at work, some neurosis may be suspected.

Third, many nervous and emotional symptoms in run-down and emaciated invalids are due to starvation alone, and disappear when the body is strengthened by adequate food. These sufferers are nearly all on a "diet," in some instances self-imposed; in others a rigorous course of food-deprivation has been instituted long previously, and kept up under a mistaken idea that the disease was being "starved out." They have developed a sitophobia, or fear of food, and this fear is a part of the nervous picture. Under generous feeding, reinforced by wholesome psycho-

therapy, the nervous manifestations in this class of patients generally disappear.

MOTOR NEUROSES

Hypermotility.—This means an abnormal rapidity in the movement of the stomach, resulting in too hasty evacuation. Sometimes the stomach is found empty in a few minutes after the ingestion of a meal. Combined with this may be achylia gastrica with defective closure of the pylorus, the latter being due to absence of the acid, or simple lack of tone in the outlet. The diagnosis is made by means of a test-meal. The treatment consists of general tonics, dilute acid, and faradic electricity applied over the stomach.

Peristaltic Unrest of the Stomach.—This complex of symptoms brings about increased peristaltic motions of the stomach, and does not often occur as a pure neurosis. These movements may be easily observed in thin patients with flabby abdominal walls, and they are often accompanied by rolling and gurgling sounds, which can be heard some distance from the patient. This condition is often present in stenosis of the pylorus, and should not be classed as a neurosis unless the former can be excluded.

Treatment comprises constitutional, dietetic, and psychic means. The body should be well nourished by bland and unirritating food, but not too much at a time, and the evening meal should be specially light. Hydrotherapy holds a useful place, either warm or cold compresses being indicated, as the patient wishes. External faradic electricity may be employed, while a brief "rest cure" is of benefit. The bromide of strontium dissolved in the elixir of the valerianate of ammonia, or concentrated tincture of *passiflora incarnata* may be given. The use of codein or morphine, as recommended by some, is to be avoided.

Peristaltic Unrest of the Intestines.—This condition consists of marked rotary or rolling movements of the intestines, so that their vermicular motion is often visible. It

is usually seen in hysterical or hypochondriacal patients, though it is occasionally concomitant with organic troubles.

Clinically there are rolling, gurgling noises in the abdomen, easily heard, generally without pain, but most embarrassing to the patient. Stenosis of the small or large intestine must be excluded.

Treatment.—This is much like that of gastric unrest, and consists of measures to tone up the body, to quiet the nerves, and to permit a maximum of food with a minimum of work for the bowels.

Nervous Diarrhea.—This exaggerated peristaltic movement may occur in both the large and small intestine, while an increased transudation of fluid may be present due to nervous influences. The treatment is the same as in ordinary diarrhea, plus attention to underlying nervous conditions.

Cardiospasm.—In this disorder the cardiac orifice of the stomach contracts at the point of its junction with the esophagus, and, with a spasmodic closure, prevents any food from entering the stomach. This spasm is probably due to some irritation of the pneumogastric nerve.

Diagnosis.—This may be made by observation of both objective and subjective symptoms. When a bougie is introduced, it is seized by the cardia, retained by the contraction a while, and then, after a period of waiting, the spasm relaxes. An organic obstruction does not exhibit this symptom. The diagnosis may be confirmed by an X-ray examination.

Treatment.—This is mainly the management of underlying neurotic states. Psychotherapy is important, so that the patient may swallow deliberately without that element of fear which precipitates the spasm. He should first perform the act of deglutition without food in the mouth, after which he should begin to eat very slowly. His attentions should be diverted from his esophagus, and his meals should be taken under pleasant surroundings.

One or two teaspoonfuls of liquid albolene may be allowed

to trickle down the esophagus just before eating, or olive oil may be given, if preferred.

Dilatation has been advised, and Dr. Sippy has devised a practical instrument for the purpose. In dilating the spasm, the stretching process should be continued for quite a while, and the orifice should be widely dilated. Large esophageal sounds or bougies may be introduced, being left *in situ* for fifteen to thirty minutes. Electrotherapy is sometimes beneficial, but probably by its psychic influence.

Pylorospasm.—This neurosis is of comparative frequency, and its differentiation between mechanical obstruction and spasm is sometimes difficult.

Diagnosis.—This is best made with either the duodenal bucket or tube. The clinical picture must be taken into account. If it is found that at times the bucket penetrates the duodenum, as evidenced by the presence of duodenal contents, while at other times it fails to leave the stomach; and if, in addition there is nervous pain with increased gastric peristalsis and perhaps vomiting, the diagnosis of pylorospasm may be made.

Treatment.—This is embraced in the external application of heat, the internal administration of nerve-sedatives and lubricants, and suitable hygienic, dietetic and psychic measures. Einhorn has used his pyloric dilator with considerable success. Oil, taken on the fasting stomach, as advocated by Cohnheim, in connection with means to relieve hyperacidity, may be used with advantage.

Rumination (Merycism).—This consists in voluntarily bringing up food in small quantities, so that it may be remasticated and again swallowed. Rumination occurring soon after meals allows the food to retain its original taste, but later on brings up the food either sour or bitter. This is more common in men than in women, there being only ten women in one hundred and forty-five cases, as reported by Presslich.

The mechanism of rumination is imperfectly understood, and is supposed to depend upon relaxation of the cardia.

Heredity has been thought to play a part; also imitation, for in one instance a ruminating governess discovered later the habit in two of her pupils.

Treatment.—The patient should be forced to eat slowly, and to fight against and suppress the habit. Bitter or bad-tasting medicines are of aid, for a bad taste in rumination tends to discourage it. Psychotherapy plays a most important part in the treatment.

SENSORY NEUROSES

Gastralgia.—This condition is discussed under various names, some of them being cardialgia, gastrodynia, or neuralgia of the stomach. It is often found in individuals of unstable nervous poise, but a positive diagnosis of this neurosis should be made with great caution, and only after logical exclusion of organic affections, underlying or even remote.

The patient complains bitterly of pain in the epigastrium, and the location of the pain is really exterior to the stomach. The paroxysms of pain come on at irregular intervals, may last from a few hours to several days, and bear little relation to food ingested. The attacks often follow nervous stress or any sudden emotion. During the attack there is hyperesthesia over the epigastrium, while eructations may be frequent and explosive.

Treatment.—This should consist of means to improve the general condition between the attacks, and embraces the usual means to accomplish this end. During the attack the patient will demand active measures, and the physician may give a hypodermic of morphine with atropine, while hot applications should be liberally applied to the epigastrium. Only in rare instances should morphine or any other potent anodyne be left with the patient to take as he desires, for such individuals readily acquire the drug habit. Many are the abject slaves to-day whose bonds were first placed by some overkind physician, and who by the continued use of some narcotic drug riveted those bonds themselves.

Occasionally 5-grain doses of phenacetine give relief, and do not tend to cause any habit. A most valuable prescription consists of equal parts of Hoffman's anodyne and fluid extract of viburnum opulus, or cramp bark. This combination may be given in teaspoonful doses in hot water every half hour till relief is obtained. Intelligent hydrotherapy, also, is beneficial in this distressing complaint.

Hyperesthesia Gastrica.—This abnormal sensitiveness often develops without an apparent cause, and leaves as quickly as it came. The tenderness is most apparent to heat or cold, and in some individuals appears after certain seemingly harmless articles of food are taken, not leaving until the stomach is empty. Like other of the neuroses, it is most often seen in those with unstable nerves.

Treatment.—The diet list should be scrutinized and articles left off that cause pain, but care should be exercised that other equally nourishing foods are put in their place, lest malnutrition supervene. Regular diet should be resumed as soon as possible, or the patient may become morbidly introspective.

Nitrate of silver in 8-grain doses, diluted in one-fourth glass of water may be given four times daily. This should be kept up only a few days, however. A combination of strontium bromide with sodium bicarbonate and bismuth subcarbonate is sometimes most efficacious. If between meals there is undue burning, calcined magnesia in teaspoonful doses may be taken dry or in water.

Bulimia.—This term, sometimes called hyperorexia, means a condition in which the sense of hunger is abnormally augmented. In some manifestations of bulimia the patient's hunger is so imperative in its demands, that he becomes almost frantic if he cannot obtain something to eat. It may be associated with gastric ulcer, or cancer, hyperacidity or neurasthenia, or may be a primary affection. This symptom is occasionally a precursor of paresis.

Treatment.—The cause, if possible, should be discovered

and removed. The patient should arrange to always have food at hand so that something may be eaten as soon as the attack begins. General tonic and hydrotherapeutic measures should be inaugurated, and all the influences of psychotherapy brought to bear.

Bulimia must be differentiated from akoria, which is loss of the sense of satiety. Akoria is generally the manifestation of a deep-seated nervous lesion which demands special therapy.

Anorexia Nervosa.—This is an aversion or distaste for food without any tangible reason. Often the patient cannot explain why, but insists that any form of food is repugnant. It may be brought on by worry, anxiety or fright, and is generally found in neurasthenics, or chlorotic girls.

Treatment.—This should be strongly suggestive, and the patient should be placed where facilities are at hand for giving food forcibly. Strenuous efforts should be put forth to induce the invalid to eat, and these failing, the food should be given by gavage, by the stomach-tube, and by enema. After a few treatments of this sort the patient will find that eating is easier, and will generally accept the inevitable. The rest cure with forced alimentation, where practicable, is nearly always specific. But few of these neurotics can be cured under home surroundings, and the physician should be chary in attempting such a case unless he can place the patient under such environment that complete control can be obtained.

Stomachics—the more bitter, the better—are sometimes of benefit, but medicinal treatment has but a small place in the treatment of this trying malady.

Hyperkoria, or increased sense of satiety, when nervous, may be classed in the same category as anorexia nervosa, and be treated in the same manner.

Eye-strain and Gastric Neuroses.—Dr. George M. Gould was practically the first to call attention to the connection between eye-strain and various gastric neuroses. There is no set rule for diagnosing a connection, but in obscure cases

the element of eye-strain should always be eliminated before the physician can be sure of his ground. I make it a routine practice to have the eyes of every nervous patient investigated, and not infrequently the problem is solved and the remedy applied by the oculist.

SECRETORY NEUROSES

Hyperchlorhydria.—This is applied to that condition of the gastric secretions in which the quantity of the gastric juice is normal, but the percentage of free hydrochloric acid higher than normal (Aaron).

While hyperchlorhydria as a pure neurosis is no doubt a clinical entity, the attitude of the medical profession is becoming more skeptical, and some of the surgeons go so far as to say that there is never any decided or lasting hyperchlorhydria without the presence of an organic lesion.

A neurotic hyperacidity is a secretory neurosis dependent upon the abnormal stimulation or inhibition of certain nerve trunks leading to the stomach. One point that causes some confusion is the fact that the clinical symptoms of either primary hyperacidity or that brought about by some underlying and irritating lesion are practically the same. Occasionally there are few or no subjective symptoms, dependent, no doubt, upon a difference in the sensitiveness of the gastric mucosa. There are some individuals with a high degree of hyperchlorhydria who make little or no complaint.

This neurosis is found chiefly in young adults, though neither the young nor aged are entirely exempt. It is most often encountered in nervous individuals, those suffering from neurasthenia, melancholia, psychasthenia, or among those who are laboring under the stress of grief, worry or mental overwork.

There are no characteristic pathologic changes in simple hyperchlorhydria.

Diagnosis.—This trouble, unless generated by some vio-

lent mental storm, develops gradually. The patient feels an uneasy sensation at a rather definite time after meals, the time depending to some extent on what has been eaten. When all is well mentally, and the mind is diverted, this discomfort is noticed less or not at all. The sensations of distress or pain vary from one of burning in the epigastrium to severe cramping spells, the latter being probably caused by pylorospasm brought on by the impingement of the extremely acid chyme against that outlet. Connected with this there may be headache, excessive nervousness, dread of eating and generally constipation. Many of these patients find that they can ease the pain by eating some light, bland article while the hyperacidity is most painful. The appetite is generally good in these patients, and, unless they are on a limited diet, or have developed an exhausting sitophobia, they appear fairly well nourished.

Upon physical examination the epigastric region is generally sensitive to light pressure, but gentle and firm pressure often affords a measure of relief.

The diagnosis can only be confirmed by chemic examination of the stomach contents, as the symptoms alone, while strongly suggestive, are not infallible. The free hydrochloric acid will be found to range from 40 to 100 or even more, though the macroscopic appearance of the test-meal is about normal. It is well to make, if possible, several tests, for it will be noted that the hyperacidity will vary according to the patient's mental status.

To make a positive diagnosis of hyperacidity as a neurosis requires the most serious thought, for the whole course of treatment depends upon the decision, and a mistake may lose for the patient much precious time, which could be utilized to better advantage otherwise.

The following diagnostic rules are adapted from Lockwood:

- (1) Do not make a diagnosis of hyperacidity until all organic lesions are excluded, and even then be prepared perhaps to change the diagnosis under later developments.

(2) Do not make a diagnosis of hyperacidity without examination of the fasting stomach with the tube. The presence of acid fluid or of food remains, or any considerable amount of acid mucus should exclude the diagnosis.

(3) Do not make a diagnosis of hyperacidity simply because the patient is nervous or neurotically sensitive. Individuals may be just as nervous in the presence of organic disease as without it.

(4) Do not make a diagnosis of hyperacidity, should the previous clinical history suggest attacks that may point to appendicular or gall-bladder disease, or should the results of physical examination be such that these lesions are probable.

(5) Do not make a diagnosis of hyperacidity in cases accompanied by acute epigastric pain, whether dependent or not upon the taking of food. Especially should this be avoided, if the pains occur at a definite period after eating and are not influenced in their onset by emotional causes.

(6) Do not make a diagnosis of hyperacidity if hemorrhage from the stomach or intestines be present, either visible or occult.

(7) Do not make a diagnosis of hyperacidity in cases accompanied by repeated vomiting, especially if the vomiting be of the abundant type indicative of hypersecretion.

(8) Do not make a diagnosis of hyperacidity when the symptoms occur at a time when the stomach is empty.

(9) Do not make a diagnosis of hyperacidity in the event of the test breakfast settling into layers, the supernatant fluid being more than twice the depth of the sedimentary layer. These are the cases of alimentary hypersecretion with which hyperacidity as a neurosis should not be confounded.

(10) Do not make a diagnosis of hyperacidity in cases attended with anorexia, with nausea, with advancing anemia, and with progressive loss of flesh, especially if the patient be of adult years, and with previously good digestion.

(11) Do not make a diagnosis of hyperacidity, without mental reservation, in any patient over forty-five who has recently developed the complaint.

(12) Do not in any case make a diagnosis of hyperacidity without one or more gastric analyses.

Treatment.—Hyperchlorhydria is in the main a symptom, and its treatment must be in the main symptomatic. After the physician has intelligently eliminated the possible organic causes, he may then set about treating the neurosis with a fair degree of confidence.

The chemic indications are naturally those of an alkaline nature, and the combinations will depend to an extent on the state of the bowels. These powders may be taken at about the time after meals when the first symptoms of discomfort appear, and repeated at half-hour intervals until relief is obtained. If the powder contains a laxative ingredient, it is well to give the patient two powders, one of which does not contain the laxative, instructing him to use the latter powder when repetition is necessary.

The following have been of service, and the ingredients may be proportioned to meet individual cases and conditions:

- R. Magnesiae ustæ,
 Bismuthi subcarbonatis.....āā ʒiv.
 Sodii bicarbonatis..... ʒi.
 SIG.—One teaspoonful dry or in water one hour after meals.
- R. Magnesiae ustæ,
 Sodii bicarb.....āā ʒi.
 Pv. rhei,
 Sacch. lactis.....āā ʒii.
 SIG.—One teaspoonful one or two hours after meals.
- R. Cerii oxalatis,
 Bismuthi subcarb.....āā ʒiv.
 Magnesiae ustæ..... ʒiii.
 Sodii bicarb..... ʒi.
 SIG.—One teaspoonful after meals.
- R. Orthoformi..... ʒi.
 Bismuthi subcarbonatis..... ʒii.
 Misturæ rhei et sodii.....q.s. ad. ʒiii.
 SIG.—One teaspoonful in a little water as needed.

Alkaline waters are practically useless, though water in abundance dilutes the stomach contents, and aids the speedy evacuation of that viscus.

Belladonna and atropin have been recommended, though their efficacy is problematical. The dryness of the fauces and general discomfort following the administration of atropin cannot be atoned for by any assumed benefit. Extract of belladonna in 1/50 grain granules, given half an hour before meals, has seemed of service. This drug may be given up to one-twentieth of a grain three times daily; more than that is not advisable. In the very small doses it inhibits to a limited extent the excessive flow of the gastric juice.

Nitrate of silver, in 1/4-grain doses, given in a capsule or in water three times daily has been recommended. It has not proved satisfactory in my hands.

Gastric Lavage.—This question of gastric lavage in hyperchlorhydria is *sub judice* at present. Whether the possible astringent and sedative effects of the lavage may not be overcome by the irritation of the tube and by strongly centering the patient's mind on his stomach is a debatable question.

I have employed with apparent benefit a lavage of nitrate of silver in warm water, 1:5000. This is preceded by a generous lavage of a warm saline solution. Stronger solutions of nitrate of silver are not, in my opinion, advisable, though the strength of 1:1500 is recommended by one good authority. Lavage on alternate days is often enough.

Rosenheim, of Berlin, recommends aluminum salicylate in doses of a half to one teaspoonful in water a half to one hour before meals. This is in the market under the name of Neutralon (Kaulbaum) and may be tried in obstinate cases.

Goodman, of Philadelphia, advocates the use of 1 ounce of a 3 per cent. solution of hydrogen peroxide in a glass of water. This affords much relief from the heart-burn,

though it exercises but little permanent effect upon the hyperacidity.

Olive oil has been recommended, owing to its supposed inhibitory effect upon the gastric secretion. A tablespoonful may be given half an hour before meals. If this is not well borne, a teaspoonful of the aromatic liquid albolene seems to answer quite as well.

Dietetic Management of Hyperchlorhydria.—Clinical observation has demonstrated that those articles of food which bind large quantities of hydrochloric acid are the best borne, and exercise the most desirable influences upon the overworking oxyntic cells. The burning feeling of distress or pain is relieved by the administration of albuminous food, while carbohydrates, if given in any quantity, cause discomfort. The diet, therefore, is of the greatest importance.

All articles which tend to overstimulate the secretory glands of the stomach should be forbidden. Such articles comprise acids, spices, pepper, mustard, pickles, horseradish, olives, acid fruits, beer, wine, whiskey, and the various tasty condiments and sauces.

The food should be rich in albumen, such as chops, steak, roast beef and mutton, game, eggs, milk, oysters and fish. None of these should be fried, however, as the frying tends to coagulate the albumen making them much harder to digest. Bread and butter can be taken, the former in moderation. Green vegetables, such as spinach, tender mustard or turnip "greens," asparagus, lettuce, peas and string beans, potatoes, rice and other cereals, should be given in small quantity. It is best, though, for these to be taken in conjunction with large amounts of albuminous food.

Alcohol in all forms should be interdicted. It is not always practicable to stop the use of coffee or tea, but these beverages should be allowed in small amounts and quite weak.

Kemp has been pleased with the use of gelatin, employing 2 or 3 ounces of 5 to 10 per cent. gelatin solution, flavored

with a pinch of sugar or a little vanilla, and given midway between meals. The value of egg-albumin and cocoa is marked. Starchy foods that have been well dextrinized, as zwieback, dry toast, and some of the dextrinized cereals, are more readily digested.

Considerable water should be drunk with meals, unless advanced atony complicates the case.

Fats, such as butter and cream are of value. Since the carbohydrates are necessarily limited, the fats are available for the supply of required calories; furthermore, fats lessen acidity, and perhaps the irritable tendency of the gastric mucous membrane.

It is often helpful in the dietetic management of hyperchlorhydria to give three additional feedings at a time after the regular three daily meals. The extra feedings may consist of lactone buttermilk (very fresh), bouillon, a sandwich, milk, raw eggs (especially the whites), and milk, with crackers or bread and butter. From this assortment of edibles, one can select an appetizing lunch.

For practical purposes an improvement in nutrition and weight, even though slight, should be sought in addition to the amelioration of the distressing symptoms. This is especially desirable in those who have been reduced in weight and strength by a too limited diet. The scales should be brought into frequent requisition, and even though an apparently sufficient number of calories are ingested, if the weight does not show improvement, the regimen should be increased in some manner.

I do not believe that a pure neurotic case of hyperchlorhydria was ever cured by a limited and prolonged diet, and in cases of doubt, the physician will find it safer and more satisfactory to allow, and perhaps to insist upon, a liberal daily intake of food.

Hygienic, hydrotherapeutic and psychic measures have their same field of usefulness in this neurosis as in the others.

Gastrosuccorrhea, or Reichmann's Disease.—In this condition gastric juice is poured out in great excess of the

digestive needs, so that not only is there an extra amount during the presence of food in the stomach, but a liberal amount of acid fluid can be found at nearly any time in the fasting stomach.

This generally occurs as an acute process, running a somewhat uniform course, but occasionally chronic, and interrupted by acute exacerbations. Though gastrosuccorhea has heretofore been classed as a neurosis, it now barely holds a position on the border-line of neuroses, and some there are who claim that in every instance there is a demonstrable organic cause for its appearance. Lockwood believes that it is the result of a combination of organic stenosis and pyloric spasm.

Diagnosis.—The patient complains of uneasy sensations in the epigastrium, with fulness and distention, especially if a full meal has been taken. This later develops into a burning or boring pain, severe and depressing. The pain at first is relieved by eating, or the taking of alkalies, but nothing gives ease for any length of time except complete emptying of the stomach by the tube, or emesis. This, however, lasts only for a while, for with the pouring out of more acid the suffering returns.

The character of the vomitus is generally sufficient to make a diagnosis. This vomitus consists almost entirely of fluid, yellowish or greenish, or even brownish from altered blood, and giving a strong reaction for hydrochloric acid. Food may be in the vomitus, if a meal has been recently ingested, but usually the bulk is this fluid. The liquid vomited is much greater in amount than would be accounted for by fluids ingested, and the quantity is often a matter of surprise to the patient, who wonders where it all came from. During the attack there is exhaustion and loss of weight, and thirst, while the patient finds that efforts to quench this thirst are followed by gastric unrest and increased vomiting. Occasionally severe headache supervenes, which promptly ceases upon emptying the stomach. The bowels are usually constipated, the urine diminished

on account of the fluid drain in the stomach, and the upper abdominal wall is retracted. Sometimes the acute attack ends as abruptly as it began, but this must not be expected. The acute manifestations of Reichmann's disease may last from several hours to three or four days. Occasionally the disorder merges into a chronic state, and if it complicates ulcer, it may render the condition of the patient most serious.

Treatment.—During the acute attack the stomach should as far as possible be kept empty, no food being allowed for a time, and occasional large draughts of water given to promote emesis, or lavage with an alkaline solution. The stomach contents should be kept as alkaline as possible, and alkaline powders or liquids should be administered freely. Atropin may be given in 1/200 grain doses every two or three hours until dryness of the mouth sets in. For the severe pain morphin may be given hypodermically. Hot applications over the epigastrium may be kept up, and every means exerted to promote quiet and comfort.

After the acute symptoms are controlled, and feeding begins, the diet is practically the same as in hyperchlorhydria.

If relief is not obtained promptly, and the patient seems to be approaching exhaustion, surgical procedures should be considered.

Alimentary Hypersecretion.—This is less severe and more chronic than Reichmann's disease, and demands treatment practically similar to other conditions of chronic hyperacidity, with hydrotherapy, change of scene, and if possible, complete rest.

Achylia Gastrica.—This may be present as a pure neurosis. Instances are numerous where some strong emotion completely inhibits the secretion of gastric juice, and food may be later vomited in an unchanged condition. Achylia may be due to nervous inhibition of secretion, to menstrual irritation, or to fatigue. There are some neurotic individuals in whom this condition causes but little inconveni-

ence, and in whom at times the gastric secretion may be found normal. This lack of juice, when it appears as a simple neurosis, needs therapeutic measures for the improvement of general tone, a liberal diet, and probably hydrotherapy.

SECRETORY NEUROSES OF THE INTESTINES

Nervous Diarrhea.—This may be a pure neurosis, accompanying fear or any other violent emotion. It is a matter of common knowledge among soldiers that raw recruits often suffer from severe nervous diarrhea the first time they face the guns of the enemy. Increased intestinal secretion is found in membranous enteritis, though some do not consider this a genuine neurosis of secretion.

Intestinal Neurasthenia.—Combinations of the intestinal neuroses frequently occur, and have been designated by Rosenheim as intestinal neurasthenia. The appetite may be good, and the symptoms usually come on during intestinal digestion, or about two or three hours after meals.

Diagnosis.—There are present pressure, tension, and griping in the abdomen, occasionally nausea, and at times evacuations of the bowels accompanied by painful sensations in the abdomen and anus. Palpitation may occur; sometimes flashes of heat and cold. Generally the patient feels worse when quiet and recumbent, than when walking about, with his mind diverted from his trouble. Constipation is usually present.

The discomfort and pain do not seem to bear any relation to the food ingested, and at times full meals seem to really make the sufferer feel better. Gastric neuroses are often associated. Anatomic lesions must be excluded, and enteroptosis must be accorded an important bearing on the case, if present.

Treatment.—The general nervous and physical condition must be toned up, and a generous but unirritating diet is

indicated. Regular evacuations of the bowels are desirable. Iron and arsenic may be given three times daily, and bromides in the intervals.

Mucous Colic (Membranous Enteritis).—This malady is known by many names, a few of them being mucous colitis, membranous colitis, pseudo-membranous enteritis, tubular diarrhea, etc. Nothnagel first suggested the name "mucous colic," in order to show that a true enteritis need not exist.

Though this distressing trouble is in the main a neurosis, the observer must be watchful for association organic disease. It occurs most frequently in women from twenty to forty, seldom late in life. There are divergent views as to its etiology, for Mathieu considers it a hypersecretion of mucus in patients of a neuro-arthritic type, who suffer from enteroptosis, intestinal sand being present. Von Noorden ascribes it to long-continued constipation in nervous individuals, while Einhorn places it among the neuroses, but finds that it is associated in many cases with Glénard's disease, and that achylia gastrica is present in many patients.

Necropsies are rare unless death results from intercurrent disease, and autopsies have demonstrated that no inflammatory condition existed in the colon that would account for the symptoms during life. Nothnagel contends that there are two classes of cases, one in which the pure "mucous colic" with hypersecretion of mucus is simply a neurosis; the other class in which the mucous colic is engrafted upon a catarrhal colitis, leaving anatomic lesions.

Diagnosis.—The patient may pass mucus in long, thin bands, ribbon-like or in the shape of a tapeworm; they may be tubular in form, making a cast of the intestines; they may be of considerable length, and the mucus may be in jelly-like masses or shreds, occasionally streaked with blood. This discharge should be differentiated from tendons, membrane of oranges or other adventitious material that may escape from the bowels. The color of the mucus is generally grayish. Microscopically, the membrane con-

sists of a structureless matrix, its chief constituent being mucus.

The patients are neurotic, self-conscious, and usually quite thin. They complain of constipation, punctuated by occasional attacks of painful diarrhea. They also complain of a long train of nervous symptoms, as dizziness, palpitation, gastric distress, etc. On palpation of the abdomen, sensitive points will generally be found. The patients give a history of severe attacks of colic, sudden and very painful, with aggravated nervous symptoms. Presently there is passed the characteristic mucus, after which some relief is obtained, though there may be a number of paroxysms, followed in each instance by the passage of mucus before permanent ease is felt.

Nothnagel describes two types: one, in which mucous colic is engrafted upon a chronic catarrhal colitis, the latter being due to adhesions from appendicitis or peritonitis; the other class, in which the severe cramp-like pains are absent, the patient passing the mucus very often, with occasional tube-casts.

In a large proportion of these patients there will be found a gastropptosis, enteroptosis, or a general dropping of the whole abdominal viscera, with consequent kinks and torsion.

Treatment.—These patients require much tact and patience in management. The disease is generally of long duration, but with proper treatment most cases can be cured.

During the attack the sufferer should be put to bed and hot applications freely used on the abdomen, moist heat in the form of hot compresses being the best.

If the bowels are constipated, copious enemas of hot water, or hot irrigations will be of service, and this may be followed by a high enema of warm olive or cotton-seed oil, which should be retained as long as possible.

Fluid diet, and not very much of that, should be given during an acute attack, though plenty of water may be allowed.

A hypodermic of morphin is sometimes required, though I have generally been able to control the suffering with hot applications combined with gentle carminatives and anti-spasmodics. The frequent administration of equal parts of the aromatic spirits of ammonia and elixir of the valerianate of ammonia exerts both a stimulant and sedative effect.

During the intervals the patient should be liberally fed, and, if the physician is satisfied that no ulcerated or decidedly inflamed areas exist in the large intestine, the diet should contain much cellulose and residue, as recommended by von Noorden. By keeping the intestines full of the insoluble parts of the diet, it is contended, and I think rightly, that mucus cannot find lodgment on the intestinal surface.

Kemp is a strong believer in the efficacy of the Rose belt, and I have employed it in several cases with apparent benefit. The belt is specially helpful where decided enteroptosis exists.

Intestinal irrigations, either with normal saline solution or boric acid solution are helpful to keep the lower bowel cleared of mucus. No irritating medicaments, as nitrate of silver, nor astringents, as tannin, should be allowed in these irrigations. The injection of two to four ounces of cotton-seed oil in the rectum at night, to be retained till morning, is both soothing and beneficial. While it is extremely desirable that constipation should not exist, drastic cathartics are never indicated. Liquid albolene may be regularly given in one or two teaspoonful doses before meals, this preparation seeming to lubricate the intestinal surface, keeping the bowels gently open, and mitigating the symptoms generally.

Gentle massage over the abdomen with an ointment composed of vaseline, to which has been added a small amount of menthol and capsicum, will often prove comforting to the patient.

It is most desirable that the patient be kept out in the open air between attacks, and be encouraged to engage in

such exercise that will strengthen the abdominal muscles. An abundance of water should be insisted upon.

Surgical Considerations.—Some writers have recommended a right inguinal colotomy to give rest to the colon in certain intractable cases. This, however, would not relieve the ptosis. In severe mucous colitis, complicated by marked splachnoptosis, shortening the suspensory ligaments of the stomach and colon has been advocated. Some even go so far as to advise a tightening of the abdominal muscles by means of suturing, so as to relieve the muscular relaxation.

I should hesitate to advise surgery in this condition, and then only after both time and intelligent care had been freely expended. Mucous colitis, when markedly a neurotic expression, does not lend itself kindly to surgery, nor do these severe measures afford permanent relief.

GENERAL CONSIDERATIONS IN THERAPY OF DIGESTIVE NEUROSES

These considerations embrace every phase of therapy, with a liberal proportion of psychotherapy at all times included.

In taking charge of any condition thought to be neurotic, the patient should receive, if possible, a more thorough and painstaking examination than he has ever had. This serves the double purpose of affording the physician a courage born of knowledge, and of inspiring the nervous invalid with a sense of confidence. This examination will in every instance furnish a cue by which a preliminary *treatment* may be inaugurated. In this connection let me emphasize the fact that *treatment* is what the patient desires, and as an integral part of this treatment, some form of medication meets both an intrinsic and psychic need. Should there be hyperchlorhydria, an oft-present neurosis, antacids sufficient to neutralize the excess will win the opening skirmish, and increase the physician's influence. Hypoacidity

calls for an acid, though some conditions of neurotic achylia are intolerant of any form of acid. Nearly all of these patients complain of flatulence and eructations, and will be grateful for an efficient carminative, though the physician must remember that much of this flatulence is due to swallowed atmospheric air.

On point, which I consider almost the keynote of the treatment, is to frequently change the medicine in some way, even though it be simply a change of appearance, every few days. These neurotic alimentary tracts soon become habituated to most prescriptions, and unless varied, the latter will lose their effect to a marked extent. I have often added to an alkaline powder of calcined magnesia and bismuth a little powdered charcoal or carmin to the increased satisfaction of the watchful and expectant patient. The active and indicated base of the prescription may remain the same, so long as the adjuvants are frequently changed.

The question of gastric lavage is somewhat a delicate one, for we occasionally encounter highly strung people, who derive more harm than good from this procedure. I might say, as a general principle, that where there is a marked excess of stomach mucus or delayed evacuation of the gastric contents, an alkaline or gently antiseptic lavage at not too frequent intervals is helpful; while for hypersensitiveness of the gastric mucosa a lavage containing 40 grains of nitrate of silver to the pint, and followed by plain water or normal salt solution, will often yield gratifying results. Routine lavage is not advisable.

Faradic electricity has proved satisfactory to me, though I confess the belief that its influence is mainly psychic. As to massage, vibratory or otherwise, the same may be said.

For indifferent appetites, the bitter stomachics, *condurango*, *calumbo*, or *nux vomica*, are indicated, with tincture of gentian or cinchona as a base, changing them often, as I have previously indicated. Occasionally, where hypoacid-

ity exists, the 3-grain doses of orexin will greatly sharpen the desire for food.

Hydrotherapy is useful in nearly every form of digestive neurosis, aiding as it does the emunctories, cleansing the bodily Augean Stables, relaxing the nervous tension, and adding its quota of bodily uplift.

Change of environment, or even occupation, should be recommended, whenever practicable; in fact, there are certain of these cases where a change, the more radical the better, seems the only method by which the discouraged invalid may obtain a start on the road to recovery.

The whole plan of therapy is based upon reinforcing the weakened digestive functions, wherever situated; pressing every procedure with kindly interest and sympathetic optimism; keeping the patient's mind as busy as possible, so as to combat introspection; dispelling doubts and fears; furnishing some therapeutic surprise, if possible, at every visit; encouraging each glimmering ray of hope; providing ample calories, so that bodily strength may promote nervous equilibrium; and, without losing sight of the main issue, taking cognizance of the countless little intercurrent and irritating ills always present.

The various types of digestive neuroses produce a most unhappy and misunderstood class of sufferers, and in no division of therapeutic endeavor will sincere, thoughtful, and persevering efforts on the part of the medical attendant yield more gratifying results.

CHAPTER XVI

THE GASTRITES, ACUTE AND CHRONIC

Gastritis, or gastric catarrh, is manifested in a number of ways, depending upon the causation, the condition of the stomach, the condition of the patient, and the course of the disease. The different forms of gastritis may be divided as follows: Simple acute, infectious, toxic, phlegmonous; and chronic forms, being chronic with excessive acid, or with deficient or no acid (achylic gastritis), and alcoholic gastritis.

ACUTE GASTRITIS

This is a most frequent affection, no age or condition in life being exempt. It may be occasioned by errors in diet, mechanic or thermic irritants, foods too highly seasoned, unripe or overripe fruits, poorly cooked or spoiled food, cold or carbonated drinks, excessive use of alcohol, or any other cause that lays a sudden stress upon the stomach. Some individuals seem peculiarly susceptible to acute inflammation of the stomach, while others are able to eat with seeming impunity articles of food that would ordinarily set up a most acute gastritis in average persons.

Toxic gastritis brought on by spoiled food (a phase of cholera nostras) may be included, and also infectious gastritis caused by microorganisms or parasites that may find their way into the stomach.

Diagnosis.—The patient first complains of loss of appetite, discomfort in the epigastrium, fulness which may be relieved by belching, and occasional nausea. There is seldom a rise of temperature. In the more severe cases the pains are acute, there is headache, nausea, and vomiting

which is prolonged, excessive and painful, the vomitus consisting first of food, then chiefly of mucus, at times streaked with blood and admixed with bile which regurgitates into the stomach with the continuous retching. There may be chilly sensations, the pulse may become rapid and thready, the tongue coated and swollen. Constipation or diarrhea may be present, and the early vomitus often has quite a disagreeable odor. Occasionally a duodenitis with jaundice is associated, and herpes of the lips is frequently observed.

Acute gastritis must be differentiated from biliary colic, in which the pain radiates to the right side or shoulder, while pain over the gall-bladder is present; from cholecystitis with or without calculi, in which previous history, tenderness over the gall-bladder, and the presence of a leukocytosis must be taken into account; from hyperchlorhydria, in which the previous history must be considered; from peritonitis, in which there is muscular rigidity, marked abdominal tenderness and distention; and from nervous gastralgia, in which the vomitus is usually very acid but containing little if any mucus, the neurotic history being suggestive. Acute gastritis must also be differentiated from the early stages of typhoid fever, and from the gastric crises of locomotor ataxia.

Treatment.—Patients who are easily upset (with “delicate stomachs”) should sedulously avoid those articles of food which have proved irritating in the past, and should empty the stomach with copious draughts of warm water upon the slightest premonitions of trouble.

The symptoms of gastritis having developed, the stomach should be cleared, as well as the intestinal tract, and the patient put to bed. In mild cases, rest to the stomach and quietude to the body will suffice, but in more severe cases, the therapy must be energetic.

For the nausea and pyrosis alkalies should be freely administered, either in the dry form as bismuth or calcined magnesia, or milk of magnesia or bismuth with some car-

minative flavoring agent. The presence of nausea requires external counter-irritation. For nausea and acidity the following prescription has often proved helpful in my hands:

R. Spts. amygdalæ amare..... ʒii.
 Resorcinolis..... gr. x.
 Lac-magnesiae..... q.s. ad. ʒii.
 SIG.—One teaspoonful every two or three hours.

Among other antiemetics, which may be used from time to time, are oxalate of cerium, 1-minim doses of Fowler's solution or tincture of iodine, or small pellets of ice given sparingly. The use of cocaine or carbolic acid is not satisfactory. Occasionally a hypodermic of morphine may be required to control the extreme pain and nausea, but it will be generally found that the secondary effects are not good.

Occasionally the patient will prefer an ice-bag over the epigastrium, but the majority are more comfortable under the application of heat, which should be employed perseveringly.

Lavage is occasionally of service when there is distressing nausea with ineffectual attempts to expel the glairy mucus, but, unless the lavage can be administered by an expert, it had best be omitted.

Diet.—Entire abstinence from food for twenty-four hours in ordinary cases, and for two or three days in severe ones, is advisable. Rectal feeding in acute gastritis is not satisfactory, as a rule. Einhorn has used duodenal alimentation in several cases with good results.

After the symptoms begin to subside, very light nourishment may be given, though caution must be observed. Egg-albumen, ice-cold; barley-water, alone or with a little milk, or rice gruel with milk, are eligible foods to begin with. Later there may be cautiously added soft-boiled eggs, scraped beef, bouillon, zwieback, broths, and a gradual resumption of the full diet. The patient, however, should be careful for quite a while, as dietetic indiscretions will be liable to result in other acute attacks.

ACUTE INFECTIOUS GASTRITIS

This form of acute gastritis is generally precipitated by microorganisms introduced into the stomach with decomposed food, especially meat or fruit, bad milk, or infected water.

Diagnosis.—This disorder presents much the same picture as simple acute gastritis, plus excessive prostration. The temperature, which is normal or even sub-normal in mild gastritis, is considerably elevated in this form.

This condition does not necessarily follow dietetic errors, but is generally the result of pure infection. With the fever are noted violent headache, thirst, quick pulse, and a marked diminution of gastric juice. The acute symptoms may merge into a semi-chronic character, keeping the patient ill and uncomfortable for one or more weeks.

This is the form of gastritis sometimes rightly, and sometimes wrongly, denominated "ptomaine poisoning," and questions involved often possess a medico-legal significance.

Occasionally death results from infectious gastritis, but usually, after a brief but stormy illness, the patient recovers.

Treatment.—The treatment is based upon the same principles as obtain in simple acute gastritis, except it is advisable to thoroughly empty and cleanse the stomach by an alkaline antiseptic lavage. A solution of boric acid, or a 1:3000 permanganate of potash in normal salt solution, or a 1:20 of the alkaline antiseptic liquid (National Formulary) will be suitable.

No food should be allowed in the stomach for several days, though it may be necessary to administer diffusible stimulants in small quantities. Wine or brandy are sometimes advisable in weak or debilitated subjects.

The physician should be cautious in resuming stomach feeding, and should be specially cautious in passing from liquid to solid food; and, should nausea or vomiting seem imminent, should resort to nutrient enemas.

Drug Therapy.—This comprises the remedies employed in the milder forms of acute gastritis, with the addition generally of small doses of dilute hydrochloric acid, well diluted. A most useful combination to quiet the stomach and abate the nausea consists of the following:

R. Hydrarg. chlor. mitis,
Phenolphthalein.....āā gr. i.
Sacch. lactis..... gr. v.
Ft. chartulæ No. 10.

SIG.—One powder dry on the tongue every hour until five are taken.

The extreme thirst may be quenched by pellets of ice or high saline enemas.

TOXIC GASTRITIS

This most intense form of inflammation of the stomach is caused by the swallowing of concentrated mineral acids, strong alkalies, or poisons, such as phosphorus or arsenic. Among the extremely irritant acids are nitric, sulphuric, hydrochloric, oxalic, and carbolic; the caustic alkalies, including caustic potash or soda, soap lees, and strong ammonia; and other irritants as alcohol, potassium cyanid, corrosive sublimate, and potassium chlorate. The effects of all these poisons are more intense when taken on an empty stomach.

When such agents are swallowed, the acids and alkalies destroy the integrity of the parts with which they come in contact, causing various degrees of sloughing of the mucosa and sub-mucosa, sometimes followed by penetration of the stomach wall and perforative peritonitis.

Diagnosis.—The symptoms are of a fulminating character, as seen in acute intoxication, modified by the nature of the poison ingested. The sudden appearance of violent gastric symptoms in a perfectly healthy individual should excite suspicion. Inspection of the lips, mouth, and tongue will show the effects of corrosive poison, if such has been taken, and examination of the vomitus and odor of the

breath may afford additional information. Sometimes it is possible to find the receptacle or bottle from which the poison was taken, or the patient may give the desired history.

Treatment.—There are certain general principles in the treatment of toxic gastritis: first, administer fluid to dilute the poison, and at the same time give an antidote; empty the stomach as rapidly as can be done by lavage; if the poison is corrosive, administer demulcents; stimulate the patient, if the vital powers are weak, and, if any of the poison has passed beyond the stomach, give a cathartic. Lavage by siphonage or, that failing, by aspiration, is indicated in practically all cases of poisoning, and any fancied danger of puncturing the stomach by the tube is immeasurably overbalanced by the potential benefits of the lavage. Should no stomach tube be at hand, one can be improvised from a fountain syringe by removing the tip and clip, rounding the edges of the end of the rubber tube, and using a kitchen funnel.

Apomorphin—one-tenth of a grain hypodermatically, or zinc sulphate or alum in warm water may be given to promote emesis. Among useful demulcents, which are generally at hand, are whites of raw eggs, milk, olive or cotton-seed oil, flour boiled with water, starch- or gum-arabic-water.

The later treatment, after the toxic symptoms are controlled, are similar to other forms of acute gastritis.

PHLEGMONOUS GASTRITIS

This rare condition is also called acute interstitial gastritis, and is used to characterize those cases of inflammation of the stomach in which the gastric submucosa, and to a lesser extent, the mucous and serous coats are uniformly or focally filled with pus (Lockwood). Up to the present only about one hundred cases have been reported. Men are more frequently affected than women in the proportion of about three to one. Among the reported cases, about one-

half have occurred among day laborers, who were addicted to alcoholic and dietetic excesses. Alcohol is thought to be an etiologic factor, though a goodly proportion of the cases has been among non-alcoholics. The disease is not limited to any particular age. The primary cause is always microbic, especially the streptococcus, which probably enters through some solution of continuity in the mucous membrane; or secondary, due to pyemia, puerperal infection or the exanthemata.

Diagnosis.—The diagnosis is exceedingly difficult during life, but few, if any, having been correctly made in advance of necropsy. The patient presents all the aspects of an acute infection, with delirium and coma preceding death. The blood examination shows leucocytocytosis with increase in the polynuclears. There is muscular rigidity in the upper portion of the abdomen, due to peritoneal irritation even before perforation takes place. When this occurs there are the usual manifestations of general peritonitis. In the cases of circumscribed abscess the tenderness is more localized, the symptoms not so fulminating, and the duration more prolonged. The duration may be from three or four days to several weeks.

The high temperature, chills, and early muscular rigidity, with exquisitely tender epigastrium point to an acute suppurative process of the stomach. Differentiation of localized gastric phlegmon from a localized peritoneal abscess following perforation of the stomach wall by ulcer or cancer is practically impossible. Abscess of the liver, acute pancreatitis, and acute cholecystitis can be differentiated by their history and other significant diagnostic points.

The prognosis is very unfavorable, the mortality rate being about 95 to 98 per cent. All cases of recovery reported have been of the circumscribed form.

Treatment.—Realizing the difficulties in diagnosis, and the unfavorable terminations of this disease, treatment holds out but little encouragement. Laparotomy may be resorted to in the vague hope of affording some relief.

Should this not be attempted, an ice-bag may be kept over the epigastrium, energetic rectal feeding may be used, enteroclysis may be administered to relieve tympanites, injections of the mixed vaccines resorted to, and the pain assuaged with opiates. By using a supportive and stimulating treatment with vigor, the patient has a slender chance for recovery.

CHRONIC CATARRHAL GASTRITIS

Up to the time that more exact methods of examination came into vogue the diagnoses of chronic gastritis, chronic catarrh of the stomach, and chronic dyspepsia were made in those cases of digestive disturbance characterized by long-continued nausea and indigestion, unless the symptoms of ulcer or cancer stood out predominantly.

Since the refinements of diagnosis have enabled gastric diseases to be more intelligently discriminated, this diagnosis is not made so frequently as formerly, though even now about 8 or 10 per cent. of chronic indigestions may be placed in this class.

This disease occurs more frequently in men than in women, and the same irritating causes that produce acute gastritis can produce the chronic type when exerted for a long period of time; such as hasty eating with imperfect mastication, gastronomic excesses, highly spiced foods and condiments, overindulgence in tea, coffee or alcohol, excessive use of tobacco, especially chewing strong, black tobacco, habitual use of certain drugs, and a septic condition of the teeth as pyorrhea alveolaris, in which constant swallowing of pus and other products of decomposition sets up inflammation. Though smoking is ascribed as a cause by some writers, I have never seen a case of chronic gastritis that could be honestly traced to that habit. (Let this not be considered a defense of smoking, for many forms of neurotic indigestion or even atony may follow in the wake of excessive indulgence in this use of tobacco.) Probably the commonest cause is found in the abuse of alcoholic

drinks, though some stomachs seem to bear without injury quantities of alcohol that would acutely inflame others. I have seen a few individuals who suffered from chronic gastritis for two or more weeks after the ingestion of less than 4 ounces of rye whiskey.

Acute gastritis does not generally merge into the chronic form, except where there are a number of recurrences at short intervals from similar causative factors. It may be secondary to acute infectious diseases, as typhoid fever, and is frequently associated with cancer of the stomach. It may be secondary to cirrhosis of the liver, pulmonary or cardiac disease, and chronic nephritis and syphilis.

There are several forms of chronic gastritis, as follows:

The form in which there is excess acid—acid gastritis, hypersthenic gastritis, or acid catarrh of the stomach.

The form in which, while there is chronic catarrh, there is practically normal acidity.

The form in which there is a diminution or absence of acid, denominated asthenic gastritis, sub-acid gastritis, achylic gastritis or atrophic gastritis.

To this may be added a rather specific form—alcoholic gastritis.

Symptoms of Chronic Catarrhal Gastritis.—These are much like those of other gastric disturbance. The disease, as a rule, develops slowly, changing in its aspect from time to time. The appetite is variable, sometimes being quite good, or even ravenous, then for a time the patient may have absolutely none. A disagreeable taste in the mouth is often mentioned, there is thirst and dryness of the mouth with frequent eructations of ill-smelling gas containing occasional food remnants. Pressure and fulness after eating are complained of, with palpitation of the heart during the digestion of meals. For a while the eructations seem to relieve most of the distressing symptoms, but as the disease progresses, there is almost constant uneasiness in the epigastric region during waking hours. The sleep, however, is troubled, and the patient often awakes with

headache, followed by vertigo on arising. The bowels are usually constipated, with perhaps an occasional attack of diarrhea.

When vomiting occurs, it is usually in the morning, and consists chiefly of slimy mucus, with occasional remnants of the previously ingested food. The tongue is sometimes covered with a thick gray fur, though this is by no means characteristic. Odor of the breath is offensive, especially when there is atony of the stomach with fermentation, or the teeth are in poor condition.

Nearly all of these patients are low spirited and pessimistic. It appears that the complex of symptoms embraced in chronic catarrhal gastritis exercises a peculiarly depressing effect on the mentality, and seldom have I seen any individual suffering from this disorder, who did not feel his spirits dampened and his mental horizon beclouded.

The patient's appearance may be quite good, and he may preserve his weight remarkably well. In severe cases he looks bad, shows black rings under his eyes and chills easily. Where the anorexia is prolonged much weight may be lost, and an extremely emaciated state may supervene.

Upon physical examination the epigastrium may appear bloated. Tympanites is sometimes present, but the stomach is usually in the normal position. The gastric region is sensitive to pressure, with rather diffuse tenderness. There is seldom any real sense of resistance or rigidity there.

A splashing sound that is found when the stomach should be empty signifies atony. When the stomach contains food, liquid, or gas, this splashing sound possesses little diagnostic importance.

The urine is generally scanty, with increased specific gravity. It is frequently loaded with phosphates and urates.

Diagnosis.—The diagnosis of chronic catarrh of the stomach *cannot* be positively and intelligently made without the employment of the stomach-tube. By gastric analysis

many suspected cases prove to have normal gastric contents, and are to be considered neuroses; while in other cases, evident gastric catarrh is discovered when some other condition was thought more probable.

Lockwood insists that:

(1) Gastric analyses should always be made in every case of dyspepsia, no matter whether these symptoms be apparently gastric or intestinal, unless passage of the tube is contraindicated.

(2) Gastric analyses should be made in every case of chronic diarrhea that is not due to evident disease of the colon or rectum.

(3) Gastric analyses should always be made in all cases of intestinal toxemia, of recurring headache of toxic origin, and in patients who complain of the symptom-complex which is spoken of by the laity as "biliousness."

(4) Gastric analyses should be made in all cases of anemia and general physical wretchedness without known cause and which are rebellious to treatment.

The presence of *gastric mucus* in *excessive quantities* in the stomach contents is the chief diagnostic point in chronic catarrhal gastritis.

My usual procedure is as follows: One hour after an Ewald-Boas test-meal has been taken (two slices of bread without butter and a glass and a half of water), a sufficiency of the stomach contents are aspirated for an examination. In chronic catarrhal gastritis these conditions are usually found present: the total acidity is often diminished; free hydrochloric acid is small in amount, or absent; pepsin and rennin are present but diminished; erythro-dextrin present in small quantities; achroodextrin and sugar abundant. Should the gastric contents well up into the tube in great quantity, hypersecretion may be suspected.

The particles of bread are not as fine as normally, but larger and coarser. Mucus is intimately mixed with food remnants and is adherent to the larger particles. Upon passing a wire up through the contents, thick, tenacious

ropes of glairy mucus hang to it, presenting a characteristic appearance. Should there appear but little mucus when the symptoms would indicate its presence, the patient should be seen the following morning with an empty stomach, and lavage performed, in which event, the mucus will be easily discovered in the wash-water.

Microscopically.—Mucus, round cells and epithelial cells are found to be present. In doubtful cases the microscope may enable the physician to differentiate the types of mucus. If squamous epithelium is mixed with it, this probably comes from the mouth or pharynx; if pigmented alveolar epithelia, probably from the air passages. Columnar epithelia mixed with mucus shows its gastric origin.

Chemical Findings.—With acid gastritis we find the free hydrochloric and total acidity somewhat or greatly increased, though this reaction bears but little comparative relation to the amount of mucus present. The observant physician may find cases of marked catarrhal gastritis in which the acidity remains practically normal, notwithstanding gastric disturbance, anorexia, and malaise.

In sub-acid gastritis there may appear all gradations from a slightly reduced acidity to a complete absence of gastric juice, or achylic gastritis.

Einhorn has carefully examined the washings of many cases, finding small shreds of the mucosa present, which he believes to be due to erosions.

Motility.—This is generally good in acid cases, in fact the tendency is toward an increased evacuation of the stomach. Should atony or dilatation be present, there is naturally motor insufficiency, and, in the absence of acid, fermentation.

Absorption.—While physiologic absorption in the stomach is but slight, even that small amount is interfered with when the mucosa is coated with thick, glairy mucus.

Course.—The tendency of all chronic gastrites is toward a long duration, and, like some cases of post-nasal catarrh, may extend over many years without incapacitating the

patient for the ordinary duties of life. Even where there seems to be decided improvement, relapses are frequent, and no one can be considered permanently cured until many months have elapsed without gastric disturbance.

Differential Diagnosis.—The following differential points are succinctly stated by Kemp:

Chronic Gastritis.—No severe pain; no circumscribed spot painful to pressure; no hematemesis; no cachexia; no marked emaciation, except in severe cases of long duration; free hydrochloric diminished or absent; gastric mucus present; slow course.

Ulcer of the Stomach.—Hyperchlorhydria present, but not invariably so; severe pain in the epigastrium with intervals free from pain when stomach is empty; local tenderness which is circumscribed; dorsal pain; hematemesis, or occult blood in the stool or gastric contents; microscopic pus; *no mucus*; patient has appearance of suffering; no true cachexia.

Cancer of the Stomach.—Age usually over forty-five; rapid course; free hydrochloric acid usually markedly diminished or absent; lactic acid present; mucus sometimes present; pain generally continuous, but not so acute as in ulcer; Boas-Oppler bacillus; cachexia; tumor on physical examination; small amount of visible or occult blood present in gastric contents; microscopic pus; hematemesis much less than ulcer; foul odor to vomitus at times present.

Achylia Gastrica.—Slow course; scarcely any gastric juice; acidity very low or entirely absent; absence of pepsin and rennin; usually no mucus nor lactic acid.

These differential considerations apply to typic cases, and the observer must be on the *qui vive* for various gradations and modifications of these clinical pictures.

ACHYLIA GASTRICA

This term introduced into medical literature by Einhorn denotes absence of gastric secretion. Many stomachs

secrete little or no hydrochloric acid, and still seem to perform their functions with a fair amount of efficiency. A test, however, will disclose the presence of the ferments in dependable quantities. Achylia may accompany cancer, severe anemia, or result from long-continued catarrhal gastritis. Einhorn claims that it may occur as a purely functional disturbance wholly apart from primary organic disease of the stomach or other organs.

Achylia gastrica as a pathologic entity should not be confounded with achylia resulting from organic or other severe disease of the stomach. It is undoubtedly true that some individuals possess stomachs with absolutely no functioning power, and still by the apparent compensatory power of the pancreatic and other intestinal juices, these people live and labor in seeming health and comfort.

Diagnosis.—The clinical symptoms of this condition are much the same as in chronic catarrhal gastritis, being anorexia, slight or severe nausea, eructations, and ill-defined sensations of discomfort in the gastric region. Sometimes the patient complains of no illness, and the achylia is discovered by accident. There is in this city an active physician, a man who accomplishes a wonderful amount of useful work, whose stomach has not secreted any juice in five or more years. While he is limited in his diet to some extent, he enjoys average health, and displays a remarkable amount of energy.

There is often an acceleration of the motility of the stomach, caused no doubt by the lack of the stimulating influence of the acid chyme against the pylorus. These patients are dependent on high functional activity of the small intestine, and, should this fall below par, the result would be a probable diarrhea (gastrogenic diarrhea), which greatly would debilitate the patient.

There might be mentioned in this connection the form of achylia which accompanies grave cases of anemia, pernicious anemia, and the anemia due to the *Bothriocephalus*

latus, though the relation between achylia and these pathologic states is not understood.

TREATMENT OF CHRONIC GASTRITIS

The main features of treatment will be discussed, attempting to note the various modifications incident to the presence of increased, diminished, or deficient acid and other gastric juices.

Treatment may be divided into: (1) Prophylaxis. (2) Hygiene. (3) Local treatment of the stomach. (4) Diet. (5) Medication, and perhaps (6) Mineral springs.

In border-line cases the general principles applying to hyperchlorhydria may be applied with safety until a definite diagnosis is arrived at.

Prophylaxis.—This is probably the most important, and consists in the correction of all causes contributory or aggravating, that may be apparent in connection with the gastric catarrh. Dietetic errors must be inquired into, and both regularity and uniformity of the meals enjoined. Some patients claim that their dietetic and other habits are already correct, but if the physician will have them keep for several days a written memorandum of every article eaten and every daily act, there will generally be found some information which can be acted upon with advantage. Deliberate eating, adequate mastication, and thorough insalivation should be insisted upon, and it is well that the physician should personally see to it that the teeth are in such condition so that good mastication may be performed without discomfort. Should Rigg's disease, or pyorrhea alveolaris, be present, the physician should be slow to promise much improvement until this very important contributory irritation is abated. Catarrhal states of the post-nasal cavities should also be investigated and cared for, and tonsillar or pharyngeal disease should receive appropriate attention. Pathologic conditions of the tonsils with their potency for evil are just now beginning to be accepted at their true value.

Cardiac disease, especially with failing compensation, should be properly treated; likewise diseases of the liver and kidneys, so as to lessen the liability to secondary gastritis.

Moderate smoking is not injurious as a general rule, but chewing tobacco, especially black tobacco, or that which is sweetened, is quite harmful, and should be prohibited. Should the "cathartic habit" be indulged in to an inordinate extent, this too, should be regulated, and evacuations of the bowels be accomplished by harmless means.

Hygiene.—A favorable mental attitude should be sought during meal-times, so as to promote the benign and helpful influences of the psychic aids to digestion. If practicable, a rest, or a brief season of bodily and mental quietude should be enjoyed directly after meals, and the body should be strengthened by properly directed exercise. The ventilation of both the living and sleeping rooms is worth investigating, and, when convenient, a change of climate, environment, or even occupation may be of assistance in the treatment.

Local Measures of Treatment.—The removal of excessive mucus and the soothing of the irritated gastric mucosa are of equal importance.

One or more glasses of hot water, drunk upon arising, dissolves and washes into the intestine some of this mucus. Alkaline medicines, also, dissolve the mucus to a certain extent, though not as much as some enthusiastic writers have claimed.

Lavage.—In no pathologic condition will more satisfactory results be obtained than by the proper and careful use of lavage in chronic catarrhal gastritis. Indiscriminately employed, it becomes harmful, and by its unskillful and injudicious application, lavage has been made the object of criticism in many quarters.

The chief indication for lavage in gastritis is the presence of mucus in such excess that it envelopes the food, prevents its saturation by the gastric juices, and impedes the orderly

evacuation of the stomach. The custom of washing every stomach in which small amounts of mucus are found, is rapidly passing away. It should be remembered that a thin mucous coating of the lining of the stomach is a protection against irritating food and gastric juice of heightened acidity, and with all this washed away, the stomach is more susceptible to pathologic influences.

Frequency of Lavage.—Once daily is sufficient, unless there is also stagnation and fermentation, in which event the mucus may be washed out in the morning, and the fermenting mass be washed out again as near as possible to the hour for retiring. Daily lavage should not be kept up long, and, where this procedure must be continued for several months, two or three times weekly is an ample sufficiency. So far as practicable, the lavage should be performed with the stomach free from food, and, if required to clean that viscus, the patient should assume both the standing and sitting positions while the operation proceeds.

The solutions employed are various, depending on the condition of the stomach and the sensations of the patient. It is well to first wash out the stomach with plain warm water, and then follow with the medicament, as described in the chapter on local treatment of the stomach. The following may be used: 1-grain tablets of potassium permanganate dissolved in 1 pint of water, sodium bicarbonate, sodium chlorid, silver nitrate, 5 grains to the pint of water, calcined magnesia, ichthyol, or boric acid. In those of a constipated habit, I sometimes leave a small amount of water containing a heaping teaspoonful of the calcined magnesia in the stomach.

Electricity.—Except in cases with marked atony or dilatation, electricity exerts but little if any tangible benefit. In nervous individuals, however, it may possess some psychic effect. The same may be said concerning vibratory massage.

Diet.—This is a most important adjunct to the management, and the patient need not expect permanent improve-

ment unless the dietetic injunctions are obeyed. Let me also caution the physician not to so limit the food, if possible, that the patient will become undernourished and with it depressed and emotional. The stomach is capable of doing only part of its work, while an extra burden is imposed upon the small intestine. The diet, therefore, must be so arranged that both divisions of the alimentary tract are protected. A diet rich in carbohydrate with a minimum of protein is indicated. In chronic gastritis, especially among those who necessarily perform manual labor, solid foods may be permitted. In achylic states spices and condiments may be permitted within bounds, and the diet should be as varied as possible.

Following are several suggestive dietaries from different well-known sources, which may be modified to suit particular cases:

DIET FOR CHRONIC GASTRITIS (EWALD)

8 a. m. 150 to 200 gm. tea with 75 to 100 gm. stale white bread, toast, or zwieback.

11 a. m. 50 gm. white bread, 10 gm. butter, 50 gm. cold meat or ham, $\frac{1}{3}$ liter of milk.

2 p. m. 150 to 200 gm. water, milk, or bouillon of the white meats, 100 to 125 gm. meat or fish, 80 to 100 gm. vegetables, 80 gm. compot.

4 or 5 p. m. $\frac{1}{4}$ to $\frac{1}{3}$ liter of warm milk (occasionally mixed with cocoa or coffee).

7 or 8 p. m. 200 gm. soup or pap, 50 gm. white bread, 10 gm. butter.

Occasionally at 10 p. m. 50 gm. wheaten bread (biscuits or zwieback), one cup of tea.

DIET FOR FIRST WEEK OF TREATMENT (EINHORN)

8 a. m. Two eggs, 60 gm. French white bread, 15 gm. butter, one cup of tea, 10 gm. sugar.

10.30 a. m. 250 gm. koumiss, matzoon, or milk, 30 gm. crackers, 20 gm. butter.

12.30 p. m. 2 ounces tenderloin steak or white meat of chicken, 100 gm. mashed potatoes or thick rice, 60 gm. white bread, 15 gm. butter, one cup of cocoa.

3.30 p. m. Same as 10.30 a. m.

6.30 or 7 p. m. Farina, hominy or rice boiled in milk, one liberal plateful, two scrambled eggs, 60 gm. bread, 15 gm. butter.

In timing the distribution of meals the previous habits of the patient or his business requirements should be considered.

DIET FOR CHRONIC GASTRITIS (FRIEDEN- WALD AND RUHRAH)

8 a. m. 200 gm. milk, flavored with tea, 60 gm. stale bread, 40 gm. butter, one soft-boiled egg.

10 a. m. 100 gm. scraped beef with 60 gm. stale bread or toast, or chicken sandwich, or a little sherry with egg.

12 m. Bouillon with egg, 100 gm. chicken, 100 gm. lamb chops or broiled steak, 100 gm. spinach, 100 gm. mashed potatoes, 100 gm. stewed apples, 60 gm. toast.

4 p. m. 120 gm. milk, with tea, 30 gm. crackers.

7 p. m. 60 gm. stale bread with 40 gm. butter, 200 gm. milk.

In the various manifestations of gastritis the motor and secretory functions must be separately considered, and a diet should be ordered which in quantity conserves the motor power, and which in quality conserves the digestive juices, if any be present.

Should hyperacidity of a marked type exist, proteins and fats somewhat in excess of the usual amount may be permitted. In achylia the diet should theoretically consist of carbohydrates and starches with a minimum of proteins and fats. Practically, some proteins are allowable, unless for a special reason, and the patient generally is none the worse for them.

Medicinal Treatment.—This must be governed by circumstances, remembering that, except for the management of symptoms, it is not well to institute a medical regimen that may extend over many months. In hyperacid conditions gentle alkalies may be administered, and gentle laxatives may be combined with them. The ordinary alkaline and carminative prescriptions indicated in hyperchlorhydria are often most efficacious and comforting to the patient. For the occasional sensitiveness of the gastric mucosa there may be given olive oil, oil of sweet almonds, or liquid albolene, in teaspoonful doses, a short while before meals.

In subacid or achylic conditions, small doses of dilute hydrochloric acid (six to ten drops) may be given after meals, and, if desired, this acid may be combined with pepsin, or *nux vomica*. The administration of huge doses of hydrochloric acid (sixty drops), as advocated by some, is not endorsed by me. Before meals, there may be given with propriety and benefit the bitter stomachics, as *condurango*, *quassia*, or *cinchona*. Three-grain doses of *orexin*, given one and a half or two hours before meals often exercise a stimulating effect upon achylic stomachs. *Acidol* tablets and tablets of *secretin* are highly esteemed by some observers.

Mineral Waters.—The treatment of chronic gastritis by the employment of mineral waters, or balneological measures, is much more in vogue in Europe than in this country, though under proper advice and supervision excellent results are sometimes attained.

Different waters may be utilized for stimulating glandular activity, or neutralizing high acid secretions, as the case may be. To stimulate secretion, the saline waters and those containing carbonic acid gas are of most service. Among these may be mentioned *Kissingen* (*Racozy*), *Kochbrunner*, *Homburg*, *Fachingen Soden*, or the American carbonic acid charged waters of *Saratoga* (*Congress spring*).

When the gastric secretion is absent these waters are of no benefit.

In hyperacidity the alkaline waters are useful, among these being Vichy, Celestine, Weisbaden (Kochbrunnen), St. Galmier, and Saratoga (Hathorn).

In the presence of atony there may be used with caution Levico Mild, Mitterbad, or Schwalbacher.

In constipation there may be taken Carlsbad, Villabracas, Pluto, or Mt. Clemens bitter water, though it is best to bring about bowel movements by dietetic and hygienic means.

The saline waters should be drunk before meals, the alkaline or ferruginous waters during or after meals. The aperient waters should be taken on an empty stomach, preferably on arising. Patients of a nervous or debilitated nature should not be allowed to partake of purgative water.

The reason that sojourners at foreign spas or at mineral springs in this country improve so markedly in so many instances, is not so much because of any great virtue in the water, as because of the freedom from business cares and worries, the exercise in the open air, the change of environment, and the diversion of the mind to outward interests. It should not be forgotten that the daily ingestion of copious draughts of water causes a steady washing out of the stomach and emunctories of the whole body, so that the sufferer is greatly benefitted thereby.

ALCOHOLIC GASTRITIS

This form manifests itself somewhat differently from the other forms, and requires somewhat different treatment. It is generally brought on by indulgence in alcoholic debauches more than in regular use of the different forms of alcohol as a beverage, and is specially prone to appear when cheaper brands or less diluted forms of whiskey are consumed.

In this form of gastritis nausea and vomiting predominate, appearing soon after meals, and depending to an

extent upon what is eaten. This nausea is less when liquids or bland articles are taken. With this nausea is a decided repugnance for food, the patient generally desiring whiskey alone, and he finds that while in the undiluted form it hurts him more, it is more easily retained. The stomach does not always become quiet when empty, but distressing retching keeps up, in which strings of ropy mucus are gotten up with difficulty. Another rather characteristic symptom is the "morning sickness," which seems relieved only by whiskey. Thus the wretched patient is constantly impelled to drink that which injures him most and keeps alive the fire of gastric distress.

The test-meal does not disclose any special signs, and occasionally fairly normal test-meals may be obtained from alcoholic patients in whom severe clinical symptoms are manifest. Long-continued cases, however, with many exacerbations, may result in complete achylia. Achylia, too, is generally present when the liver is cirrhotic.

Treatment.—The outlook naturally depends upon the patient's habits, for, if complete abstention from all forms of alcoholic intoxicants may be secured, the chances for recovery are bright, although the deep pathologic changes will of course persist.

In some cases it seems impossible to stop the stimulant at once, though this is always theoretically indicated. I have found in many instances, that the following prescription given in but little water, will to some extent relieve the craving for whiskey:

R. Tr. capsici,
Tr. gentianæ co.....aa ʒiv.
SIG.—ʒi in water every 3 hours.

Also may be given:

R. Spts. ammoniæ arom..... ʒi.
SIG.—One teaspoonful in water every one to three hours.

Should there be threatened delirium tremens with occasional spasmodic twitching of the muscles, the hypodermic

use of 1/50 grain of apomorphia every two hours will bring both quiet and relaxation. This should not be continued if nausea is increased. For the nervousness and tremor, I have found this helpful:

R. Conc. tr. passifloræ incarnatæ,
Elix. ammoniæ valerianatis.....āā i.
Sig.—One teaspoonful in water every one or two hours.

The diet should be bland and liquid at first, though, if the food is retained with difficulty, hot soup or oyster stew, to which is added plenty of black pepper, will more probably be kept. It appears that these overstimulated stomachs require highly seasoned foods to stimulate the juices, and the alcoholic habitues have sometimes learned this fact by experience.

The unirritating hypnotics may be required for a brief period, but should be promptly discontinued upon convalescence, or another pernicious habit may be formed.

Gentle salines may be employed to empty the bowels, and several glasses of warm water may be taken on arising when the retching is ineffectual.

In addition, all the resources of psychotherapy should be brought into play, in order that a weakened will power may assert itself, that complete and lasting abstention from alcoholic drinks may be achieved, and with bodily and nervous strength may also be gained digestive peace and health.

CHAPTER XVII

MOTOR INSUFFICIENCY AND DILATATION OF THE STOMACH

According to Stoker, the stomach exercises a so-called double motor function, namely peristole and peristalsis. The former is the process by which the food, as it reaches the stomach is grasped and mixed by the reflex muscular action of the fundus, and the latter consists of the wave from fundus to pylorus driving the food out of the stomach. According to whether one or both of the above-named functions of the stomach are disturbed, and also according to the degree of the disturbance, we differentiate:

(1) Hypotony, or motor insufficiency of the first degree (Boas).

(2) Atony, or motor insufficiency of the second degree (Boas).

(3) Gastrectasis, due to mechanical obstruction at the pylorus.

Motor insufficiency of the first degree (myasthenia) depends upon a primary relaxation of the muscular wall of the stomach. This relaxation may result from bad habits, gastronomic excesses frequently committed, or prolonged use of narcotic or hypnotic drugs. We also find this form of motor insufficiency with or following grave anemias, infections, severe hemorrhage, childbirth, chronic gastritis, or chronic constipation.

Diagnosis.—Atony may be present without characteristic physical signs, unless repeated examinations are made, especially two or three hours after eating.

To the observer of experience much is learned by an inspection. Stout, robust-looking individuals, with broad costal angles would hardly suggest gastric atony, while

delicate, high-strung individuals, with sharp costal angles are particularly susceptible to this condition.

An atonic stomach, as stressed by Lockwood, need not necessarily be a large stomach at all times, but it tends to sag upon slight provocation, is abnormally distensible, and varies greatly as to the position of the lower border. When the patient stands, and several glasses of water are taken, the lower curvature may reach 2 or more inches below the umbilicus, while when lying down and the stomach is completely empty, the whole organ may lie above the umbilicus.

The normal tonic stomach is no larger than its contents, but in the atonic stomach, splashing may readily be elicited, if half glass of water is taken on an empty stomach. Exception might be made in thin primiparae with incompetent abdominal walls. In atony visible peristalsis is never observed.

The radiographic diagnosis of atony is most helpful, and is based on the examination of two sets of plates, one taken directly after a bismuth test-meal and the other in six hours. Differentiation must be made from pyloric stenosis, ulcer of the lesser curvature, cancer, or perigastric adhesions limiting free motility. Another bismuth meal may be given after the six-hour plate has been taken, which will accurately show the outline of the filled stomach. The second bismuth suspension meal, given after the first six-hour plate, will demonstrate the different appearances of the filled stomach as shown by Holzknecht. "This classification," according to Holzknecht, "gives us a method of testing the motility of the stomach far in advance of anything obtained by the ordinary clinical methods. As may be seen in the diagrams, the normal time for the complete evacuation of the stomach varies from two to eight hours. For types 3 and 4 a delay of six hours would be normal, whereas for type 1 it would indicate some obstruction of the pylorus. In type 4 even eight hours delay would lead to no suspicion of either spasmodic or permanent con-

tractions." For further descriptions of radiographic appearances of the stomach, the reader is referred to the special chapter on X-ray diagnosis.

Treatment.—This should be regulated upon the principle of resting the stomach muscles and improving their tonus. The diet should be so adjusted that the least demands are made upon the motor activity of the stomach, and the least weight placed upon the incompetent supports. The meals should be small in quantity, and comparatively frequent. Should the motor power be quite deficient, either liquid or semi-solid food should be given for a while. Water should be drunk in plenty, but small amounts at a time. The stomach will generally be found to easily care for and expel adequate amounts of liquid, so they are taken in small quantities at a time. Milk holds the foremost place in the list of foods, and by frequently giving a glassful, enough milk alone may be ingested to well nourish the resting body. In cases of hypersecretion or hyperacidity with atony, Strauss recommends a strictly protein-fat diet, to obviate the carbohydrate fermentation which would otherwise result from insufficient starch digestion. Protein in such cases may be taken in solid or semi-solid form, but it should be thoroughly cooked. In subacid conditions, the general principles obtaining in the treatment of subacid gastritis also apply. The diet may contain a large proportion of fat, and meats, if allowed, should be finely subdivided and well masticated. Eggs may be allowed, and some carbohydrates in the form of flour soups, leguminous soups or vegetable pureés, all of which should contain as much butter and milk as possible. Alcohol should be prohibited, unless in the form of very small quantities of mild claret, and only then as a compromise to one who is perhaps habituated to the use of strong drink.

Lavage.—This is not specially indicated in atony of the first degree, though a not too frequent lavage with a very weak nitrate of silver solution may be of benefit.

Electricity and hydrotherapy both have appropriate uses.

Medical Treatment.—The alkalies are naturally indicated in simple atonic cases with hyperacidity. The light calcined magnesia when there is a tendency to constipation, and bismuth or heavy magnesia when the bowels are loose may be given. Bicarbonate of soda should not be given, as it produces too much carbon dioxide. In the presence of fermentation, resorcinol, salicylic acid, salol, or menthol may be combined with the alkalies, plus suitable carminatives for the eructations. In subacid or anacid conditions, the dilute acids may be given in small doses after meals, while *nux vomica*, *condurango*, or the other bitter tonics may be administered before meals.

MOTOR INSUFFICIENCY OF THE SECOND DEGREE

This is also called chronic dilatation of the stomach, *isochymia*, and *ectasia ventriculi*.

We must not commit the error of mistaking *gastroptosis* for dilatation. With the former the upper border of the stomach descends as well as the lower border, and there are generally movable kidney and *enteroptosis*. The prolapsed stomach may in addition be dilated. In dilatation the upper border does not descend, but maintains its relation with the diaphragm, and the stomach is dilated chiefly in the direction to which the greatest force is applied, downwardly and laterally. Dilatation may also ensue in the transverse and antero-posterior dimensions, and the pylorus may be a little further to the right and in a slightly lower plane, but the lesser curvature maintains its relation to the diaphragm, and this is the differential point between dilatation and *gastroptosis*.

In insufficiency of the second degree the food remains in the stomach still longer than when the peristole alone is disturbed, and with the dilatation there is an inability to expel its contents within the normal limit of time. Investigation has shown us that a certain amount of stenosis of

the pylorus is responsible for nearly every case of motor insufficiency of the second degree. This stenosis may result from various causes, but it is nevertheless there, either periodically or continuously.

Einhorn uses his duodenal bucket of different sizes to test the patency of the pylorus. This is swallowed, allowed to remain over night, and on being withdrawn the next morning, is examined for pancreatic ferments, which, if found, show that the pylorus is patent. Einhorn has also drawn attention to the fact that, if there be an ulcer in the tract traversed by the cord, the silk will be blackened and discolored at that point, affording a clue to the site of the ulcer.

Diagnosis. Atonic Type.—In this condition the symptoms are not always referred to the stomach, but just as often to the nervous system, and the patient is prone to become melancholic or neurasthenic. There is frequent belching, and a sense of uneasiness in the epigastrium, but acute dyspeptic symptoms may be absent. Occasionally, in extreme dilatation, there may be vomiting of large quantities of fluid, but not as much as in the stenotic type. Chronic gastritis with the attendant symptoms are sometimes associated; rarely hyperchlorhydria.

The gastric findings are variable; fermentation is frequent, while subacidity or absence of hydrochloric acid is often the case; hyperacidity is seldom noted, while Kemp reports a few instances of achylia.

Stenotic Type.—This may be congenital, or acquired from ulcer, cicatrices following burns from acids or alkalies; from severe gastritis producing hypertrophy at the pylorus; repeated pylorospasm from extreme acidity; pressure from large gall-stones; perigastric adhesions; sclerosis in the pyloric end of the stomach; and often a stenosis from beginning or slightly advanced malignant disease of the pylorus. Secondary dilatation may also arise from decided stricture of the duodenum or a kink there from "water-trap" stomach.

The symptoms of dilatation of the stomach due to

pyloric obstruction are quite characteristic, being modified when malignancy is a factor. When congenital, they come on directly after birth, or a few weeks later, depending on the degree of stenosis. There are present wasting, projectile vomiting, visible gastric peristaltic waves, non-fecal bowel movements, and in some instances a palpable tumor in the region of the pylorus. Projectile vomiting, occurring early in an otherwise healthy appearing infant, when the mother's milk is normal, should quickly excite suspicion of congenital pyloric stenosis. In other cases, where there can be detected no pyloric thickening, where the bowel movements are occasionally fecal, and where, in spite of the projectile vomiting, there is no rapid loss of weight, the condition is probably due to pylorospasm. Many of these latter cases are wrongly diagnosed, being considered cases of difficult feeding.

Acquired Stenosis of the Pylorus.—These symptoms are thirst, dryness of the throat, dry skin, cramp-like pains of considerable severity, peristaltic restlessness of the stomach, and vomiting of much chyme, often containing remnants of food taken the day before, or even several days before. The bowels are constipated, and emaciation rapidly supervenes. Intestinal fermentation and putrefaction with indicanuria are often present.

The benign type of stenotic dilatation may pursue rather a long course, with periods of improvement under appropriate treatment, but with a tendency to relapse.

In the malignant type there is marked cachexia, rapid emaciation, either coffee-ground vomitus or that with occult blood, free hydrochloric acid diminished or absent, lactic acid and Boas-Oppler bacilli present, undigested meat, and the age of the patient forty-five or over. A confident diagnosis of malignant stenosis is justified, under such conditions.

Einhorn directs the patient to eat a supper containing a liberal quantity of rice and raisins. If these two foods are still in the stomach in appreciable quantities the following

morning, he diagnoses marked stenosis of the pylorus. Weinstein asserts that any patient in whom a considerable proportion of a mixed meal is found in the stomach seven or eight hours after eating it, is affected with pyloric stenosis.

Treatment.—The acute cases of congenital stenosis in young infants should receive prompt surgical attention. Other treatment is futile, and the reported cures have probably been cases of pylorospasm.

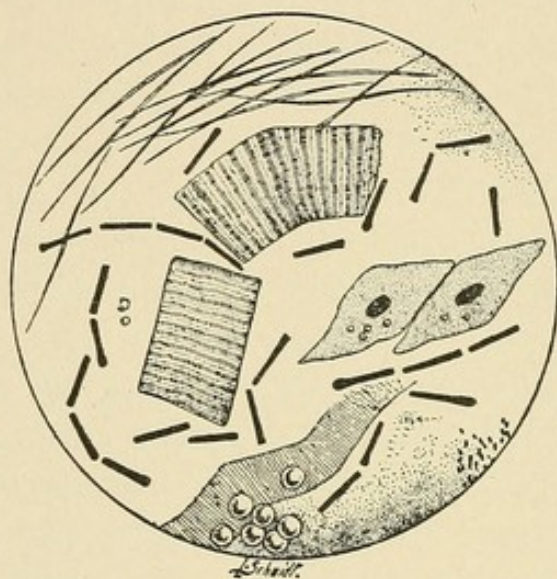


FIG. 71.—Boas-Oppler bacilli. (Hemmeter.)

Atonic dilatation is by far the most frequent condition that calls for treatment, being found among those who are hearty, and rapid eaters, or who drink immense quantities of fluid, fermented or otherwise. Associated with this we often find disturbed acidity or chronic gastritis.

Dietetic regulations are important, and a light, rather dry diet, as in chronic gastritis is proper, with modifications suited to the amount of acid and other juices secreted. Sufficient water should be allowed, but in moderate quantities at a time.

Orthopedic Treatment.—In this form of dilatation, unless there is stenosis of marked degree, the supportive measures described in a preceding chapter will be found most useful. I have in many instances employed the Rose

adhesive plaster belt, and have been able to demonstrate a heightening of the lower border of the stomach by 2 or more inches. The belt, if worn several weeks, will increase intra-abdominal pressure, and, in the meanwhile, if the patient is well and appropriately nourished, a certain amount of abdominal fat will be accumulated, which will bring about permanent benefit. Silk and elastic abdominal supports are not as serviceable as the adhesive bandage which stays on continuously.

Hydrotherapy.—Much assistance may be obtained from rational hydrotherapy, persistently and intelligently applied. Foolish hydrotherapy is a bane from which many atonic patients suffer, and unless proper facilities and experienced attendants are available, this part of the treatment had best be omitted. The fan and Scotch douche applied to the epigastrium, and cold compresses and sponging are included in the use of water.

Lavage.—This, too, has an important place in the treatment, particularly in the more severe cases where the stomach is emptied with difficulty, and some fermenting residue is often left there. It is best, if practicable, to thoroughly wash out the stomach just before bedtime, as the muscles of that viscus will then have all night in which to rest and accumulate renewed tonus. J. W. Weinstein is strongly in favor of lavage at this time, and endeavors to see his atonic patients as late as possible in the evening. Should this period for lavage not be convenient, the early morning hours before food is taken are next best. The aim is to wash out superfluous mucus but not food, for if too much of the nourishment is lost with the lavage, the patient suffers in nutrition.

In cases of subacidity with fermentation I use in the lavage one of the several antiseptics previously mentioned, as potassium permanganate, ichthyol, liquor alkaline antiseptic (N. F.), or even creolin. In hyperacid cases I use calcined magnesia, soda bicarbonate, boric acid, or lime water. In constipated habit, I allow one or more teaspoon-

fuls of calcined magnesia mixed with the last half pint of water to remain in the stomach. This generally exerts a mild and pleasant hydragogue cathartic effect.

Electricity, massage, and systematic methods of exercise have their proper and useful place in the treatment of this diseased state, but none of these should be attempted except under competent advice. I often have these sufferers consult me who report various bizarre exercises taken upon the suggestion of zealous but ignorant friends, and find that they have sustained injury thereby.

Medication.—Acids, if subacidity is present; alkalies, if hyperacidity is found; bitter and ferruginous tonics, if anemia be in evidence; gentle laxatives or enemas for constipation; stomachics before meals, if the appetite is lacking; nerve sedatives (not habit-forming ones) for unstable and distressed nerves—all these are indicated in motor insufficiency of the second degree.

Treatment of Stenotic Dilatation (Non-malignant).—The treatment afforded this condition by the internist is at best only palliative. No roseate promises of permanent improvement can be honestly given, for they must look to surgery for relief.

If for any reason surgery cannot be obtained, frequent lavage, duodenal or rectal feeding, and the administration of either olive oil or liquid albolene are the best that medical aid can offer. If the pylorus is not entirely obstructed, liquid food may be given, and if the patient will lie on his right side for an hour or more afterward, much of it may pass the pylorus. Einhorn has recommended his pyloric dilator, but its use will seldom be found possible, and, while efforts are being made in this direction, valuable time is lost. Unless there is some positive contraindication to surgery, the patient should seek that form of aid; any other form of therapy is simply dalliance with disease.

Malignant Stenosis will be discussed under cancer of the stomach.

ACUTE DILATATION OF THE STOMACH

This is also called acute gastrectasis, post-operative gastric dilatation, duodenal ileus, and mesenteric ileus.

Formerly it was believed to be rare, but it is now considered somewhat frequent, and many cases of post-operative vomiting and collapse are now thought to be due to this condition.

There are many conflicting views as to the cause of this acute and alarming condition, but a reasonable consensus of opinion is thus summarized by Lockwood.

(1) In rare instances mechanical dilatation of the stomach may be induced by excessive eating or drinking, either by causing a paralytic overdistention or by mechanical pressure of the overloaded stomach upon the duodenum.

(2) Mechanical pressure of the stomach on the duodenum is favored by counter-pressure of the abdominal wall, explaining the relative frequency with which the accident has occurred after the encasement of the body by a plaster jacket in orthopedic cases.

(3) Arterio-mesenteric constriction by traction of the root of the mesentery from downward displacement of the intestine may occur in rare instances as a primary cause for acute dilatation, although when the stomach is dilated the enlargement of the organ tends to push the intestines downward, and to create a mesenteric pull that is quite enough to keep up an obstruction after it has once started. This view implies, therefore, that in the very great majority of instances mesenteric constriction is a secondary factor in the production of an acute dilatation.

(4) The same may be said of mechanical obstruction of the duodenum by the pressure of an overloaded stomach on the duodenum; in the majority of instances the dilatation is the first event and the mechanical pressure of the stomach is an entirely secondary affair.

(5) Diminished motor innervation by paresis of the

vagus is plausible to explain acute dilatation following head injuries.

(6) Lowered tone of the vomiting centers after anesthesia as a cause may be considered doubtful.

(7) Dilatation of the stomach may be increased after the process has once started, by closure of the cardia either by valve-like folds of mucous membrane or by lateral intra-gastric pressure on an oblique insertion of the esophagus.

(8) Probably the most potent cause for acute dilatation is a paralytic relaxation of the gastric wall due to the effect of various toxins, in infectious diseases and in septic conditions. A primary dilatation so induced may lead to a certain degree of mesenteric constriction which is often a marked contributory factor.

(9) Local peritonitis of the gastric serosa with muscular relaxation may occur after abdominal operations, not sufficiently intense to cause septic or frank inflammatory symptoms, but quite sufficient to induce an appreciable degree of dilatation, which may be further increased, should any of the secondary factors for dilatation be brought into play.

Diagnosis.—The symptoms are quite characteristic, pointing plainly to the acute condition. There comes on sudden abdominal distention, pain, tenderness, excessive vomiting, constipation, thirst, scanty urine, and collapse. The onset is nearly always sudden, and the vomiting is profuse, coming up in great gulps without straining. At first the vomitus may consist of gastric contents, but later it becomes watery and of a greenish hue. Sometimes the vomitus may take on a foul and feculent odor.

Pain is generally present in the epigastric and umbilical region, sometimes being suggestive of peritonitis. This is followed by a sense of distention with accompanying cardio-respiratory symptoms. Muscular rigidity is absent, though there may be general abdominal tenderness. Hic-cough may occur as a terminal symptom.

In the gastric or gastroduodenal type there is distention

of the abdomen, but not uniform, chiefly filling the left half and lower part of the abdomen, while the right hypochondrium appears to be flattened. The epigastrium, too, is often swollen.

Splashing sounds (succussion) and the sense of fluctuation can often be made out, though they are not always present at first when there is chiefly gas in the stomach.

Percussion will show the resonance increased, but will be interfered with when there is much fluid. Percussion, therefore, is important when the splash is absent.

The general symptoms are those of collapse, a rapid and small pulse, frequent and troubled respiration, and a sub-normal temperature.

One of the main diagnostic points, however, is the passage of the stomach-tube, when the escape of air in large quantities, the outflow of fluid of the character previously described, and the flattening of the epigastrium following this, are signs of the greatest significance, especially if the patient has undergone a previous operation.

Prognosis.—This is grave, about a 72 per cent. death rate being recorded. If the diagnosis can be promptly made, and suitable and energetic measures be at once instituted, there is a moderate outlook for recovery.

Treatment.—Distention following operations should receive immediate treatment by lavage and enteroclysis, and both should be expertly done, not being left to the discretion of some inexperienced assistant. It is radically wrong to wait until the symptoms are marked or until projectile vomiting ensues before lavage is instituted. The stomach may redistend in severe cases.

Lavage should be given two or three times about three hours apart, and thereafter every four or six hours during the first twenty-four hours. It may need to be kept up for several days, and it is better to err by washing the stomach too much than too little.

No food or drink should be given by the mouth. For severe thirst saline enemata or proctoclysis must answer,

and rectal feeding must be kept up for several days after the symptoms disappear.

Should there be indications of intestinal distention or obstruction, continuous proctoclysis with a normal saline solution at 120° F. is of value. In some instances there may be given an ounce of sulphate of magnesia by a high enema.

The posture of the patient is important, and should be semi-oblique or nearly in the sitting position. The head of the bed should be elevated so the patient lies on an inclined plane. Elevation of the foot of the bed has been recommended in acute dilatation of the duodenum, but this entails a dangerous pressure on the heart and lungs, should the stomach redilate.

Medicinal Treatment.—This is mainly symptomatic, though eserine in 1/100-grain doses is generally given to promote intestinal peristalsis. Strychnin, atropin, or belladonna may be administered as indicated. The employment of apomorphia to produce emesis is to be condemned.

Surgical interference is now considered inadvisable by the majority, and the only excuse for surgery lies in those post-operative cases in which a differential diagnosis between acute dilatation and acute obstruction by reason of adhesions and kinks is impossible to be made. Under these circumstances the surgeon is sometimes justified in performing an exploratory laparotomy.

CHAPTER XVIII

HEMATEMESIS—ULCER OF THE STOMACH

There are few symptoms more dramatic or fear inspiring than the escape of blood from the mouth. Patients will bear without treatment many painful or exhausting ailments for a time without seeking medical relief, but when hematemesis appears, no matter what cult they may subscribe to in health, they will at once, and urgently, seek medical aid. It is well, therefore, to briefly mention the causes of gastric hemorrhage, and the treatment.

The physician should not be deceived by vomitus colored by previously ingested berries, dark wine, or iron preparations, nor should he forget that the hemorrhage may arise from blood originating in the post-nasal space or lungs, and swallowed during sleep.

These factors being eliminated, the causes of gastric hemorrhage may be classified as follows:

(1) Trauma over the stomach, or injuries to the mucosa from swallowed articles which may cut or bruise the inner walls of the stomach.

(2) Thrombosis or embolism of the vessels, varicosities, or esophageal varices.

(3) Lesions of the heart or lungs producing stasis in the vena cava.

(4) Constitutional diseases, as leukemia, pernicious anemia, hemophilia, scurvy, or purpura hemorrhagica.

(5) Hematemesis as a type of vicarious menstruation.

(6) Ulcer of the stomach, erosions of the stomach, carcinoma.

(7) Acute infectious diseases, as yellow fever, hemorrhagic malarial fever, scarlet fever, measles, small-pox, etc.

(8) Venous stasis due to cirrhosis or tumors of the liver.

Symptoms and Diagnosis.—The main symptom is the hematemesis with the subsequent melena. If much blood is lost, either vomited or expelled into the bowel, there are the usual manifestations of pallor, faintness, blurred vision, and collapse, with cold extremities and feeble pulse. If the blood is small in amount or has been in the stomach for a time, it will be of a coffee-ground color; but if large in amount it may be a bright red. Sometimes all the blood escapes into the intestine, and then until the melena appears the diagnosis must be made from the subjective symptoms.

Prognosis.—This is rarely fatal from the first hemorrhage, but should impress the necessity of treating the cause, which may otherwise progress to a fatal termination.

Treatment.—On first seeing the patient, a hypodermic of morphin should at once be given, and both physical and psychic quiet strictly enjoined. Following this an ice-bag should be placed over the epigastrium, and strychnin may be given hypodermically if there is collapse.

There is doubt as to the efficacy of drugs given by the mouth while the stomach contains blood, but as a matter of routine, and one which can do no harm, the following is suggested: A 10 per cent. solution of gelatin, 2 drams every half-hour; lactate or chlorid of calcium, 15 grains, or adrenalin chlorid (1:1000) five to ten drops, by mouth or hypodermic. The last-named should not be pushed too far, as it may unduly raise the blood pressure and produce a renewal of the hemorrhage.

The patient should be fed by rectum, and nothing except small pellets of ice should be allowed by the mouth for several days. The resumption of food should be approached with extreme caution.

ULCER OF THE STOMACH

This lesion is also called peptic ulcer, *ulcus ventriculi*, gastric ulcer and round ulcer.

The etiology and pathology will not be discussed, as to

adequately cover this phase of the subject would exceed the scope of this work.

Diagnosis.—This is made from subjective and objective symptoms and chemical findings.

The patient, generally young or not over middle aged, gives a history of systematic indigestion, heart-burn

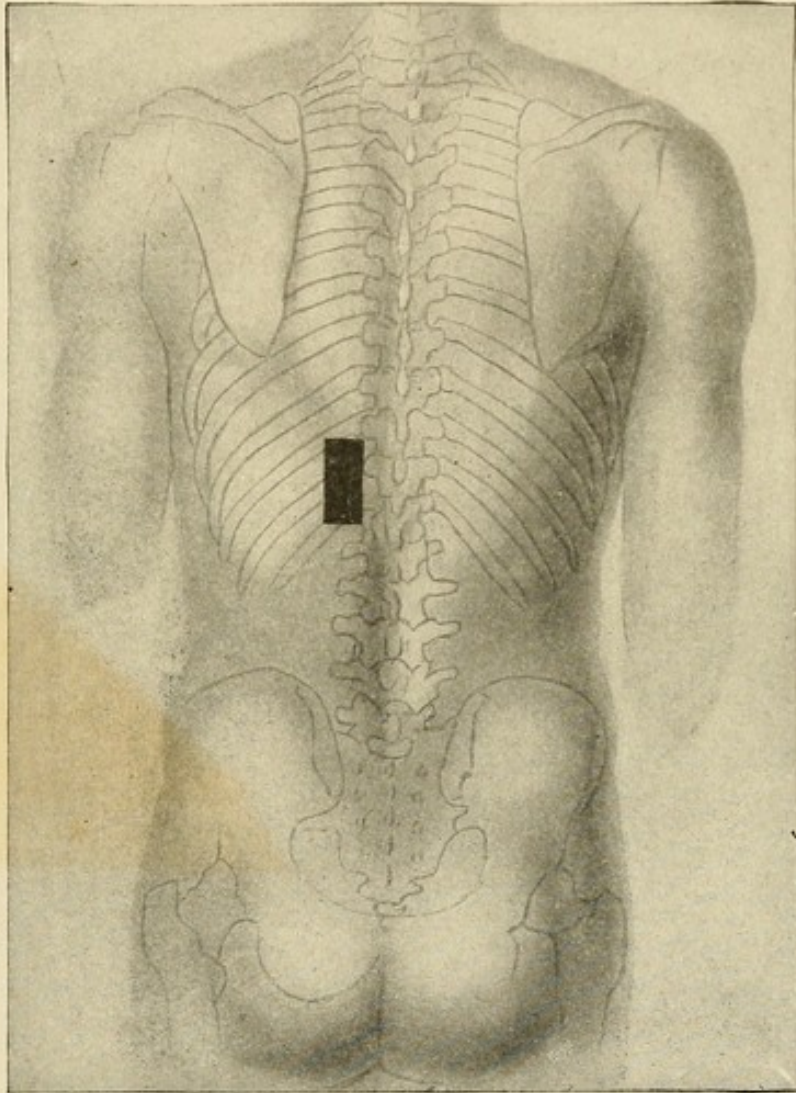


FIG. 72.—Typical pressure point in gastric ulcer. (*Cohnheim.*)

occurring immediately or soon after eating, cessation or amelioration of the pain for a time on shifting the position so that the contents of the stomach fall away from the eroded spot, lack of cachexia, epigastric pain, which is greater after a full or coarse meal, and which may increase

until vomiting empties the stomach. These symptoms excite a suspicion of gastric ulcer, and, if there is a history of hematemesis or melena the suspicion is strengthened.

The pain is one of the most suggestive symptoms, generally occurring a few minutes after eating (occasionally one or two hours later), and persisting during digestion. Liquid nourishment produces the least discomfort, and bland liquids may temporarily ease it. The pain is of a burning or gnawing character, and there may be a sensitive epigastric point which is increased on pressure. Later comes the dorsal pain, gnawing in character, lying generally to the left of the spine, between the eighth and tenth vertebræ. This dorsal pain may alternate with the epigastric.

Appetite is variable, though many patients are hungry indeed, but fear to eat on account of the pain that ensues. Constipation is generally in evidence.

As the ulcer progresses, hemorrhage may occur, and this is visibly present in from one-third to one-half of the cases, though occult hemorrhage of a minor degree probably occurs in a large majority. Should the symptoms be noted carefully, and frequent tests be made of the gastric contents and stools both chemically and microscopically, I believe blood would be found in nearly every case. The hemorrhage may be occult, with no vomiting of blood, but this may be progressive, and the patient may become extremely anemic from small and repeated losses.

The motor functions of the stomach are increased, unless pyloric stenosis or adhesions complicate the ulcer.

Examination of the Stomach Contents.—If there has been a recent hemorrhage, it is not advisable to pass the tube for ten or more days, but otherwise a test-meal should be taken. Instead of the Ewald-Boas test-meal it is preferable the night before to give a liberal meal of potatoes, rice, a few dried raisins, and some chopped spinach, and on the following morning the Ewald-Boas meal may be given, and aspirated one hour later. The presence of raisins and rice would indicate motor insufficiency or pyloric obstruction.

In about 95 per cent. of acute uncomplicated cases of ulcer hyperchlorhydria is present, the free acidity running from 50 to 60, or even more, while the total acidity may run from 90 to 150. Sometimes chronic cases of long duration do not show hyperacidity, and some have been reported where achylia was present.

The absence of hyperchlorhydria does not exclude ulcer, and we must bear in mind the possibility of there being a developing cancer on the base of an ulcer. The presence of occult blood is a strong diagnostic point in the favor of ulcer, especially when fortified by clinical history.

Perforation, with concomitant symptoms of shock and perhaps peritonitis, and later on subphrenic abscess are possible complications that must be anticipated.

Radiographic Diagnosis of Ulcer.—If it were the fact that the base of an ulcer would regularly and systematically retain a bismuth coating after the rest of the meal had left the stomach, radiography would afford an easy and quick solution of the question. In reality, however, the ordinary crateriform ulcer does not hold its bismuth coating any longer than the mucous membrane in its vicinity, and sometimes we can arrive at a diagnosis only by indirect evidences, and a combination of clinical history, physical examination and chemical analysis taken in connection with the plates. The radiologist, who alone and without the aid of clinical history attempts to arrive at a diagnosis of gastric ulcer will likely fall into error.

The following technic is advised by Holzknecht and Haudek. The patient first receives an efficient cathartic, preferably castor oil, given at night. The following morning at a specified hour the Rieder meal is taken, consisting of eight ounces of oatmeal gruel into which is well mixed 2 ounces of bismuth sub-carbonate. A light breakfast of tea and toast may be taken one hour later, if desired. The patient should be at the radiologist's office in sufficient time that the first exposure may be made at exactly six hours after the bismuth meal has been taken. This will

show the motility of the stomach and the location of the bismuth column. A second bismuth meal, composed of bismuth $\frac{1}{2}$ ounces, and mucilage of gum acacia 2 ounces, to which is added water enough to make 8 ounces, is then given, and a second radiograph taken. This will show the size, shape, and position of the stomach. Occasionally a third radiograph may be taken fifteen minutes later, which will show the motility of the pylorus and the first part of the duodenum.

The following radiographic findings may be considered suspicious of ulcer:

A displacement of the pylorus upward and to the left is suspicious of ulcer of the lesser curvature, which may cause contractions along the upper border approximating the cardia and the pyloric end. This is called the "snail stomach." Hour-glass contractions appearing in all the plates are suggestive of ulcer. Distortion or displacements of the stomach by adhesions suggest the presence of ulcer. Possibly the most suggestive radiographic appearance is that of a small puckered area in which the rugæ are distorted. Where the bismuth adheres to the base of the ulcer after the rest of the meal has left the stomach, the radiologist can be almost positive.

Advisability of Medical or Surgical Treatment.—This is often a difficult question to decide, and I am free to admit that I now more readily refer ulcer cases to the surgeon than a few years ago.

The mortality of ulcer varies greatly, being modified by the length of the ulcer history, the character, and the facilities for treatment. Some place it as high as 20 per cent., while the late Dr. Musser placed the mortality in private practice at about 3 and in hospital practice about 12 per cent. The position of the ulcer modifies the prognosis, for, if on the anterior wall, perforation is more apt to occur.

Leaving out the dangers from hemorrhage or perforation, I believe that the acute ulcers or those of moderate chronicity, where the patient can be managed, and proper facili-

ties for carrying out an intelligent line of treatment are available, offer a fairly good prospect for a permanent cure. The chronic ulcer, as a rule, should be referred to the surgeon, for unless it is possible for the patient to undergo a long and rigorous course of medical attention, the prospects of permanent relief are not encouraging. The age of the patient must also be taken into consideration, for one must never forget the liability of later development of cancer upon the scar of a healed ulcer, and when the patient is of middle age surgery must be considered more readily.

TREATMENT OF GASTRIC ULCER

General Management.—When the diagnosis of ulcer has been made, and medical treatment decided upon, the patient should be put to bed, and under a strict discipline of rest, diet, hygiene, and suitable medicine. If the patient can be controlled and kept in bed from four to six weeks, the dangers of hemorrhage and perforation are minimized, and the outlook for a cure correspondingly bright. After the time has passed for rest in bed, the transition back to walking should be spread over about two weeks. At this time (six weeks from the beginning of the treatment) plain and substantial fare may be gradually resumed, though coarse, irritating, or highly seasoned foods should be prohibited for a long space of time—indefinitely, if practicable. As regards beverages, beer, ale, wine, whiskey and alcoholic drinks of all sorts should be interdicted, as well as tea, coffee, and the stimulating drinks obtained at the soda fountains. Some of these latter “invigorators” which are dispensed under a harmless guise are both stimulating and habit-forming.

After convalescence is well established, and a mixed diet has been resumed, rest for one or two hours after each meal should be insisted upon, and all troublous topics of conversation avoided while digestion is actively progressing. If it can be arranged, a sojourn in the country for city patients, or in the city for country patients should be advised, and all

the habits should be those of "the simple life." During the first year at regular intervals analyses of the gastric contents and feces should be made, so that hyperacidity in the former or occult blood in either may receive prompt and appropriate treatment, if discovered.

Dietetic Management in the Treatment of Gastric Ulcer.—Concerning this there are divergent views, and a rather spirited controversy has been waged between several schools of thought as to whether this management should be one of starvation and scant fare, liberal feeding, or duodenal alimentation. Probably no one rule is applicable to all, and the physical condition of the patient, together with the manner in which he responds to the treatment should be the guide for at least the beginning.

In so far as the stomach is concerned, it seems that the results depend upon the elements of gastric and pyloric spasm, freshness of the ulcer, location of the ulcer, if the duodenal tube is to be used, amount of bleeding and vomiting, and the general excitability of the viscus. In great irritability rectal feeding should at least be inaugurated, though occasionally the duodenal tube, by short-circuiting the food directly into the small intestine, and removing the irritation from a sensitive ulcer, will be followed by a quick cessation of all these symptoms. As a rule it works best to inaugurate the von Leube treatment for the first few days, then cautiously institute and follow up the Lenhartz method, unless it is decided to employ Einhorn's method of duodenal alimentation.

There are two warnings, which Bassler well expresses: The first, that if resort to mouth feeding or to a fuller fare is long delayed after the use of rectal enemas, a distention of the stomach with a sudden increase in acidity is liable to occur, and these may precipitate vomiting, and directly or indirectly prevent the healing of the ulcer. The second is, that, because of the nature and quantities of food, the Lenhartz feeding is liable to keep high the excess acidity of the stomach, and in this way a cure of the ulcer is wrought,

but a high status of gastric secretion is left, which militates against prophylaxis of a return, or a better state of stomach condition in the post-ulcer period.

The dietetic treatment inaugurated by von Leube, and modified somewhat by Ewald is described by the latter as follows:

"For the first three days absolutely no food is to be administered by the mouth, but a nutritive enema is given three times daily; subsequently, besides the enemata, milk or milk in flour soup, in teaspoonful doses or bland chicken broth. The milk, on account of its fine flocculent coagulation, has some pegin added. If this diet is well borne, it is added to in a manner to be described; otherwise absolute rectal nutrition is again instituted. If no pain follows the careful administration of milk, we may permit somewhat larger quantities (up to a flat plateful), leguminous flour soup, then legumes; later pappy food made of chestnuts, sago, tapioca, hygiama and others, and later small quantities of milk. Among nutritive substances cows' milk takes first place. It is suitable because it contains all of the nutritive elements in solution, that is, finely subdivided, is free from irritating substances, because the acid is neutralized, and because the coagula which form from the action of the gastric juice remain soft. The patient, however, must drink it very slowly and lukewarm. To prevent the flocculent coagulation of milk, and the irritation of the ulcerative surfaces due to this, I now add pegin, or lab-ferment, which produces a very fine flocculent coagulation. Besides pigeon or veal soups, the yolk of an egg, or beaten-up egg albumen, pulverized meat or leguminous soups may perhaps be given. We must limit ourselves to these foods until the severe symptoms have disappeared. In the third week a food richer than this, both quantitatively and qualitatively, is permissible, and we should then carefully try food of somewhat greater consistence, such as scraped raw ham, raw or very soft boiled eggs, scraped venison or breasts of fowls, rolls or zwieback softened in

cocoa, but milk is always preferable, and we should always be ready to return to a simpler diet as soon as the symptoms, or even pains appear."

It will be noted that this diet claims as its main feature stomach rest, and that no particular effort is made to supply caloric values equal to the maintenance of nutrition, nor is any special attempt made to encourage the repair of the ulcer process. This diet may be considered a conservative and rational combination of well-tried methods, and, with certain modifications to suit individual cases, is probably the best.

Arguing from the fact that hyperchlorhydria, chlorosis and anemia frequently develop in the course of ulcer, Lenhartz has advocated quite a different course of treatment, based upon a different assumption. Even in cases of hemorrhage and other severe symptoms, Lenhartz allows his patients from the start to take concentrated foods rich in albumen, on the hypothesis that this diet converts free hydrochloric acid into the loosely combined form, and prevents further erosions and irritation of the ulcerated area.

His course of treatment extends over two weeks, during which time absolute rest in bed is required. Local applications of ice bags are employed during the first ten days. Lenhartz also recommends the use of bismuth subcarbonate in 30-grain doses three times daily. Chronic ulcers with decided pain are treated by silver nitrate and a limitation of liquids. Bland preparations of iron are given if anemia is present. The following articles are recommended by Lenhartz: Fresh milk, iced; both milk and eggs placed in a glass tumbler, surrounded with cracked ice, and kept at the bedside—even the feeding spoon being kept iced also. The eggs and milk may be given alternately in hourly doses, or may be mixed and given together. Granulated sugar is added to the eggs after the third day. Raw scraped beef, boiled rice and zwieback are given later. According to the following schedule, cooked chicken, finely chopped, or well-chopped ham or beef are added with butter and given

in large doses. After the tenth day broiled chop or steak may be substituted for the scraped meat; toasted bread may replace the zwieback, and fine cereals may take the place of the rice. During the first ten days rigid adherence to the prescribed regimen is necessary, both as regards the quantity of each article given at each feeding, and to the totals of each article for the twenty-four hours. The food is given in hourly intervals from 7 A. M. to 9 P. M., and a complete rest of 10 hours is allowed through the night. Beef broths are contraindicated owing to their contained extractives which induce hyperacidity. Lenhartz begins his method of dieting in a few hours after severe and repeated hemorrhages, and claims to have no disastrous results from his early feeding. It might be said in this connection, however, that few clinicians in this country either advocate or employ the unmodified Lenhartz method so soon after hemorrhage as the originator advocates.

LENHARTZ SCHEDULE

| | Day after last hematemesis | | | | | | | | | | | | | |
|----------------------------|----------------------------|-----|-----|-----|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Eggs..... | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Sugar..... | ... | ... | 20 | 20 | 30 | 30 | 40 | 40 | 50 | 50 | 50 | 50 | 50 | 50 |
| Milk..... | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Raw scraped beef..... | ... | ... | ... | ... | ... | 35 | 2×35 | 2×35 | 2×35 | 2×35 | 2×35 | 2×35 | 2×35 | 2×35 |
| Milk cooked with rice.. | ... | ... | ... | ... | ... | ... | 100 | 100 | 200 | 200 | 300 | 300 | 300 | 300 |
| Zwieback.... | ... | ... | ... | ... | ... | ... | ... | 20 | 40 | 40 | 60 | 60 | 80 | 100 |
| Ham (raw).. | ... | ... | ... | ... | ... | ... | ... | ... | ... | 50 | 50 | 50 | 50 | 50 |
| Butter..... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 20 | 40 | 40 | 40 | 40 |
| Calories..... | 280 | 420 | 637 | 779 | 955 | 1,135 | 1,588 | 1,721 | 2,138 | 2,478 | 2,941 | 2,941 | 3,007 | 3,073 |

The eggs and milk are given ice cold and in teaspoonfull doses.

In this treatment Lenhartz claims a mortality of 2 or 3 per cent. and asserts that the recurrence of hemorrhages is less frequent than in any other form of treatment.

It might be fairly stated that when patients are reduced

by hemorrhage or previous inability to take food, the Lennhartz treatment or some modification may be employed. When, though, the patient is in fairly good physical condition, the Leube treatment is perhaps safer.

As a conservative treatment of ulcer, and one that well suits the majority of patients the general plan of Lockwood may be commended, and the following is in the main as he carries it out:

The patient is kept in bed for four weeks, and during the first ten days he is not allowed to rise to either drink or eat, or to evacuate his bowels or bladder.

For the first three days nothing is allowed to enter the stomach, whether or not there is visible or occult hemorrhage. During these three days mouth washes are used frequently, to minimize mouth sepsis and to quench the thirst. A cleansing enema is given early in the first day. Nutritive enemas are not employed, nor is enteroclysis, except in the case of those who are weakened by hemorrhages, insufficient nourishment, recurrent vomiting, or who are greatly below par. Decinormal solutions of sodium bicarbonate are preferable to the saline solutions usually recommended, and the fluid may be introduced by the Murphy drop method. In milder cases in which the only indication is to relieve thirst, retention enemas of the soda solution may be given.

Drugs during this period are rarely indicated, exception being made in the case of recent hematemesis, or continuous secretion with or without acid vomiting.

During the entire treatment hot moist applications are to be employed, except when visible hemorrhage has occurred at any time within the previous three weeks, and the hotter they can be used the better. While considerable heat is desirable, it should not approach a degree of extreme discomfort. The electric pad is quite convenient, and the Priesnitz application, changed every hour during the day and twice at night, is also easily used. These external applications should last during the four weeks.

In cases of visible hemorrhage, ice-bags are to be applied constantly until all traces of blood have disappeared from the stools, and are then to be succeeded, not by extreme heat, but by the Priesnitz applications warm only, and reapplied every six hours.

From the fourth to the seventh day feeding by the mouth may begin, by giving peptonized milk in 2-ounce doses, and a similar amount of Celestins Vichy or of a solution of sodium bicarbonate on the intervening hours, so that the patient receives 2 ounces of liquid every hour. This must not be done during the sleeping hours. On the fifth day these quantities are increased to 3 ounces, on the sixth day to 5 ounces, on the seventh day the milk is increased to 7 or 8 ounces, while the alkaline water, given at the alternate periods, is reduced in quantity to suit the patient.

No drugs are specially indicated at this period, unless indicated by special conditions such as acidity, vomiting or hemorrhage. The bowels are moved daily by s. s. enemas.

During the second week the diet may be enlarged by the substitution of the following articles for any of the doses of milk; junket, arrowroot gruel, milk toast, creamed macaroni, malted milk, blanc mange, farina, grits or cream of wheat with cream and sugar. Not more than 5 ounces of any one of these should be given at any one time, and the system of two-hour feeding continued. Only one article is given at a time. Celestins Vichy or the soda solution may be taken as often as desired, but not in greater quantity than four ounces at one time.

During the third week the only change is the enlargement of the diet, there being gradually added mashed potatoes, purées of any kind not made with meat stock, creamed or boiled fresh fish, soft-boiled or poached eggs, the soft part of pumpkin pie, custards and mashed vegetables that can be put through a purée sieve. Soft bread or crackers well masticated, are allowed. Several articles of diet may be given at a time, and the feeding interval increased to

three hours. At this time milk may be discontinued, if desired.

During the fourth week the patient is allowed to sit up a portion of each day, while the external applications are gradually diminished. The only other change in the treatment is the addition of creamed chicken, tender squab, lean boiled ham, minced veal.

After the fourth week has passed the diet is to be continued for at least a month before resumption of a more varied menu, though the quantity given at one time may be gradually enlarged, so that the patient is allowed three larger and two smaller meals a day. Eating at night is not advisable. For at least six months red meat, scratchy articles of food, raw fruit and fruit juices, ice cream, ice water, and all highly seasoned articles of food must be avoided. Smoking may be allowed in moderation, after eating only. Tea is not good, and only weak coffee and a small amount should be allowed. No alcoholic beverages of any kind are permissible, and the patient would be better with *total* and *permanent* abstinence from them.

Medical Treatment.—This may be both routine and symptomatic, the former intended to promote healing of the ulcer, the latter to meet conditions as they arise.

Many clinicians use Carlsbad water, either hot or lukewarm, daily in order to keep the bowels gently moving. Should the original water be unavailable, the desiccated salts may be obtained, and artificial water prepared. This water seems to both reduce hyperacidity and hypersecretion. It is, therefore, of less use in ulcers accompanied by diminished secretion.

The two remedies *par excellence* in the routine treatment of gastric ulcer are nitrate of silver and bismuth.

The nitrate of silver may be administered in doses of $\frac{1}{4}$ to $\frac{1}{2}$ grain three times daily for about four days, unless it causes diarrhea, in which event it should be discontinued for about two days. It has been my custom to give this drug for four days, leave it off for two days, use

it again for four days, and in this manner to keep it up for about thirty days.

Lavage with a 1:3000 solution of nitrate of silver is recommended by some. In this I do not concur, as I think it best to avoid, if possible, the use of the stomach-tube for fear of its possible traumatic effect.

Bismuth may be employed both for its alkaline and mechanic effect. Lockwood objects to the subnitrate, as he believes the sharp crystals of this preparation may irritate the floor of the ulcer. I am not sure he is justified in this fear. Aaron has written a valuable paper on the use of bismuth subnitrate for ulcer, and believes that owing to its physical consistence, its fine distribution, and its high specific gravity, this drug is capable of forming a layer over the ulcer, which mechanically protects it from injury. Moreover the good effect may be also due to chemic action, for it has been found that bismuth, when introduced into the stomach, induced a mucous secretion, and that the protective layer was a muco-bismuth mixture. In this process bismuth is reduced to bismuth oxide, and it may be assumed that this is the principal agent in the formation of the bismuth crust. Owing to its astringent property, bismuth is capable of producing a healing effect, for, as is well known, astringents precipitate albumin and mucus, entering into combination with the albumin and forming albuminates. As a result of the deposition of new, firm particles in the tissue interspaces, the epithelial surface is smoothed, and the size of the blood-vessels diminished. Secretion is, therefore, reduced, and the hyperemic conditions and attendant pains relieved; and the fact, that mucous membrane of this consistence is a favorable culture ground for bacteria, supplies another reason for the subsidence of the inflammatory manifestations.

According to Fleiner's and Aaron's present method about ten to twenty grams of bismuth subnitrate in a tumbler of warm water are taken by mouth in the morning on an empty stomach, the stomach having been previously

cleansed with about 150 c.c. of Carlsbad or Vichy water. This should be given daily, the dose being increased, reduced, or discontinued, according to the clinical course.

A modification of this method consists in administering bismuth in oil, by combining the bismuth treatment with Cohnheim's oil treatment, the doses of bismuth finely suspended in olive oil being taken several times daily.

When there is constipation following the bismuth, or where there appears to be an idiosyncrasy against it, other alkalies may be given to correct hyperacidity. Among these are magnesia usta, or magnesia carbonate. Soda bicarbonate is not desirable on account of the liberated carbon dioxid following its use.

Atropin is of service to control pain, to reduce acidity, and to relax muscular spasm. It is chiefly indicated during attacks of acute hypersecretion from pyloric spasm.

Hemorrhage has in the main been considered, but I might say that the drug of greatest benefit is adrenalin in 10-minim doses of the 1:1000 solution. This may be given every fifteen minutes to half hour, diluted in a little water, until satisfactory results are attained. Some fear the reaction dilatation following the vasomotor constriction, but before this occurs a thrombus is generally formed at the bleeding point. Gelatin and calcium chlorid and lactate have been discussed. Ergotin hypodermically has gone out of use.

Vomiting is usually relieved by regulation of diet, counterirritation over the epigastrium, minim doses of Fowler's solution or wine of ipecac, 1 or 2-minim doses of dilute hydrocyanic acid, or 1/2-grain doses of menthol. Oxalate of cerium has not proved satisfactory, though I have gotten some results from chloretone in 3-grain doses.

Pain should be controlled by heat, alkalies, atropin, or abstinence from food. Should pain keep up for over ten days after a systematic ulcer treatment, there is probably some complication which requires appropriate attention.

Perforation is a surgical complication, and dalliance with any other measures may lose for the patient his chance of recovery. Cases of spontaneous cure which have been reported do not afford any excuse for a waiting or expectant course.

For the anemia and debility Blaud's mass or pill is probably the best ferruginous preparation. None of the iron preparations containing alcohol as a menstruum should be given. Should the stomach be intolerant of any form of iron, the hyperdermic injections of the green citrate of iron may be administered. This can now be obtained in ampules, and is a convenient form for use.

Einhorn's Duodenal Method in Gastric Ulcer.—In this method Einhorn gets the duodenal tube *in situ*, as previously described, and feeds the patient directly into the small intestine for two weeks. The dietary and the methods of introduction have been described in a previous chapter.

During the time of the duodenal alimentation full doses of bismuth should be swallowed each day, or occasional doses of magnesia usta, when it is desired to temporarily discontinue the bismuth. The mouth should be kept well cleansed with an aromatic alkali, as liquor alkaline antiseptic.

In proper cases this method is invaluable, and yields splendid results. Where, however, it seems that the tube impinges upon the ulcerated or inflamed area, the patient can get no peace nor comfort until the tube is removed. Occasionally, when the stomach seems intolerant of the tube, if it is removed and rectal feeding resorted to for forty-eight hours, it can be replaced and comfortably retained.

After fourteen days of this feeding have passed, the tube should be removed, and the combined Leube-Ziemssen method of feeding inaugurated with rather rapid increase.

There are attractive possibilities in this method of ulcer treatment, and with proper technic it will probably yield

tangible healing results without weakening the patient as do some of the other plans.

Therapeutic Use of the X-rays.—This has been advocated by Bassler, who argues that from the beneficial effects obtained in the treatment of cutaneous ulcers of all types and its discutient effect on cicatricial conditions, such as may be seen in scars of furunculosis of the neck, cicatrices from injuries, etc., that ulcers of the stomach might likewise be favorably influenced by the X-rays. While he has reported some apparently favorable results, the dangers incident to exposure to the rays have deterred many from attempting this method, and it will not probably come into much use.

INDICATIONS FOR SURGERY

If any of the following complications arise during the course or medical treatment of gastric ulcer, surgery should be advised, the time for such attack depending on the urgency of the symptoms:

Perforation with commencing peritonitis; local peritonitis, with or without abscess, subphrenic abscess, perigastric adhesions, decided ectasia due to stenosis from ulcer or spasm from its irritation, or gastric tetany with ulcer. In recurrent acute hemorrhages it may be necessary to enter the stomach, locate the bleeding point, and suture it. In cases of chronic ulcer, with recurrent hemorrhages, after systematic treatment for eight months to a year, if the patient is still complaining and apparently losing ground, surgery may be favorably considered, though some surgeons hesitate to operate unless there is pyloric stenosis. The present trend is toward quicker resort to surgery in gastric ulcers, especially since the technic has been so improved.

In cases of pyloric obstruction from ulcer with dilatation of the stomach, though medical treatment may show a temporary improvement, surgery really offers the only permanent relief.

Excision of the ulcer in chronic cases will probably prevent in many instances the development of cancer in later life, as the liability of cancer to develop upon the site of a healed ulcer is well known. Some observers claim that at least 75 per cent. of cancers have their origin in chronic gastric ulcer, while Wilson and McCarthy, writing from the Mayo clinic, report that of 153 specimens of undoubted carcinoma taken from the stomach at time of operation, 71 per cent. "presented sufficient gross and microscopical evidence of previous ulcer to warrant placing them in a group labeled 'carcinoma developing from previous ulcer.' Eleven other cases showed considerable evidence of precedent ulcer, but not sufficient to warrant placing them in the previous group. In 33 cases (22 per cent.) there was relatively small or no pathological evidence of precedent ulcer." Though the Mayo clinic receives, as a rule, only the chronic ulcers which have resisted all forms of medical treatment, these figures afford food for reflection, and show the possible future danger of allowing an ulcer to remain in painful evidence for months or years.

CHRONIC EROSIONS

These may be chronic or acute, and may be properly discussed in this chapter.

Acute erosions are small abrasions of the mucosa of the stomach, generally multiple, and extending partly through the layer. There is frequent hemorrhage with this type, which may occur in the new-born, in the cachexia of children, in chronic heart and arterial disease, in cirrhosis of the liver, in some post-operative cases, and sometimes is associated with the throbbing aorta in neurotic women. Erosions seem to be rather frequently manifested among hard drinkers, especially middle-aged men with livers somewhat cirrhotic. In such cases the hemorrhage seems, to an extent, to be compensatory and beneficial.

The treatment is naturally that of the cause of these

erosions, as mentioned above, and the treatment of the attendant hematemesis the same as in gastric hemorrhage from other pathologic conditions. Occasionally these erosions are so numerous that the hemorrhage is fatal. George H. Noble reports a case, in which after repeated hemorrhages, he entered the stomach, but found blood oozing from practically the whole gastric surface, and which could not be stopped.

Chronic erosions are small superficial exfoliations of the gastric mucosa, and it is claimed by some that they present a part of the clinical picture of chronic gastritis. Einhorn first described this condition as a clinical entity.

Diagnosis.—This consists of pain, emaciation, weakness, and lassitude, and finding in the wash-water after lavage one or more small pieces of gastric mucous membrane. There is usually a decrease in acidity and free hydrochloric acid and considerable mucus. Einhorn believes that the "erosions" resulting from the peeling off of the mucous membrane are responsible for the pain and tenderness, and that it has not yet been determined whether the exfoliation recurs at the same place after healing or in new regions of the stomach.

The disease is usually of long duration with, at times, intervals of improvement.

Treatment.—This depends upon the gastric findings, being much the same as in chronic gastritis. Hyperacidity, hypoacidity, or achylia require appropriate consideration.

There are three methods of local treatment advocated:

(1) Lavage every other day with an alkaline wash to dissolve the mucus, and 15 to 30 grains of bismuth before each meal, taken in a half-glass of water.

(2) The administration of nitrate of silver as in ulcer of the stomach is probably the best method of treating chronic erosions. Lavage also is useful, and the stomach may first be cleansed with a warm alkaline solution and then washed with the nitrate of silver solution, 1:1000 or 1:2000.

Einhorn advocates intragastric galvanization one day,

with nitrate of silver spray preceded by lavage on the following day, and so alternating.

(3) The extract of the suprarenal gland has been also recommended. It may be used in the Einhorn powder-blower, and applied to the stomach every other day, 3 grains at a time. This method has apparently given some good results.

Measures for the upbuilding of the body, the strengthening of the nervous system, and the improvement of general tone, are all helpful in healing gastric erosions.

CHAPTER XIX

TUMORS OF THE STOMACH—FOREIGN BODIES IN THE STOMACH

In an analysis of 30,000 cases of cancer, W. H. Welch finds the stomach involved in 21.4 per cent., standing next in frequency to uterine cancer. Osler, Haberland, Brinton, Virchow and others have placed the frequency of cancer of the stomach at from 15 to 35 per cent., while all agree as to its alarming prevalence.

Race.—It has been supposed that some races were less susceptible than others. Negroes seem to suffer less than whites, and it has been seldom observed in Egypt and some parts of South America. Kuttner has commented on the prevalence of cancer in southeastern Germany, and Bryant claims that it is on the increase in the United States. It has been noted in recent years that in countries where this disease was supposed to be rare, that upon the establishment of a proper system of vital statistics, it would be found in abundance.

Age.—Welch finds that three-fourths of the cases in his analysis occurred between the ages of forty and seventy, with the majority between forty and sixty. Cases under thirty are rare indeed, though J. L. Campbell has just reported to me personally a case that came to operation in a girl of fourteen.

Sex.—Welch finds cancer of the stomach slightly more frequent among men than women, and Osler in 150 cases, finds 126 males and 24 females.

Heredity.—Most of the recent statistics have tended to disprove the heredity of cancer, though, on the whole, this question is still *undecided*.

Traumatism.—This has been given by some as a prominent factor in etiology, but Osler reports only one case in his series. Deaver refers to the influence of trauma, citing as an example skin carcinoma caused by continued exposure to the X-ray.

Chronic inflammatory disease of the mucous membrane of the stomach is considered a predisposing factor by some in the production of carcinoma, especially the polypoid form of gastritis. As a rule, however, carcinoma develops without previous history of long-standing gastric disturbance, and Ewald and Einhorn are probably correct in the assumption that these conditions have little or no influence.

The development of cancer upon an ulcer scar has been clinically demonstrated many times, and it is now thought that about 71 per cent. develop from that cause. When one remembers that in about 5 per cent. of persons dying from all causes Brinton finds evidences of gastric ulcer, it can be understood how carcinoma can develop on an ulcer with no apparent previous gastric symptoms.

The parasitic origin of cancer is being strenuously investigated, but has not as yet been proved.

Varieties.—The most common form are the cylindrical-celled adenocarcinoma and the encephaloid or medullary carcinoma; next in frequency is the scirrhus; and least frequent is the colloid cancer.

Adenocarcinoma.—This type forms soft tumors of firmer consistency than the medullary type, and sloughing slowly. Microscopically, a section shows elongated tubular spaces filled with columnar epithelium, while the intervening stroma is abundant. Gradually the tubular spaces develop into cell nests, there is frequent infiltration of the connective tissue with white blood corpuscles, and cystic degeneration is common.

Medullary Carcinoma.—This occurs in soft, spongy, fungating masses, which involve all the coats of the stomach, usually ulcerating early. It is large, often flat, projecting above the mucous membrane, and may form a

cauliflower-like outgrowth. It is soft and grayish or yellowish white in color. Microscopically, it shows scanty stroma, enclosing alveoli containing irregular polyhedral and cylindric cells. This form also shows a tendency to ulcerate, and metastases are frequent.

Scirrhus Carcinoma.—This type is characterized by great hardness, due to abundance of stroma and limited amount of alveolar structure. The large amount of connective tissue makes the tumor firm and compact. There is only slight tendency to ulcerate, except at a late stage superficially, and secondary metastases are not common. This form is rather often seen at the pylorus, though at times it may be diffuse, involving all parts of the stomach. It has been reported in the stomach as secondary to uterine cancer, and it may be combined with the medullary type.

Colloid Carcinoma.—This form is characteristic from the fact that it invades widely all the coats of the stomach, frequently spreading to the neighboring parts and causing secondary growths of the same nature in other organs.

Its appearance is distinctive, showing large alveoli filled with translucent gelatinous material, colloid in nature. On scraping no cancer juice exudes, but gelatinous fragments.

Sarcoma.—This may be primary or secondary, and is a neoplasm consisting of small cells of an adenoid or embryonic type without epithelial appearance and in many cases without stroma. Primary gastric sarcoma occurs in two forms—infiltrated and circumscribed. The usual location of starting point of lymphosarcoma is the pylorus, and this variety may infiltrate the entire wall of the stomach without invading the orifices. Next in frequency is the myosarcoma, having its starting point in the muscular coat. This form and the fibrosarcoma often acquire enormous size, with frequent metastases. Many cases of gastric sarcoma cannot be distinguished clinically from gastric carcinoma, especially in the round-celled type, in the course of which ulcerations, softening and hemorrhage may occur, with occasional perforations.

Unlike carcinoma, sarcoma is often a disease of young adults, although certain forms of sarcoma seem to be most common in the old. Sex does not show any particular difference as to the frequency of its occurrence, nor has a parasitic origin been demonstrated. Cohnheim's theory pertaining to the origin of cancer seems to bear a greater significance in sarcoma, for the reason that the latter growths are so closely related to undeveloped connective tissue that sarcomatous tissue may be compared to embryonal tissue.

Softening, hemorrhage and perforation occur but seldom in gastric sarcoma, owing to the fact that it is an infiltrating growth with neither contraction nor obstruction. If the latter occurs, it is due more to mechanical conditions than to a constriction of the growth.

Diagnosis.—The course of sarcoma of the stomach is variable. In some a long dyspeptic history may be obtained, while in others symptoms did not appear until an easy palpation of the tumor was possible. Cachexia, as a rule, appears late, and as stenosis is seldom present, emesis may be lacking through the whole course of the sarcoma. Pains in the epigastrium and vicinity may appear early and be intense. Free hydrochloric acid is absent generally, and lactic acid present. Boas-Oppler bacilli are occasionally found. Marked anemia is developed as the disease progresses, and death may occasionally take place from hemorrhage.

The following differential points as between gastric carcinoma and sarcoma have been collated by Aaron:

| Carcinoma. | Sarcoma. |
|----------------------------------|--|
| (1) Much pain. | Much pain early, which diminishes as the tumor becomes palpable. Sometimes no pain at all. |
| (2) Involvement of the orifices. | Orifices not involved or rarely so. |
| (3) Stenosis marked. | Stenosis seldom. |
| (4) Hemorrhage early. | Hemorrhage late in the disease. |
| (5) Markedly malignant. | Less malignant in its course. |
| (6) Growth rapid. | Growth comparatively slow. |
| (7) Metastases early. | Metastases late. |
| (8) Cachexia early. | Cachexia late. |

Benign Tumors of the Stomach.—These are extremely rare, seldom producing any symptoms during life, though they may occasionally ulcerate, causing hemorrhage and perhaps later on, obstruction. These growths may be simple or multiple, sessile or pedunculated, and are classified according to the tissues or gastric layers from which they are derived, as lipomata or fatty tumors arising from the sub-mucosa of any part of the gastric walls; fibromata, probably arising from fibrous thickenings of the pylorus or elsewhere in the stomach, arising from old cicatrizing ulcers; fibromyomata, or benign tumors which project into the stomach, and consist of unstriped muscle fibers in fibrous tissue.

Cysts may be formed in the stomach by the occlusion of ducts of gastric glands. These may attain the size of a small walnut, but they are usually quite small and multiple, having the appearance of minute vesicles.

Epigastric Hernia.—This condition is brought about by a rupture occurring at some part of the linea alba between the umbilicus and ensiform process. It is classed among the preperitoneal lipomata, being made up of omentum and fat, and varies in size from a bean to an egg. Careful palpation is generally required to diagnose this tumor.

The symptoms produced by the presence of an epigastric hernia may stimulate almost any gastric disorder, and has been mistaken for gastric ulcer, acute or chronic gastritis, gastralgia, carcinoma, and cholelithiasis.

Treatment.—This is surgical, other methods being a waste of time and effort.

DIAGNOSIS OF CANCER OF THE STOMACH

An early diagnosis of this disease, with an early recourse to surgery offers a fair chance for permanent recovery. A sad feature of gastric cancer is the fact that after the growth has advanced to such a stage that diagnosis is plain and easy, treatment is often either unavailing, or

surgical procedures are out of the question. It is, therefore, of the utmost importance that every diagnostic method be brought to bear upon a suspected case, in order that speedy and radical measures may be inaugurated, should cancer be found.

General Symptoms.—Usually a patient of middle age, previously in good health perhaps up to six or less months before consulting the physician, comes complaining of dyspeptic disturbances, loss of appetite, fulness, pressure and discomfort after eating. The previous history of good health, however, will nearly always be slightly modified after careful cross examination, for practically all will admit periodical, though perhaps slight, attacks of indigestion in former years, pointing in many instances to gastric ulcer. The feeling of discomfort and ill-being later on merges into pain, generally not of the spasmodic type noted in ulcer, but continuous in character. The pain is sometimes increased by food, but is often intense at a later period of digestion than in ulcer. With belching there is at first regurgitation of food, later vomiting, not after every meal, but once or twice daily. This vomiting is naturally more prominent when the growth sets up a stenosis of the pylorus.

As the cancer progresses, there is generally hematemesis several times in succession, the vomitus being of a coffee-ground appearance and not large in quantity. The patient has during this time been losing flesh and strength, and perhaps cachexia is now apparent. As the disease progresses, weakness and prostration become more and more marked, and he finally dies of inanition or of complications.

A brief analysis of the symptoms is in order.

Anorexia.—This occurs in about 85 per cent. of all cases, and as a rule is progressive. Many patients find that meat is especially repugnant to them, and hyperkoria or increased sense of satiety, is noticeable. It is probable that progressing toxemia is responsible for the anorexia.

Pain.—Actual and acute pain may not be prominent in all cases, but it is doubtful if any progress to a fatal termination without a certain amount of local discomfort being complained of at some time during its course. Osler reports pain in 130 out of 150 cases, and Brinton finds it in 92 per cent. of his cases. Lockwood's private patients showed 15 per cent. in which no pain appeared.

When pain is present, however, it is generally a prominent symptom, and, while not intense, it is constant and wearing in its character. It is usually noted at an early date, first in the epigastrium, but may be referred to the hypochondriac regions, the sternum, the shoulders or back. This pain, unlike ulcer, is not generally relieved at the end of gastric digestion. Sometimes over the region of the tumor the pain is most intense, at other times it is described as a painful dull feeling. Cancers of the cardia are often characterized by pain during or after swallowing. An important point in the consideration of cancer pain lies in the fact that it is not so amenable to bland or liquid diet as ulcer. A patient who is carefully dieted for a week or more, and who admits no amelioration of the pain may well be viewed with suspicion of possessing malignant trouble.

Vomiting.—This occurred in 128 out of the 150 cases reported by Osler, and in 87 per cent. of Brinton's cases. At first it is not very frequent but later on may occur several times daily. It is more frequent when the pylorus is involved, and may come on only at stated intervals, the vomitus containing mucus, undigested food, changed blood, and Boas-Oppler bacilli. Sarcinæ rarely are present, being noted more often in benign stenosis. A few cases have been noted in which extensive involvement of the anterior or posterior wall of the stomach was accompanied by no vomiting.

Hemorrhage.—This occurred in 36 of Osler's 150 cases, and Brinton places it at 42 per cent. The blood is usually visible, is mixed with the secretions of the stomach, is dark in color, and rarely a bright red; also less in quantity than

in ulcer. Fatal hemorrhage in carcinoma of the stomach is rare indeed.

Loss of Weight and Cachexia.—These show in practically every case. Sometimes in the early stages of a carcinoma, if special efforts toward keeping up the nutrition are exerted, a patient may look well and keep up his weight, but this cannot last long, and the inevitable emaciation appears later on with seemingly greater rapidity. With the emaciation comes the sallow skin with its peculiar ashy look, and loss of strength and weight presage with realistic certainty the termination.

The Blood.—Anemia is nearly always present, though occasionally when there is copious vomiting with but little ingestion of fluids, the blood may become concentrated and show normal or increased red cells with high hemoglobin. This is only temporary, though the count is sometimes surprisingly high considering the cachexia. Leucocytosis is present in gastric cancer, usually mild, and rarely above 12,000 to 15,000. In occasional cases the blood count is so low as to suggest pernicious anemia, but the absence of megaloblasts and the presence of leucocytes suggest cancer.

Tumor.—In connection with other diagnostic points the presence of a palpable tumor in the epigastrium is almost pathognomonic.

Inspection.—But little can be gained from this except in rather advanced cases. In a good light there may sometimes be observed a fulness under the left costal arch or a localized fulness or prominence in the epigastrium showing respiratory movements. This prominence may be due to the growth itself, or in the presence of pyloric stenosis, to a distended stomach.

Peristaltic movements are often noted when stenosis is marked, and in decided gastroptosis the lesser curvature may be seen at times with the tumor moving with respiration. Inspection with the patient standing, as suggested by Knapp, will frequently yield additional information.

Percussion.—This may or may not be of assistance, though the auscultatory or scratching method of percussion may in some instances give a dull note over the tumor.

Palpation.—This is reliable if the patient is not too stout or if the tumor has advanced to the stage where it can be felt. The location of the tumor makes quite a difference, for, if located on the posterior wall of the stomach, it is hard to recognize, unless the stomach is empty. When the tumor is on the lesser curvature and the stomach in normal position, it cannot be palpated except on deep inspiration.

Another point of much moment in considering surgery is the fact that gastric tumors seem smaller to the palpating finger than they appear at operation.

Inflation.—This is of some value in deciding whether the growth is connected with the stomach. If during inflation the tumor moves away from the liver, the diagnosis of tumor of the stomach may be made and that of the liver or gall-bladder excluded. Should this not occur, there may be adhesions or involvement of both organs. A tumor of the pylorus generally moves to the right and downward on inflation. Tumors of the posterior wall and lesser curvature that are palpable before inflation, are frequently so no longer after the stomach is filled with air or gas. It is well to first map out the position of the stomach before inflation, and to mark the boundaries with a pencil. After inflation this can be repeated and the data obtained can be better understood.

A great amount of inflation in a stomach whose walls are weakened entails a risk.

Transillumination.—This method, as described in a previous chapter, may be of some service, when the tumor is on the anterior wall of the stomach, or the shape of the stomach has been changed by its presence; otherwise not much information can be gained.

Esophagoscopy.—This method applied only to tumors situated in the cardiac orifice, and the passage of the

esophagoscope would probably cause more damage than the information obtained would profit the patient or physician.

Gastroscopy.—In the *Journal of the A. M. A.*, Oct. 11, 1913, there appears an article by Dr. H. H. Janeway, in which he enthusiastically advocates this method for early diagnosis of cancer of the stomach. In the course of his article he says "Up to the present time I have made a positive diagnosis by this method in twenty cases of cancer of the stomach, in two of which the roentgenoscopic examination was negative." He further says, "I am convinced that, if proper gentleness and carefulness of technic are exerted, it is possible to diagnose cancer of the cardia simply with the aid of cocainization of the pharynx and without causing pain or an amount of discomfort to which a normal person would object." This opens up interesting possibilities which are as yet, perhaps, in a nebulous state.

Subjective Symptoms Due to Location of the Tumor.—If at or very near the cardia, the patient finds at first a slight impediment to swallowing, and frequently has to wash down his food with draughts of liquid. Later on this increases, and he finds it impossible to take solid food. If he tries to swallow, the food is regurgitated, sometimes with much retching, and mixed with mucus or streaks of blood. Upon examination with a bougie the obstruction may be easily felt, and the location and size of the stricture determined. Force should not be exerted, or trauma with increased proliferation of the growth may be induced.

When the growth is in the pyloric region there is pain, fulness in the stomach, and frequent attacks of vomiting. Sometimes just before emesis there are sharp pains caused by the efforts of the stomach to expel the food through the inflamed and constricted pylorus. The vomitus is generally large in amount, and may be of offensive odor. Peristaltic unrest with cramping pains are also noted.

When the cancer invades the body of the stomach, general pain is complained of, vomiting may not be such a prominent symptom, and the vomitus is more finely

divided. There may be slight motor insufficiency, but this does not generally take place until cachexia is far advanced.

Chemic Examination of Stomach Contents.—An Ewald-Boas test-meal should be given, and one hour later should be aspirated carefully.

Hydrochloric Acid.—This is deficient or absent in a majority of cases. Osler found it absent in 84 out of 94 cases examined, and Boas found it absent in 35 out of 40. Graham found in the Mayo clinic, however, only 80 cases of absent hydrochloric acid in 150 cases. The absence of free hydrochloric acid is not pathognomonic of cancer, but taken in connection with other symptoms forms a strong link in the chain of evidence.

Lactic Acid.—This may be found in those cases of cancer in which there is a stagnation of the stomach contents, resulting from pyloric obstruction, and where the atrophy of the mucous membrane has progressed to the point where measurable amounts of free hydrochloric acid are no longer secreted. Its presence, therefore, is not pathognomonic, but simply shows a certain amount of food-stasis and is, like the absence of free hydrochloric acid, a corroborative symptom.

Lockwood reports normal chemic findings in 15 per cent. of his cases.

Macroscopic and Microscopic Examination.—To the eye there appear undigested food particles, and perhaps coffee-ground material. The aspirated contents often divide into two layers on standing, the upper three-fifths being liquid, the lower two-fifths being food remains, mucus, and perhaps pus or exfoliated gastric mucosa. Microscopically there can be seen pus, amorphous material, blood corpuscles, or Boas-Oppler bacilli.

Specific Tests for Gastric Cancer.—In 1909 Neubauer and Fischer announced that the cancer ferment had the power of hydrolizing simple peptids. One of the products of this cleavage when the dipeptid glycyl-tryptophan is acted upon is tryptophan, an amino-acid, whose presence in

gastric contents is easily ascertained. The "glycyl-tryptophan test," therefore, depends upon this reaction.

J. W. Weinstein holds that the use of glycyl-tryptophan is useless, and that it is only necessary to test for tryptophan in the gastric filtrate without employing the former at all. The presence of tryptophan he claims is sufficient. He gives a regular dinner at noon, consisting of bread, butter, meat prepared plainly without seasoning, and sweet weak tea without milk. Pepper and lemon juice interfere with the reaction. Sugar seems an excellent stimulant to the secretion of the cancer enzyme, and beef he finds better than chicken. Three or four hours later the stomach contents are aspirated, and tryptophan tested for. If present, he considers reaction positive; if absent, the filtrate is placed in a thermostat and tested for tryptophan twenty-four or forty-eight hours later. When a negative tryptophan test is obtained in a case of pyloric stenosis showing free hydrochloric acid, lavage may be instituted, and Ewald's test breakfast given in hope that contents may be free of free hydrochloric acid, and that the reaction may be secured. Acetic acid and bromin vapor are employed.

In this test Weinstein claims that the only practical sources of error are first, the presence of free hydrochloric acid equal to 0.36 per cent., though he has noted exceptions; and second, the regurgitation of duodenal contents so that the contained trypsin may produce tryptophan. He does not believe that occult blood or bacteria interfere with the test.

These tests have been studiously followed up by Friedman and others, and a considerable difference of opinion prevails in regard to the factors which may invalidate them. At present this test is not as enthusiastically regarded as formerly.

Attempts have been made to apply the principle of complement deviation, which has been of so much use in the diagnosis of syphilis, to the early diagnosis of cancer. Laborious efforts have been entered into in the hope of

finding an antigen, perhaps an extract of cancerous tissue, which would combine with the antibodies supposed to exist in the serum of patients suffering with cancer. The results obtained by them have not been uniform, and it must be admitted that so far the action of the antigens have not been specific enough to certainly differentiate cancer from syphilis, benign new growths, and other conditions.

The latest serum test is Abderhalden's test, concerning the use of which in other conditions much is now being written. This test is based on the consideration that when foreign proteins get into the blood, the body reacts by elaborating a ferment which causes their disintegration. The same reaction is believed to occur under the influence of certain peculiar protein substances derived from the organism itself. As elements from the placenta pass into the maternal blood, the serum acquires the power to digest placental tissue, and Abderhalden believes this to be present only in pregnancy.

As his test for pregnancy is based on this principle, so, asks the *Journal of the A. M. A.*, may it not be possible that in cancer analogous reactions occur, so that the serum of cancerous patients may be able to digest cancerous tissue? If this should be the case, the detection of the products of such digestion would present a means of specific diagnosis. The method is as follows: A small piece of cancerous tissue is placed in a dialyzing-sack and covered with a few cubic centimeters of the serum of the suspected cancer patient; this sack is put in a 2 per cent. solution of sodium fluorid in a suitable container, and the whole placed at 22° C. for thirty-six hours. At the end of this time the fluid outside of the dialyzer is tested for the products of protein digestion. The presence of peptones signifies a positive result—the patient has cancer. Perfect sterility must be observed throughout this method, as contamination of any sort spoils the result.

Kabanow states that he has applied the test with preparations made from various portions of the gastroin-

testinal tract, portions which seem to be physiologically and anatomically independent of each other. He thus applied the test with preparations made separately from the fundus, the pylorus, the duodenum, small intestine, large intestine and appendix, and tabulates the details of sixteen cases. It is remarkable to note the positive reaction to the special organ tissue involved, and the lack of reaction in presumably purely nervous affections. One table reports the findings in four cases of pernicious anemia; the reaction was positive to stomach and small intestine tissue in one case; to the latter alone in two others, and there was no reaction in the case of a patient who had entirely recovered from the anemia. The only contradictory finding was in a case of acute gastritis. The test was applied the third day, and there was no reaction, evidently because the ferments had not yet had time to appear in the blood.

Erpicum has tested the serum of forty-two patients with tumors in various parts, the exact nature of which was determined after operation. Of these tumors all the cancers (two sarcomas) gave positive results. The benign tumors gave negative results. Should, upon further experimentation along this line, the same positive results be obtained, the early diagnosis of cancer by specific means will be practically an accomplished fact.

X-ray Examination for Cancer of the Stomach.—The use of this method in the early or late diagnosis of cancer has been to a certain extent discussed in a special chapter. Holzknecht firmly believes that a diagnosis of early carcinoma is justified, if in a patient with achylia, six hours after the meal bismuth residue is found in the stomach, provided that the head of the bismuth column has at this time reached the splenic flexure, and that the second bismuth meal shows a normal stomach shadow. He reasons on the hypothesis that as normally the head of the bismuth column should in six hours reach only the hepatic flexure, we are dealing with hypermotility, when the splenic flexure shows the bismuth, which, when the pylorus is free,

is a regular accompaniment of achylia. The bismuth residue, moreover, demonstrates an achylia with stagnation, but his stipulation that the contour of the stomach after the second bismuth meal should be normal, excludes atony and many cases of ulcer.

It appears to Lockwood, and his view is concurred in by myself and others, that the claims of Holzknecht are too positive, as ulcers near the pylorus which occasionally happen to be associated with achylia, may produce the same radiographic picture, and that a differential diagnosis from pylorospasm due to gall-bladder disease accompanied by achylia, would be quite impossible. Morphinism, too, must be excluded as a possible cause, as among these habitués pylorospasm and bismuth retention may be found in their stomachs, which, after the second bismuth meal are seen to retain their normal size and shape, but in morphinism there would be no bismuth at the splenic flexure.

The following suggestions from Lockwood properly apply to conclusions derived from radiographs:

In extensive and infiltrating cancerous growth radiographs may show nodular indentations, "similar to finger prints," as expressed by Cole. When the destructive process is extensive, large areas of the stomach may be entirely obliterated, the ragged edge of the uninvolved area sharply limiting the outline of the bismuth shadow.

Should the pylorus be obstructed by the tumor, the narrow constricted lumen of the pylorus may give passage to an abnormally thin line of bismuth, sinous and crooked. Sometimes the bismuth outline narrows down to the semblance of a cone, with a small outlet the apex. In other instances a thread-like shadow may issue directly from the sharply defined edge of an apparently normal pars pylorica. In some instances the stomach is found to be empty in six hours, but has lost its normal hook shape, and has assumed a "horn-shape." This picture is looked upon with much confidence by the radiologists, and when they make out with distinctness that the "horn-shape" is present, they

generally consider that the growth has reached the inoperable stage. This has happened several times in patients of the writer.

In conditions of inoperable diffuse cancer in which the whole organ is involved, we may find the stomach empty in six hours, the head of the bismuth column at or beyond the splenic flexure, and a bismuth deposit in the lower esophagus after six hours. The second bismuth meal may show a greatly distorted stomach lying obliquely in the abdomen, and the bismuth immediately after ingestion beginning to flow freely out of the stomach, indicating insufficiency of the pylorus.

The X-ray is a most valuable adjunct in the early diagnosis of malignant growths of the stomach, but, like other methods, cannot be depended on to the exclusion of other well-known and well-tried clinical investigations.

Differential Diagnosis.—There are several conditions which may in certain particulars simulate carcinoma ventriculi, and will be briefly considered.

Apparent Tumors of the Stomach.—Prolapse of the left lobe of the liver, a pulsating aorta, or a thickened portion of the abdominal recti muscles have been mentioned by Einhorn as being mistaken for a tumor of the stomach. The history, general appearance of the patient, and careful examination will suffice to eliminate cancer.

Grave Anemia in Cancer without Palpable Tumor.—These cases show dyspeptic symptoms, and must be differentiated from pernicious anemia. The blood findings, as previously stated, will mark the difference. It might be said in addition that the gastric acidity of the stomach contents is higher in cancer than with the achylia of pernicious anemia, and lactic acid may be present in cancerous anemia. With secondary anemia or chlorosis, hyperchlorhydria is generally associated.

Syphilis.—This sometimes presents a syndrome of symptoms, plus gummatous masses in or around the stomach, that will deceive the most experienced observer. The

history will have to be carefully noted and a Wassermann test made. While the writer does not subscribe with great confidence to the Wassermann test, it may be accorded a modicum of weight when corroborated by other evidence. As an antiulcer treatment is helpful in clearing up a diagnosis, so an antisiphilitic treatment may be utilized, and the results noted.

Sclerosis of the Stomach.—This is usually found in persons past middle life, who complain of pain in the stomach, distention after eating if they attempt any physical exertion, and dyspnea, relieved by the eructation of gas. They also complain of nocturnal seizures, accompanied by distention, heart disturbances, dyspnea, and sense of impending danger. On examination there is found a heart somewhat enlarged, a sharp aortic second sound, a murmur over the aortic area, pulsation in the episternal notch, attacks of pain over the precordial region radiating to the left arm, and marked tenderness over the abdominal aorta down to the umbilicus. All these show the circulatory system as the real origin of the trouble.

Aneurysm of the Celiac Simulating Carcinoma of the Pylorus.—The possibility of this error is interesting. Kemp reports a negro patient, in whom were vomiting, gastric pain, anorexia, etc., and a loss of 40 pounds in three months. A palpable tumor, the size of a small egg, was present in the epigastrium, in which there was a slight pulsation, but no bruit or thrill. Exploration showed an aneurysm of the celiac axis pressing on the pylorus posteriorly, causing occlusion of the pylorus and other digestive disturbances.

Prognosis.—If diagnosed very early, surgical treatment offers a moderate amount of hope, and some cases are on record, where, after resection of the pylorus, or even the major part of the stomach, the patients have lived several years. Kocher has reported an instance in which the patient was in good health five and a half years after resection of the pylorus for carcinoma; and Wolfler one

where the patient remained well for five years, dying of a metastasis. Criete, of Gottingen, mentions a case, in which the patient was still in seeming perfect health fourteen years after resection of the pylorus for cancer. These cases, however, are infrequent. Deaver shows that about 10 per cent. may be cured by early and radical operation, and perhaps that is about the best we can expect.

Medical aid can alleviate the suffering and prolong life; it can do no more.

MEDICAL TREATMENT OF GASTRIC CANCER

Medical treatment, while not curative, has an important place in the amelioration of the symptoms, relieving the pain, nourishing the patient, and smoothing in many ways the downward path which leads to the inevitable termination.

The treatment naturally divides itself into the dietetic, mechanic, and medicinal, and should be directed entirely according to the location of the lesion.

Dietetic.—In carcinoma of the pylorus, if the stenosis is not already of sufficient gravity to produce marked stagnation of the stomach contents, the diet must consist of liquid and semi-solids, rich in liquid fats, as butter, cream, or olive oil. In carcinoma not involving the pyloric region, the diet suited to atrophic gastritis is fairly appropriate, including milk, farinaceous foods, soup with finely divided vegetables, as peas, beans, or potatoes; broths, gruels, raw or soft-boiled eggs, butter and cream in plenty, weak tea or coffee, and milk toast. In some cases there may be given with satisfaction chicken, squab, scraped meat, stale bread, oysters, fish, etc. A valuable addition to nearly any cancer dietary consists of raw eggs beaten up in milk, and the more of these, up to eight or ten a day, the better. Food should be administered in small meals, four to eight a day. The caloric value of the food ingested is not as fit a criterion as the patient's weight, and the scales should be used frequently.

Mechanic Treatment.—When there is marked downward displacement of the stomach or other abdominal viscera, a Rose belt, not too firmly applied, will in many instances afford marked comfort.

Local applications in the form of hot stupes, moist hot trunk packs, and dry heat, to lessen the pain and relax muscular spasm are indicated. The use of electricity or massage is not to be recommended.

Lavage possesses a most useful place in the treatment, especially when the motor function of the stomach is disturbed. In motor insufficiency of the first degree it is not necessary to wash the stomach every day—probably two or three times a week; but in motor insufficiency of the second degree, or where the pylorus is markedly constricted, the lavage should be performed every day, preferably at night before supper. This seems to exert a pleasing influence, relieving many distressing symptoms, decreasing the pains, and permitting an improvement in nutrition. Lavage cannot arrest the advancing cachexia resulting from cancer, but in spite of the gradually progressive weakness, it enables patients to remain free from many subjective symptoms which would otherwise render their existence a greater burden. The lavage should be followed by an anti-fermentative solution, as liquor alkaline antiseptic, ichthyol, or potassium permanganate, and the operation should be performed as expeditiously as possible, for each lavage requires a certain amount of effort on the part of the weakened sufferer.

Medical Treatment.—The object of this is the increasing of appetitie, the improvement of digestion, and the relief of pain.

Condurango has been employed most frequently as a medicinal agent for the stimulation of appetite, and was at one time given empirically as possessing certain curative virtues. While this view is no longer accepted, condurango certainly aids the appetite. It can be given in the form of a decoction or, that not being easily prepared, the tincture

may be employed, fifteen drops in water three or four times daily. This may with benefit be combined with nuxvomica, cinchona, gentian, or the other bitter stomachics. When there is no free hydrochloric acid, orexin, in 3-grain doses, given two hours before meals, sometimes yield happy results.

For the gaseous eructations, there may be given resorcin, combined with milk of magnesia or bismuth, and aided in its carminative action by spirits of anise or compound tincture of cardamom, as laid down in the chapter on drug therapy.

Methylene blue has been advocated by some for long-continued use in inoperable cases. This drug, administered in 3-grain doses, will do no harm, and may be tried as a last resort.

The "trypsin treatment," so confidently vaunted a few years ago, is without value, and has fallen into disrepute.

The pain will demand anodynes, and either tincture of opium or morphin may be allowed, or the latter given hypodermically. It is well to remember, however, that when once started these anodynes will need to be given till the end, and generally in rapidly increasing doses.

The X-rays have been, and are still used in inoperable cancerous growths; and radium, deposited in radium receptacles, which consist of hard-rubber capsules attached to a silk thread, has been introduced into the stomach like the stomach bucket. This is retained in the stomach one hour. The X-rays and the radium may be used, if desired, and may exercise some beneficial effect. They are at least worth the trial.

Adamkiewicz has employed a serum called "cancorin," and Doyen has advanced a "cancer cure serum," both of which seem to have failed to afford any tangible effects. Good results in the way of producing a shrinkage and softening of the cancerous masses have been reported from the use of "cancrocin," made by Schmidt, of Cologne.

Coley's fluid (toxins of the streptococcus of erysipelas and

of bacillus prodigiosus) has been tried, and in some cases of inoperable sarcoma has appeared to afford at least some temporary relief. Coley recommends its use also after operation for carcinoma to lessen the chances of recurrence. The injection of this fluid should be begun with $\frac{1}{4}$ minim diluted with sterile water to ensure accuracy of dosage. Daily injections should be given, increasing by $\frac{1}{4}$ minim, until the desired reaction and a temperature of 102° to 104° F. has been obtained. The dose should then remain stationary until it fails to give a reaction, when it can be again increased by $\frac{1}{4}$ minim again until a reaction is obtained; and so on. The largest dose has been 7 or 8 minims. The duration of the treatment may be from six weeks to four months, and in some cases of inoperable sarcoma from thirty to eighty injections have been given. This method is certainly worth trying, and may accomplish some good, when nothing else seems available.

The systematic use of aromatic liquid albolene in dram doses, four to six times daily, or olive oil in $\frac{1}{2}$ -ounce doses three or four times daily, is soothing to the bowels and helpful to the orderly and unirritating progress of the fecal current. As a general rule cathartics should be avoided, and simple enemas, or those to which a little milk of asafetida or turpentine has been added should be depended upon to keep the bowels empty. Should there be very much apparent intestinal toxemia, the following prescription will generally answer, and it will probably cause neither nausea nor griping:

R. Hydrarg. chlor. mitis,
 Phenolphthalein..... $\bar{a}\bar{a}$ gr. ss.
 Sacch. lactis..... gr. v.
 Ft. chartulæ No. 5.

SIG.—One powder dry on tongue every half hour till taken.

Should diarrhea complicate the situation, the bismuth preparations, especially the subgallate, are of service. I often use the milk of bismuth as a vehicle, and add to it, as indicated, tincture of opium, catechu or kino, or other

astringents. I have also found the 10-grain doses of tannin, one given after each loose bowel movement, satisfactory.

Finally, the cheering and sustaining influence of optimistic psychotherapy should never be denied these unfortunate sufferers, for, while little may be done for the disease, much may be done for the patient, and the encouraging word or hand grasp, the sympathetic interest, and the evident determination of the physician to leave no stone unturned—all these will exert their favorable influence upon the cancer victim, aiding him in his desperate and losing conflict with the powers of disease.

FOREIGN BODIES IN THE STOMACH

Many and varied are the foreign bodies that are swallowed, either accidentally or purposely. Insane patients sometimes swallow any article that can be gotten down the esophagus, and some intelligent individuals seem to fall into the habit of unconsciously swallowing such articles as bits of wood, pieces of finger nails, balls or bits of hair, or other small substances that find their way into the mouth.

Among the many articles reported as finding entrance to the stomach, are pins, needles, scarf-pins, knives, spoons, forks, artificial teeth, glass, hooks, pens, buttons, balls of hair, bits of iron, nails, lead, wood, and even the stomach-tube. Long-continued swallowing of hair has resulted in hair-balls of surprising size, and in dealing with the mentally irresponsible the physician need not be surprised at finding in the cavity of that long-suffering organ, the stomach, the most bizarre commodities.

Vandivert and Mills report a case from the State Hospital, St. Joseph, Mo., in which a patient died apparently from nephritis, and with no special suspicions of gastric trouble until autopsy. This disclosed a mass of foreign material lying on the sacculated portion of the stomach, leaving only a narrow channel along the lesser

curvature for the passage of food. There was atrophy of the mucous membrane, much formation of connective tissue, erosions, and the points of some of the foreign bodies had penetrated the stomach walls, but the adherent omentum prevented leakage. There were several small walled-in abscesses. The appetite remained good until two weeks before death, and no symptoms referable to the stomach were complained of. In all, 1446 objects were found in the stomach.

Occasionally, when the swallowed body is rather large, it may be arrested at some point in the esophagus, though the patient will think it has passed into the stomach.

Diagnosis.—There may be local disturbances of severe type and vomiting, or if damage be done to the mucous membrane, there may be profuse hemorrhage. On the other hand, there may be little if any disturbance, and the foreign body, if small or fairly smooth may be evacuated from the bowels. Sometimes the foreign substance, as swallowed hair, may become quite large, forming a large and palpable tumor. Several cases of hair-balls have been reported in which the collection of hair formed a solid mass as large as the cavity of the stomach, and accurately conforming to its shape.

The X-rays may be depended on to give the desired information as to the presence of these foreign bodies, and together with the previous history will furnish the necessary data as to their location. In the case of hair-balls, the mass itself does not cast a radiographic shadow, and they may simulate inoperable growths. The following from a case of Dr. A. E. Barclay, gives his description of the methods employed, and appearances: "The examination was conducted in the erect posture, and in all such cases bismuth food is given in order to establish the relationship of the stomach and other parts of the alimentary canal to the tumor. In this case the bismuth flowed into the stomach, and then began to canalize down the greater curvature, showing very clearly that the tumor was not the spleen,

otherwise the greater curvature would have been displaced to the inner side of it. At this stage the appearances were those sometimes seen in advanced cases of carcinoma involving the whole of the pyloric end and lesser curvature of the stomach. Presently, however, as more food was given, the shadow extended down the lesser curvature, apparently around the mass, which was evidently not to the inner side of the stomach, but, either inside, in front, or behind it. A little manipulation and rotation of the patient quickly demonstrated that the mass displacing the bismuth (showing as a lighter area in the midst of the dark shadow of the bismuth) was actually within the stomach."

Treatment.—Emetics are inadvisable, for forcible and convulsive efforts of the stomach are more liable to work harm to the organ than to expel the foreign body. Mr. Stephen Mayou has devised a means of removing small bodies of a metallic nature from the stomach by passing down an electro-magnet, enclosed within a flexible celluloid tube. By the aid of the X-ray the course taken by the magnet and its relation to the foreign body can be clearly seen. In the case of a boy, aged two, who had swallowed a hair-pin, this was removed by this method without the need of surgical intervention.

When the physician is first consulted, and the patient or family much alarmed, it is generally not advisable to at once give a cathartic, unless the object is smooth like a marble or small ball; otherwise the hurried passage of the body through the intestinal canal may inflict great damage, as perforations or hemorrhage.

The safest and best method is to give constipating food, as potatoes or rice, or the soft part of bread, keeping the bowels quiet for several days so that a protective mass may envelop the article. Later on, castor oil or liquid paraffin may be administered, and the foreign body will have a better chance to traverse the intestines safely, and escape without causing injury.

Should intestinal obstruction ensue, or with bodies of

large size any serious symptoms become evident, the location by the X-ray should be sought, and the object removed by the surgeon.

Occasionally a small object may be located in the stomach by the gastroscope, and removed by long forceps, or may proceed as far as the rectum, and be removed from that. These contingencies, however, are extremely rare.

In some instances the foreign body escapes without the patient's knowledge, but the symptoms persist through psychic influence. Some years ago there was brought to me a girl of twelve years, who gave a history of having swallowed an iron tap two years before. She complained much and bitterly of pains in her abdomen, but the X-rays showed the presence of no foreign body. Being convinced that the body had been expelled, the patient complained no more, and has continued in perfect health.

CHAPTER XX

DUODENAL ULCER—INTESTINAL ULCERATION —PROCTITIS

With increasing experience the conviction is impressed upon us that duodenal ulcer is of much more frequent occurrence than was formerly thought. Within the medical recollection of the writer are recalled the teaching that ulcer of the duodenum was a rare disease, generally due to external burns. Up to ten years ago duodenal ulcer was not compared with gastric ulcer in frequency, but since that time the belief has been forced upon the medical profession that duodenal ulcer is fully as common as gastric, and is a possibility always to be reckoned with in disease of the upper abdomen.

Much of this change of view has been brought about by the Mayos in America and Moynihan in England, who have definitely and conclusively shown us by their operative work how frequently this lesion occurs.

Mayo has reported 272 operations for duodenal ulcer, and his statistics showed ulcer more often on the duodenal than the gastric side of the pylorus. Moynihan has recently summarized his previous papers on the subject, reporting 186 cases, and he stresses its frequency, making plain the definite clinical picture it presents. As Mayo says, however, we should not assume that duodenal ulcers are more frequent than in the past, but merely that they have heretofore been mistaken for something else.

Diagnosis.—Clinically, duodenal ulcer, which is twice as frequent in males as in females, asserts itself in a variety of manners. In some cases of disease, brought to autopsy for other illness, one or more ulcers may be found, healed or partly healed, in which no particular symptoms had

been noted in life that would point to such a lesion. In some instance either perforation or hemorrhage are the first warnings given. In the great majority of duodenal ulcers, though, symptoms appear in a definite and well-ordered sequence, and with a remarkable precision.

The following diagnostic data are abstracted from Moynihan:

A patient, probably past middle age, complains of indigestion. Asked as to how long he has suffered, he may say, "All my life." This frequent answer shows that the ulceration may, with periods of repose, continue up to middle life, or even to advanced age. Upon further questioning, the patient will relate how insidiously and almost imperceptibly he began to suffer from a sense of weight, oppression, or distention after meals. At first the discomfort was apparently capricious, but after a time he begins to notice that the discomfort comes two hours or a little more after food has been taken. Immediately after a meal there is ease; if pain were present before, the meal relieved it. Again the pain is felt two, three, four or even six hours later. When this pain comes on three or more hours after food, it has been found that the ulcer was "tucked back"; that is to say, posteriorly in such a manner as to prevent its delivery into the abdominal wound. When the pain consistently comes on at an earlier time than two hours after food, either an active ulcer has contracted recent adhesions to the abdominal wall or liver, or stenosis is beginning to develop. The interval between the taking of food and the onset of pain is very remarkable, and is constant from day to day if the character and quantity of food remain the same. If the food is entirely liquid, the pain comes rather earlier; if it is heavy and solid, the pain comes on later. With an ordinary meal of liquid and solid, the pain very rarely appears in less than two hours. Many patients will volunteer the statement that the pain begins to appear "when they are beginning to feel hungry," and the term "hunger pain," has been suggested as descriptive

of this particular symptom. At first the pain is noticed only after the heaviest meal of the day. If a heavy dinner is eaten, for instance, at 1 or 2 p. m., the pain may be expected at or near 4 p. m. This condition may remain stationary for quite a while, but in the course of time the patient will notice that the pain comes on at the characteristic period after each meal, and that by every meal the pain is relieved, only to return as before. Another characteristic feature of the pain is that it wakes the patient at night about 2 o'clock. By this time he has generally discovered that the ingestion of food mitigates the pain, and in most instances food is kept at hand, perhaps a biscuit or cracker or glass of milk, so it can be conveniently eaten when needed. The pain of duodenal ulcer is often preceded or accompanied by a sensation of weight or fulness in the epigastrium, and is described as "boring," "gnawing," "burning." It may be relieved by belching, and for this reason strenuous efforts are made to eructate this gas. There may be with the gas a slight regurgitation of food, with a bitter or acid taste, leaving in its wake a sense of scalding; followed, perhaps, by a free gush of saliva. For long periods, sometimes all through the case, the pain may be confined to the epigastrium, but it may strike through to the back or pass around the right side. Sometimes the pain is severe but partly relieved by pressure, and the patient may hug a pillow to the abdomen to obtain comfort. In all probability a spasm of the pylorus is responsible for these cramping pains. Vomiting is rare, seldom developing until stenosis arrives. Another noteworthy feature in this condition is found in the history of intervals of apparent health for a varying period of time, with relapses brought on seemingly by exposure to cold, getting the feet wet, or eating an indigestible meal. The most common cause, as related by the patient, is "getting cold," and many suffer only during the winter months.

Moynihan reports one instance where a patient was

perfectly well for three years when in India. He returned to England in November, and within two weeks had "caught a chill" with the consequence that all his symptoms returned. The attacks, which vary from three weeks up to several months, may sometimes be cut short by a rest in the country or at the seaside, and occasionally an attack may determinate as suddenly as it came on. In the interim, so complete may be the recovery, so good is the appetite, and so comfortable the digestion, that the patient cannot realize that he has been suffering from an organic affection, and accepts such a statement from the physician with a tolerant smile of disbelief.

Many of these cases have been erroneously diagnosed as hyperchlorhydria, acid gastritis, or even as gastric neuroses, and may not show any abnormalities of sensation or resistance on physical examination. For this reason Moynihan advances an opinion, with which the writer does *not* agree, that it is not necessary to the attaining of an accurate diagnosis that any examination of the patient be made; that the anamnesis is everything, the physical examination comparatively nothing. On the contrary, there are numerous instances where much and vital corroborative evidence is obtained from a careful physical examination.

Stomach Contents.—An Ewald-Boas test-meal should be given in all cases, and practically every one will be found hyperacid. As Boas has said, many cases of intractable cases of "acid dyspepsia," which have resisted all treatment are in reality caused by duodenal ulcer. In a few cases of chronic ulcer, the free hydrochloric acid may be reduced, but as a rule those cases which have progressed to stenosis and dilatation of the stomach have hyperacidity; and in these the chief symptoms may be referred to mechanical obstruction. The test of treatment possesses diagnostic value here, for, while simple hyperchlorhydria is amenable to treatment, when it is present with a history of hematemesis or melena, the hyperchlorhydria is not easily relieved by either treatment or diet.

The diagnosis of blood in the stomach contents, while characteristic of gastric ulcer, is not necessarily found in duodenal ulcer, nor is hematemesis frequent. Blood in the feces is, however, quite frequent, and, if on examination of stomach contents no pus is found, and occult blood either present or absent, but occult blood in the stools, and the characteristic history is obtained, a confident diagnosis of duodenal ulcer may be made. One statement, I would certainly *not* make, is that "hyperchlorhydria is duodenal ulcer."

Hemorrhage.—Though this is occasionally early, it is generally a late symptom. Visible hemorrhage Moynihan believes a sign of neglected opportunity. This hemorrhage may manifest itself either a hematemesis or melena, with dark tarry stools. Hemorrhage from a duodenal ulcer may be more insidious and dangerous than from a gastric ulcer. When acute, the patient may complain of an exacerbation of the indigestion and a feeling of distention. The patient may then suddenly become faint and weak, the head covered with drops of cold perspiration, pallor of the face may show itself, and he asks for air. These are the evident signs of internal hemorrhage, and the patient may bleed to death without any visible blood. As a rule, though, these symptoms are followed by tarry evacuations of the bowels twenty-four or more hours later. When the hemorrhage is small, there may be progressive anemia and weakness, attributed by the patient to other reasons. Though several examinations may be required before occult blood is found in the feces, it is believed that by persevering, this symptom will be manifested in every case of duodenal ulcer at some period of its progress.

Dilatation of the Stomach.—In some cases there are evidences of dilated stomach, as copious and repeated vomiting, while the symptoms of active ulceration are latent or absent. In this type, which can only be accurately diagnosed by operation, the ulcer is generally found

nearly healed, the cicatricial contraction being responsible for the stenosis and dilatation.

Perforation.—This is the most serious complication that can occur in the course of a duodenal ulcer. Finney reports this in an infant of two months, while Moynihan has encountered it in a woman of twenty-seven years.

Perforation may happen suddenly with acute duodenal ulcer due to burns or septicemia, or it may occur during the course of a chronic ulcer, that has taken on for some reason, active pathologic changes.

Diagnosis of Acute Perforation.—There suddenly seizes the patient an excruciating pain, occasionally so fulminant that death quickly follows. He is prostrated, pale and faint, with livid anxious features and clammy brow. Respirations are short and labored, for deep inspirations increase the agony. The pulse is generally rapid and thready, and muscular rigidity is followed in a few hours by abdominal distention. Extreme tenderness of the whole abdominal surface is usually in evidence. Neither palpation nor percussion are willing born by the patient. As the symptoms progress, the pulse-rate rises while the pulse-character becomes poorer, the abdomen, still rigid, becomes generally distended, the temperature may quickly rise to 102° F., or more, intestinal stasis is absolute, though gas or small amounts of feces may be expelled by enemas, general cyanosis develops, and death may occur in from a few hours to four or five days, should relief not be afforded.

Diagnosis of Subacute Perforation of Duodenal Ulcer.—In this condition, though the perforation may be sudden, there is a definite localization of the fluid, that escapes through the opening, and the general symptoms, while similar to those in acute perforation, are less fulminant in character. Vomiting and prostration may be present in considerable degree, but in this a tag of omentum may plug the opening, or peritoneal irritation may cause plastic lymph deposits on the base of the ulcer, so that a protective barrier is formed. There may result from this effort of

nature a later periduodenal abscess, a secondary rupture into the general peritoneum, an adhesion of the ulcer area to the abdominal wall, liver or pancreas, the inflammation may subside, and the patient may live for years in comparative comfort and safety.

Diagnosis of Chronic Perforation.—In this complication, the walls of the intestine are slowly eroded by the ulcer, and by the time the serous coat is reached a protective barrier is thrown out, and protective adhesions are formed, so that process is circumscribed, and instead of perforation into the peritoneal cavity, there is instead, a local peritonitis. This may be followed by a periduodenal abscess, burrowing in different directions, or fistulæ may result between the duodenum and gall-bladder, or pancreas; even between the colon, or a hepatic abscess may form.

One more diagnostic test proposed by Einhorn is the thread-test previously mentioned, only with a longer thread. Should the dark spot appear at a distance of 58 to 66 cm. from the teeth, in connection with other symptoms, the diagnosis of duodenal ulcer is greatly strengthened.

TREATMENT OF DUODENAL ULCER

This, except in acute conditions, should first be medical. In the mild cases regulation of the diet, as would be recommended for marked hyperacid conditions, improving the general health by suitable tonics and other hygienic measures, may bring about a considerable amelioration of the symptoms, with perhaps a cure. Olive oil in tablespoonful doses before meals, or the liquid albolene in teaspoonful doses in a like manner, may be of marked service.

In more pronounced cases of duodenal ulcer, with hemorrhages, severe pain, etc., a strict ulcer cure with rest in bed, rectal alimentation, and afterward fluid diet, must be put in force. In such cases large doses of calcined magnesia or bismuth may be given before meals, depending on the

state of the bowels. All details as in the cure for gastric ulcer must be carried out, but if, in response to these efforts conditions do not improve; if there come severe hemorrhages, obstinate spasm of the pylorus, associated with cramping pains and peristaltic restlessness, an operation (usually gastroenterostomy) is indicated.

In duodenal ulcer the physician should generally advise an operation sooner than in gastric ulcer, as the former is liable to more frequent, and graver complications, as hemorrhages, perforations, or stenosis of the pylorus, which place the patient in decided danger. Gastroenterostomy in these cases is usually attended with satisfactory results, for as the gastric juice is diverted from the ulcer area, the lesion soon heals, and the previous dangers are averted.

The complications described are generally successfully managed only by surgery, and the time of operation depends on the emergent nature of the case. Medical treatment in the face of such accidents is useless, and only serves to alleviate pain or sustain the flagging strength until surgical aid may be obtained.

INTESTINAL ULCERS

The mucous membrane of the intestine may be ulcerated in every form and extent, from erosions no larger than a pin-head to deep ulcers the size of a silver dollar, or even larger; and these ulcerations may occur anywhere in the intestinal tract from the duodenum to the anus. These ulcers may be classed as catarrhal, decubital, toxic, uremic, embolic, tubercular, syphilitic, typhoid, dysenteric, and malignant. Catarrhal ulceration may arise from an especially severe grade of inflammation of the mucosa. Decubital ulcers may be produced by pressure of hard scybalæ, especially in the cecum or the hepatic or sigmoid flexures of the colon. This is more liable to occur when there are kinks or angulations along the course of the intestine. Decubital ulcers may also arise from the pressure of neighboring organs, such as the uterus or gall-bladder. The other

intestinal ulcers mentioned originate as their names indicate.

Tubercular ulcers are rare in the stomach, but somewhat frequent in the intestines. E. C. Thrash, an authority on tuberculosis, contends that tuberculosis of the stomach, especially if any free acid is present, is practically unknown. When this form of ulceration invades the intestines, however, the lesions may be most extensive, and they may invade the ileum and colon, seeming to select by preference the cecal region, where irregular tumors resembling neoplasms may be found.

Diagnosis.—This condition may begin with irregular diarrhea, slight fever, and colicky pains. Hemorrhage is seldom an early symptom. At first the case simulates a chronic intestinal catarrh, but emaciation and involvement of the lungs should point the diagnostic finger very soon. The stools should be examined time and again for the tubercle bacillus, which, if found, is diagnostic. Other approved tests for tuberculosis should also be made. Osler reports in some primary cases of intestinal tuberculosis, occasional fatal hemorrhage or perforation, with the formation of pericecal abscess or perforative peritonitis, or, rarely, partial healing, with great thickening of the intestinal walls and narrowing of the canal.

The following diagnostic suggestions are quoted from Nothnagel:

“Ulceration of the intestine often runs its course without symptoms. Even when a number are present, or when the ulcer is very large, the clinical symptoms are frequently not at all proportionate to the intensity of the anatomic changes. Significant signs only are pus and fibrous tissue in the stools. A very important objective sign, also, is the presence of blood in the stool, though this must be interpreted with great caution. On the other hand, the number of stools passed, or the fact that they are of liquid consistency, will not aid in forming any direct conclusions as to the condition present.”

Many and extensive ulcerations may be suspected when amebic dysentery is proved by the ameba in the stools, though in this condition, too, the amount of ulceration cannot be correctly judged by the clinical symptoms.

Exceptions in the general history are to be made in the case of duodenal ulcer, which has been considered, and gall-bladder disease must be excluded.

The most important diagnostic fact in the decision is the presence of pus in the stools. This may be hard to discover when the ulcer is high up in the intestine, but if small grayish-white specks are observed in the stool, or pus is seen under the microscope, the diagnosis of intestinal ulcer may be made with confidence. Mucus alone is not diagnostic of ulcer.

Ulcers of the rectum will be discussed later.

Treatment.—Hemorrhage would be treated as that from duodenal ulcer, when it is above the rectum. The primary cause should be appropriately treated, and every effort should be put forth to build up the patient's general health. Tuberculous ulcers or syphilitic ulcers indicate the line of treatment to be employed, and under this much improvement may be made.

The diet should be unirritating, should contain a minimum of cellulose, and as a rule the flesh proteins are well borne. Many cases of ulcerated intestinal tract never heal because the patient is never nourished enough to furnish the parts sufficient strength to institute a healing process.

Medicinally, bismuth, tannigen, small doses of silver nitrate, or other of the vegetable astringents are indicated. Opium and its derivatives should be avoided, if possible. High injections are not of service except in rectal or low colonic ulcers.

PROCTITIS

Proctitis deserves the first place among diseases of the rectum, not only on account of the frequency of its occurrence, but because it is responsible for many abnormal

conditions high up in the abdomen, that are looked upon as distinct disease entities. I am more convinced, as my experience broadens, that acute irritation and inflammation of the rectum may reflexly set up a disturbance at practically any point in the digestive canal. This has been specially impressed upon me on witnessing sundry digestive disorders markedly abate when acute rectal irritation is cared for.

Proctitis may be produced by a variety of causes, and may be acute, subacute, or chronic, the last two being generally designated rectal catarrh.

The acute form is often encountered in general practice among persons of all ages, and at times the true condition may be masked by symptoms that direct attention higher up in the abdomen. The acute condition will generally soon disappear upon removal of the exciting cause, but when it merges into the chronic state, it tends to remain indefinitely, with the formation of mucous channels in the rectal walls and perirectal spaces.

Diagnosis of Acute Proctitis.—Pain, heat, burning, fullness, tenesmus, hypersecretion of mucus, and a constant desire to evacuate the bowels, the last-named being caused by the tumefied mucous membrane giving the sensation of a foreign body in the rectum. Sometimes the pain is agonizing, and the continual straining may bring about prolapse of the mucous membrane, and from this membrane, engorged by sphincteric contraction, a hemorrhage may arise. There may also come an involvement of the bladder on account of its close proximity and nerve connection, with an almost constant desire to urinate.

Mild attacks give the patient little more than a sense of discomfort, but whenever these symptoms exist in a milder form with persistence, a chronic form may be suspected. Some of these patients will give a recital of repeated attacks of rectal discomfort during ten or twenty years, with a history of no careful examination, and only palliative treatment.

Examination with the Brinkerhoff speculum will show

the rectal mucous membrane a fiery red, with numerous deeply engorged spots and perhaps eroded areas, produced by the rubbing of the walls of the rectum during the intense straining.

Treatment.—This is largely symptomatic. When the acute condition is caused by irritation or infection, the alleviation of the more pronounced symptoms is first demanded. The patient finds that the reclining position is most comfortable, as it facilitates the emptying of the congested parts. The first indication is irrigation of the rectum, so as to remove all particles of feces and mucus, which act as irritants. Hot water is generally more comfortable to the patient than cold, though some fear the hot water on account of the already present heat and burning. This burning sensation is generally soothed by the hot water, but if the patient really finds the hot water uncomfortable, cool or cold water may be substituted. Albright recommends a beginning of water at 100° with gradual raising to 120°. The last is rather hot, and it might be well to stop somewhat short of that temperature. Common salt (one teaspoonful to half-gallon of water) is a good solution, or boric acid in the same proportion.

As soon as a moderate degree of comfort is brought on, the origin of the trouble should be sought, and if there seems to be fecal irritation higher up, a thorough evacuation of the whole intestinal canal should be obtained, preferably by an efficient hydragogue cathartic. After the bowels are well emptied, irrigations may again be practised, continuing them for fifteen to thirty minutes, and repeating them every two or three hours, except at night when the patient is asleep. The method of irrigation has been previously described. Among the solutions now indicated are boric acid, ichthyol, non-alcoholic hydrastis, and an occasional use of silver nitrate solution, 4 grains to the pint. After each irrigation a small quantity of soothing ointment may be introduced into the rectum, or an occasional opium and belladonna suppository.

The patient should be kept on a liquid diet for several days, and the return to regular diet should be gradual, care being observed that no food is taken that would leave an irritating residue. The internal antiseptics are of but little value in this condition.

Proctitis and Periproctitis.—This may involve the rectum and part of the sigmoid flexure, the latter being termed sigmoiditis, though the distinction is one of name only. When inflammation once invades the lower end of the intestinal tract, through the medium of infection or traumatism, there are so many and varied causes of irritation that it extends to other portions of the bowel and may extend through its several coats into the surrounding tissues, producing periproctitis. Jamison believes that some of the chronic proctitis may be traced back to an infection from the diaper saturated with urine, worn during the first year of the patient's life. Other causes may be traced to improper food, digestive disorders, and especially to the unwise use of purgatives.

Proctitis, in the gradually developing stage, gives rise to no marked discomfort, and may be present for years before its presence is discovered, the occasional exacerbations being ascribed to some indiscretion of diet, or "catching cold." As repeated attacks occur there is a constant increase of tissue formation, with a consequent lessening of the caliber of the bowel, accompanied by impairment of function and muscular contraction and constriction. With this progressive inflammation comes the exudation of mucus, so often found in rectal diseases, and which so annoys and distresses the patient. Were the inflammation confined to the mucous coat of the rectum there would be comparatively little trouble in applying the proper remedy, but in its progress it may involve not only the muscular coat, but passes through this coat into the perirectal tissues, and from them, as well as the mucous membrane, the exudate continues.

The product of inflammation arising from the mucous

surface accumulates in the rectum until carried out by defecation; but that which arises from the deeper structures accumulates and travels in the course of least resistance, forming in some instances sacs or pouches, and in others it burrows in one or more directions thus bringing about the formation of mucous channels of various lengths. These mucous channels may extend to a considerable length, and their most common course is toward the connective tissue between the mucous and muscular layers of the rectum, thence downward to the anus. Here, the parts being more firm, their onward progress is deflected, and again following the course of least obstruction, they burrow downward and under the skin about the anus and buttocks, forward to the perineum and scrotum, and backward into the space between the rectum and coccyx. The latter space is a favorite spot for the establishment of mucous channels, as the tissues therein are peculiarly adapted for its invasion. I have seen demonstrated by Dr. A. B. Jamison channels running from some point near the anus directly upward for 6 inches, or from 7 to 10 inches directly backward over the coccyx, or forward along the perineal raphe, or from the perineum directly upward and ending over the pubic bone. These channels are a pathologic entity, and can be demonstrated. The mucous pouches or sacs are most numerous in that portion termed the "pile-bearing" area, and this sacculated condition of the parts has much to do with the production of hemorrhoids.

The external effect of this exudate is to render the integument about the anus puffy and hypertrophied, to cause dark and excoriated spots, and sometimes the exudate oozes through the skin itself, producing that annoying moisture of the parts which some superficial observers call "perspiration."

Diagnosis of Chronic Proctitis and Periproctitis.—The symptoms manifested are those of inflammation in the rectum, but it seems that in this location rather extensive pathologic changes can take place before the patient

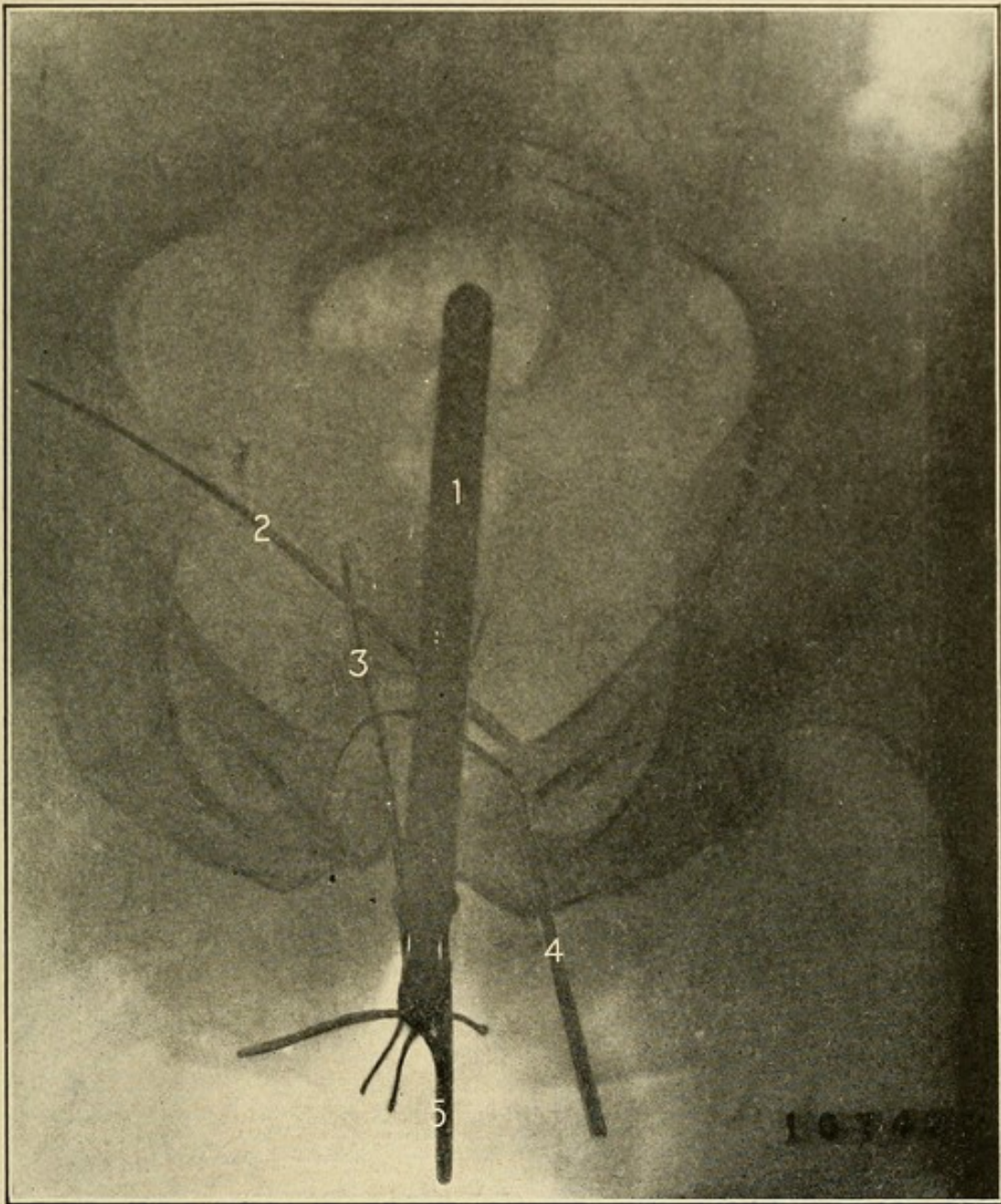


FIG. 73.—Radiograph (rear view) showing speculum in rectum and probes in numerous mucous channels in peri-rectal spaces. (Dr. A. B. Jamison.)



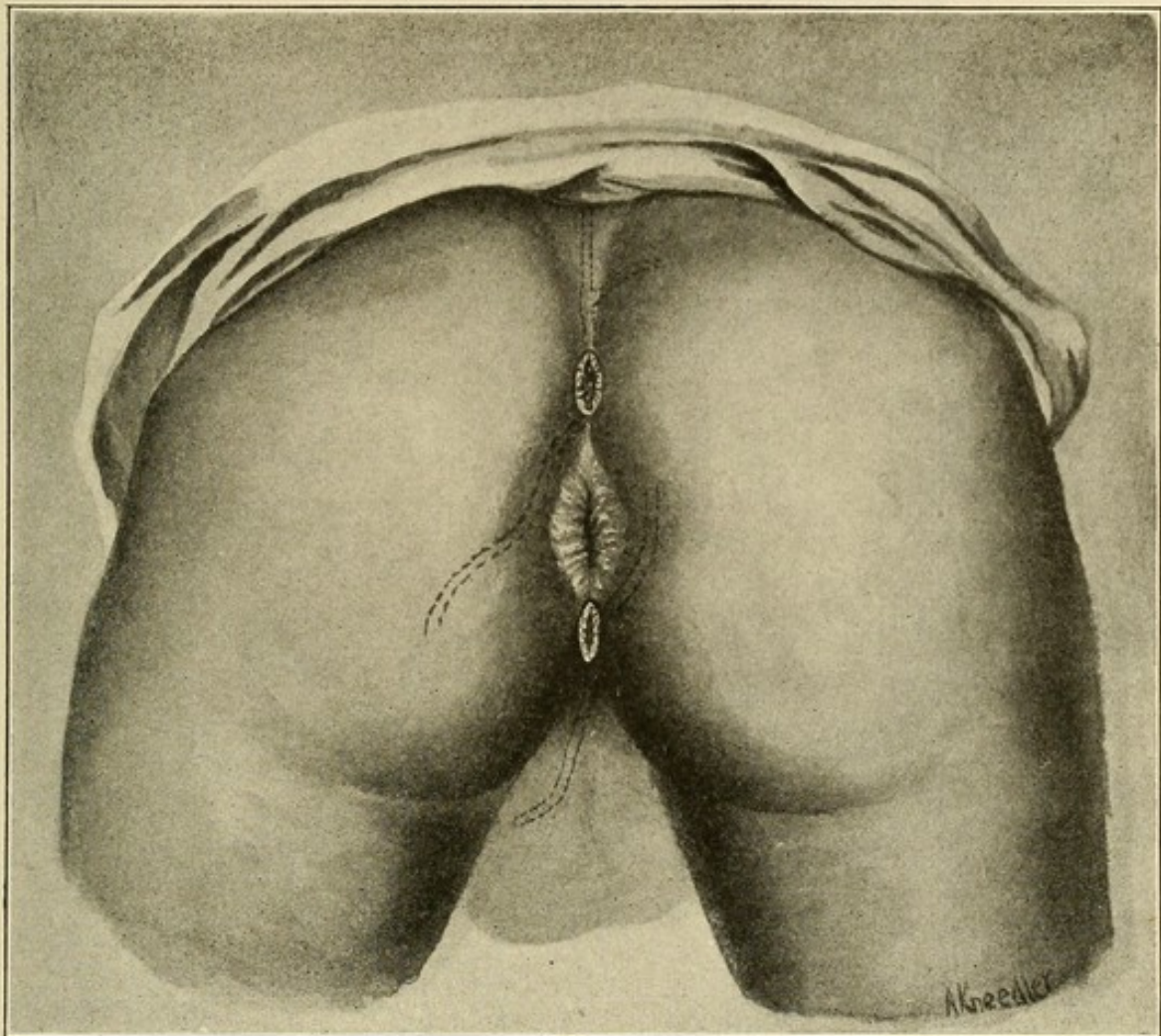


FIG. 74.—Diagrammatic illustration showing subtegumentary channels as found in chronic proctitis. (Albright.)

The dotted lines indicate the locations in which these sinuses are most frequently found. Posteriorly, a branch from a tract running directly over the coccyx will be seen extending toward the right; on the right, a sinus coursing backward from an accumulation of sero-mucous exudate situated anterior to the rectum, from which the branch to the scrotum also arises; on the left, a channel is observed invading the subtegumentary tissues of the buttock. The incisions shown, both anterior and posterior to the anus, indicate the points at which the first incisions are usually made. From these the various channels can be located and the proper treatment applied. This drawing is purely diagrammatic, and is intended as an aid to the reader in forming a clear idea of the subject. All the channels shown are not supposed to exist in a single individual, neither are those shown the only directions in which the exudate may course.



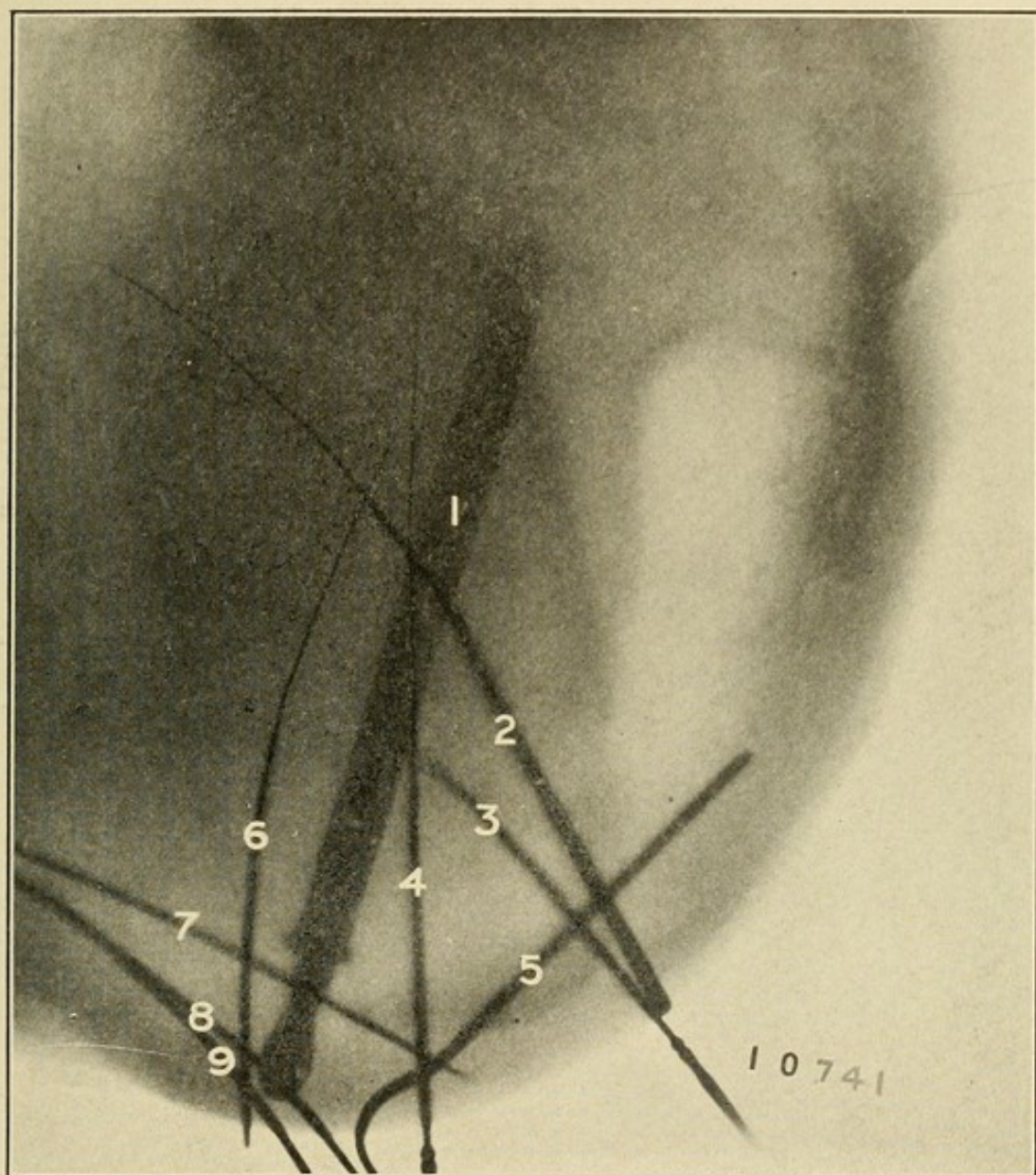
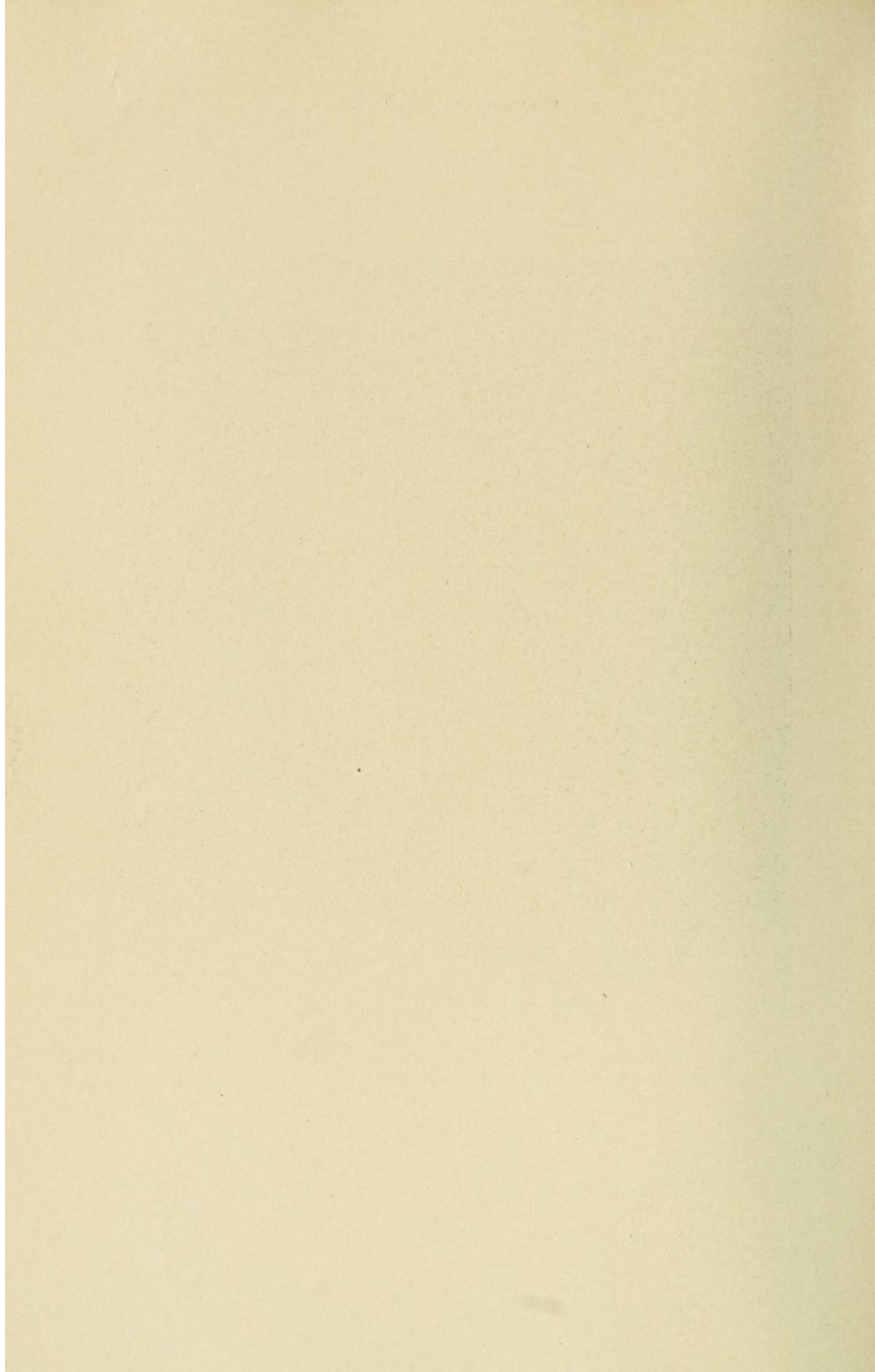


FIG. 75.—Radiograph (side view) showing speculum in rectum, and probes in numerous mucous channels in perirectal spaces. (Dr. A. B. Jamison.)



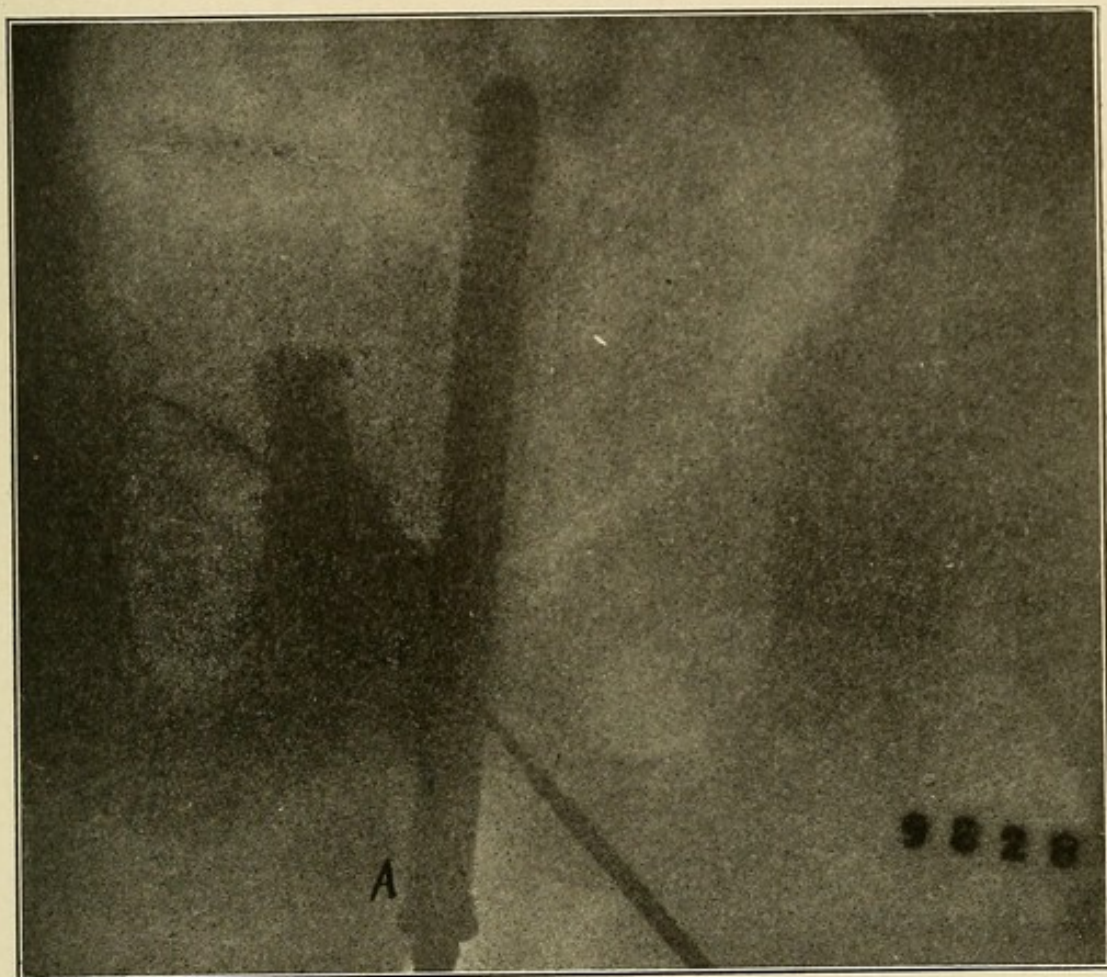
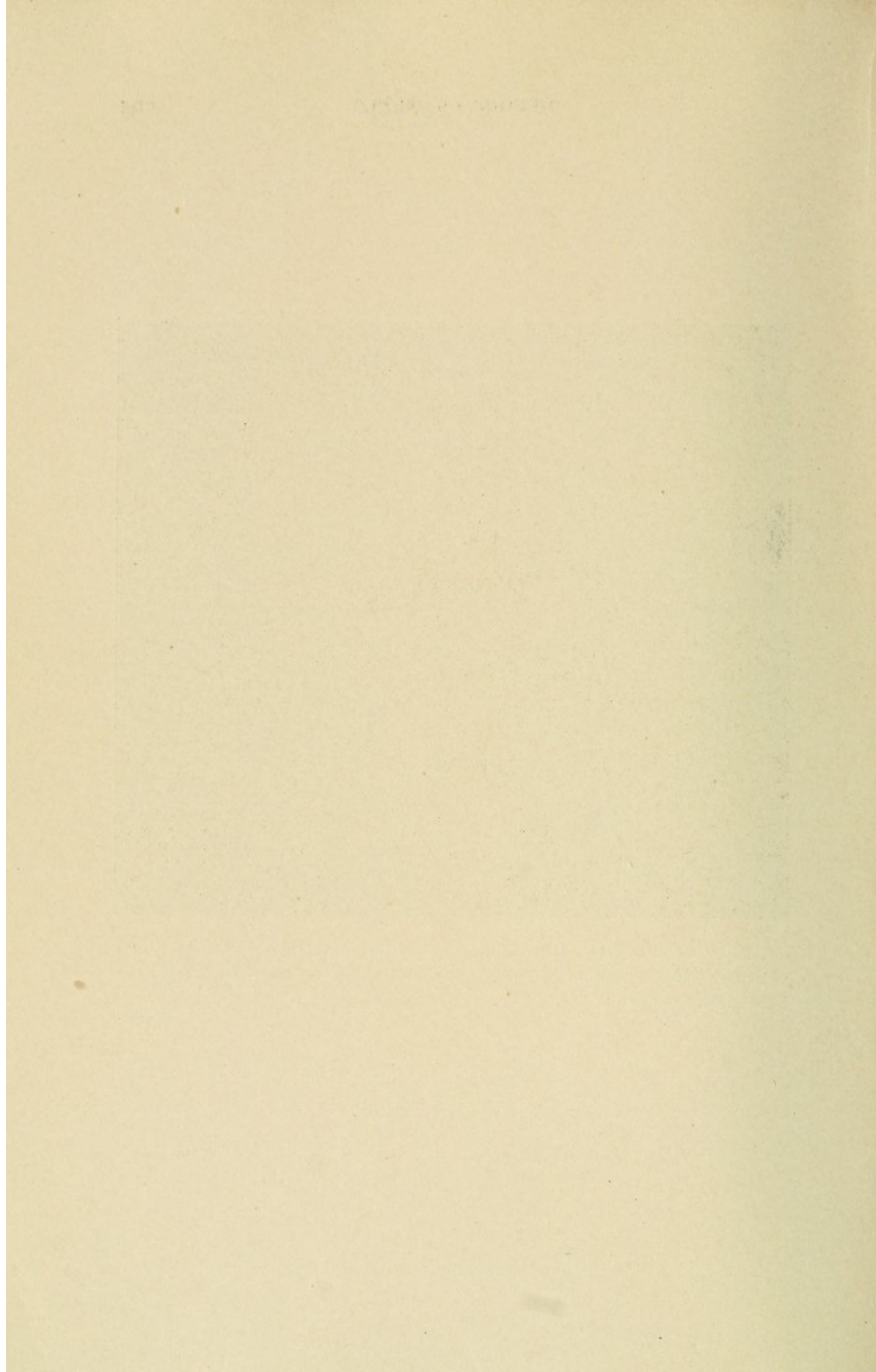


FIG. 76.—Radiograph showing destruction of perirectal tissues, cavity, and channel. Metal syringe in rectum. *A* marks approximate location of the anus. (Albright.)



realizes his true condition; in other words a chronic proctitis may exist for several years before the inflammatory process will cause burning and discomfort enough to demand active treatment. During this time incessant impairment of the function and structure of the anal canal and rectum is going on. In various spots about the anus and buttocks the patient will complain of hot and sore spots, which indicate the location of channels or small reservoirs near the surface, and serve as guides for beginning treatment.

Mucus is always found in the rectum, unless the inflammation has become localized in the perirectal structures, or atrophy has taken place. The anal orifice is frequently constricted, constipation is nearly always present, though occasional spells of diarrhea supervene.

Secondary symptoms are presented as pruritus ani, hemorrhoids, and anal fissure, and those who have been taught otherwise will find this statement correct after careful investigation.

Treatment of Chronic Proctitis and Periproctitis.—This requires patience, perseverance, and co-operation on the part of the sufferer. Daily irrigation with water heated to 110° F. (Jamison and Albright advise 120) is indispensable. This irrigation should be continued from one-half to one hour without interruption, and to the hot water may be added sodium borate, boric acid, potassium chlorate, or magnesium sulphate. One or 2 per cent. strength of these medicaments is sufficient. To the last part of the irrigation there may be added with comfort to the patient a little oil of cajeput, spruce, or cedar. Following this may be made an injection of warm refined cotton-seed oil (2 or 3 ounces) which will not only sooth the inflamed parts, but will soften and bring down any hard scybalæ that may have found lodgment higher up in the gut. If the patient can successfully inject and hold it, this oil is best put in at night and retained until the following morning.

Methods of thorough irrigation have been covered in a previous chapter.

Local Treatment.—This includes a certain amount of minor surgery in that the sinuses or mucous channels must be evacuated, irrigated, and obliterated. Having located the itching or irritated spot, a local anesthetic is injected into the skin and underlying tissues at a point midway between the anus and coccyx, after which an incision about 1 inch in length is made directly inward, enlarging the opening forward and backward as far as the anesthetic effect extends. Often a considerable cavity is found just beneath the superficial integument. After entering, a careful examination is made with a thin silver probe, and in nearly all of these cases one or more sinuses will be found leading to a cavernous reservoir 4 or 6 inches up. The channels in the anterior parts will be found to best advantage after an opening is made into the perineum similar to that made posterior to the rectum. Channels running beneath the integument, when once located, are easily followed. After the principal channels have been discovered, an opening large enough to admit an irrigating tube should be made, and it will be generally found that the opening up of these channels and sacs causes but little shock or discomfort. Patients can nearly always leave the office and pursue their usual vocations with but small inconvenience.

The irrigation should be carried out with a solution of phenol, 1 or 2 drams to the pint of water, permanganate of potash, 15 grains to the pint, or nitrate of silver, when the granulations do not heal satisfactorily.

The irrigation should be carried out daily, and when the patient cannot come to the physician's office, some member of the family should be instructed in its application. After thorough irrigation, the wound is packed with plain gauze, which should be removed about thirty minutes before the next irrigation, for it will aid matters to let the patient enjoy a hot sitz-bath a short while before each irrigation.

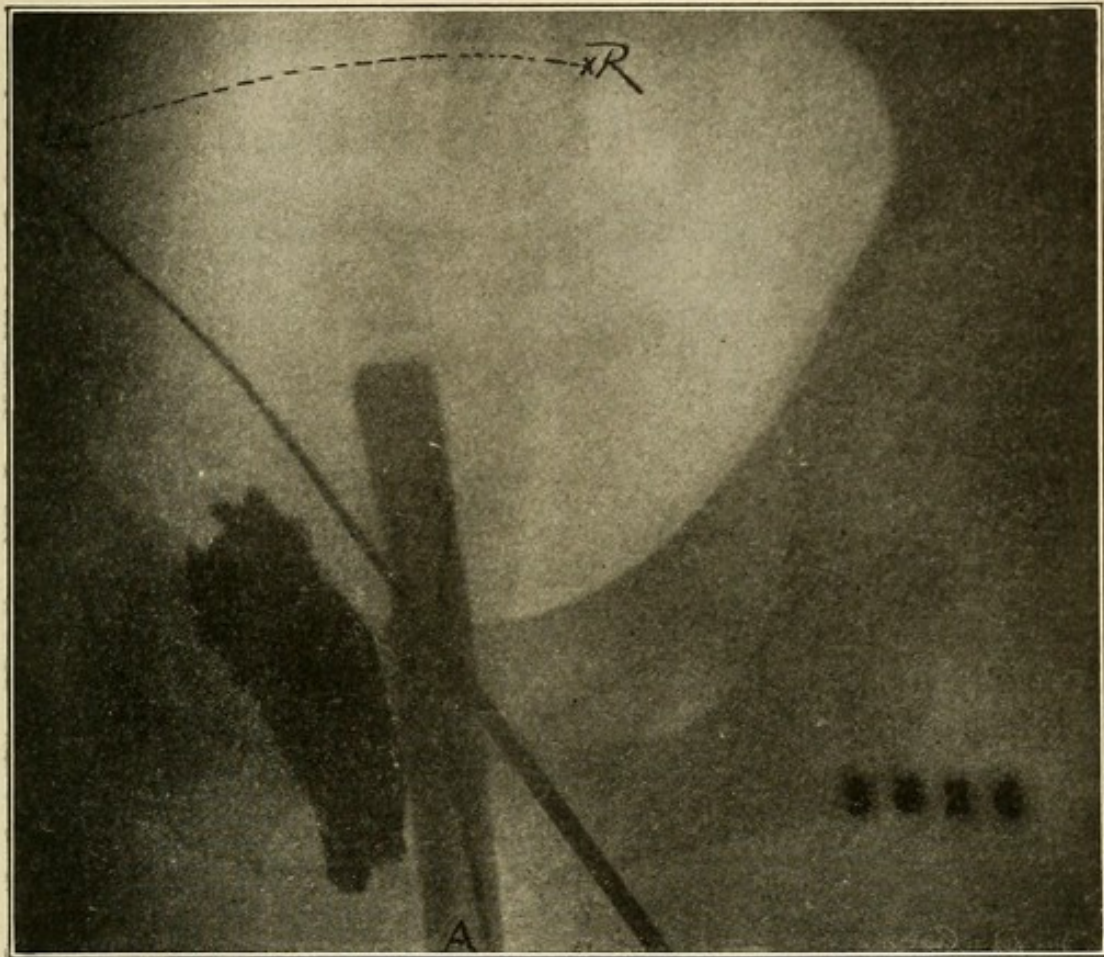
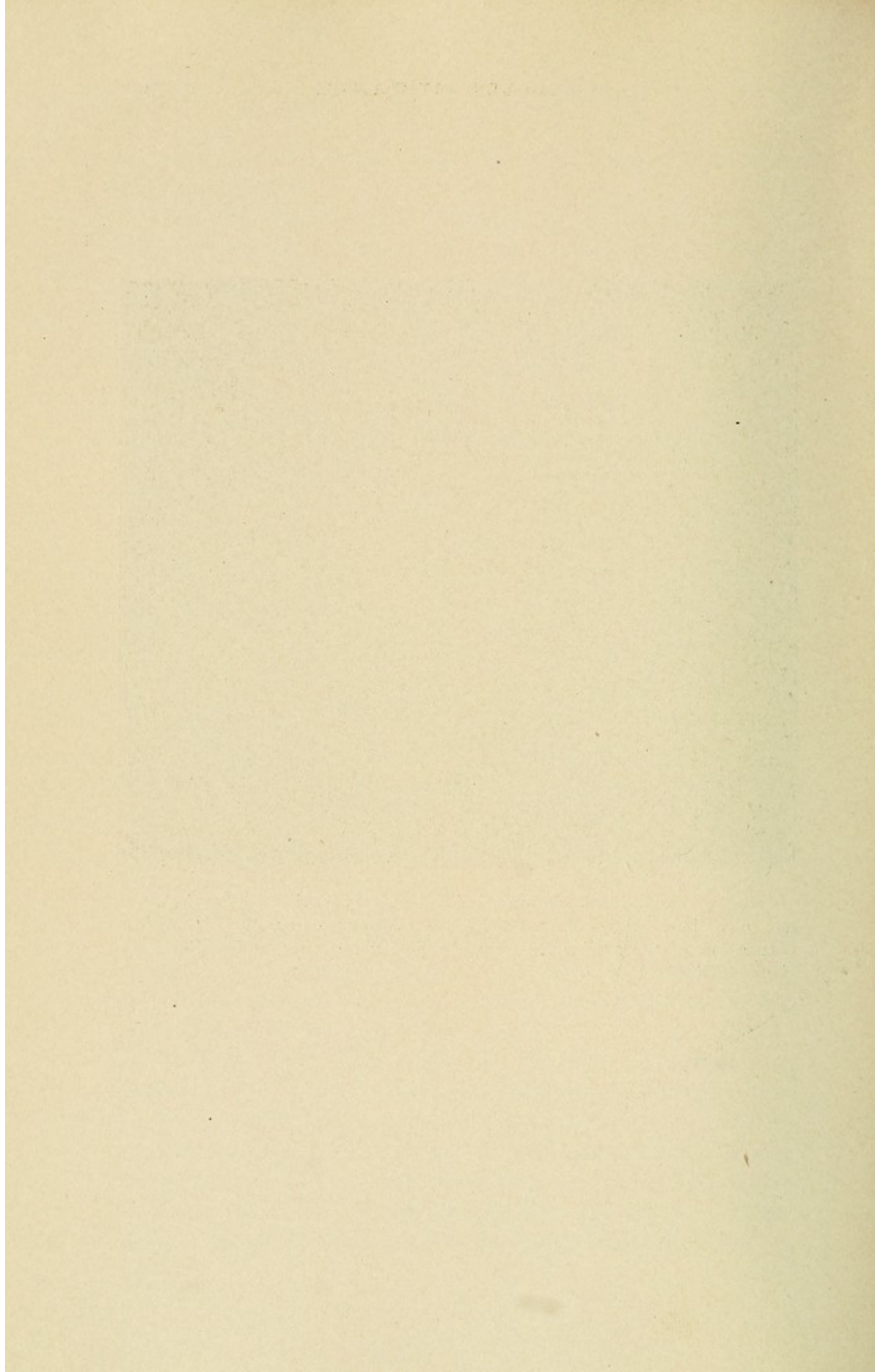


FIG. 77.—Radiograph showing subtegumentary cavity in the buttock, due to the burrowing of the acrid exudate resulting from proctitis. Complete destruction of the areolar tissue in the post-rectal space, and a submucous sinus. (Albright.)



The physician should seek, should open up, and should irrigate each channel, and in this way, after a time conditions will regain their wonted health, and the patient will experience great comfort.

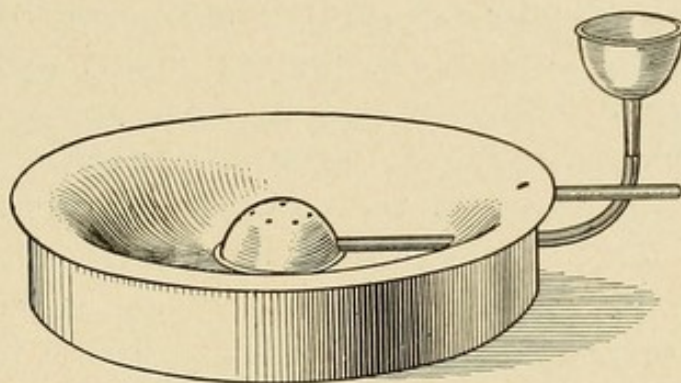


FIG. 78.—Jamison's sitz-bath pan.

Ulceration of the Rectum.—Ulcers in this part of the intestinal canal are of the most varying depth and size, from superficial erosions to deep-seated ulcerations the size of a dime. Sometimes the mucous channels previously spoken of break down and form deep ulcerations, but generally the origin lies in infections from gonorrhea, syphilis, tuberculosis, dysentery, typhoid fever, pyemia, etc. Gonorrheal infections are most frequent in women through taking enemata with an infected syringe.

Diagnosis.—This may be made by careful examination of the rectal walls. When they are low down, they may be easily seen, but when high up in the rectum a rectoscope or sigmoidoscope is required. The manipulation of these instruments has been described.

Treatment.—The ulcers may be "touched" with pure phenol, or silver nitrate, care being exercised to apply the cauterant only to the actual ulceration. If a rather large surface is to be treated, a solution of silver nitrate, 40 grains to the ounce, is preferable. For the accompanying proctitis the irrigations and ointments previously described will be appropriate.

Stenosis of the Intestinal Canal.—This is brought on by the same causes, *i.e.*, ulcers, infections, etc., as cause steno-

sis in the other regions of the intestine. As a sequel to stenosis, there are dilatations above the stenoses, and the various symptoms of intestinal stasis, obstruction, and dilatation are found.

Diagnosis.—A stenosis of moderate constriction may exist a long time without giving rise to any marked symptoms, for liquid feces may pass by some effort, and a compensatory hypertrophy of the intestinal muscles tends to force the fecal current by the stricture. Even a stenosis of the sigmoid may be compensated for a while, but eventually the patient will feel griping pains, tension in the abdomen, a sense of obstruction at some point, which he can note when it is overcome, and recurrent attacks of colic which disappear when the bowels are freely emptied.

Sometimes the patient or the physician will observe that the stool is of small caliber, and made up of irregular or broken fragments of fecal matter. Another annoying symptom is gaseous distention, which "balloons" the abdomen, and restless and easily felt tonic contractions of the intestine may be noted above the stenosis.

"Sometimes," says Nothnagel, "the diagnosis of stenosis can be made with absolute certainty, and sometimes this is impossible; between these extremes there exist many cases in which the diagnosis can be made with greater or less probability."

Examination by the X-rays after a bismuth test-meal is the most certain means of diagnosing these cases, and when the technic is correct and expert, both stenoses and dilatations may generally be located and delimited with absolute confidence.

Treatment.—Much may be done by medical means, and surgery should not be resorted to unless there is malignancy, or the obstruction renders the patient's life a burden, or closure of the canal is complete.

The diet should be bulky, with much cellulose and much fat. In addition agar agar should be taken with the food several times daily. Much water should be drunk, and

every means should be employed to stretch the lumen of the canal and to keep the fecal current moving onward. The different oils as olive oil, cotton-seed oil, and at times castor oil should be given to keep the intestinal walls well lubricated. The liquid albolene and liquid paraffin are most useful, and the case of Dr. Bassler has been mentioned, in which 8 ounces of liquid paraffin were required to move the bowels. These oily preparations should be given in sufficient quantities to get results, and the physician should

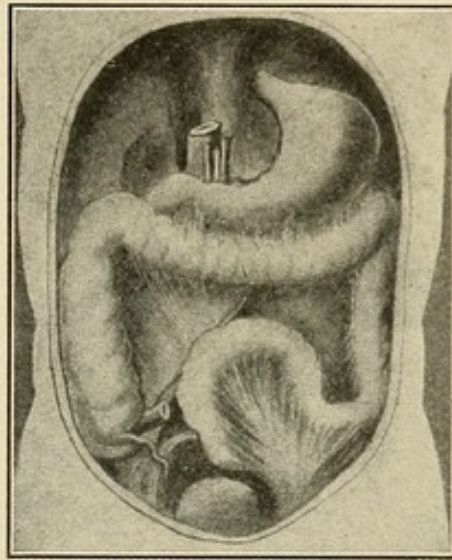


FIG. 79.—Mesenteric bands on under surface of sigmoid.

not hesitate to push them, otherwise the obstruction may become insuperable, and the surgeon will need to be called in.

Many times the obstructions are the result of kinks or adhesive bands, and the surgeons are now investigating with much interest the formation of these constricting bands, and attempting to decide whether their origin is pathologic or physiologic. The decision has not yet been reached.

By the use of the foregoing methods of treatment, and never allowing the bowels to fail of daily evacuation, many cases of extensive and tight intestinal constriction may live for years in comparative comfort.

The case is mentioned in a previous chapter where a woman had multiple strictures extending over several feet of her small intestine—so extensive, in fact, that the surgeon, on entering the abdomen, could do nothing. This woman, after two years, is living and in fairly good health, though she has to diligently carry out the instructions.

Malignant neoplasms of the intestines or rectum are purely surgical conditions, and call for no special discussion in this work.

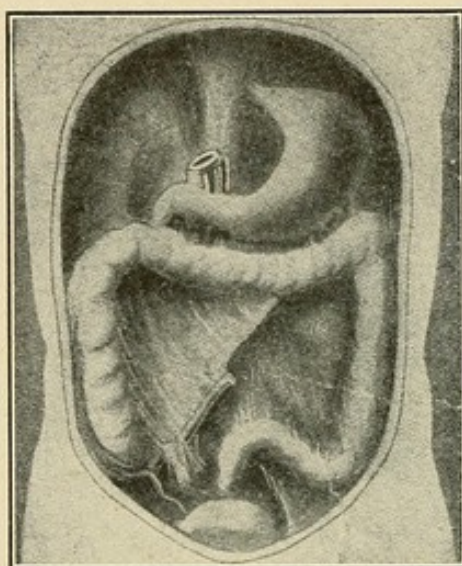


FIG. 80.—Lanis kink of ileum.

Apart from surgical care, however, the same general principles apply as in carcinoma ventriculi, namely, sedatives for the pain, bland, nutritious, and easily digested diet, appropriate digestives, and all the cheering psychotherapy that can be afforded. In such cases I may be excused for repeating the phrase, "though little can be done for the disease, much can be done for the patient."

CHAPTER XXI

DIARRHEA AND DYSENTERY

Clinically, diarrhea may be defined as abnormal rapidity of intestinal peristalsis, accompanied by frequent evacuation of the bowel contents, which are too liquid or watery in character.

The term "loose bowels" is a comparative one, for some there are whose bowels normally move two or three times daily, while others of a constipated habit would be in a diarrheal condition were the intestines to be evacuated twice in twenty-four hours.

Diarrheal stools are caused by the excess of water in the feces, and may be due to the liquid contents of the small intestine being so rapidly hurried into the colon that little absorption can take place in the small intestine. The free transudation of water from the blood-vessels or glands may also be a factor. At times increased peristalsis is the only cause, and both the large and small intestine may be involved, while no organic lesions are present. There are numerous ways by which increased intestinal peristalsis may be originated. In the majority of instances it is the result of anatomic changes caused by disease, as intestinal catarrh, ulcers from typhoid, etc. Again it may be caused by irritability of nerves of the intestinal walls, or it may be due to a central lesion of the nervous system. In considering a diarrhea it is important to know whether it is produced by abnormal exudation with increased peristalsis of the large intestine; or whether the peristalsis of the small intestine is increased, as in the latter unchanged digestive fluids and large amounts of undigested food-stuffs may be hurried through the small gut resulting in great damage to the nutrition.

The type of diarrhea brought about by intestinal ulceration is discussed elsewhere. This form is secondary to the anatomic changes and should be looked upon as an incident, wherein, if the real cause is controlled or cured, the diarrhea quickly ceases.

The type of diarrhea which will now be covered is that due to irritation from substances contained in the bowel contents, in which no intestinal lesions are originally present.

This type may be classified as follows:

Irritative diarrhea from bowel contents, as diarrhea dyspeptica from the presence of undigested food; diarrhea gastrica (gastrogenic diarrhea) in which the stomach permits undigested food to escape into the small intestine; diarrhea stercoralis, or that produced by irritating fecal matter; diarrhea entozoica, or that produced by intestinal parasites; diarrhea from irritants transmitted in the blood, as uremia; and nervous diarrhea.

Diarrhea Cathartica.—This term, as used by Nothnagel, is intended to mean undue bowel movements brought about by the ingestion of strong cathartic medicines. In many instances a catarrhal condition of the intestinal mucosa may be set up by the unwise or prolonged use of cathartics, and a severe diarrhea may ensue.

Diarrhea Dyspeptica.—This is probably the most common, and is produced by irritating or indigestible food, as fresh or unripe fruit, cucumbers, pickles, etc. There is great variation as to susceptibility, for certain articles that may set up a violent diarrhea in some individuals may either cause no disturbance, or even constipate others; while some individuals can eat with impunity certain articles under favorable circumstances, while under other circumstances the same articles will set up a diarrhea.

The food may contain pathogenic organisms when ingested, or may ferment and spoil after entering the intestines. These are the conditions under which are observed the various food poisonings, and in which important considerations, legal and otherwise, may be involved.

Diarrhea dyspeptica, uncontrolled, may merge into the chronic catarrhal form.

Diarrhea Gastrica, or Gastrogenic Diarrhea.—A number of years ago Einhorn called attention to cases of diarrhea, in which the stomach was entirely at fault. In the majority of instances there was a marked diminution or entire absence of hydrochloric acid in the stomach, and with a patulous pyloric outlet, the food was thrown into the small intestine in an unprepared condition.

In such cases there are flatulence, borborygmus, and colicky pains, with a tendency to bowel movements soon after meals. This condition, too, may develop intestinal catarrh.

Diarrhea Stercoralis.—This is an intermittent diarrhea noted in constipated persons, in which after a period of constipation, there sets in a short but painful diarrhea, accompanied by cramps, great flatulence, and the passage of hardened lumps of feces. After the bowels are thoroughly emptied, relief is obtained.

Diarrhea Entozoica.—This is the form brought on by intestinal parasites, as the tapeworm or others. Like other forms of diarrhea, there are at first no organic lesions present, but these may appear after long-continued irritation.

A very marked and sometimes intractable diarrhea may be produced by irritants in the blood, as the diarrhea of septicemia, nephritis, diabetes, cholera, etc.

In this class may be properly included the "compensatory diarrheas," being that form of diarrhea in which the toxic products of catabolism are simply washed out, with neither material harm to the bowel, nor systemic shock.

Dr. Henrich Stern classifies the types of compensatory diarrhea as (1) diarrhea concomitant with deficient or perverse catabolic processes; (2) diarrhea which is the consequence of functional or structural disease of certain excretory organs; (3) diarrhea occurring during the period of systemic physiologic decline. As illustrative of the first type may be mentioned the diarrheas of gout, Addison's disease, diabetes, goiter, and pellagra. The second

form of compensatory diarrhea may present itself as a concomitant of impaired renal function, or as the result of extensive burns over the abdomen.

That certain diarrheas, not exhausting, but rather grateful in their effects, are not infrequent in old people, will be noted by all careful observers, and I have under treatment at present a hale old gentleman, who welcomes his fortnightly diarrhea as a salutary visitation. In these forms of compensatory diarrhea the discharges from the bowel consist in the main of incompletely or perversely catabolized substances, or catabolic products normally excreted by other emunctories.

This type may also represent certain toxic states of the blood with secondary elimination of toxins through the intestinal mucous membrane. We should not forget, however, that it is possible for an irritative diarrhea to occur simultaneous with one of a compensatory nature, or that secondary inflammatory lesions of the intestinal mucosa may merge this beneficial drainage into an exhausting process; and it can be readily understood how the passage of these toxins from the blood, plus other excrementitious substances, may intensify the diarrhea, and transform the disturbance into one of a non-compensatory character.

Further studies, since the compensatory character of pellagrous diarrhea was advanced by the writer four years ago, have tended to prove the truth of that contention. The early diarrhea in this disease is of central origin, though the later manifestations may, and generally do, become irritative. Another probable cause of the diarrhea lies in the great diminution of tegumentary excretory power entailed by the dry and scaly skin, which would demand a vicarious activity of both the bowels and kidneys. The resident physician of one of the local sanatoria has reported to me a recent case of pellagra coming under his observation, where the patient seemed to be progressing favorably, but on checking suddenly his rather profuse diarrhea, he went into coma, dying in about twenty-four hours.

It has been observed that within two days after a burn, not necessarily deep, but covering an extensive area, a very watery diarrhea often occurs, followed by an improvement in the shock and clearing up of the mental hebetude or coma. This is evidently a vicarious elimination of auto-toxicoses, and it is probable that, in addition to the curtailed activity of the skin, there are also some poisonous gases generated in the body, which are discharged through the bowels along with other catabolic products. The colliquative diarrhea supervening after a long confinement from a burn, resulting from both systemic exhaustion and ulcerated intestines, is generally a terminal symptom and not at all compensatory.

In uremic intoxication we probably note the most frequent compensatory diarrhea, though this symptom is hardly as common as the vomiting. As far back as 1859 Treitz claimed that the intestinal irritation occurring in the course of nephritis was produced by ammonium carbonate formed in the intestinal tract by the urea excreted into it. This irritation may progress until catarrhal enteritis, and, later on, uremic ulcers are formed, provoking continuous intestinal disturbances not compensatory in their nature. The diarrhea in uremic conditions, therefore, where there are no decided changes in the intestines, may generally be regarded as compensatory, and treated as such.

In old people, especially women past the climacteric, we notice occasional attacks of diarrhea, apparently unprovoked by dietary indiscretions or atmospheric changes, brief, painless, and followed by no exhaustion. This periodical washing out of catabolic products is probably due to the fact that the tegumentary eliminative functions in the old of both sexes are incomplete, while in some women the body continues to require that occasional readjustment formerly afforded by the menstrual flow.

Diarrhea Nervosa (Nervous Diarrhea).—This depends on nervous or psychic disturbances, without any morbid changes in the walls of the intestines. It is entirely com-

patible with this type for a marked diarrheal discharge to be present, while no impairment of the digestion is felt by the patient.

True nervous diarrhea may originate from excessive stimulation of the nerves governing peristalsis, or from the transudation of great quantities of serous material into the bowel brought on by nervous influences. In many cases both conditions obtain. In some instances the stimulus may originate in the nerve-centers, and, being transmitted through the fibers of the vagus, sympathetic, or splanchnic nerves, may thus reach the intestinal ganglia.

Examples of nervous or psychic diarrhea are easy to find, and can be traced directly to some emotion, as fright, shock, or disgust, which send their impulse to the brain centers and from thence reach the intestines.

Nothnagel reports instances of chronic nervous diarrhea in persons who are attacked with gurgling, abdominal pain, tenesmus, and loose evacuations as soon as they find they can secure no access to a convenient toilet; while in others the sight of a toilet produces this symptom. Some patients may have attacks at definite hours, without any relation to surrounding conditions.

With some people a regular syndrome of symptoms may precede the diarrhea, as vertigo, giddiness, congestion of the head, reddening of the face, hot flushes over the body, fear, oppression, palpitation, and rapid breathing; and, strange to say, these distressing manifestations quickly disappear after several copious diarrheal movements of the bowels.

In a diarrheal attack the number of stools may vary from two to even fifteen, and consist of liquid with little if any mucus. Generally the first movement is comparatively normal, the next mushy, and the rest watery. This form of diarrhea is found in hysteria, neurasthenia and psychasthenia, and even in healthy people after a nervous shock. The instance of soldiers suffering from nervous diarrhea when they first "face gunpowder" is well known.

Charcot describes attacks with *tabes* (intestinal crises) much in character like the gastric crises; and Peyer mentions a reflex form of nervous diarrhea concomitant with abnormal conditions of the genitourinary tract, as from uterine catarrh, nocturnal emissions, spermatorrhea, and sexual excesses. Fischl reports a stubborn case of diarrhea, resisting all treatment, cured by replacing a reflexed uterus.

TREATMENT OF DIARRHEA

I shall not attempt to specifically consider the treatment of a chronic diarrhea that is caused by enteritis, colitis, deep-seated ulceration, tuberculosis of the bowels, or that produced by or concomitant with chronic organic diseases.

A chronic looseness of the bowels cannot be successfully treated until its cause has been determined and it has also been determined whether there is really a condition of diarrhea. As well said by Dr. Blackader, formed movements of the bowels, two or three daily, in a person who has long had this habit cannot be considered pathologic, but unformed, watery movements, even if not more than one or two a day, must be considered abnormal. Such a character of the movements may be brought about by a disordered normal function or by an actual pathologic condition.

Diarrhea brought on by the unwise use of laxative drugs or waters can be controlled best by tincture of opium and bismuth, with rest in bed and hot applications to the abdomen. It may be laid down as a general principle that, as exercise stimulates peristalsis, quietude, both physical and mental, will soothe troubled peristalsis.

A good general rule in administering astringent remedies for diarrhea is to direct a dose "after each loose action," but generally not nearer together than one hour. In this manner as the peristalsis subsides the medicine is given less frequently, and the danger of "binding up" the bowels too tightly is avoided.

With either dyspeptic or stercoral diarrhea the first requisite is the removal of the offending and irritating material from the digestive canal. To accomplish this the most efficient laxatives are Epsom, Rochelle, or Sprudel salts, or castor oil. After the bowels are well emptied by two or three copious movements unaccompanied by griping, an astringent may be given after each loose movement until the bowels are regulated. Occasionally intestinal irrigation is indicated in these types.

For gastrogenic diarrhea, or that produced by faulty stomach digestion, both the diet and the deficient gastric juices should be considered. Chiefly finely divided starchy foods are indicated, and dilute hydrochloric acid with pepsin should be given after meals. The actual diarrhea demands the same medication as other forms.

The physician's viewpoint toward the various compensatory diarrheas should be different, and as a factor for good its chronicity must often be welcomed. To a certain extent it fills the same useful place as the safety valve on a steam engine, "popping off" when the pressure becomes dangerously high. When in the several conditions mentioned, this bodily safety valve shows its ability to "pop off" at intervals, the probability of a sudden fatal termination is much lessened. As a general rule, when the medical attendant feels that this compensatory process is well established, he may venture a much more favorable prognosis as to the danger of fatal dyspnea, convulsions or coma, and may hold out to his patient the hope of a material prolongation of life. Therefore, unless the diarrhea shows a marked tendency to set up acute irritation or ulceration, or becomes decidedly exhausting in its nature, no therapeutic measures to check it should be employed.

The various astringent prescriptions suitable for acute diarrhea are laid down in the chapter on drug therapeutics.

Chronic Diarrhea.—Chronic looseness of the bowels require in some particulars different management from

the acute, and this management, as classified by Blackader, may be considered as (1) physical, (2) dietetic, (3) medicinal.

Among the physical requirements may be mentioned rest, either absolute or at least a while after each meal. A change of climate, especially from a warm to a cool climate is often followed by a complete cessation of the diarrheal symptoms. With this change there may also come relief from business cares or household worries, and in some instances this relief can only be attained through sanatorium treatment.

Other helpful physical methods are included in baths, which promote normal activity of the skin, electricity, massage, and passive movements, which may later be followed by those more active. The exercises are indicated principally in those who have led a sedentary life. This form of treatment is specially beneficial for the nervous forms of diarrhea.

Diet.—This will often call for a careful study of individual peculiarities, as well as the efficiency of the digestive juices, and then on limited diets, changed from time to time, the physician will determine that there are one or more articles of food which increase indigestion and promote looseness of the bowels. Such articles of food must, of course, be temporarily at least prohibited. However, it is often best to put the patient on an absolute milk diet for a week, and then gradually try the additions of different foods to the dietary. Occasionally a strictly milk diet will not be tolerated, and it may be found necessary to add an alkali to each glass of milk, as lime water or milk of bismuth. Boiling the milk may make it agree, or it may be necessary to peptonize it, the latter being rarely needed. If the patient is an adult and is placed on an absolute milk diet, he should not attempt to work. As before intimated, complete rest in bed for one or two weeks, on a corrected diet, should materially start the sufferer on the road to recovery. The first addition to the milk diet should be toast, eggs, and

raw or scraped beef, or, if uncooked meat is repulsive to the patient, the chopped beef may be slightly broiled. The future increase in the diet should be carefully suited to the individual, avoiding for quite a while those foods containing an abundance of cellulose or irritating residue.

Drugs.—Perhaps the most useful of all drugs in the treatment of diarrhea is bismuth, and next the tannin preparations. Opium, as a rule, is not advisable.

The two methods of giving bismuth are either to give two large doses of about one teaspoonful each day, or to give about 5 grains every three hours. I prefer the former, though about one day in each week I omit it, lest it form scybalous masses in the colon. If bismuth is long administered, it may be best occasionally to omit it for four or five days, unless the bowel movements are free.

The most eligible form of tannin seems to be tannigen, which may be given in doses of ten or fifteen grains after each loose action. This is especially serviceable in serous forms, or pellagrous diarrhea, and may be given regularly for several weeks without harm or seeming habituation. It is claimed, probably with some justice, that tannigen exerts no effect in the stomach, but produces its astringent action throughout the intestinal tract.

The vegetable astringents, as kino, catechu, rhatany, and others in that class, may be given in ten- or fifteen-drop doses, either in water, or with the milk of bismuth as a vehicle.

An antiseptic, such as phenyl salicylate (salol) may be given with benefit in 5-grain doses three or four times daily, unless albumen is in the urine. This drug may also be combined with the bismuth.

Occasionally bicarbonate of soda is of assistance, but alkalies are seldom indicated, unless in those rare cases of hyperacidity. On the other hand the dilute hydrochloric acid is often beneficial, and some diarrheas originating from achylic stomachs yield to this acid alone.

Quinin seems to have many times a specific action in the

intestine, not only as an antiseptic and tonic, but really seems often to alone inhibit looseness of the bowels.

As most of these patients are, or later on become, anemic, iron is generally indicated both for its tonic and astringent effect. The most eligible preparations are the sulphate of iron in doses of 3 or 4 grains after meals, or the tincture of the chlorid of iron in doses of ten to twelve drops in water after meals. When the latter preparation is being administered no dilute hydrochloric acid should be given, unless there is a marked demand for acids. Should these disagree, other preparations of iron are available.

DYSENTERY

One or two decades in the past, dysentery was recognized as a rather common disease, characterized by frequent movements of the bowels, containing mucus mixed with blood, and accompanied by griping pains and rectal tenesmus, the pathologic lesions on which these symptoms depended being situated chiefly in the large intestine; the disease being regarded chiefly as the result of cold, and the treatment consisting of the administration of a laxative followed by astringents and sedatives.

At present it is known to be an infectious disease characterized by specific ulcerations of the large intestine, and in typic acute cases it gives rise to bloody mucus or mucopurulent dejections, accompanied by extreme tenesmus.

This disease is found in all parts of the world, is endemic and often epidemic. It is most common in warm climates, as in the southern portion of the United States, Cuba, the Philippine Islands, and along the southern coast line of Asia, Africa, Egypt, Mexico, Central and South America. It has been met with, however, in cold climates, as North Russia and Greenland.

Unless sanitary precautions can be strictly carried out, this disease is the bane of warfare, and during the Spanish-American war the mortality from dysentery and typhoid

was far in excess of that from battle. In the Boer war the English troops suffered likewise.

Dampness, overcrowding, and imperfect ventilation predispose to dysentery, and when a sporadic case occurs, and sanitary regulations are poor, infection from the dejecta can readily follow, and an epidemic be precipitated.

In the Russo-Japanese war the Japanese medical officers took every possible sanitary precaution, with the result that the death rate from typhoid and dysentery was practically negligible, thus demonstrating that by proper care of the water-supply and proper sanitation epidemics of dysentery can be stamped out.

Heat and moisture predispose to intestinal disorders, and under such conditions vegetables, fruits or canned foods easily deteriorate, disturbing the digestion and rendering infection easy. Sudden alterations from heat to cold or from dry to a humid atmosphere also predispose to dysentery.

No age nor race is exempt, but the poorly nourished, the old, and those below par from other causes more readily succumb to its ravages. It is often prevalent in small towns or country localities where the water supply is dependent on wells that are in proximity to open privies, stagnant pools, or stables.

Types of Dysentery.—Bacillary dysentery (Shiga) or one of its strains, under which may be included the sporadic type (acute catarrhal), and which probably includes the ileocolitis of infants.

Amebic dysentery, caused by the presence in the intestine of a protozoon to which has been given the name *ameba coli*, or *ameba dysenteriae*. These cases have been observed principally in tropical climes, and the synonym, tropical dysentery, would lead some to suppose it of small interest to physicians in temperate latitudes. But, since our flag has been planted in the Philippines, giving rise to a constant travel to and from those islands; since the Panama canal brings thousands of our people who labor there into

intimate touch with the United States; and also with the large and growing fleet of fruit vessels plying between our shores and the South and Central American countries, the subject of amebic dysentery has become of importance to communities far removed from the tropics.

The examination of the stools and the technic for discovery and classification of the amebæ have been thoroughly discussed in the chapter upon examination of feces.

The source of infection is chiefly contaminated water, and green vegetables or fruit. Musgrave has found the ameba on dishes washed in tap water, on the surface of uncooked vegetables, in milk, and on the hands of attendants.

That the ordinary non-pathogenic water ameba can and does produce amebiasis is brought out by Allan, also by Nichols and Siler of the U. S. Army Medical Corps. Allan believes, in addition, that the ameba found in the soil may become pathogenic when taken into the body. Out of five specimens of earth, taken from vegetable gardens in Charlotte, two showed amebæ. It has been stated by Schaudinn that amebæ occur in normal stools—meaning normal individuals, but Allan has not been able to find those people who constantly harbor any kind of amebæ without symptoms of intestinal disturbance.

Diphtheritic dysentery constitutes a type, and also the secondary diphtheritic dysentery, which may be a terminal event in acute or chronic disease, and in which Vedder has demonstrated the presence of the bacillus dysenteriae.

Diagnosis of Bacillary Dysentery.—The incubation period of this type is short—not over forty-eight hours, and the onset is usually sudden, characterized by fever, pain in the abdomen, and frequent stools, first containing mucus, and later consisting chiefly of glairy mucus and blood. The tongue is coated, tenesmus is acute, there may be excessive thirst, nausea and vomiting. The abdomen is not usually distended, but there are tenderness over the colon and cramp-like pains radiating over the whole abdominal region. The pulse increases in rate and may become feeble and

thready. Urine is lessened and may contain albumen. The temperature generally rises, and the patient presents every appearance of being both painfully and seriously ill.

Among other clinical manifestations of bacillary dysentery are the acute catarrhal form and the follicular form, the latter sometimes resulting in but little pseudomembrane and no deep sloughing. The diphtheritic type may be included among the forms caused by the bacillus diphtheriæ combined with streptococci and others. In this there may be considerable necrosis and infiltration of the mucosa, and at times indications of general infection.

Complications.—These may be many and varied, consisting of acute bronchitis, pneumonia, gangrene of the lung, albuminuria, rheumatic pains and swollen joints, pericarditis, proctitis and periproctitis, and occasionally pyemic manifestations. There is also a frequent impairment of the digestion following bacillary dysentery, which may persist a long time.

Prognosis.—This varies with the epidemic, in some the mortality being high. As a rule, however, uncomplicated cases in persons of good physique, and where proper attention can be had, tend to recovery, though convalescence may be tedious.

Treatment.—Absolute rest is first in importance, and should be enforced no matter how mild the case seems to be. This is necessary, not only to conserve the caloric needs of the body, but it diminishes the activity of the bowels, as peristalsis is increased when the intestines are pressed on by the surrounding organs, on account of the contraction of the abdominal muscles during the upright position and walking. Many patients can control the desire to evacuate the bowels while quiet and recumbent, but are unable to check the straining when the body is erect or in motion.

As suggested by Dr. Meara in an excellent article, a patient with dysentery demands as active and careful management by the nurse as one with typhoid fever. Therefore it is preferable that the bed which the patient

occupies should be narrow and high, and that the springs should be stiff. The mattress should not be too hard, and if it is not smooth, should be covered by a folded blanket. Over this is placed the lower sheet, which is well tucked under the mattress, and over this should be spread a rubber sheet wide enough to extend from the pillow to the patient's knees and long enough to be tucked under the mattress at either side. Over this should be placed a draw sheet, which is folded lengthwise and placed across the bed so as to cover the rubber sheet. This may be readily changed for a clean sheet as often as necessary. The patient lies on this sheet, and over him should be placed another sheet, and blankets in sufficiency.

The room occupied by the patient should be large, well aired, and should receive some sunlight, although if it is summer time and hot weather, the patient may not desire too much of this form of light. A daily warm sponge bath should be administered, with the water at about 110° F. One part of the body should be bathed after another, so as not to entirely uncover the body at once, and so no unnecessary fatigue may be caused. Following the bath, a gentle alcohol rub should be given, and the back should be dusted with a bland powder. The last precaution is important, especially in thin or debilitated individuals, for carelessness in this particular may result in chafing, excoriation of the back and buttocks, and even bedsores. The mouth should be cleansed frequently, Dobell's solution, or liquor alkaline antiseptic (N. F.) being suitable. If painful stomatitis is in evidence, diluted peroxide of hydrogen solution or chlorate of potash may be used, or the buccal surfaces may be swabbed with a nitrate of silver solution, twenty grains to the ounce. For the dryness of the mouth, which is sometimes so annoying, equal parts of a pure mineral oil and a two per cent. boric acid solution, with a little lemon juice, will be found grateful.

Unless the attack is extremely mild, the patient should not be allowed to leave the bed when the bowels move,

but a bedpan should be employed. Some are extremely averse to this procedure, declaring that they never could and never can use a bedpan, but sufficient persuasion will generally accomplish this important part of the treatment. It should be warmed before being placed under the patient; a towel should be placed between it and the draw-sheet, and he should be assisted in raising his body by the hand of the nurse placed under his back. After the bedpan has been used, the patient should be locally bathed, dried, gently rubbed with alcohol, and powdered.

In cool weather chilling of the body should be carefully avoided, and it is sometimes well to place an extra piece of flannel over the abdomen, while the feet should be kept warm by a hot-water bag placed between the sheets at the foot of the bed.

The diet is quite important, and during the early days of the dysentery should be rather limited. In robust individuals I frequently allow no food whatever for the first forty-eight hours, seeing to it, however, that a sufficiency of water is ingested. Meara and others believe there is nothing better for patients with this trouble than milk, for it is bland, non-irritating, and non-stimulating to the intestinal tract, is readily assimilable, and leaves but little residue. Occasional idiosyncrasies against milk, when really present, should be respected. A glassful should be given every two hours, if the stomach will hold it comfortably, and some digest it better if boiled. Others prefer the raw milk, ice-cold, especially if the temperature is high. If thought advisable by the physician, the milk may be diluted at pleasure with plain boiled water, lime water, rice or barley water. If, on account of distress or flatulence, the milk seems to be not well borne, the possibility that the fat is not well digested should be considered, and the milk may be skimmed before it is drunk. After the fever has subsided and the stools become more normal, the patient may take barley jelly or well-boiled rice; later toast and soft egg, a broiled chop, and finally the usual diet, being particular for

a while as to the ingestion of foods containing much cellulose. Water may be allowed frequently, but in small amounts and not too cold, for either very hot or very warm drinks or food tend to increase intestinal peristalsis. Should milk continue to disagree, egg-albumin, or thin chicken broth may be allowed, and to the latter milk sugar may be added, unless it increases flatulence.

It is the almost universal rule to commence the treatment of dysentery by the administration of a cathartic, and the three most in use are castor oil, calomel, and the salines. By this means the intestines are emptied of the accumulation of sticky mucus, and later, astringents will not produce griping. When the bowels are suddenly checked before first clearing out this mucus, the patient is liable to suffer great pain and increased fever. I do not advocate the use of calomel, but prefer one ample dose of either castor oil or a dependable saline cathartic. After two or three free movements, an astringent may be given, and one containing a small amount of opium is preferable, not enough, however, to produce a narcotic effect. Should the griping continue, the following prescription from Delafield is useful:

R. Olei ricini..... ʒiiss.
 Phenylis salicylatis..... gr. xxv.
 Tr. opii deodorati..... ℥xv.
 M. et ft. capsulæ 15.
 Sig.—One capsule every two hours.

This prescription may be kept up until the stools diminish in frequency, and then permit the intervals to be increased. Should this not be efficient, the following is useful:

R. Tr. opii..... ʒss.
 Tr. opii camphoratae..... ʒiv.
 Spts. foeniculi..... ʒii.
 Mist. rhei et sodii..... q.s. ad. ʒii.
 Sig.—One teaspoonful every two or three hours.

It may be advisable to give an extra dose of oil every few days, should the mucus and blood continue in the stools.

For the excessive griping hot stupes and hot poultices are indicated. Turpentine may be added to the stupes, but care must be exercised lest the abdomen be blistered.

Warm rectal irrigations are recommended by some, but it has been my experience that they increased both peristalsis and discomfort.

For the painful tenesmus nothing is as efficacious as the local application of opium and belladonna in suppository:

R. Opii pulveris..... gr. i.
 Ext. belladonnæ fol..... gr. ss.
 Olei theobromatis..... ʒss.

M. at ft. suppositoria No. 10.

Sig.—One inserted in rectum every three to six hours.

If this method is not satisfactory, the tincture of opium may be added to thick starch-water, and about 2 ounces of starch-water with fifteen drops of the tincture may be gently injected into the rectum every three to six hours as needed.

Occasionally a hypodermic of morphin is required for excessive pain, but this should be avoided, if possible, as the secondary nausea is usually distressing, while it checks some of the useful secretions.

Among the astringents tannigen is my favorite, and with this may be given bismuth subgallate in large doses. When bismuth is long given, the precautions previously mentioned should be observed.

Opium, while being the most useful astringent, should be continued with care, and, if possible, the patient should be ignorant of its use, otherwise the habit may become fixed. I have seen a number of confirmed opium habitues who informed me that their bondage dated back to an attack of dysentery.

While most patients recover from dysentery in five to ten days, a certain number continue for several weeks, and then very slowly recover, or the disease becomes chronic. In the chronic condition irrigation is of more use than in the

acute, but care must be taken that the irrigation does not keep up the trouble.

An irrigation of plain warm water may first be used, followed by a weak nitrate of silver solution. If the latter causes much pain, it should be followed by a neutralizing solution of chlorid of sodium.

I have during the last two years used high injections of kerosene oil for intractable forms of bacillary dysentery, especially in pellagra, where the early compensatory diarrhea had merged into a painful dysenteric state, and with satisfactory results. I would recommend its trial in such cases.

In these protracted cases there will generally be found ulcers in the rectum, and the symptoms will not yield until these ulcers are properly treated.

Patients with long-continued dysentery often improve greatly with change of air and environment, and I have observed several instances in which, after medicine and other measures had failed, quick improvement took place during a sojourn in the mountains or at the seashore. Many of these patients, too, become sitophobic or fearful of food, and consequently become thin and anemic. It is just as necessary in the promotion of healing in the rectum and colon that an adequate diet be ingested as in the recuperation from any other exhausting illness.

As this disease, like typhoid fever, is water-borne, the same precautions in regard to the care of stools and of bedding soiled by the fecal discharges should be exercised as is advised in typhoid fever; otherwise new cases may soon develop in the same house or vicinity.

AMEBIC DYSENTERY

Diagnosis.—The ordinary mental picture of dysentery with its outspoken tenesmus, small and frequent evacuations, containing blood and mucus, and running a rather acute course, must be changed somewhat in regard to ame-

bic dysentery, for its variable and capricious syndrome of symptoms makes a purely bedside diagnosis uncertain, and may even tend to disarm an ordinary suspicion of its existence. The clinical picture of bacillary dysentery could hardly be used as a descriptive one for the so-called dysentery of amebic origin. In the first place this condition is practically always chronic, in the sense of a protracted infection, and the acute types occasionally met may be looked on as mere exacerbations. The number of years the infection might exist in latent form, or, if established, remain unrecognized, is quite variable, and depends largely upon the ability of the physician making the diagnosis. S. K. Simon, in reporting fifty cases, found one in which the disease could be traced back twelve years, another eight years, two for six years, and in five cases the condition had been present two years at the time of consultation. The average duration of the cases was about nine months.

During the course of this disease there are quiescent periods, when apparently all trace of the trouble has vanished. The bowels might even become markedly constipated. The amebæ remain, however, constantly under cover during this time, the infection suddenly flaring out again under favorable conditions for renewed activity. The occasional attacks of diarrhea, alternating with periods of normal evacuation or constipation, make up a suggestive picture of amebiasis, and when present should lead to an immediate examination of the stools for amebæ.

When attacks of diarrhea do occur, the number and character of the evacuations do not follow any set rule, for a great deal depends on the location of the ulcers. If low down, and especially if in the rectum, the evacuations are usually frequent, accompanied by a marked tenesmus and soreness of the lower bowel. If the main lesions are above the sigmoid, as they often are, the number of stools may never average more than two or three a day. Mucus may or may not be present, but commonly is. Pure blood, or a blood-streaked mucus, I have found to be fairly con-

stant, though at times in only small amounts. In fatal cases with liver abscess, according to Strong, hemorrhages are frequent.

In regard to age, this is a disease of adult and middle life, being rare among children and aged people. The colored race do not suffer much from amebiasis, though they are not entirely exempt, and among all races the males seem to be mostly affected. Occupation and greater exposure of males to infection in general is the probable explanation of the last assertion.

Musgrave has classified the main types as follows:

- (1) Latent and masked infection with the amebæ.
- (2) Mild and moderately severe infections (subacute dysentery).
- (3) Severe infection, including gangrenous and diphtheritic types (acute dysentery).
- (4) Chronic dysentery.

In the latent infection there may be a pathologic amebic process in the intestines, without any diarrhea or other symptoms that would indicate the infection. Dull, aching abdominal pains are present, which are attributed to catching cold. They first appear and are most active during the night or early morning, and are accompanied by indigestion, headache, lassitude, coated tongue, loss of appetite and weight, and at times a yellow skin.

Physical examination discloses on deep palpation tenderness along the colon, especially over the cecum and ascending colon. This last is quite a significant symptom. If a hydragogue cathartic is administered, there can generally be found in the stools amebæ, mucus, tissue elements, and often old blood.

In the moderately severe manifestations of amebiasis, the aspect of diarrhea may be more prominent than that of dysentery, and the trouble may develop from the latent type. There are noted abdominal pain, tenderness along the colon, headache, digestive disturbances, irritability and loss of weight. Amebæ are found in the diarrheal move-

ments, and some of these patients never show any dysenteric stools, even without treatment.

In these somewhat atypic cases of loose bowels with contained amebæ may be mentioned the interesting report of Dr. William Allan, who has found in the stools of pellagrins both the *entameba coli* and the *entameba histolytica*. He claims that there is danger of mistaking amebiasis for pellagra and *vice versa*. In this I hardly agree, for a careful study of either disease, each of which is a pathologic entity, should serve to stamp the diagnosis.

Cases of amebic dysentery slightly more severe will show a diarrhea marked in the morning, consisting of several semi-fluid stools, with neither mucus nor blood, but increasing in intensity until both appear.

Finally, in the severe cases, the onset is sudden, with marked abdominal colic, diarrhea with tenesmus, and great straining. Later there may be passed sloughs consisting of gray or blackish masses of necrotic tissue of very foul order. The temperature may not be high, but the patient rapidly emaciates. Death may occur in a week after the onset. Intestinal hemorrhage or general peritonitis may take place, or extensive ulceration may remain after the sloughing, causing a chronic diarrhea which exhausts the patient. In such cases as many as twenty or thirty stools may be passed in the day, all of them containing blood and mucus, perhaps gangrenous fragments of tissue. Anorexia, nausea and vomiting may occur, and with the great prostration may come cold extremities, delirium, stupor, and cerebral disorders.

Should death be averted, the disease may pass into the chronic state with ulcerated intestines and all the long-continued symptoms that go with these intestinal lesions.

While the disease does not often affect the extremes of life, Musgrave has reported from the Philippines cases in infants of six months, and in persons over sixty years of age.

The only way in which a positive diagnosis of amebiasis

can be made is by the microscope, and by the finding of the protozoa in the stools. In regions where the disease is endemic and a microscope is not available, one can reasonably infer its presence by the most valuable symptom, namely, abdominal soreness, which is increased on pressure, and extends along the course of the colon, especially when there is maximum intensity over the cecum and ascending colon. I believe with Musgrave that the presence in the stools of any form of ameba in warm or tropical regions should be considered diagnostic for purposes of treatment, whether or not active symptoms are present.

Prognosis.—This is largely determined by the period of its recognition and the type of the disease. In a general way it may be said that the longer the infection has continued the greater probability there is of serious complications. In Simon's fifty cases, 28 per cent. died, and in fifteen out of the seventeen fatal cases the cause of death was determined accurately by post-mortem. Extensive ulcerations of the large bowel were found in practically all, and in nine instances seemed the sole cause of the fatal termination. Perforation was observed in but one case, while six abscesses of the liver were discovered, five solitary and one multiple. In Futcher's cases liver abscess was diagnosed in 23 per cent., and in Craig's 33 per cent. This complication, it will therefore be noted, is important, and its possibility should always be considered. The diagnostic puncture of the liver is not a dangerous operation, and the use of the aspirator is indicated when the merest grounds for suspicion are present. Only thus may a serious and often irretrievable oversight be avoided.

Under proper treatment recovery is the rule in the young and well-nourished adults, if the disease is not of long duration. The early diagnosis and treatment are the important considerations in the prognosis, as otherwise apparently mild cases may assume a dangerous character, complications may arise, and it may either enter into a chronic course, or death may ensue.

Treatment of Amebic Dysentery—Musgrave holds that the best rule to observe in localities or countries where the disease is endemic is to take nothing into the gastrointestinal tract which has not been sterilized. This is not always possible. The drinking water should be boiled, and dishes and the hands of attendants should be washed in boiled water. Raw fruits and vegetables should be first placed on ice, and then have scalding water poured over them, which kills the amebæ. The stools should be disinfected in carbolic acid or bichlorid of mercury solutions, and the same precaution taken with soiled linen.

The acid of the stomach lessens the chances of infection, and acid mixtures are helpful for this purpose.

In the acute form the patient should be put to bed and placed on a liquid diet, with the same dietetic precautions as in acute bacillary dysentery. I have heard from several sources the advocacy of liberal allowances of tender turnip "greens" made into a purée for this condition, and have also heard glowing accounts of good results following. I am not able to find any logical reason for such diet, and am skeptical as to its curative results, though I have neither had nor sought any experience with this somewhat unique method.

Local applications for the abdominal pain, general care of the patient, and the employment of other symptomatic measures are practically the same as in the treatment of other forms of acute or chronic intestinal irritation.

The *crux* of the whole therapeutic problem is to destroy the amebæ, and later to heal the ulcerated intestines and cure other possible complications.

For the destruction of the amebæ there are two methods of internal medication and one of local irrigation which are practically specific, and the physician may be spared trying the numerous remedies which he can find recommended by some who have had but little actual experience in the treatment of this disease—I refer to the internal administration of ipecac, the hypodermic administration of emetin hydro-

chlorid, and the high injection into the large intestine of kerosene oil.

For many years ipecac has been held in the highest esteem in East India and neighboring Oriental countries, and while in some quarters it is unfavorably regarded, it has the endorsement of Manson, of England, and Siler of this country. I have had the opportunity of using it in a number of cases, and my results have been satisfactory.

In the administration of ipecac several details must be observed, or the stomach will not retain it and the results are not good. First of all, the drug should be administered only in pill form and these pills should be coated about an eighth of an inch with phenyl salicylate (salol); for this coating does not readily dissolve in the stomach, and it is necessary that the ipecac get beyond the stomach before it is absorbed, lest the emetic effect cause the patient to reject it. The pills should generally contain 5 grains each of the ipecac.

If desired, castor oil may be given ten or twelve hours before the ipecac is to be administered, and my usual mode is as follows: No food is allowed for six hours, and no water for three hours. The patient is kept on his back and the pills swallowed with as little fluid as possible. Twenty drops of tincture of opium should be given thirty minutes before the ipecac pills. After this he should not be allowed to move or speak or expectorate, and the nurse should keep a cold cloth over his throat and should frequently bathe his face. His head should be kept low, and both physical and psychic quiet enjoined. He may move gently on his right side in an hour, but should not be allowed any water until three hours have elapsed after taking the pills, and then sparingly. In this way the pills are generally retained; but, should they be rejected, the same procedure may be repeated the following day or night. After six or seven hours he may take a glass of milk or some light broth, if he desires.

The dose of ipecac should be about 40 or 50 grains the

first night (eight or ten pills), and reduced ten grains each night until only 10 grains are given. It is well then to continue this 10-grain dose every night for ten days or two weeks.

Given this way ipecac appears almost as a specific, and under its influence the stools become soft and mushy, but soon lose their dysenteric character, and may assume a normal form in a few days, while the amebæ disappear almost at once.

The *modus operandi* of ipecac was not well understood until in March, 1911, Vedder, working in Manila, published his findings that a fluid extract of ipecac would kill amebæ in cultures in dilutions as high as 1:200,000. The next year Rogers in Calcutta found that emetin hydrochlorid killed amebæ in stools of in dilutions 1:100,000, and began the use of this salt hypodermically in cases of amebic dysentery. Since then this preparation has been extensively employed, and present results seem highly satisfactory.

There are variations in the method of its use, and there is not yet a unanimity of opinion as to the best, but from one-third to four-fifths of a grain may be used hypodermically every day or every alternate day until good results appear, or the amebæ disappear from the stools. Allan, of Charlotte, has experimented rather extensively with this salt, and reports giving it in doses of as high as 2 1/4 grains without vomiting. He reports one case in which 4 grains were given hypodermically, but in this nausea occurred.

It is probable that, as the effects of emetin hydrochlorid are better understood, larger doses will be given than are now recommended, and, as Allan found that the amebæ disappeared much more quickly when the large doses were given, and as he found that 2 grains produced no nausea nor vomiting, the dose now usually recommended may be increased with safety and efficiency.

High Injection of Kerosene Oil.—This procedure is of recent date, and has not come into general use, but is a

valuable aid in amebic dysentery. For an adult about a pint of the pure oil should be employed, and, with the patient in the knee-chest position should be injected high up in the bowel through a colon tube. He should keep this position, in an exaggerated manner if possible, for several minutes so the oil will gravitate into the colon. This injection should be retained for thirty to forty minutes, and then permitted to escape, though if all does not escape at once, no alarm need be felt. R. T. Dorsey reports one case where, through a misunderstanding of orders, the oil was allowed to remain in the bowel over two hours. No ill effects occurred.

This injection may be repeated daily for three or four days, and then occasionally, as required. It will be found, however, that not many will be needed, for, unless the case is extremely far advanced, improvement will promptly set in.

Deeks, at the Ancon Hospital, employs chiefly the sub-nitrate of bismuth treatment, giving $1\frac{1}{2}$ drams by measurement or about 3 drams by weight, stirred in a glass of water, every three hours. Normal saline or plain water irrigation of the bowels are added. Rest in bed and an absolute milk diet are enforced, and an occasional dose of morphin and atropin are allowed for the pain. Deeks claims good results from this method, but recommends appendicostomy, or cecostomy, if the symptoms persist.

It would appear to the writer that surgery, especially that entailing the formation of an artificial anus, should hardly be recommended in this disease, except in extremely intractable cases.

Other solutions for local treatment, which have been advised are:

Acetozone, 1:1000 and alphozone in the same strength. These are claimed to destroy amebæ and other bacteria.

Protargol, argyrol, bisulphate of quinin, each 1:500; silver nitrate, 1:2000; thymol, 1:2500, or permanganate of potash, 1:2500—all these are probably of some value

both for their germicide properties and as astringents. Hydrogen peroxid has been used by some with satisfaction, and Tuttle has recommended cold water at a temperature under 45° F. as destructive to amebæ.

Other medication, diet, physical measures, etc., are similar to those indicated for other conditions resulting in similar lesions of the intestines; for the general symptoms need to be appropriately treated as they arise, while strenuous efforts should be put forth to conserve and improve the patient's bodily strength. A change from a warm to a cool climate is nearly always of benefit, and on several occasions I have known of marked improvement quickly following such a change.

Regarding abscess of the liver, Rogers states that in the presuppurative stage there is exacerbation of temperature, usually increased pain in the liver region, and leucocytosis. With suppuration there is increased density of the liver shadow to the X-rays, local swelling, and edema with increasing leucocytosis. Rogers claims, however, that 86 per cent. of these abscesses are sterile and are infected by other bacteria by the open operation. He recommends repeated aspirations of the abscess cavity with the injection of quinin solution, and no drainage. This method failing, he adds sterile siphon drainage.

Amebic dysentery, like duodenal ulcer, is probably much more prevalent than has been supposed, and its frequency has been shown by more thorough diagnostic methods. By carefully examining every suspected case of possible amebic infection, and by early and energetic treatment, this otherwise serious disease can in nearly every instance be promptly and permanently relieved.

CHAPTER XXII

CONSTIPATION

Constipation, like diarrhea is a comparative term, and may be defined as a condition in which the feces are not passed sufficiently often or in sufficient quantity. The quantity of feces is somewhat variable, from 100 to 160 grams being the daily average, though in vegetarians this may be greatly increased. Much of the bulk of the fecal evacuations is composed of bacteria, of which Herter has estimated the daily number as 126,000,000,000, which explains the fact that patients who eat but little may pass considerable fecal matter.

There are many and various grades of constipation, and what might be considered constipation in some individuals would not be considered so in others, as it depends to a great extent on the *habit* of the bowels.

Constipation may be acute or chronic, and the former may be due to complete obstruction of the intestinal tract or to post-operative ileus and intestinal paresis. An almost complete obstruction may sometimes also result from kinks and angulations in the intestines brought about by enteroptosis, or from constricting bands which diminish the lumen of the canal.

Strictly speaking, constipation is not a disease, but the symptom of various pathologic states. The latter may consist of gross anatomical changes in the rectum or other parts of the gastrointestinal tract, or merely of nervous inhibition due to stimulation of the splanchnic from central emotion; yet there is always a cause even in those cases which are produced by irregular habits in not answering the call of Nature, and a proctitis and dilatation of the rectum may be a feature. It is of the utmost importance to look upon

constipation as a symptom, for the whole treatment depends upon this viewpoint.

The causes may be divided into mechanical, inflammatory, reflex and neuromuscular. The first two are by far the most frequent, and before ascribing constipation to a nervous cause, as neurasthenia or hysteria, it is much wiser to search for an anatomical reason, such as obstructions or inflammation.

Obstructions at any point of the gastrointestinal tract from the esophagus to the anus, and from any cause whatever, are capable of giving rise to the symptom of constipa-

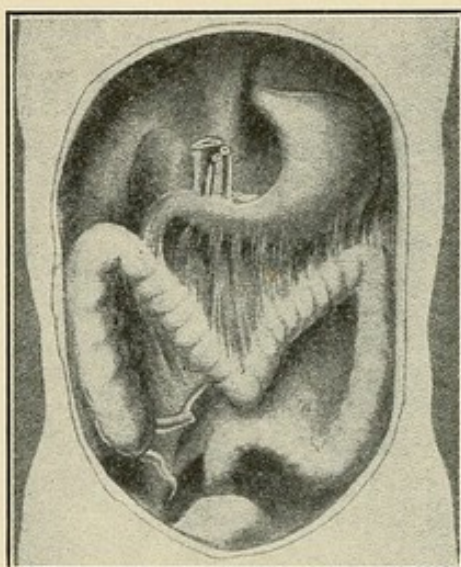


FIG. 81.—V-shaped ptosis of transverse colon.

tion. Thus, cancers of the esophagus or pylorus nearly always produce small and infrequent movements, and one of the common symptoms of gastric dilatation with obstruction due to ulcer or any other condition is obstinate constipation. In such cases huge doses of cathartic medicine set up no action of the bowels whatever before gastroenterostomy, because these agents cannot reach the intestines.

Tumors or stenosis of any part of the intestines, when developed enough to obstruct the lumen will cause scant stools, not necessarily hard, but small in quantity. This applies to cancer or benign tumors of the hepatic and splenic flexures of the colon as well as those of the rectum.

The influence of adhesions and angulations of the intestines as a factor in constipation is becoming well recognized. Kemp goes on record with the statement that from 15 to 20 per cent. of all women have enteroptosis, and fully 30 per cent. of women coming to him for treatment of the gastrointestinal tract are sufferers from this condition.

It is extremely probable that adhesions affecting the intestines of slight or moderate degree, not sufficient to cause stenosis, are responsible for a disturbance of both their motor and secretory functions. In effect, therefore, as asserted by Kemp, careful investigation will demonstrate, in

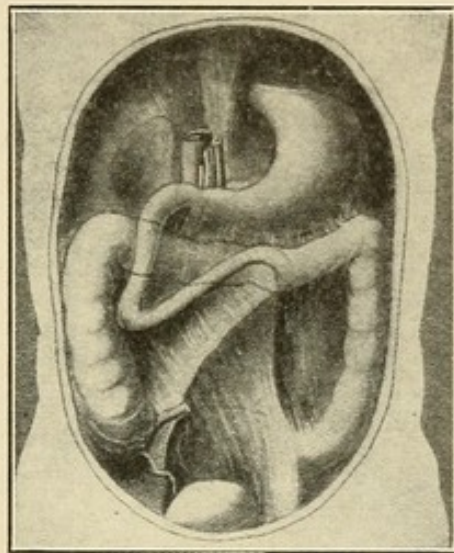


FIG. 82.—V-shaped duodenum lying to right of spine.

quite a large proportion of cases of so-called atonic constipation, that enteroptosis with moderate angulations or that slight adhesions are factors. This he and others have demonstrated by radiographs. Kemp also believes that adhesions with narrowing of the intestinal canal, as well as enteroptosis with marked angulations, are frequent factors in the production of so-called spastic constipation, as he has seen the typic symptoms with the evacuation of small balls, or pencil-shaped stools, occur in the above-stated conditions.

Tuttle mentions finding bands of adhesions which arose from a chronic appendix or from pelvic peritonitis due to

pus tubes which tied down the sigmoid portion of the colon, and caused most intractable constipation by preventing the normal straightening out of the sigmoid when filled with feces prior to its emptying into the rectum, thus leaving a kink and difficult uphill passage of stool. Such cases he has repeatedly cured by cutting the adhesions, removing the appendix or other offending organs, and stitching the sigmoid to the abdominal wall.

Among the inflammatory causes of constipation we have chiefly to consider the chronic catarrhal inflammations of the intestine, particularly of the colon, sigmoid and rectum.

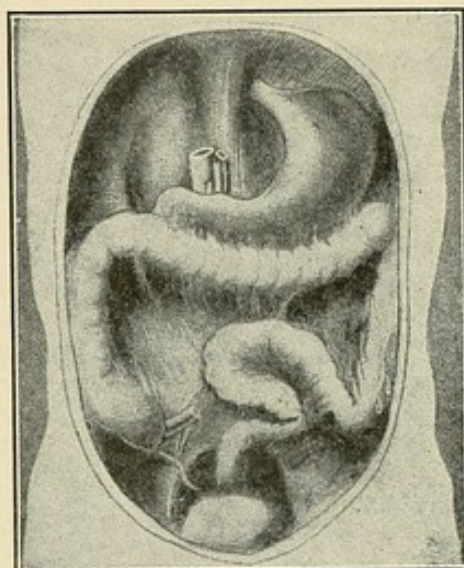


FIG. 83.—Cecal ptosis.

These are quite common, and even if not the primary faults, they at least promote its continuance. It has been noted that once low-grade catarrhal inflammation begins, then constipation occurs, while the constipation itself increases the inflammation, and so on.

The reflex causes of constipation most frequently emanate from the stomach in hyperacidity, appendix, female generative organs, gall-stones, hemorrhoids, anal fissures, etc.

Among the neuromuscular factors we have lead-poisoning, which sets up a spasmodic contraction of the intestines without the rhythmic relaxation necessary to normal peris-

talsis; and in another group is found asthenic states, as chlorosis, anemia and general weakness from any cause, which may decrease the peristaltic force of the neuromuscular mechanism.

Other important causes are ingestion of insufficient water with meals or between; an habitual diet containing but little residue, whereby the intestines lack their normal stimulus to contraction; a sedentary life which promotes intestinal stasis; irregular habits and failure to heed the inclination to empty the bowels when the "call" is felt, whereby the valuable influence of the subconscious stimuli

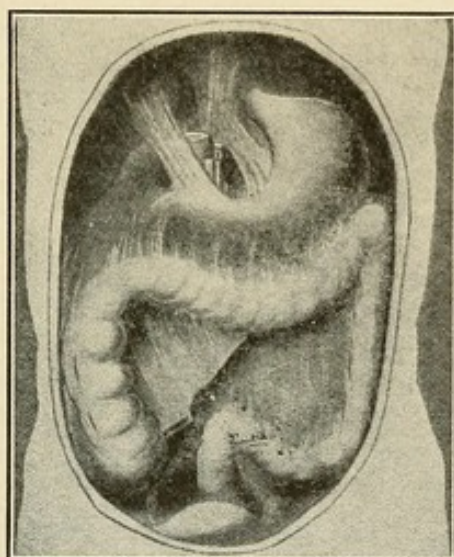


FIG. 84.—Cecal ptosis displacing hepatic flexure.

to intestinal peristalsis is lost—all these exert their malignant power in the inauguration and perpetuation of the constipated habit.

Clinically, constipation may be divided into (1) **atonic**, (2) **spastic**, and (3) **obstructive**.

Diagnosis.—Acute constipation should be diagnosed when evacuations of the bowels cannot be obtained by ordinary measures, and when the accumulation of fecal contents produces active symptoms. This condition may mean absolute obstruction, and may require prompt and energetic measures to avoid a fatal issue.

Chronic constipation generally begins in the atonic form,

and manifests itself by a simple inability to evacuate the bowels. It may be confidently diagnosed in those who have long eaten a concentrated diet with perhaps insufficient fluids, who have led an inactive life, whose muscular system is below par, or those who have from an unmethodical life been unable to empty the bowels regularly, or from carelessness and inattention have drifted into this unfortunate state. In this class may generally be included those who have depended upon cathartic stimulation, and whose bowels have become absolutely unresponsive to any ordinary natural or psychic influences.

The catarrhal stage is but an advance beyond the atonic condition, and its diagnosis is made possible by the presence of membranous mucus surrounding the scybala. We do not accurately know the real condition of the small intestine at this stage, but may assume that a catarrhal condition has gradually developed here also.

The spastic stage sets in when the secondary enterocolitis, or the continued abuse of cathartics has irritated the colon, so that a persistent hypertonicity of its musculature has developed.

In the atonic stage the patient complains of nothing more severe than constipation, a dull feeling, slight headache, inability to think quickly, and perhaps impaired appetite. Laxatives, or effective enemas temporarily afford relief.

In the objective examination the stools will show normal consistency, and will be covered by the normal amount of mucus. The sigmoid flexure, and usually the transverse colon will be found filled with feces, and will give a doughy feel upon palpation. No special pain nor flatulence are present.

In spastic constipation, the following differential symptoms will serve to diagnose it from the atonic:

(1) Colic is a frequent symptom, in slight cases flatulent colic, in severe ones, mucous colic. Nearly every case of chronic constipation that runs its course with attacks of pain belong to the spastic type.

(2) Laxatives are either not effective at all, or only so when given in tremendous doses, which produce griping and pain. Enemas likewise are not effective.

(3) Objectively, on palpation, the transverse colon and the sigmoid flexure are found to resemble a hard cord, about the size of the little finger, and is quite sensitive.

(4) Examination of the rectum discloses an empty gut, or else it is filled with small and hardened feces, about the size of the little finger. In atonic constipation the rectum is usually filled.

(5) The stool is of small caliber, sometimes ribbon-shaped, or even slightly quadrangular. It is frequently cut into short segments. In the atonic form the feces are voided in large solid lumps, of irregular shapes and sizes.

The obstructive form of constipation must be diagnosed either from physical examination or by means of the X-ray. It may be reasonably supposed to be present in individuals with decided enteroptosis, especially when constipation is chronic, and the movements are both difficult and uncomfortable. I have known several instances in which the act of defecation was looked upon as almost a torture, and was postponed as long as possible through fear.

"Lane's kinks" and "Jackson's veil" or membrane are now receiving much attention from the surgeons, and undoubtedly exert a decided influence in constipation.

Prognosis.—This depends on the length of the habit, the underlying cause, and greatly on the intelligence and perseverance of the patient. After a constipation is overcome, unless the original causes are abated, it will in all probability return. The obstructive form is occasionally only amenable to surgical treatment, and the spastic type depends on the healing of the lesions which generally keep up the spasm. In the functional cases of habitual constipation, the patient may be cured and stay cured in the majority of instances, if he will strictly obey orders and exercise both patience and perseverance.

Treatment.—General treatment consists in teaching the patient the underlying causes of constipation, so that intelligent cooperation may be secured, and the subconscious powers employed to their best advantage. An outdoor life with exercise in plenty should be encouraged, and regular habits as to visiting the toilet should be specially insisted upon.

Diet.—The main idea is the ingestion of foods which contain a liberal proportion of residue, and, where there is no intestinal inflammation, even a certain amount of irritating particles, so the intestinal mucosa may be stimulated. A glass of cold or hot water should be taken upon arising, so as to inaugurate early peristalsis, and an abundance of water should be drunk at and between meals.

Among the articles of food which should be recommended are buttermilk, cider, lactone buttermilk; raw fruits, such as grapes, oranges, grapefruit, apples (unpeeled), figs, prunes, cranberries, pears, peaches, plums, gooseberries, currants, strawberries, raspberries, blackberries; cooked fruits, jams, honey, lemonade; vegetables rich in cellulose, as cabbage, cucumbers, spinach, greens, Brussels sprouts, cauliflower, green salads, Spanish onions, carrots, asparagus; syrup, sugar; salmon, sardines, herring; rye bread, Graham bread, brown bread, pumpernickel; fatty foods, plenty of butter, cream and olive oil. Oatmeal and some of the cereals are of value; also cornbread, whole wheat flour bread, and bran biscuits. Excess of potatoes and rice may constipate, and sweet milk, especially when boiled, is constipating to many. Whortleberries are constipating, and red wines, tea, chocolate and cocoa should be prohibited. Chicken and red meats may be given in moderation, but it should be remembered that the flesh proteins are nearly all consumed, leaving but little residue.

Massage by a trained attendant, and automassage, as described in the chapter on mechanical methods, are often of use in atonic constipation, but harmful in spastic. Gymnastic exercises, which bring into play the abdominal

muscles are of some service; and the Swedish movements are occasionally of benefit. Electricity may also be used in the atonic cases.

Hydrotherapy in the form of baths, fomentations, wet binders, and Priessnitz compresses are all of service, but are not often thoroughly carried out except at sanatoria.

Injections into the lower bowel possess a wide field of usefulness in constipation, though they are in some instances fearfully abused. For the acute constipation, numerous injections of warm water and soap suds may be employed, interspersing them with injections of cotton-seed oil. These injections should be sent up high through a colon tube, and, unless there is a surgical condition present, will suffice to overcome the constipation.

In ordinary chronic constipation the use of small enemas of warm water, or one every day is infinitely preferable to the daily use of laxative drugs. I generally allow my patients to have a fountain syringe convenient, and to use a small enema, if, after an earnest effort, the bowels fail to move alone. I believe, and have taught for years, that two or three enemas of a pint each are better and safer than one large enema of several pints. The immense quantities of water which some advocate are dangerous, and liable to bring on intestinal paralysis.

In some cases with accumulation of hard feces in the rectum, and where the mucous membrane is dry and excoriated in places with pieces of adherent fecal matter, and where the sigmoid and lower end of the colon are sensitive to pressure, exceedingly good results are obtained by systematically washing out the colon and rectum with one or two quarts of hot water containing a few teaspoonfuls of sodium bicarbonate or borax or boric acid. The fluid should be introduced slowly, and at low pressure, while the patient is in the knee-chest position. Following each injection at night, from 2 to 4 ounces of warm cotton-seed oil or olive oil may be injected into the rectum and kept over night. This by antiperistalsis will work up into the

sigmoid and colon, where it will exert a softening effect on the feces and an emollient effect on the gut.

It is a common custom of mine to advise the injection of warm cotton-seed oil in quantities of 2 to 4 ounces (as much as can be conveniently retained) every night for one or more weeks, then every other night for one or more months, and by this I have controlled some obstinate cases.

Glycerin suppositories, or those made of soap, are useful only when the initial contraction of the bowel is lacking.

A most useful agent, lying on the border line between diet and medication, is agar agar. Studies made in the laboratory of L. B. Mendel, of Yale University, have shown that, whereas ordinary carbohydrates (starches and sugars) are very perfectly utilized in the alimentary tract of man, a considerable number of unusual carbohydrates, such as occur in many seaweeds, etc., are not attacked by the digestive enzymes. Experimenting with agar-agar, for example, he found that the greater part was excreted in the feces unchanged. As agar agar absorbs water readily and retains it, and as it is able to resist the action of intestinal bacteria, as well as the enzymes, its value in the treatment of chronic constipation was suggested. Its effect on the total mass of feces passed is noteworthy, for the agar agar easily retains water in the alimentary residue, prevents the formation of scybalous masses, so characteristic of spastic constipation, and lends a soft consistency to the whole stool.

This carbohydrate may be begun with heaping teaspoonful doses, eaten with milk and cream as with an ordinary breakfast food, and taken night and morning. The dose may be increased with impunity, if necessary. Generally regular movements will begin after the agar agar has been taken for three or four days. In the meanwhile, the lower bowel may be emptied by enemas. This preparation may be obtained in the market under the name of "Regulin," which, though no better, is a convenient form of the agar agar. After the bowels move with regu-

larity, the preparation may be gradually reduced until none is needed.

Psychotherapy.—This has been fairly covered in the chapter of that name, but I may be pardoned for reiterating the statement that the initial peristalsis is largely under the influence of the subconscious personality of every individual. If this subconscious power is trained to exert its effect at a stated, exact time, and if this psychic agent is aware that its "still small voice" will be promptly heeded, the vast majority of intestinal musculatures will respond with clock-like regularity (for this power can mark the time), and the constipation can be cured by this means alone. This is no fanciful picture. It has been demonstrated time and again.

Drug Therapy in Constipation.—Before entering this subject, let me sound a warning note, for many cases of constipation have been caused by the unwise use of drugs. A real cure for constipation must first be based upon hygiene, diet, and the physiology of peristalsis; after that may come drug treatment.

The medicines needed for the relief and cure of this symptom may be divided into two classes in so far as rational prescribing is concerned:

First those needed to unload the bowel which has become filled. In such cases the proper drugs to use are the various purgative salts, jalap, colocynth, senna, mercury, castor oil and rhubarb.

Second, those that will so influence the intestines as to cause evacuations and produce normal activity—that is, drugs that will cure the tendency to constipation, rather than give temporary relief. In these cases the indicated drugs are such as aloes, cascara, buckthorn, phenolphthalein, sodium phosphate and podophyllin.

As some of these drugs have certain peculiarities in so far as their curative action is concerned, it may be well to consider a few of these, for the help it will be in rational prescribing:

For instance, aloes and podophyllin should always be prescribed in combination with some other non-purgative drugs. The reason is made plain in the following example:

R. Resinæ podophylli..... gr. iv.
 Ext. nucis vom.,
 Ext. belladonnæ..... āā gr. v.
 Ext. physostigmatis..... grs. iii.
 M. Ft. pil. No. XXX.

Sig.—One night and morning as directed.

The object of adding the non-purgative extract of nux vomica is because of its peculiar tonic and stimulant powers in preventing subsequent atony of the musculature and increasing reflex action, thus improving peristalsis. This should be remembered, as it has an important bearing on many cases of chronic constipation. The dose, however, should be small.

The object of adding the non-purgative extract of belladonna is to depress the inhibitory fibers of the splanchnic nerves, to allay spasm and to decrease griping, all of which, of course, aid peristalsis. The object of the laxative extract of physostigma is to stimulate the unstriated muscular fibers of the intestines, thus aiding the whole prescription.

When prescribing senna, colocynth, or jalap, remember that they are quite active purgatives, and that the reaction from their effects is liable to again cause the very ailment that they are being given for. They should not be used except when quite necessary. Rhubarb also should be prescribed with care, for its secondary effect is astringent. Four days of rhubarb medication is sufficient for a time, and a week should elapse before it is again employed. This drug is unsuitable for regular administration in constipation.

Another drug that is harmful for regular use is calomel, and it has probably been more abused than any other cathartic. For emptying the alimentary canal one or

two times it is useful and efficient, but for continuous use it is pernicious.

Among the most dependable cathartics for constipation are cascara sagrada (*rhamnus purshiana*) and phenolphthalein. The former is best administered in the form of aromatic fluid extract (dose fifteen drops to one teaspoonful) or the fluid extract (dose ten to thirty drops). Phenolphthalein may be given in doses of 1 to 5 grains, seeming to act as a simple evacuant of the bowels. This drug is specially adapted for combination with calomel, and in quantities as small as 1/10 of a grain with an equal amount of the calomel, exerts a perceptible effect. It is the active constituent of many of the laxative proprietaries now so attractively advertised, and many preposterous claims are made for it.

For other cathartic prescriptions the reader is referred to the chapter on drug therapeutics.

The liquid preparations of petroleum are coming into popularity for internal administration for constipation, and with some reason. Liquid albolene, liquid paraffin, and other forms are now available, and by the addition of aromatics, are made palatable. These are suitable for the spastic type and the obstruction type, especially when the latter is not too severe. In conditions of enteroptosis or membranous constrictions of the bowels, the free ingestion of these hydrocarbons exercises a sedative, antispasmodic, lubricating, and evacuant effect. They are best given on an empty stomach, as before meals or at bed time. I usually direct from one to four teaspoonfuls before meals, and double the dose at bedtime, regulating the dosage by the effect produced. In many instances the physician will find it advisable to reduce the dose after the bowels begin to move with ease and regularity, instead of increasing it, as required by some other cathartics.

A full diet, but without irritating residue is indicated in the obstructive form of constipation, combined with free administration of the liquid petroleum preparations. The

ordinary cathartics are not so well suited, for, while they may empty the bowels, griping pains are generally suffered during their action and irritation follows in their wake. To keep the intestinal lumen well filled, so as to promote forward peristalsis, and at the same time to keep the intestinal walls well lubricated so the fecal current may move on with the least impediment, is both logic and good therapeutics.

These absolutely failing, surgery is generally indicated.

To thoroughly relieve a sufferer who has long been afflicted with chronic constipation, and has borne all its burdens, is a most worthy achievement for any physician; for to a great extent it substitutes energy for languor, hope for pessimism, appetite for anorexia, courage for timidity, and joy for a previous settled gloom. As an emancipated patient once expressed himself to me, "each flower bears a new perfume and the skies are a deeper blue."

CHAPTER XXIII

INTESTINAL PARASITES

Many of the animal parasites occurring in man inhabit the intestinal canal. About fifty varieties have been located, but all do not produce pathologic conditions. Some are harmless when first introduced into the body, but may later take on pathologic potentialities; some produce a pathologic state locally in the intestines or by their toxins in the blood; some bring on anemia by causing small but repeated hemorrhages from the intestinal surface. There are no characteristic symptoms accompanying the presence of intestinal parasites, but their presence must be diagnosed by discovering either them or their ova in the stools.

Many and varied are the gastrointestinal disturbances, nervous manifestations, and general debility that may follow their presence; while numerous complications may occur by their migration to other organs.

These parasites may be broadly divided into two classes, the protozoa and the vermes.

The methods of examination of the stools in search and discovery of them have been covered in the special chapter on examination of the feces.

Among the protozoa are the amebæ, whose examination and treatment have been discussed. Another of the unicellular organisms is the coccidium, which is occasionally found in the stools. The coccidia are egg-shaped, provided with a thin shell, and contain in their interior a large number of nuclei, usually arranged in groups. They seem to exert no ill effect upon the human organism.

The *cercomonas intestinalis* is pear-shaped, with a nucleus and eight flagellæ. The head tapers obliquely, and has a depression. This organism seems to exert no primary bad

effect, but is claimed to prolong existing catarrhal affections of the intestines.

Balantidium Coli.—This protozoon has been described, and is capable of producing lesions similar to amebiasis. Harlow Brooks stated in 1902 that an outbreak of dysentery among the orang-outangs in the New York Zoological Park was due to this cause. From a study of 111 cases reported with sufficient completeness Strong concludes that thirty-two recovered; and that, while the mortality was apparently 30 per cent., a number of the cases died of other diseases.

Treatment.—Quinin enemias, as given in amebiasis, seem to have been successful. Rapid cure following the full ipecac treatment has been reported by Duncan; also the ordinary vermifuges have apparently given good results when used energetically.

VERMES

The tapeworms or cestodes are perhaps the most important of this class, and have been described. Many efforts have been expended in discovering a specific treatment for this parasite, but in some individuals it is extremely difficult to expel the head, and unless this is accomplished the worm will continue to grow.

The male fern is nearer a specific than any other drug, and before administering it the intestines should be as completely empty as possible, not only of food and the products of digestion, but also of the mucus which irritation from the worm has caused.

Consequently, before the anthelmintic is administered, at least two days should be devoted to the preparation of the patient for the treatment. It is important that for these two days the patient should attempt no business, but should attend to the matter in hand. The diet should be liquid; milk, not more than a quart, or beef tea and coffee, if he desires. During these two days he should

receive a small dose of salts three times daily, so that the upper portion of the intestines may be thoroughly cleaned. The following is an eligible prescription:

R. Magnesii sulphatis..... ʒii.
 Spiritus chloroformi..... ʒiii.
 Aquæ..... q.s. ad. ʒvi.
 SIG.—One tablespoonful in water three times daily an hour before meals.

If this acts painfully, the discomfort may be lessened by an occasional hypodermic dose of 1/10 grain of morphin, but the saline should be kept up, if possible.

At bed time the evening before the specific drug is to be administered the patient should receive two tablespoonfuls of the above magnesium sulphate mixture, and if this has not acted well by eight o'clock the next morning, the same dose should be repeated.

The male fern should be given as follows:

R. Oleoresinæ aspidii..... ʒi.
 Ft. capsule No. 8.
 SIG.—Four capsules, with half a glass of hot water, at 9 A. M., and four capsules, with hot water, at 10 A. M. (Important: before taking the above capsules, each one should be uncapped.)

At twelve o'clock three tablespoonfuls of the magnesium sulphate mixture should be taken to insure the rapid passage of the male fern through the intestine, lest too much absorption ensue.

During the morning no nourishment should be ingested other than black coffee, clear tea or bouillon.

Except when on the toilet, the patient should stay in bed the remainder of the day. Should faintness be felt, brandy or aromatic spirits of ammonia may be given, or a hypodermic of strychnin. After 1 P. M. the patient may take light food, if he desires.

The stools should all be passed into receptacles where they can be thoroughly strained, in order that the tape-

worm's head may be sought. After the above treatment it will often be found.

There are many other remedies for this parasite, some of which are quite efficient, and when one is unsuccessful, others may be tried.

Filmaron, which is said to contain the teniacide principle of the male fern, is useful in some cases. It may be administered in capsules of 8 to 15 grains, and followed by a saline cathartic. It should not be given in connection with fatty oils or alcohol, as they dissolve it, and may produce toxic symptoms.

Pomegranate root, in the form of infusion of the bark, is recommended. Three ounces are macerated in 10 ounces of water, and given in divided doses an hour or more apart. This sometimes causes colic.

The active principle of the pomegranate root, pelletierin, in 4- to 8-grain doses, with 5 grains of tannin added to each dose, has been used by some with satisfaction. I have had no personal experience with it.

An infusion of pumpkin seed, in which about 4 ounces of the bruised and macerated seed are boiled in water, is quite efficient. This can be taken in one or two doses, and castor oil in two hours. In one instance this proved successful in a case under my observation, after both male fern and kamala had failed to bring the head of the tapeworm.

Turpentine in a 1-ounce dose, followed immediately with a glass of milk, and two hours later with a cathartic, is recommended, but I should hesitate to give that quantity of turpentine at once.

Kamala.—This, too, in doses of 1 or 2 drams, is efficient. This sometimes produces quite an energetic effect, and may be accompanied by griping, nausea, and vomiting.

Benzene has been recommended by Hemmeter, and Osler has recommended salol and croton oil.

The male fern, pumpkin seed and kamala are the best remedies.

Before leaving the subject of tapeworm, let me say that

there are no reliable subjective diagnostic symptoms. Indefinite symptoms of malaise, indigestion, anemia, morbid appetite, etc., are not indicative of tapeworm, and the only true diagnostic information can be obtained by inspection of the stools, and noting the segments of the worm as they escape with the feces. In many patients with tapeworm no symptoms whatever are manifested, and I have had more than one patient appearing in perfect health who have noted pieces of tapeworms in their stools, but were unaware of the trouble from other sensations.

Distomiasis or Fluke Worms.—These parasites are found in the lungs, liver, small intestine, and in the blood; in the latter case affecting chiefly the urinary system and rectum.

In general the liver fluke is of leaf-shape, and more frequently affects young children. With this there is generally an irregular diarrhea with pain and intermittent jaundice, but not much fever. The ova of the fluke are found in the stool.

The treatment should consist of male fern, as employed for tapeworm, for the intestinal manifestations. Nothing has been found effective for the treatment of this parasite in the blood, though Kemp recommends hexamethylenamin and sodium benzoate in large doses four times daily.

Ascaris Lumbricoides.—This nematode, or round worm, is one of the most commonly observed parasites in man. It occupies the upper part of the small intestine, and usually not more than two are present, though in some patients they have been found in enormous numbers.

Infection usually takes place by eggs in the soil near dwellings, in drinking water, and especially in raw foods, as salads and fruits. The lumbricoid worms are more often observed in children from three to twelve years of age, and are seldom found in adult males.

The worms sometimes crawl into the stomach, whence they may be ejected by vomiting, or they may even crawl up the esophagus and mouth. Cases are on record where

this worm has entered the larynx, producing fatal asphyxia, or into the trachea, producing gangrene. Appendicitis has been attributed to this parasite, and obstruction of the bowel has been brought on by large masses.

Diagnosis.—There may be, and often are, no special symptoms. Children may be restless in sleep, with picking at the nose, grinding teeth, and twitching muscles, or even convulsions. The only positive diagnosis can be made from finding the worm, or detecting its ova in the stools.

Treatment.—It is well to administer a saline purge before giving an anthelmintic, and withholding solid food for twenty-four hours. Santonin combined with calomel, seems to be the most effective remedy. This drug, in doses of one-half to one grain for a small child, and 2 or 3 grains for an adult, may be given in two doses, and followed in six hours by a full dose of castor oil.

Chenopodium, in doses of 15 to 30 grains of the powdered seed, or two to ten drops of the oil, followed by a cathartic, has proved effectual.

The patient or family must be informed that santonin may be followed by orange yellow urine or yellow vision, lest uneasiness be felt, if these symptoms appear.

Oxyuris Vermicularis (Thread-worm, Pin-worm).—These are small thread-like worms, which infest the rectum, and often find their way into the vagina.

Diagnosis.—These worms produce almost intolerable itching and irritation about the anus, interfering with sleep, and rendering the patient nervous and irritable. The little worms are easily recognized in the stools.

Treatment.—Santonin may be administered as for ascaris, to remove them from the upper bowel, should they be there.

Local means are generally effectual in expelling them from the rectum, where they are the most annoying. Enemas of water containing a small amount of benzene or vinegar seem useful. A very popular remedy is the infusion of quassia, which has been employed for many years. In

my own practice I have found the injections of kerosene oil more satisfactory than anything else, and have rarely needed to direct the second injection.

Trichina Spiralis.—The trichina when fully grown is found in the small intestine, though the embryos pass from the intestines and reach the voluntary muscles, where they may become encapsulated.

Their etiology has been fully discussed, being produced by the eating in man of the raw or incompletely cooked flesh of trichinous hogs.

Diagnosis.—Patients infected with this parasite suffer from gastrointestinal disturbances, as pain in the abdomen, anorexia and vomiting, or even diarrhea. These symptoms have been so marked as to cause the suspicion of typhoid fever or cholera nostras; for with the other symptoms may be an intermittent or remittent fever of marked degree. Pain and swelling are present in the muscles. The general nutrition is much disturbed, and both emaciation and anemia supervene.

The intestinal worms are visible to the naked eye, being white and glistening, with a thickened caudal extremity armed with two little projections. They can also be found in the muscles.

Treatment.—This consists of gastric lavage, and free evacuation of the bowels. Thymol, santonin, aspidium, kamala, and the other recognized anthelmintics are indicated. Later on the treatment is symptomatic and supportive. Kemp recommends hexamethylenamin and sodium benzoate four times daily.

Tricocephalus Dispar (Whip-worm).—This worm infests the cecum and large intestine of man, and is easily recognized by the peculiar differences between the anterior and posterior portions. The anterior forms three-fifths of the body, is thin and hair-like, that of the male being rolled like a spring. The number of worms is variable, as many as twenty thousand having been counted. These parasites are common in Europe, but up to two or three years ago

they were rarely found in the United States. They are fairly prevalent now.

Diagnosis.—This can be made from the peculiar ova, as living worms are rarely found in the stool. The ova are lemon shaped, dark brown, and have button-like projections.

Treatment.—Either thymol or male fern seems effective, and high enemas of water containing a little benzene, or the high enemas of kerosene oil may be employed.

Uncinariasis (Hookworm Disease, Ground Itch Anemia).—This is probably the most important and destructive of the intestinal parasites. For man, two different species are known, namely the New World form (*Necator Americanus*, or American murderer) and the Old World form (*Anchylostoma duodenale*). The vast majority of cases in the United States are due to the New World hookworm; but occasionally cases caused by the Old World parasite are found among immigrants or native-born Americans who have lived abroad.

The hookworm is a slender worm, about $1\frac{1}{2}$ inch long and scarcely thicker than a small-sized hairpin. It attaches itself to the intestinal walls, wounds the mucosa, sucks the blood, eats the epithelium, and according to present evidence, it apparently produces a poisonous substance which injures the host.

To C. W. Stiles we owe much of our pioneer information concerning this parasite, and in his bulletin, published by the Public Health and Marine-Hospital Service, is found a most complete discussion of the subject.

Hookworm disease, as might be expected from its African origin, is most common where the negro is most numerous. Through ages of infection the black man has acquired an almost perfect racial immunity from the *effects* of the parasite, but this in no way interferes with the fact that he frequently harbors a large number of the worms. The negro, coming in contact particularly with the poorer class of white people, is liable to infect them, and this parasite, gaining a foothold in the new host, saps both life and vital-

ity, preventing normal mental and physical growth. Thus hookworm disease, by its enervating effect has become both a medical and sociologic problem.

Diagnosis.—There are three methods of diagnosing hookworm disease, according to Stiles—namely, by microscopic examination of the feces to find the eggs; by judging the symptoms; and by experimental treatment, and finding the expelled worms in the stools.

It is rare that the adult worms are seen in the feces except during treatment, but the stools of hookworm cases contain the characteristic eggs of the parasite, and by finding these a positive diagnosis can be made. The various Southern state boards of health and the Hygienic Laboratory of the U. S. Public Health and Marine-Hospital Service make these examinations free of charge.

For ordinary purposes the following technic is sufficient: Patients are instructed to furnish about half an ounce of their fresh fecal material. A small portion of this is taken up on the flat end of a toothpick (using a separate toothpick for each specimen), and smeared on a slide in a drop of water; and in hot weather or when the feces are specially offensive, trikresol is better than water. The smear should be uniform and not too thick, with neither staining nor drying. A cover-glass is placed over the smear, and the preparation is examined under an 8-millimeter or 1/3-inch objective. In heavy infections the eggs will usually be found on the first slide, but at least ten such preparations should be examined before a negative opinion is expressed. Stiles claims that it takes thirty to sixty minutes to properly examine ten such slides.

If free embryos are present in the fresh feces the probability is that the *Strongyloides stercoralis* is there. The beginner may also be confused by various vegetable cells which he mistakes for eggs, or by plant hairs, which he mistakes for embryos. Strawberry hairs are specially liable to cause mistakes.

Bass has recently suggested a method of concentrating

these ova, by using salt solution, or preferably, calcium chlorid, in a solution slightly heavier in specific gravity than are the eggs.

The recognition of well-marked cases by symptoms is generally easy for an experienced observer, but should not

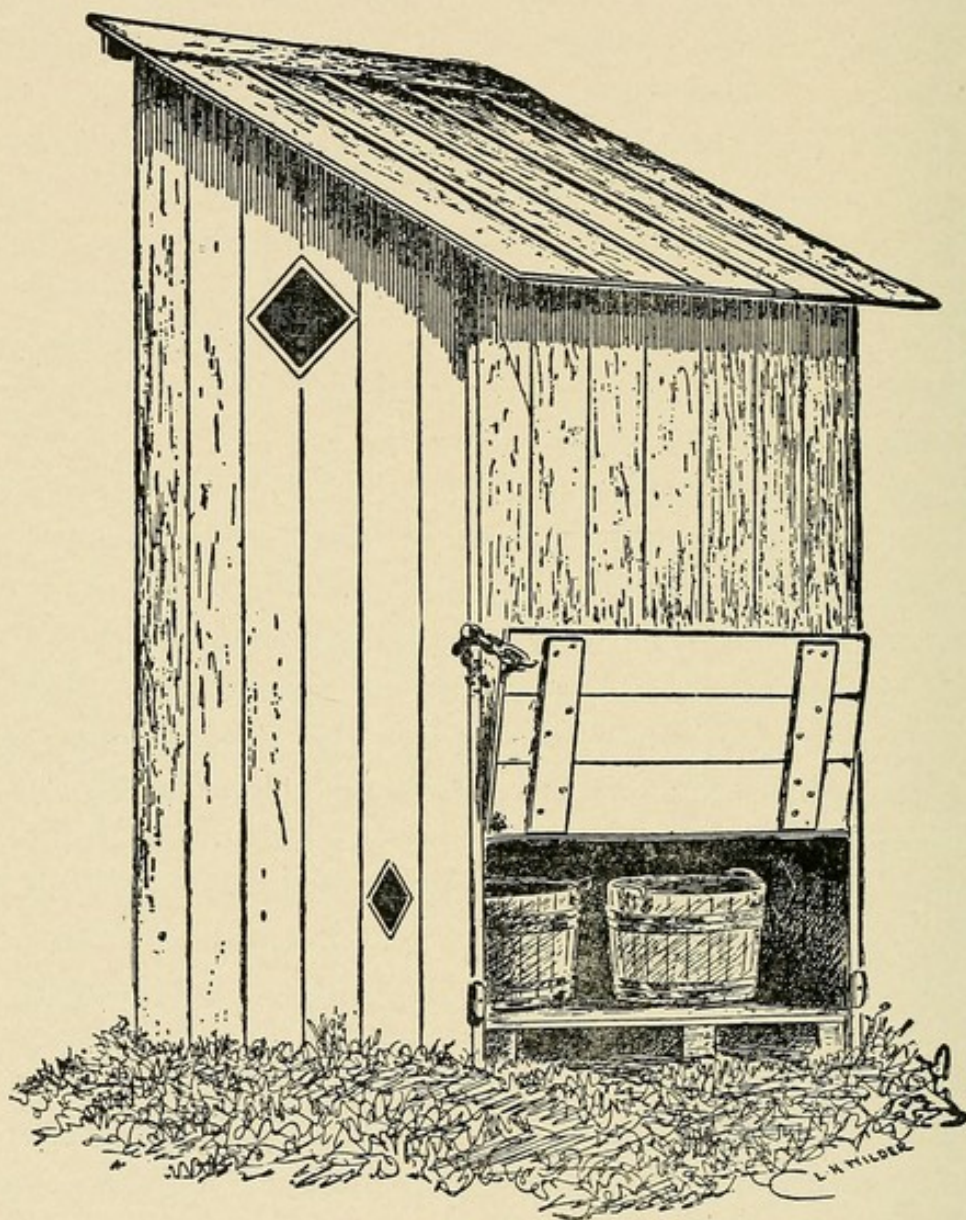


FIG. 85.—View of a floor-privy, tub system. (Hookworm Bulletin, Georgia State Board of Health.)

be depended on alone. These are dry hair, dry skin, dilated pupils, tenderness in epigastric region, winged shoulder-blades, shoulders sloping down and forward, slow speech, tallow-like skin, under-developed bodies, general

anemia, scant pubic and axillary hair, delayed menstruation, and a history of ground itch.

Prophylaxis.—Those infected should be treated, as every one is a source of danger. It is better to carry on the treatment in the fall and winter months, lest summer treatment

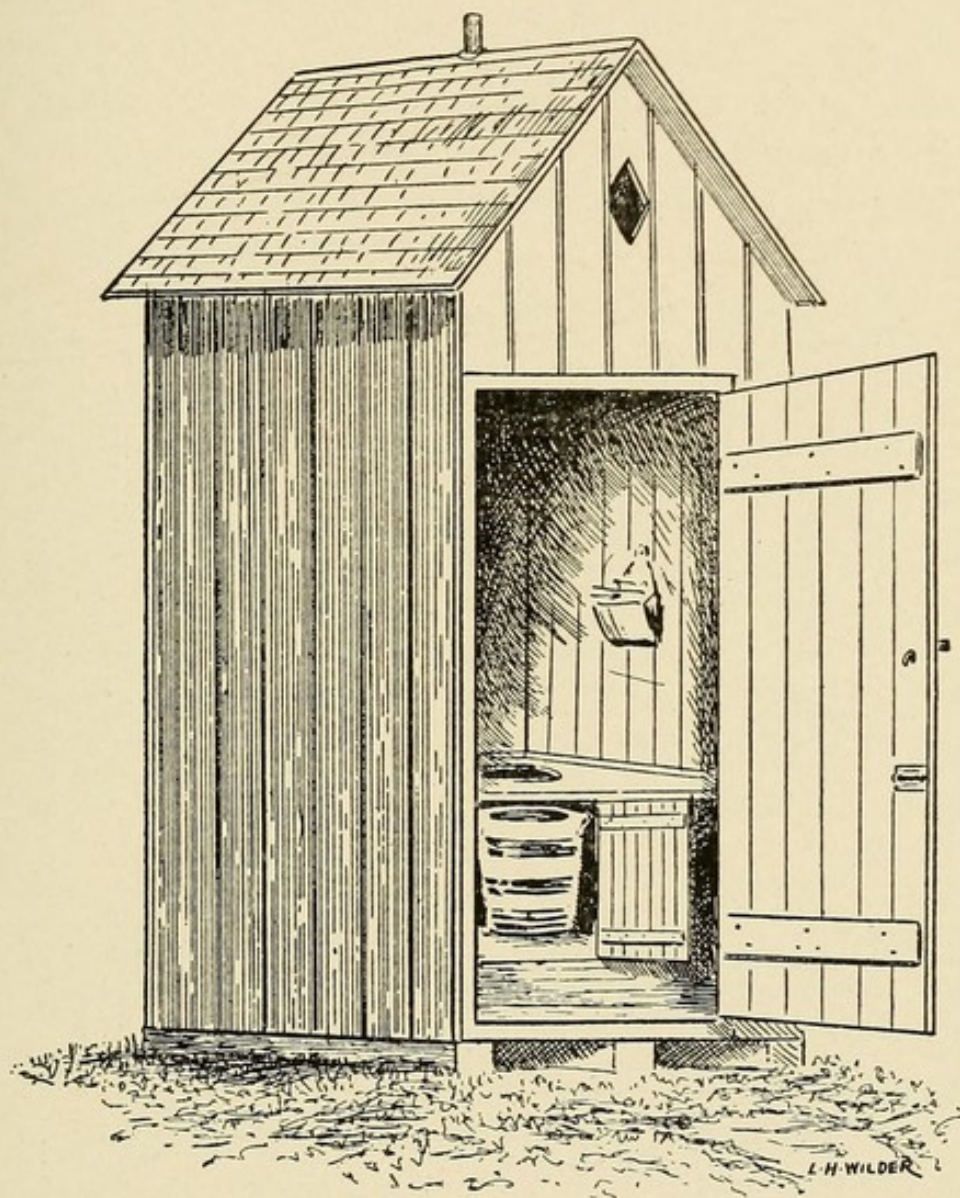


FIG. 86.—A floor-privy, pail system, closed in back. (Hookworm Bulletin, Georgia State Board of Health.)

be only temporary in freeing from the embryos the ground around the farm houses. All persons living in infected localities should be cautioned concerning coming in direct contact with pools of water on the ground or moist earth.

All should wear shoes, and children should not be allowed to play out of doors except at some distance from the house. It is important to prevent indiscriminate scattering of feces in the yard, around the barn, or in the orchards, for the provision of properly constructed water closets or privies in rural localities is of the greatest aid in preventing the spread of hookworm disease. Finally, the feces having been passed into some proper receptacle completely protected from flies and all animals, at intervals should be carried to a suitable place and buried. The time and trouble taken by these precautions do not compare in the least with the suffering, invalidism, and death that may result from indifference, not to say the pecuniary loss occasioned by the inaptitude or inability of these victims to perform labor. Well has the hookworm infection been called the "lazy disease."

Treatment.—The following treatment promulgated by the Georgia State Board of Health is simple and effective, and has given me almost uniform good results:

The diagnosis having been established, the patient is consulted as to the day of the week that can be most easily spared; and in many instances, as in mill operatives, it will be Sunday.

On the day before the treatment is to be begun the patient is advised to eat little dinner and no supper. Late in the afternoon he is given a full dose of calomel, the amount varying from 2 to 5 grains, depending upon the age and strength of the patient. Castor oil is not advisable. If the calomel acts freely during the night no other purgative is needed on the following morning, but if not, a full dose of magnesium sulphate should be given in hot water on awaking. After the bowels have freely acted, finely powdered thymol in capsules is then given, the quantity depending on the age and strength. It is well to be guided by the apparent age of the patient rather than the given age, as many of these unfortunates appear as much as six, eight, or ten years younger than they really are.

The dose of thymol should be divided into two equal parts, the first half being given at once, and the second at the expiration of an hour. Following the administration of the medicine the patient should be instructed to remain in bed. Lying on the right side will assist the drug to pass quickly into the intestine from the stomach. The amount of thymol to be given is as follows:

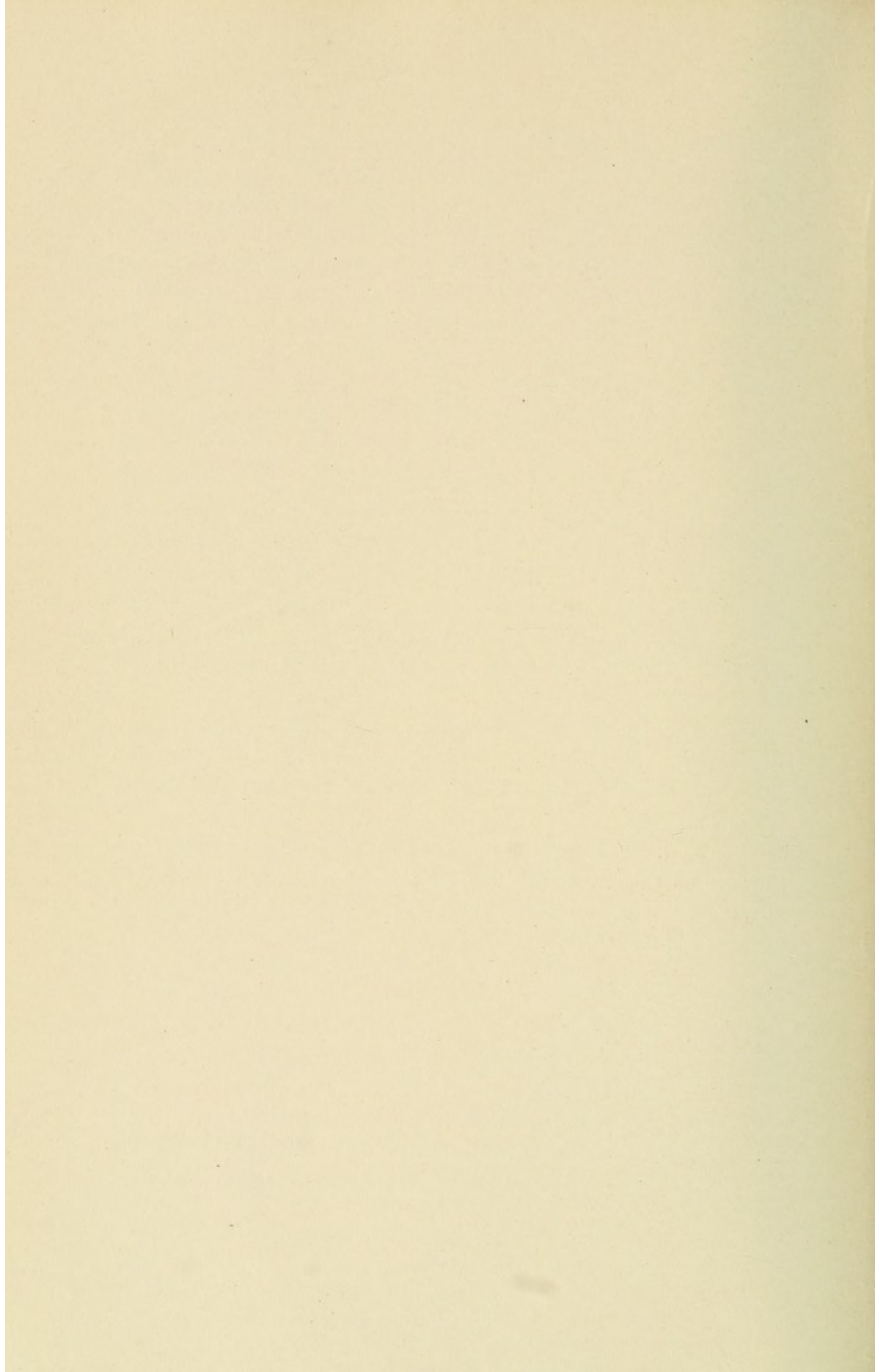
| | |
|------------------------------|------------------|
| Up to five years of age..... | 10 to 15 grains. |
| From five to ten years..... | 15 to 30 grains. |
| Ten to fifteen years..... | 30 to 60 grains. |
| Fifteen and over..... | 60 grains. |

The patient should be allowed neither breakfast nor dinner on the day of the treatment, though one or more cups of coffee may be permitted. If no ill effects are experienced from the thymol, it is well to put off the administration of a laxative until four or five o'clock in the afternoon, at which time a saline should be given in hot water. After the bowels have acted well the patient may be allowed to have food.

When this treatment is carried out faithfully it is rarely necessary to repeat it, though it is well after two weeks to have the feces examined, and, then, if thought advisable, the treatment can be repeated.

It is of special importance that no castor oil or other oils should be taken on the day of the treatment, lest by dissolving the thymol and aiding in its absorption, dangerous symptoms might develop.

After the parasites are destroyed, iron tonics and nutritious food will soon make a surprising change in these woe-begone sufferers, and in many instances their stunted frames will take on a new growth, and a fresh impetus will be given their impaired mentalities. The physician, who thus discovers this infection in his particular locality, and by properly directed prophylaxis and treatment banishes it, enlarges his field from that of a medical man to that of a public benefactor.



INDEX

A

- Abderhalden's test, 472
- Abdomen, cleansing and shaving of, 229
- counter-irritation over, 215
- examination of, 12
- by inspection, 16
- flabby, malign influence of, 223
- irritation of, 275
- local treatment of, 203
- neurasthenic conditions in, 213
- palpation of, 29
- upward traction on, 229
- X-ray examination of, 110
- Abdominal bandage, zinc oxid plaster, 231
- compresses, 268, 269
- disease, border-line cases of, 159
- hyperesthesia, 312
- massage, 219
- operations, peritonitis after, 436
- pain, spasmodic, 37
- pressure, 8
- relaxation, 30
- soreness as symptom of amebiasis, 537
- supporter, 223, 224
- sympathetic system, 205
- viscera, abnormalities of, 157
- general ptosis of, 163
- support of, 231
- walls, support of, 222
- Abscess, appendiceal, 165
- of stomach, 482
- periduodenal, 491
- peritoneal, 409
- subphrenic, 443
- Abscesses from oxyuris vermicularis, 88
- in right iliac fossa, 38
- Absorption from intestines, 304
- Acetic acid test, 54
- Acetphenetidin in neuralgia, 369
- Acetylsalicylic acid, 369
- Achroodextrin, 58
- Achylia gastrica, 415
- application of cold in, 271
- as a pure neurosis, 395
- diet in, 333, 421
- duodenal feeding in, 342, 343
- Achylia gastrica, functional, 416
- in active physician, 416
- in old callous ulcer, 123
- senile, 47, 357
- test-meal for diagnosis of, 118
- of pernicious anemia, 475
- with stagnation, 474
- Acid dyspepsia, 488
- index, high, 333
- Acidity, gastric, effect of alkalies on, 351
- of gastric contents, 51
- with frothy diarrhea, 353
- Acidol in gastritis, 422
- in senile achylia, 357
- Acids, administration of, 356
- volatile, in gastric filtrate, 54
- Adalin as hypnotic, 368
- Adenocarcinoma, 461
- Adhesions in intestines, 545
- perigastric, 219
- protective, 491
- Adhesive bandage, removal of, 230
- bands in intestines, 513
- plaster belt, 433
- for support, 228, 229, 231
- Adler's benzidin test, 61
- Aerophagia, 301
- carminatives in, 302
- Agar-agar as evacuant, 362
- in chronic constipation, 552
- for distention of bowels, 168
- in intestinal stenosis, 512
- Age, apparent, in hookworm disease, 568
- Agglutination tests, 108
- Air, swallowing of, 301, 364, 401
- Akoria differentiated from bulimia, 386
- Albolene in treatment of cancer, 480
- liquid, as laxative, 168, 362, 555
- in cardiospasm, 382
- Albright's rectal irrigator, 238
- Albumen, absorption of, 344
- loss, 330
- Albuminous food, daily requirement of, 319
- Alcohol, abstention from, 424, 425, 452
- as cause of gastritis, 409, 410
- in predigested foods, 349

- Alcohol in proprietary foods, 337, 338, 339
prohibited, 334
- Alcoholic coma in infants, 338
debauch, gastric lavage for, 268
gastritis, 423
- Alcoholism, acute, emesis in, 366
- Alimentary canal, compensation in, 324
hypersecretion, 389, 395
tract, effects of vibration in, 212
study of, 109
upper, bleeding from, 167
- Alimentation, duodenal, 339, 340
- Alkalies, combinations of, 352
effects of, 351
- Alkaline antiseptic liquids, 199
mineral waters, 423
powders and liquids, 355
treatment of hyperchlorhydria, 390
waters, American, 355, 356
- Allison table for rectal therapeutics, 234
- Aloin test for blood, 60
- Alternate douche, 268, 269
- Ameba coli, 79, 526
as cause of dysentery, 278
dysenteriae, 79, 526
examination of, 80
conditions in which found, 82
destruction of, 538, 541
by ipecac, 540
in stools, 527, 557
in the soil, 527
- Amebiasis, 527, 534
diagnostic sign of, 537
moderately severe, 535
mortality in, 537
- Amebic dysentery, 79, 494, 526
bismuth treatment in, 541
diagnosis of, 533
duration of, 534
drug therapy in, 538
hemorrhages in, 535
prevalence of, 542
surgery in, 541
treatment of, 538
types of, 535
- American murderer, 102, 564
- Amidulin, 58
- Ammonio-magnesium phosphate in feces, 74
- Amylodextrin, 58
- Amylopsin, tests for, 67
- Anamnesis in digestive diseases, 4
- Anchylostoma duodenale, 99, 101
- Anemia accompanying achylia, 416
accompanying ulcer, 448
advancing, 389
Anemia caused by anchylostoma duodenale, 101
from Bothriocephalus latus, 416
from diarrhea, 525
from hemorrhage, 442, 557
from intestinal parasites, 557
ground itch, 564
in cancer, 475
pernicious, serum test for, 473
- Anesthesia as aid to examination, 30
in gastroscopy, 25
vomiting centers after, 436
- Anesthesin, 367
- Anesthetic in rectal examination, 238
- Aneurysm of large arteries, 171
of the celiac, 476
- Anger as cause of indigestion, 293
- Angle worms eaten by epicures, 286
- Anguillula stercoralis et intestinalis, 95
- Angulations of intestines, 545
- Animal food consumed under necessity, 286, 287
- Ankylostoma duodenale, 564. See also *Anchylostoma duodenale*.
- Anorexia in gastric cancer, 465
nervous, 6, 269, 386
relief of, 359
- Antacids, use of, 352, 354
- Anthelmintics, administration of, 370
- Antibodies in cancer serum, 472
- Antiemetics, 366
- Antiferments, 365
- Antigens, action of, 472
- Antiperistalsis, 112
- Antiquity, influence of emotions in, 282
- Antiseptic enemas, 251
lavage, 433
- Antiseptics, intestinal, 364
- Antrum, obliteration of, 121
- Anus, artificial, formation of, 541
constriction of, 507
fissure of, 235, 275, 276, 507
itching of, from worms, 562
patulous, 252
puffiness of, 498
soreness of, 507
- Aorta, aneurysm of, 38
pulsating, 457, 475
- Apepsinia, 56
- Aphthous ulcers, 13
- Apomorphin hydrochlorid, 366
- Appendicitis a cause of hyperchlorhydria, 377
acute, 163
hydrotherapy in, 279
treatment of, 279
differential blood count in, 164

- Appendicitis differentiated from hyperacidity, 389
 enteroliths in, 78
 facial expression in, 165
 fulminating type, 164
 recurrent, 165
 relapsing, 163
 treacherous nature of, 165
 Appendix, rectal injection of, 149
 Appetite, aids to, 358
 and food supply, 321
 and mental state, 294
 consideration of, 6
 in gastric neuroses, 401
 juices, 283, 292
 morbid, 561
 vicious, 320
 Apple dumpling, phobia for, 289
 Apples, unpeeled, for constipation, 550
 Area of dulness, 20, 21
 of resistance, 165
 Areolar tissue, destruction of, 509
 Armed tapeworm, 89
 Aroma from body, 304
 Arterio-sclerosis, advanced, 171
 Artificial foods, 336
 Asafetida enema, 271, 280
 Asbestos conducting tube, 257
 Ascaris lumbricoides, 85, 561
 lumbricoides, infection from, 561
 obstruction of bowels by, 562
 ova of, 99, 561
 Ascending colon, tenderness of, 535
 Asiatic cholera, 106
 diagnosis of, 108
 stools in, 107
 Asphyxia, fatal, from worm in larynx, 562
 Aspidium, administration of, 370.
 See also *Male-fern*.
 Aspiration of duodenum, 245
 of stomach contents, 179, 181
 Aspirin for neuralgia, 369
 Asthenic gastritis, 411
 Astringents, 369
 vegetable, 370
 Atony, intestinal, due to enormous enemas, 249
 of cecum, 155
 of stomach, 21, 137, 163, 426
 medical treatment of, 429
 treated by gyromele, 215
 X-ray diagnosis of, 427
 Atrophic gastritis, 411
 diet in, 477
 Auscultation of stomach, 17, 19
 Autointoxication, intestinal, 6, 298
 Autolavage by water emesis, 365
 Automassage, 220
 for atonic constipation, 550
 Autosuggestion and bowel movements, 295
 Autotoxicoses, vicarious elimination of, 519

 B
 Bacillary dysentery, 108, 526
 diagnosis of, 527
 Bacillus aerogenes capsulatus, 104
 bifidus, 104
 coli, 104, 106
 comma-shaped, 106
 diphtheriae as cause of dysentery, 528
 dysenteriae, 527
 lactis aerogenes, 104
 prodigiosus, 480
 putrificus, 104
 pyocyaneus, 104
 tetani, 105
 tuberculosis, 105
 typhosus, 105
 Bacteria, indol-forming, 267
 in feces, 543
 in intestinal canal, 330, 552
 Balantidium coli, 82
 in intestines, 558
 "Ballooning" of intestine, 303
 of abdomen, 512
 the rectum, 346
 Barley flour as substitute for milk, 341
 Bassler's electrode, 207
 corset, 225, 226
 Bath, neutral, 278
 Bathing, prevention of, a deprivation, 228
 Beach rectal tube, 236
 Bedpan, use of, 530
 Beef juice, value of, 338
 tapeworm, 90
 Belchings, 5000 in 24 hours, 301
 Belladonna as sedative, 367
 Benefit from exploratory operation, 168
 Benzine enema, 562
 Beverages, chemic composition of, 327
 interdiction of, during ulcer, 445
 Bicarbonate of soda in gastric acidity, 351
 Bile, appearance of, after laborious vomiting, 62
 duct, calculi in, 151
 catarrh of, 363, 365
 inspissated, 68
 in the stomach, 62
 obstruction of, 68

- Biliary calculi, calcareous, 151
 cholesterin, 151
 radio-diagnosis of, 146, 151
 colic, gastritis differentiated from, 404
 Biliousness, gastric analysis in, 413
 Binder, electric, 272
 Bismuth bolus enema, 152
 coating of ulcer, 443
 column in cancer, 473
 location of, 444
 crust, formation of, 453
 in gastric ulcer, 452, 453
 meal, 112, 118
 outline, 474
 residue, 117
 shadows, 139
 shown in skiagram, 139
 Bitter medicines, use of, 384
 Bladder, irritation of, 495
 Bland food, 283
 Blanket pack, 270, 272
 Blastomycetes in stools, 104
 Blood count, differential, 164
 in appendicitis, 164
 excrementitious substance in, 298
 in gastric contents, 59, 62
 detected by spectroscope, 61
 origin of, 62
 in stools, 74
 occult, in gastric contents, 59
 -pressure, 171
 lowering of, 224
 raised by adrenalin chlorid, 440
 swallowed during sleep, 439
 Blue color of face, 172
 Blushing, cause of, 302
 Boas-Oppler bacillus, 415, 431, 432, 463, 466, 470
 Boas' resorcin-sugar test, 50
 stool-sieve, 76
 test-breakfast, 45
 for lactic acid, 53
 "Bodily housekeeping," 267
 nutrition and mastication, 334
 uplift, 402
 Body, effluvia from, 304
 underdeveloped, in hookworm disease, 566
 weight and calories, 323
 Boer war, dysentery and typhoid in, 526
 Bolting of food, 335
 Borborygmus, 303
 Bothriocephalus latus, 91
 Bougie, esophageal, 26
 contraindications for, 29
 Bouillon as a medium, 106
 Bowel, cold fluid into, 250
 evacuation, artificial, once in two months, 299
 once in two weeks, 299
 investigation of condition of, 9
 lower, examination of, 31
 malignant disease of, 243
 movements, formed, 521
 habit of, 515, 543
 regularity in, 553
 obstruction of, 547
 by worms, 562
 shelves and pouches in, 299
 tortuous kinking of, 163
 waking stimulus in, 296
 Bradyphagia, 334
 Brain, cysticerci in, 90
 Bread pills, 294
 Breath, offensive, 304, 364, 412
 Brinkerhoff's rectal speculum, 237, 495
 Bromides, action of, 367
 Bronchitis with emphysema, 171
 Bubbling sounds, 145
 Bulimia, 385
 Burning sensation in epigastrium, 385, 388, 392, 394
 in rectum, 496, 507
 Burns as cause of diarrhea, 518
 as cause of duodenal ulcer, 490
 from radium, 211
 Burrowing of acrid exudate, 509
 Business man as prey to indigestion, 4
 Butter as cause of diarrhea, 287
 as cause of sitophobia, 288
 to increase flesh, 341
 Buttermilk injections, 157
 lactone, 393
 Buttock, subtegumentary cavity in, 509
 Butyric acid in gastric contents, 54
- C
- Cachexia in gastric cancer, 467, 478
 marked, 160, 171
 Calculus, biliary, opacity of, 151
 Calomel, abuse of, 554
 action of, 361
 in hookworm disease, 568
 Caloric absorption by rectum, 345
 balance, disturbance of, 289, 290
 bankruptcy, 11, 202
 loss by lavage, 201
 requirement, 317, 318
 Calories, deficiency of, in predigested foods, 337
 in cereals and vegetables, 326
 in dairy products, 326

- Calories in fish, 325
 - in fruits, nuts, sugar, 327
 - in meats and game, 325
 - in soups and beverages, 327
- Calorimeter, 322
- Cancer, analysis of 30,000 cases of, 460
 - as indicated by lactic acid, 54
 - cure serum, 479
 - dietary, 477
 - differentiation of, 472
 - early diagnosis of, 471
 - enzyme, 471
 - ferment, 470
 - in girl of 14, 460
 - inoperable diffuse, 475
 - juice, 462
 - of cardia, 466
 - of duodenum, 35
 - of esophagus, 544
 - of pylorus, 34, 462
 - of the stomach, diagnosis of, 464
 - by gastroscopy, 469
 - symptoms of, 415, 465
 - X-ray examination for, 473
 - of uterus, 462
 - on base of ulcer, 443, 457
 - on scar of ulcer, 445, 461
 - patient, serum of, 472
 - serum diagnosis of, 472
 - victim, aid to, 481
- Cancorin, 479
- Cancrocin, 479
- Cannon ball massage, 218
- Carbohydrates, 316, 317
 - in liquid form, 328
 - in mushes and soups, 328
- Carbonic acid gas as an aid to diagnosis, 20
 - gas, inflation with, 33
 - waters, 273, 422
- Carcinoma, diagnosis of, 118, 473
 - diffuse contracting, 118
 - from previous ulcer, 457
 - inoperable, 121, 123
 - X-ray therapy in, 210
 - medullary, 461
 - of esophagus, 112
 - of pylorus, diet in, 477
 - simulated by aneurysm, 476
 - surgical cure of, 477
 - of stomach, 115, 129
 - odor from, 47
 - recurrence of, 480
 - ventriculi, differential diagnosis of, 475
 - prognosis of, 476
- Cardia, carcinoma near, 119
 - closure of, 436
 - congestion at, 130
- Cardiac neuroses, 171
- Cardialgia, 384
- Cardiospasm, 382
 - electrical treatment of, 210
- Carlsbad water, 356, 454
 - in ulcer, 452
- Carminative enemas, 250
 - infusions, 364
- Carminatives, 355, 363
- Cascara sagrada, action of, 361
 - in constipation, 555
- Cast of intestines, 397
- Castor oil as evacuant, 361
- Catarrh, fatal, from *balantidium coli*, 85
- Catarrh of stomach, chronic, 410, 411
 - diagnosis of, 412
- Catarrhal gastritis, chronic, lavage in, 418
 - symptoms of, 411
 - course of, 414
 - differentiation of, 415
 - microscopical examination in, 414
- Catfish as cause of sitophobia, 288
- Catharsis without griping, 363
- "Cathartic habit," 418
 - prescriptions, 363
- Cathartics, action of, 360
 - drastic, 361, 362
- Cats as food, 287
- Cecal ptosis, 546, 547
- Cecum, atony and dilatation of, 155
 - growths in, 38
 - parasite in, 93
- Celestins-Vichy in ulcer, 451
- "Cell-hunger," voicings of, 6
- Cercomonas intestinalis*, 557
- Cereals, chemic composition of, 326
- Cestodes, 88. See also *Tapeworm*.
- Change, environmental, benefits from, 309, 356
- Channels, subtegumentary, diagram of, 501
- Charcot-Leyden crystals, 75
- Cheerful companionship, 310
- Chemic classification of food, 316
 - examination of gastric contents, 388
 - findings in cancer, normal, 470
- Children, fluke worms in, 561
 - parasites in stools of, 104
 - tuberculosis in, 105
- Chilly sensations, 165
- China, flesh used for food in, 285
- Chittenden's dietetic views, 319
- Chloral as sedative, 368
- Chloretone, 454
- Chloroform for relief of pain, 216

- Chlorosis, Egyptian, 101
 in girls, 386
 hyperchlorhydria in, 475
- Cholelithiasis, 76
 radio-diagnosis of, 146
 search for stone in, 76
- Cholera nostras, 108, 278, 403
 simulated by trichiniasis, 563
 spirilla, 107
- Cholesterin in feces, 75
- Chronic diarrhea, 522
- Circumference shadow, 139
- Cirrhosis of liver, achylia in, 424
- Climacteric, diarrhea after, 519
- Climate, change of, benefits from, 542
 for diarrhea, 523
- "Climate of the mind," 3
- Cocain as gastric sedative, 367
- Coccidium in intestines, 557
- Cocoa butter inunctions, 349
- Cohnheim's oil treatment, 454
- Cold, application of, in achylia gastrica, 271
 with electricity, 214
 enema, psychic effect of, 270
 -mitten friction, 269, 279
 percussion, 271
- Coley's fluid, 479
- Colic, enemas for, 247
 gall-stone, 76
 in spastic constipation, 548
 intestinal, 9
 mucous, 73, 78, 397
 recurrent attacks of, 512
- Colitis, catarrhal, 397, 398
 membranous, 243
 muco-membranous, 278
 ulcerative, 242
- Collapse, saline infusions in, 349
- Colliquative diarrhea, 519
- Colloid carcinoma, 462
- Colon, ascending, obstruction of, 36
 palpation of, 36
 enormous flushing of, 249
 impacted, causing pain in back, 40
 irrigation of, 255
 motility of, 152
 needle douche, 258
 pathologic states of, 157
 percussion of, 18
 position of, 152
 radiograph of, 157
 rectal injection of, 149
 transverse, sacculation and peristalsis of, 33
 tube, introduction of, 253
 recurrent, 254
 use of, 157
- Colon, vibration of, 212
 V-shaped ptosis of, 544
- Colonic massage bags, 258
 ulcers, 494
- Coloptosis, complete, 153
- Coloptosis, 147
- Color gradations, 52
- "Color sense," physician's, 50
- Coma from checking diarrhea, 518
- Compensatory diarrhea, 517
 chronicity of, 522
 in old people, 518
 in uremia, 519
 hemorrhage in drunkards, 457
- "Complainers," chronic, 4
- Complement deviation, 471
- Compress, revulsive, 270, 271
 spongiopiline, 272
- Compresses, hot, for nausea, 268
 in acute gastritis, 270
 ice water, 269
- Concretions, intestinal, 352
 from magnesia, 352
 of medicines, 78
- Condurango in cancer, 478
- Congenital dilatation of colon, 33
 of stomach, 431
 pyloric stenosis, orthopedic treatment of, 432
- Connective tissue in stools, 73
- Constipation, 543
 agar agar in, 552
 as a cause of colic, 9
 of mucous colic, 397
 as a pathologic symptom, 543
 atonic, 218, 274, 547, 548
 calomel in, 554
 causes of, 544, 547, 548
 chronic, treatment of, 214
 copious water-drinking for, 264
 counter-irritation for, 274
 cured without drugs, 297
 drug therapy in, 553
 emancipation from, 556
 enemas for, 247, 251
 from irregular habits, 543
 from obstruction, 544
 habitual, 549
 in small eaters, 312
 in young girls, 295
 long-standing, 274
 marked, 168
 massage and gymnastics for, 550
 mineral waters for, 423
 neuromuscular causes of, 546
 obstructive, 547, 549
 full diet in, 555
 petroleum in, 555
 prognosis in, 549

Constipation, reflex causes of, 546
 relieved by Rose belt, 232
 spastic, 273, 274, 545, 547, 548
 prevention of, 552
 surgery for, 274
 treatment of, 550
 by hydrotherapy, 273
 with hyperacidity, 353
 Conversation, troublous, avoidance
 of, 445
 Copremia, 298
 Corrosive poisoning, 408
 Corset, fitting of, 227
 for gastroptosis, 225
 like perfectly fitting garment,
 227
 straight-front, 223, 226
 Cotton-seed oil enemas, 252, 275,
 507
 for constipation, 551, 552
 Council on Pharmacy and Chemistry
 of the American Medical
 Association, 337
 Counter-irritation from iodine, 218
 indications for, 215
 -pressure, 224
 Cramps, abdominal, 168, 398
 epigastric, 388
 Creatin in urine, 265
 Croton oil as drastic, 362
 Crying, tendency to, 11
 Cysts from echinococci, 92
 in stomach, 464
 pancreatic, 34
 trichinous, 95

D

Dairy products, chemie composition
 of, 326
 Death, sudden, in duodenal ulcer,
 489, 490
 Debauch, alcoholic, 268, 423
 Decubital ulcer, 492
 Defecation, habit of, 295
 in early morning, 296
 painful, 275, 549
 psychic management of, 297
 regular time for, 296
 Deformity of pylorus, 135
 Deglutition, impediment to, 6
 in cardiospasm, 382
 sounds, 22
 Dehio's investigations, 18, 20
 method of outlining stomach, 31
 Delay in instituting treatment, 306
 Delirium tremens, 424
 Demulcents in corrosive poisoning,
 408
 Depression, mental, in dyspeptics, 2

Dermatitis from adhesive plaster, 228
 Desquamative catarrh, 74
 Dextrose, 58
 Diagnosis based on subjective symp-
 toms, 10
 by means of X-ray, 110
 by microscopic examination, 15
 methods of, 15
 of digestive diseases, 376
 positive, advice following, 160
 Diaper, infection from, 497
 Diarrhea as a pure neurosis, 396
 at new moon, 294
 cathartica, 516
 caused by lactose, 341
 chronic, 413, 521
 sanatorium treatment of, 523
 definition of, 515
 drug treatment of, 524
 dyspeptica, 516
 entozoica, 517
 excessive, saline infusions in,
 349
 explosive, 278
 following extensive burns, 519
 from increased peristalsis, 515
 from irritating substances, 516
 in the blood, 517
 from toxic state of blood, 518
 frothy, 353
 gastrica, 517
 gastrogenic, 416
 if no access to toilet, 520
 in cancer, 480
 in pellagra, 72, 518
 nervosa, 382, 519
 stercoralis, 517
 suspicious, 108
 Diastase, 359
 Diet bland, 333
 bulky, 512
 considerations of, 315
 faddists in, 320
 for constipation, 550
 ideal, 317
 in diarrhea, 523
 in digestive disorders, 329
 in dysentery, 530
 in hyperchlorhydria, 392
 in hypersecretion of gastric
 juice, 332
 in rest cure, 311
 liberal, benefits from, 350
 in proctitis, 497
 psychotherapy in, 307
 rational and sustaining, 350
 scheme, graduated, 291
 too restricted, 330
 Dietary, appetizing, 323, 332
 cutting-down of, 289

- Dietary for the sick, 322
standards, 319, 321
- Dietetic errors, 410
fears, how created, 289
indiscretions, 9
- Dieting, foolish systems of, 11
- Digestants, 358
- Digestion affected by ill-temper, 293
effect of emotions on, 282
influence of mind upon, 284
psychoneurosis of, 314
- Digestive diseases, causing continuous distress, 5
classification of, 5
diagnosis of, 1, 15
drug therapy in, 351
in persons of refinement, 4
in the business man, 4
in the old, 378
in the young, 3
prenatal causes of, 5
juices, working quantity of, 307
neuroses, 377
psychotherapy in, 402
therapy of, 400
- Digestives, use of term, 370
- Dilatation for cardiospasm, 383
gastric, passage of stomach-tube in, 437
of pylorus, 129
of stomach, 163, 186, 426, 489
acute, 435
prognosis in, 437
atonic, 15
chronic, 429
diagnosis of, 436
post-operative, 435
treatment of, 272
- "Dirt eaters," 101
- Discomfort, intestinal, 5, 8
- Discontent as cause of indigestion, 293
- Disinfection of gastric mucosa, 204
- Disproportion between pulse and temperature, 165
- "Distempers," ancient, 287
- Distention of colon by air, 152
- Distomiasis, 97, 561. See also *Fluke Worms*.
- Distomum lanceolatum, 100
- Diverticulum of esophagus, 27, 111
of stomach, 124
- Dog meat a cause of nausea, 286
as food, 285, 287
- Dogs, *tænia echinococcus*, in 92
- Dorsal pain, 442
- Douche, alternate, 268
cold, in constipation, 273
fan and jet, 272
- Douglas' cul-de-sac, worms in, 88
- Dragging-down sensation, 222
- Drigalski-Conradi plate, 106
- "Dripping sounds," 23
- Drug habit, formation of, 379, 384
therapy, 351
- Drunkards, gastric erosions in, 457
- Duodenal alimentation, 343, 446, 455
conditions in which useful, 344
bucket, 383, 430
cap, 160
obliteration of, 161
contents, characteristics of, 67
examination of, 63, 66
feeding apparatus, 340, 341
at blood temperature, 341
technic of, 342
ileus, 435
juices, methods of obtaining, 63
microscopic examination of, 67
self-feeding, 341
syringe, 341
test-meal, 64
tube, clogging of, 343
Gross, 245
obstacles to passage of, 66
ulcer due to burns, 485
hemorrhage from, 489
operation for, 485, 492
perforation of, 490
relapses in, 487
surgery in, 492
symptoms of, 130, 152
tenderness of, 32
treatment of, 280, 491
surgical, 166
"tucked back," 486
X-ray therapy in, 211
- Duodenum, acid reaction in, 245
aspiration of, 64, 342
kinking of, 162
treatment for, 162
lavage of, 244
contraindicated, 246
stenosis of, 151
torsion of, 16
tumors of, 34
V-shaped, 545
- Duration of digestive diseases, 5
- Dysentery, acute, hydrotherapy in, 277
amebic, 79, 526
clinical picture of, 534
among orang-outangs, 558
as an infectious disease, 525
bacillary, 108, 526
careful management of, 528
catharsis in, 531

- Dysentery, chronic, 278
 irrigation in, 532
 complications of, 528
 diphtheritic, 527
 follicular form, 528
 in Manila, 82
 in warfare, 525, 526
 nursing in, 528
 pain in, 532
 source of infection in, 527
 sporadic, 526
 water-borne, 533
- Dyspepsia, amylaceous, 359
 functional, 7
 gastric analysis in, 413
 "Dyspeptic environment," 5
 Dyspeptics, concessions to, 309
 mental state of, 2, 13
- E
- Eating, excessive, 307, 385, 426.
 See also *Bulimia*.
- Echinococcus disease, 93
 Ectasia ventriculi, 429
 Eggs as irritant food, 287
 in cancer dietary, 477
 per rectum, 348
- Einhorn's diet in gastritis, 420
 duodenal alimentation, 446
 method in gastric ulcer, 455
 pump, 65
 tube, 341
 esophageal bougie, 207
 method of aspirating duode-
 num, 65
 powder-blower, 204, 459
 test for acetic acid, 55
- Electric cabinet, 274
 compress, 274
 current, power of, 207
 head-light, 241
 illumination, examination by,
 23, 24
 pad, 272, 450
 transillumination, 13
- Electricity, abdominal conditions
 benefited by, 209
 diffusion of, 209
 for atonic constipation, 551
 in digestive neuroses, 401
 in rectal examination, 236
 intragastric, use of, 205, 208
 percutaneous, 208
 psychic effect of, 419
 static, 209
- Electrode, epigastric, 208
 intragastric, 207
- Electro-magnet passed into stomach,
 483
 -therapy in chronic cases, 209
- Electrovibrator, 213
- Emaciation as a symptom, 145, 412
 butter in dietary for, 341
 diet in, 330
- Emesis as auto-lavage, 365
- Emetin hydrochlorid in dysentery,
 538, 540
- Emollient enemas, 251
- Emotion, inhibitory effect of, 6
- Emphysema, pulmonary, 171
- Emptiness, sensation of, 304
- End reaction, 51
- Enema in sitting position, 254
 obstruction to, 255
- Enemos at "hydrant pressure,"
 248
 daily, 271
 for various conditions, 247
 in gastritis, 270
 methods of giving, 248
 nutritive, 248, 345, 346
 indications, for 347
 of enormous quantity, 249
 oil, 251, 252, 275
 saline, high, 346
 temperature of, 250
- Energy, furnishing of, 317
- Entameba coli, 81, 82
 in pellagrin stools, 536
 histolytica, 82, 536
- Enteritis, gravel-forming, 78
- Enteroclysis, 186
- Enterocolitis, 275
- Enteroliths, 77
- Enteroptosis, belt for, 232
 in the slender, 228
 in women, 545
 treatment of, 271
- Enteroptotic habitus, 378
- Environment, change of, 309, 356,
 402, 423
- Environment, cheerful, 310
- Enzymes, effects of electricity upon,
 205
- Epidemics of dysentery, prevention
 of, 526
- Epigastralgia, 214, 377
 relief of, 216
- Epigastric compresses, 272
 pain, 389, 441
 pressure, significance of, 8
- Epigastrium, counter-irritation over,
 215
 flattening of, 437
 mass of tumors in, 34
 palpation of, 29
 tenderness in, 31
- Epiglottis, irritable, 199
 sensitiveness of, 172
- Epithelial cells in stools, 74

- Erosions of gastric mucosa, 172
 of stomach, treatment of, 458
 rectal, 496
- Eructations, explosive, 303, 384
 in chronic catarrh, 411
- Erythema of hands in pellagra, 10
- Erythrodextrin, 58
- Escharotics, use of, 244
- Esculin, 43
- Eserin in acute dilatation, 438
 laxative effect of, 360
- Esophageal bougie, divisible, 207
 dilatation by silk thread method, 28
 diseases, electrical treatment of, 210
 with malignant tendency, 210
 electrode, 27
 sound, 26
 stricture from ingestion of acid, 28
 walls, outline of, 111, 112
- Esophagismus, 210
- Esophagoscope, use of, 23, 25
- Esophagoscopy in cancer of the cardia, 468
- Esophagus, cancer of, 111
 cicatricial stenosis of, 210
 disease of, 6, 7
 diverticulum of, 7
 length of, 179
 malignant growths in, 29
 passage of food down, 334
 plugging of, 111
 rapid emptying of, 111
 sacculation in, 111
 secretion of, 26
 stenosis of, 7
 stricture of, 22, 27, 113
 impermeable, 28
 worms in, 561
 X-ray examination of, 110
- Ethereal sulphate output, 266
- Evacuation of bowels, 299
 of food from stomach, 330, 427
- Evacuations in amebic dysentery, 534
- Ewald-Boas test-meal, 45, 48, 61, 442, 488
- Ewald's diet for chronic gastritis, 420
 test-meal, 45
 treatment of ulcer, 447
- Examination of patients, 10
- Exploratory operation, advantages of, 168
- "Expression method," 180
- Extremities, cold, relief of, 277
 massage of, 277
- Exudate, sero-mucous, 501
- Eye-strain, 386
- F
- Facial expression, 30
- Faintness from coal-tar drugs, 369
 from invisible hemorrhage, 489
- Fan douche, 272, 277
- Faradic current in cases of atony, 206
 value of, 205
- Fasciola hepatica, 100
- Fasciolopsis buski, 97, 100
- Fasting stomach, contents of, 63
- Fat digestion, impaired, 246
 in abdomen, 231
 in mushes and soups, 328
 in stools, 73
- Fats a cause of food retention in stomach, 330
 emulsified, 359
 in food, 316
 in hyperchlorhydria, 393
 retention of, in stomach, 262
- Fauces, sensitiveness of, 172, 175
- Fear, cathartic effect of, 285
- Febrile conditions and use of the stomach-pump, 172
- Fecal accumulation, 21, 551
 current, acceleration of, 12
 movement, varying habit in, 299
 nitrogen, decrease of, 265
- Feces, ameba dysenteriae in, 80, 527
 analyses of, in ulcer, 446
 ball-shaped, 545
 blood in, 489
 burying of, 568
 concretions in, 77
 constituents of, 75
 contamination of soil with, 568
 examination of, 69
 macroscopic, 72
 gall-stones in, 76
 hookworm eggs in, 102
 investigation of, 108
 larvæ of flies in, 103
 nematode in, 95
 normal characteristics of, 69, 72, 75
 occult blood in, 59
 sources of, 62
 parasites in, 74, 75, 84, 85, 543
 segments of tapeworm in, 561
 tarry, 489
 tumor fragments in, 79
- Feeding, duodenal, 446
 intolerance of, 344
 of delirious, comatose, or insane, 348
- Feldspar, poultice of, 216
- Fermentation, delayed, 186

- Ferments, artificial, 359
 Fibromata of stomach, 464
 Fibromyomata of stomach, 464
 Filmaron for tapeworm, 560
 Fingerprints, nodules similar to, 474
 Fish, chemic composition of, 325
 raw, eating of, 92
 Fissure of anus, 235, 275, 276, 507
 Fistula following local peritonitis, 491
 rectal, detection of, 235
 Flabby abdomen, 223, 381
 support of, 222
 stomach, 209
 Flatulence, drug therapy of, 354
 due to swallowed air, 364
 from milk diet, 530
 intestinal, 300
 in the neurotic, 303
 painful, 355
 relief of, 254, 271, 363, 364
 Flatus, accumulation of, 220
 during irrigation, 258
 Fleiner's and Aaron's method, 453
 Flesh, loss of, 389
 Fletcherism, 335, 336
 "Flicking percussion," 20
 Flies, larvæ of, in stools, 103
 Fluids with meals, 260
 Fluke worm, 97, 561
 infection, symptoms of, 98, 561
 treatment in, 561
 Fluorescent media, 42
 Fluorescin, 43
 Fluoroscope, use of, 111
 Fluoroscopic examination, 22, 23
 inspection in the cat, 293
 Fly in food a cause of nausea, 285
 Fomentations, hot, 270, 271, 273
 Food, abstinence from, in gastritis, 405
 albuminous, 448
 aversion for, 386
 caloric value of, 318
 classification, 315
 customs of mankind, 320
 evacuation of, from stomach, 331
 -fear as result of dyspepsia, 2
 fried, 392
 ingestion of, followed by pressure, 8
 liberal intake of, 393
 personal idiosyncrasies to, 319
 poisonings, 516
 questions, 319
 regurgitation of, 276
 requirement, at rest, 318
 in health, 317
 residue, diet leaving little, 329
 Food, residue, irritating, 555
 large, 550
 small, a cause of constipation, 547
 stimulating action of, 312
 retained in stomach nineteen hours, 127
 scratchy articles of, 452
 stagnation, 379
 -stasis, 470
 sterilization of, 538
 stratification in stomach, 262
 substances, chemic composition of, 324
 suppositories, 349
 undigested, acting as a foreign body, 329
 Foods, artificial, 336
 proprietary and patented, 336
 without secretagogues, 283
 Foodstuffs, mental attitude concerning, 286
 Foot bath, hot, for nausea, 268
 Foreign bodies in stomach, 146, 460, 481
 1446 found, 482
 psychic influence of, 484
 treatment of, 483
 X-ray diagnosis of, 482, 484
 Foreign body, duodenal tube acting as, 344
 removal of, 26
 Fountain syringe for enemas, 248
 "Niagara," 254
 French army officer with abnormal bowel, 299
 Friedlieb apparatus, 190, 193
 Friedenwald's diet in gastritis, 421
 Fruits, chemic composition of, 327
 Furuncles from adhesive plaster bandage, 229

 G
 Gall-bladder adherent to pylorus, 135
 disease differentiated from hyperacidity, 389
 painful area in, 40
 with achylia, 474
 tenderness, 404
 Gall-sand, 77
 Gall-stones, analysis of, 77
 concretions resembling, 77
 in feces, 76
 search for, 76
 size of, 76
 Galvanic current, sedative effect of, 205
 Galvanization, intragastric, 458

- Game, chemic composition of, 325
- Gangrene from worm in trachea, 562
 indications of, 164
 of appendix, 164
 of intestines, 536
- Gant's speculum, 240
- Gas-bubble in stomach, 139
- Gas, eructations of, 200
 liters of, 301
- Gaseous eructations, relief of, 479
- Gasterin as digestant, 357
- Gastralgia, 377, 384
 treatment of, 204
- Gastrectasis, 426
 acute, 435
 differentiated from aerophagia, 301
- Gastric acidity, bicarbonate of soda in, 351
 analysis, 412
 cancer, macroscopic and microscopic examination in, 470
 mechanic treatment of, 478
 medical treatment of, 477, 478
 symptoms of, 465
 subjective, 469
 tests for, 470
- carcinoma and sarcoma differentiated, 463
- catarrh, 245
 treatment of, 279
- contents, analyses of, in ulcer, 446
 churning of, 261
 evacuation of, 262
- crises, 8, 9
- digestion, stimulation of, 283
- dilatation, 15, 16
- distress relieved by corset, 225
- examination, preparations for, 16
- evacuation, 117
- filtrate, 51
- flatulence, 300
- hemorrhage, causes of, 439
 prognosis and treatment of, 440
- intoxication, acute, 407
- irritability, 446
- juice, deficiency in, 324
 digestants made from, 357
 dilution of, 261
 excessive, 394
 flow of, on sham feeding, 293
- lavage, apparatus for, 188, 193
 astringent, 369
 benefits of, 186
 dangers in, 202
 for hyperchlorhydria, 391
- Gastric lavage, frequency of, 201
 hot and cold, 269
 indications for, 185, 199
 Leube-Rosenthal method, 188, 189
 possible accidents in, 190
 toleration of, 194
 when harmful, 401
 with medicaments, 190, 199
 with nitrate of silver, 270
- mucosa, damage to, 174
 disinfection of, 204
 drugs irritating to, 367
 erosions of, 172, 200, 414, 457
 infection of, 409
 intolerant of acid, 356
 irritable, 200
 perforation of, 185
 pus in, 408
 sensitiveness of, 387, 401
 sloughing of, 407
- mucus, excessive quantities of, 413
 lavage for, 270
 significance of, 63
- neroseus and eye-strain, 386
 therapeutic tests in, 368, 380
- phlegmon, 25, 408, 409
- residue, fermentation of, 201
- sarcoma, primary, 462
- secretion, deficient, 333
 inhibition of, 392
- sedatives, 367
- sensation, abnormal, 205
- serosa, peritonitis of, 436
- shadow, 123, 124
- spray, 203
- tetany with ulcer, 456
- tumors, location of, 469
 size of, 468
- ulcer, 124, 440. See also *Ulcer of Stomach*.
 chronic non-indurated, 125
 concentrated foods in, 448
 diet in, 333, 446, 447
 differentiated from catarrhal gastritis, 415
 excision of, 457
 healing, 140
 hot applications in, 450
 hydrotherapy in, 280
 Lenhart treatment of, 446
 mortality from, 449
 mouth feeding in, 451
 penetrating, 139
 pressure point in, 441
 reaction dilatation in, 454
 skiagram of, 139
 spontaneous cure of, 455

- Gastric ulcer, tenderness of, 32
 test for, 367
 treatment of, 445
 contraindicated, 205
 surgical, 166
 von Leube's, 446
 X-ray, 211
 wall, paralytic relaxation of, 436
- Gastritis, acute, 270, 403
 and chronic, differentiated, 404, 415
 diet in, 405
 infectious, 406
 drug therapy in, 407
 interstitial, 408
 treatment of, 404
 alcoholic, 411, 423
 border-line cases of, 417
 catarrhal, treated by gyromele, 215
 chronic, 186, 270, 403, 415
 catarrhal, 410
 diet in, 420, 421
 treatment of, 417
 by lavage, 201
 by medicines, 422
 with erosions, 458
 polypoid, 461
 phlegmonous, 25, 408, 409
 sub-acid, 411, 414, 428
 toxic, 403, 407
- Gastrodiaphany, 41, 42
- Gastrodynia, 384
- Gastroenterostomy, 123, 492
- Gastrogenic diarrhea, 517
- Gastrointestinal diseases, electricity in, 208
 essential treatment of, 306
 failure of radium in, 212
 hydrotherapy in, 260
 psychotherapy in, 282
- Gastronomic excesses, 426
- Gastroptosis with hypermotility, 133
- Gastroptosis, 16
 contours in, 44
 corset for, 225
 diagnosis of, 17, 19
 in the slender, 228
 mistaken for dilatation, 429
 treatment of, 271
 with movable kidney, 226
- Gastroscope, use of, 26, 484
- Gastroscoy, 24, 26, 469
- Gastrosuccorrhea, 393
 morning vomiting in, 9
 organic cause of, 394
 vomitus in, 394
- Gastrotomy, 28
- Gelatin in hematemesis, 369
 in hyperchlorhydria, 393
- Germain-Sée's test-meal, 45
- Germicide solutions, 541
- Girdle, cold wet, 271
 Neptune's, 269, 273, 276
- Glands, lymphatic, enlargement of, 35
- Glandular activity, stimulation of, 422
- Globus hystericus, 7
- Glycerin suppositories, 297, 552
- Glycyl-tryptophan test, 471
- Gmelin's test in gall-stones, 77
- Gonorrhea as cause of rectal ulcer, 511
- Greater curvature, infiltration of, 160
 jagged and irregular, 161
 transverse constriction of, 129
- Grief as cause of indigestion, 285
- Gripping, excessive, relief of, 532
 from cathartics, 556
 in abdomen, 396
- Gross duodenal tube, 64
- Ground-itch, 564, 567
 anemia, 564. See also *Hookworm Disease*.
- Growths in epigastrium, 33
 in right iliac fossa, 38
 inguinal region, 38
 in umbilical region, 37
- Guaiac test for blood, 60
- Gummatous masses in stomach, 475
- Gunsburg's phloroglucin-vanillin test, 49
- Gurgling sounds, 381
- Gymnastics for constipation, 219, 550
- Gyromele, 214, 215
- H
- "Haakenworm," 101
- Habit formation, 295
- Habitués, alcoholic, 425
 morphin, 474
- "Habitus enteropticus," 12
- Hairball in the stomach, 146, 482
- Hair follicles, infection in, 229
- Hair-pin removed from stomach, 483
- Hairs of plants in feces, 565
 swallowing of, 481, 482
- Ham, raw, trichina in, 563
- Hand vibrators, 212
- Hare enema, 251
- Head injuries as cause of gastric dilatation, 436
- "Head zones," 39
- Health resort, sojourn at, 355
- Heart-burn, 355, 441

- Heart-disease, organic, 171
 with broken compensation, 171
 shadows, 113
 Heat combined with electricity, 214
 for relief of pain, 217
 generation of, 317
 units in food, 324
 Helminthiform masses, 152
 Hematemesis, 34, 439, 442
 astringents for, 369
 gelatin for, 369
 in gastric ulcer, 415
 into intestine, 145
 Hematin, extraction of, 59
 Hemorrhage checked by enemas, 247
 from duodenal ulcer, 489
 from intestinal ulcer, 494
 from stomach, 145, 167, 439, 442
 treatment of, 280
 surgical, 167
 gastric, caused by foreign body, 482
 in gastric ulcer, 466
 recent, and the stomach-pump, 171
 Hemorrhoids, 347, 498, 507
 detection of, 235
 Hepatic flexure, displacement of, 547
 Hepatin as digestant, 357
 Heredity a cause of rumination, 384
 of cancer, 460
 Hernia, epigastric, 464
 Hiccough in dilatation of stomach, 436
 treatment of, 272
 High irrigation, 255
 Hirschsprung's disease, 33
 History, elicitation of, 41
 Hodgkin's disease, 35
 Hog parasite, 82, 85
 trichiniasis in, 93
 Holadin and bile salts, 365
 Honey as bowel stimulant, 297
 Hookworm, 100, 564
 detection of eggs of, 102, 565
 disease, 101, 564
 as sociologic problem, 565
 diagnosis of, 565
 forms of, 564
 origin of, 564
 prophylaxis of, 567
 symptoms of, 566
 treatment of, 568
 ova, microscopic examination for, 565
 Hormonal, 360
 Hormones, 11, 283
 influence of, 324
 Horn-shaped stomach, 474
 Hot-air cabinet, 274
 Hot applications in gastritis, 405
 in hyperchlorhydria, 271
 water bag for relief of pain, 217
 coil, 274
 sipping of, 271
 Hour-glass stomach, 140, 141
 symptoms of, 140, 145
 Hunger, abnormal sense of, 385
 constant, from self-dieting, 290
 pain, 486
 Hydragogue cathartics, 363
 "Hydrant pressure" in irrigating bowel, 248
 Hydrochloric acid, 356
 absence of, in gastric tumors, 470
 free, computation of, 52
 tests for, 49
 in 60-drop doses, 422
 in stomach contents, 47
 Hydrostatic pressure of enemas, 248
 Hydrotherapy, 260
 first principle of, 267
 for constipation, 273
 for peristaltic unrest, 381
 in antiquity, 260
 in cholera nostras, 278
 in constipation, 551
 in enteroptosis, 271
 in gastralgia, 385
 in gastric ulcer, 280
 in gastritis, 270
 in gastropnoxis, 271
 in hyperchlorhydria, 271
 in nervous dyspepsia, 277
 in pyloric stenosis, 433
 investigation of, 281
 Hygiama, 447
 Hygiene, value of, 351
 Hyperacidity of stomach, 118, 124
 diagnosis of, 388
 variations in, 388
 with constipation, treatment of, 200
 Hyperalgesic areas, 39
 Hyperchlorhydria, 8, 9, 51, 271
 as duodenal ulcer, 489
 as secretory neurosis, 387
 burning eructations in, 301
 diet in, 332, 392
 nervous, 379
 pain due to, 353
 treatment of, 271, 390
 Hyperesthesia, gastrica, 367, 385
 of abdomen, 22
 over epigastrium, 384
 Hyperkoria, 386, 465
 Hypermotility of stomach, 117, 130
 as a symptom, 152

- Hyperorexia, 385
 Hyperpepsinia, 56
 Hypersecretion, 378
 alimentary, 395
 symptom of, 413
 Hypnotics in digestive diseases, 368
 influence of, 368
 Hypochlorhydria, 271. See also
 Achylia Gastrica.
 Hypochondriac region, left, exam-
 ination of, 35
 Hypopepsinia, 56
 Hypotony of stomach, 426
 Hysteria in digestive diseases, 8
 Hysteric patient, tactful treatment
 of, 30
- I
- Ice-bag in gastric hemorrhage, 440
 to epigastrium for hiccough, 272
 Ice-cold water, ingestion of, 263
 Ice for relief of nausea, 268
 use of, in cholera nostras, 278
 -water lavage, 187
 Iced feeding spoon, 448
 Icterus, treatment of, 246
 Idiosyncrasy against bismuth, 454
 against milk, 530
 against stomach-tube, 172
 concerning food, 287
 Ileocecal intussusception, 37
 Imitation as cause of rumination,
 384
 Inanition, 162
 Indefinite ills, 167
 Indican in urine, 266, 267
 Indicanuria in pyloric stenosis, 431
 Indigestion, chronic, 1, 410
 fear of, 289, 290
 forms of, 377
 nervous, 378
 psychic, lasting 8 years, 290
 suggestions of, 289
 Infant foods as compared with milk,
 338
 Infants, ileocolitis of, 526
 Infectious gastritis, acute, 406
 Infiltration of stomach, 160
 Inflation of stomach, 13
 value of, in gastric cancer, 468
 Inguinal fossa, left, growths in, 39
 region, left, growths in, 39
 Injections for constipation, 551
 Injuries from swallowed articles,
 439
 Inorganic salts in food, 316
 Insalivation, 335
 Insomnia, relief of, 368
 with indigestion, 308
- Inspection of abdomen, 16
 in gastric cancer, 467
 Interstitial gastritis, acute, 408
 Intestinal antiseptics, 364, 365
 autointoxication, 298
 fear of, 300
 digestion, aid to, 360
 growths, malignant, 160
 indigestion, 213
 juices in the stomach, 62
 motility, influence of mind
 upon, 294
 mucosa, inflammation of, 250
 irritated, 251
 neurasthenia, diagnosis and
 treatment of, 396
 obstruction, 187
 parasites, 79, 557
 paresis, post-operative, 186
 putrefaction as affected by
 water-drinking, 266
 sand, 78
 in mucous colic, 397
 stasis, 547
 stenosis, use of oils in, 513
 strictures, extensive, 514
 tuberculosis, 105
 stools in, 105
 ulcer, 492
 diagnosis of, 493
 diet in, 494
 Intestine, small, outline of, 152
 Intestines, catarrhal inflammation
 of, 546
 inflation of, 13, 258
 life of hookworm in, 103
 local treatment of, 233
 lubrication of, 361
 peristaltic unrest of, 381
 waves of, 17
 secretory neuroses of, 396
 stenosis of, 511
 tetanic-like contractions of, 220
 tumor of, 544
 twisted, 163
 Intravascular feeding, 349
 Introspection, habit of, 209, 277
 morbid, as cause of indigestion,
 4, 310
 Intussusception, 187
 enemas for, 248
 enteric, 37
 Inunctions, nutrient, 349
 Invalids, "experienced," 167
 self-made, 289
 "Invigorators," 445
 Iodine, painting with, 218
 Iodoform reaction, 54
 Ipecac as specific for dysentery,
 539

- Iron tap in the stomach, 146
 test for presence of blood, 61
 Irrigating fluid, 250
 loss of heat in, 257
 preparation of, 250
 temperature of, 256, 257
 tube, double current, 255
 Irrigation, cold, 270
 of esophagus, 112
 intestinal, solutions for, 256
 of duodenum, 244
 of large intestine, 253
 of rectum, 496
 Irrigator, varieties of, 254
 Isochymia, 429
 Itching from adhesive plaster, 228
 in jaundice, relief of, 279
 in rectum, 508
- J
- Jackson's method of gastroscopy, 24
 veil, 549
 Jamison's irrigator, 254
 sitz-bath pan, 511
 Jaundice due to fluke worms, 561
 from malignant disease, 34
 hydrotherapy in, 279
 relief of, 365
 Job's cell-exhaustion, 282
- K
- Kamala for tapeworm, 560
 Kaolin poultice, 216
 Kemp belt, 230
 Kemp's method of examination, 18'
 21
 of irrigation, 257
 stomach whistle, 21
 Kerosene oil for worms, 563, 564
 injections in dysentery, 533,
 539, 540
 Kidney, floating, 223, 224
 flushing of, 246
 movable, palpation of, 31
 shape and consistency of, 37
 suspended, 161
 Kidneys, growths in, 35
 Kilmer's abdominal belt, 223
 Kinks in intestines, 492, 513, 514,
 543, 546
 Kneading of abdomen, 221
- L
- Lab-ferment, 447
 Laborers, day, gastritis among, 409
 Lactic acid in gastric cancer, 470
 in the diagnosis of cancer, 54
 tests for, 45, 53
 Lactose in duodenal feeding, 341
 Lane's kink and coloptosis, 147
 influence of, in constipation, 549
 of ileum, 514
 Laparotomy, exploratory, 167
 in acute dilatation, 438
 in phlegmonous gastritis, 409
 Larvæ, parasitic, in feces, 84
 Larynx, spasmodic closure of, 172
 worms in, 562
 Lavage fluid, temperature of, 199
 frequency of, 419
 habit, 202
 in corrosive poisoning, 408
 nutrition lost in, 433
 of rectum and sigmoid, 74
 of stomach, 145
 solutions for, 419
 transduodenal, 244
 tube, 174, 187
 clogging of, 194
 double current, 188
 Laxative drugs as cause of diarrhea,
 521
 Laxatives, abuse of, 275
 mildest, 360
 Lazy disease, 568
 Lead-poisoning as cause of consti-
 pation, 546
 Leg pack, hot, 270, 277
 Lenhartz diet schedule, 449
 Leptodera stercoralis et intestinalis,
 95
 Leube-Rosenthal gastric lavage, 189
 Leube-Ziemssen method of feeding,
 455
 Leucocyte counts, 164
 Leucocytosis, absolute, 164
 Liniments for relief of pain, 218
 Lipomata of stomach, 464
 Liquid diet, indications for, 332
 Liver, abnormally lobulated, 35, 36
 abscess, 535, 537, 542
 protozoa in, 80
 diagnostic puncture of, 537
 fluke, 100, 561. See also *Fluke*
 Worm.
 pain, 40
 prolapse of, 475
 shadow, 133
 Lividity caused by drugs, 369
 Lockwood abdominal belt, 224
 bulb, 180, 194
 Loose bowels, 515
 Lubrication of tubes, 250
 Lumbar region, right, examination
 of, 36
 Lunar caustic, application of, 244
 Lymph deposits on base of ulcer, 490
 Lymphosarcoma, 462

M

- Magnesia, action of, 352
 forming concretions, 352
 Male fern for tapeworm, 558, 560
 Malignancy developing after mas-
 sage, 219
 Malignant disease, X-ray therapy in,
 210
 growths in stomach, 160
 late and early, 160
 Malnutrition, 312, 316
 dangerous state of, 330, 339
 tendency to, 320
 Maltose, 58
 Manila, dysentery in, 82
 Massage, abdominal, contraindica-
 tions for, 219
 bags, colonic, 258
 cannon ball, 218
 electrovibratory, 213
 for atonic constipation, 550
 in mucous colic, 399
 movements of, 220
 roller, 214
 vibratory, 212
 Mastication, 334
 hasty, 12
 interminable, 336
 temperamental, 335
 Maternal blood, 472
 Mayo clinic, 470
 cancer records in, 457
 Mayo's reports on duodenal ulcer,
 485
 Meals, imbibing fluids with, 261
 Meat broth, lack of nourishment in,
 339
 juices, overrated as food, 338
 repugnance to, 465
 tea, dietetic value of, 339
 Meats, chemic composition of, 325
 Mechano-therapeutics in constipa-
 tion, 274
 Medication, demand for, 373
 frequent changes in, 401
 Medinal, effects of, 368
 Medullary carcinoma, 461
 Melena, 440, 442
 Membranous enteritis, 396, 397.
 See also *Mucous Colic*.
 Menstrual irritation, 395
 Mental attitude in rest cure, 311
 of patient, 2, 13
 depression in gastritis, 412
 disturbance affecting digestion,
 284
 storm, 388
 Merycism. See *Rumination*.
 Mesenteric bands, 513
 Mesenteric bands, constriction as
 cause of gastric dilatation,
 435
 ileus, 435
 Metal ball in intestine, 294
 Metastases, 220
 Meteorism, 364
 Methyl salicylate ointment, 218
 Methylene blue in cancer, 479
 Microorganisms in stools, 104
 Microscopic examination of stomach
 or intestinal contents, 15
 Migraine, excessive vomiting in, 62
 Milk diet in diarrhea, 523
 in dysentery, 530
 with carbohydrates, 328
 and fat, 328
 with solid food, pastry, and
 broths, 329
 substitutes for, 341
 Mine anemia, 101
 Mineral springs, benefit from sojourn
 at, 423
 waters in gastritis, 422
 Mitchell, Dr. Weir, 311
 Mixed diet, advantages of, 321
 food loss in, 322
 "Morning sickness, 424
 Morphin habitués, bismuth reten-
 tion in, 474
 in gastritis, 405
 Motility, loss of, 129
 of stomach, 427
 Motor functions of intestinal tract,
 293
 insufficiency, 186, 426
 alcohol in, 428
 atonic, 430
 in cancer, 470
 of second degree, 429, 430
 medication in, 434
 stenotic, 430
 treatment of, 428
 neuroses, 381
 power, impairment of, 186
 Mountain anemia, 101
 Mouse in cream a cause of nausea, 285
 Mouth, dryness of, 529
 sepsis, 450
 watering of, 283
 worms in, 561
 Moving equilibrium, state of, 305
 Moynihan on duodenal ulcer, 486
 Mucous channels in rectum, 495, 498
 probing of, 499, 503
 colic, 73, 78, 397
 treatment of, 398
 colitis, 243, 397
 surgical considerations in, 400
 membrane, peeling of, 458

- Mucus, absent in gastric ulcer, 415
 cast, 397
 excessive, in stomach, 418
 gastric, 63
 in dysenteric stools, 534
 in feces, 72, 494
 in rectum, 241
 in stomach, 186
 contents, 47
 sticky, in throat, 268
 Murphy drop method, 343, 450
 Muscles, cysticerci in, 90
 parasites in, 88
 trichina spiralis in, 93, 563
 Muscular rigidity, 165
 in abdomen, 409
 tissue in feces, 73
 Musculature, gastric, tonicity of, 302
 Mustard plaster, 216
 Myasthenia, 426
 Myosarcoma, 462
 Myositis, trichinous, 95
- N
- Naaman, the Syrian, and hydro-
 therapy, 260
 "Nachmagen," 67
 Nature's power of compensation, 300
 Nausea caused by mental images,
 284
 by nervous or mental dis-
 turbance, 284
 by thought of shambles, 284
 from stomach-tube, 172
 of gastritis, 404, 405
 relief of, 268, 366
 tepid water for, 268
 with flatulence, relief of, 355
 Nebulizer, 258
 Necator Americanus, 99, 100, 102,
 564
 Necrosis in intestines, 536
 Needle douche, 258
 Negro, hookworm disease in, 564
 Nephritis, nausea in, 268
 simulated by gastric disease, 481
 Nephroptosis, belt for, 232
 Neptune's girdle, 269, 273, 276
 Nerve endings in abdomen, 206
 Nervous anorexia, relief of, 268, 269
 debility, tonic for, 373
 diarrhea, 382, 396, 519
 dyspepsia, 33
 cured in four weeks, 292
 static electricity in, 209
 treatment of, 276
 indigestion, diagnosis of, 378
 relieved by change of board-
 ing place, 310
- Nervousness as cause of indigestion,
 3
 Nessler's reagent, 54
 Neuralgia of stomach, 369, 384
 ovarian, 38
 Neuroses, border-line, 394
 gastric, 8, 11, 206, 368
 intestinal, 78, 278, 303
 motor, 377
 secretory, 377, 387
 sensory, 377
 Neurotic disturbance of digestion, 3
 Neurotics, eliciting of history from,
 41
 Neutralon, 391
 "New thought" cult, 289
 Nitrate of silver for erosions, 458,
 459
 in gastric ulcer, 452
 lavage, 199, 201, 391
 Nitric acid test for bile, 63
 Nitrogen balance, 343
 income and outgo of, 265
 Nocturnal seizures, 476
 Nodular indentations, 474
 Nodules, malignant, 34
 Non-malignant growths, 162
 Non-purgative drugs in constipa-
 tion, 554
 Normal stomach, picture of, 130
 Nourishment of body as a symptom,
 10
 Nutrient enemas in gastritis, 406
 recipes for, 348
 Nutrition below par, 329
 disturbance of, 213
 Fletcher's work on, 334
 in the body, 322
 Nuts, chemical composition of, 327
- O
- Obese, the, examination of, 16, 21, 31
 Obesity as impediment to diagnosis,
 151
 Obsessions of dyspeptics, 12
 Obstruction, cicatricial, 162
 Occult blood, 442
 in feces, 220, 489
 in ulcer of the stomach, 415
 Odor of feces in pellagra, 72
 of stomach contents, 47
 Oidium albicans in the stools of
 children, 104
 Oil enemas, 251
 in mucous colic, 398
 inunction, 349
 Oils for lubricating intestines, 513
 Oily hydrocarbons, 362

- Olive oil enemas, 252
 for inhibitory effect, 392
 in duodenal ulcer, 491
- Omentum, tumors of, 33
- Onion, prolonged chewing of, 336
 chewings of, 336
- Open air exercise, 423
- Operation in malignant infiltration, 160
- Opium as astringent, 370
 habit, 532
 rectal use of, 347, 348
- Optimism, sympathetic, curative power of, 305, 402
- Orang-outangs, dysentery among, 558
- Orexin as appetizer, 402
 as stomachic, 358
 in cancer, 479
 in gastritis, 422
- Organic disturbance of digestion, 3
- Orientals, bowel habits among, 300
- Origin of cancer, 461, 463
 Cohnheim's theory, 463
- Orthoform in treatment of gastric ulcer, 367
- Ova of flies in stools, 103
 of flukes, 99
 of hookworm, 102
- Ovary, removal of, 161
 right, inflammation of, 38
- Oxgall enema, 251
 in jaundice, 279
- Oxidation of foods, 322
- Oxyntin in antacid states, 357
- Oxyuris vermicularis, 88, 562
- Ozonized turpentine, 60
- P
- Packs in acute dysentery, 277
 variety of, 270
- Pad for pendulous abdomen, 226
- Page's test for tubercle bacilli, 105
- Pain, abdominal, counter-irritation for, 216
 spice plaster for, 217
 after eating, 145
 agonizing, in rectum, 495
 boring, burning, 487
 colicky, 308
 due to hyperchlorhydria, 353
 from enlarged spleen, 40
 gastric, relief of, 367
 gnawing, 442, 487
 in digestive diseases, 6, 7
 in gastric cancer, 466
 ulcer, 454
 periodic, 6
 recurrent, significance of, 8
 relieved by food, 487
- Pain, relieved by tincture of iodine, 217
 varying nature of, 7
- Palpation, examination by, 13
 in gastric cancer, 468
 of stomach, 145
- Pancreas, tumors of, 34
- Pancreatic cysts, 34
 stones, 77
- Pancreatin, action of, 359
- Pancreon, 360
- Papain, action of, 359
- Paraffin, liquid, as evacuant, 362
 as protective coat to foreign body, 483
 for constipation, 555
 in intestinal stenosis, 513
- Paralysis, intestinal, due to large enemas, 551
 post-operative, 360
- Parasites, animal, in intestines, 557
 as cause of diarrhea, 517
 of gastritis, 403
 in feces, 74, 75, 84
 intestinal, 79
 quinine enemas for, 558
- Parasitic origin of cancer, 461, 463
- Paresis, bulimia a precursor of, 385
 gastrointestinal, 186
- Paris, siege of, animal food during, 286
- Pars cardiaca, carcinoma of, 130
- Pars inferior duodeni*, contents of, 68
 media, callous ulcer of, 124
 pylorica, defect in filling of, 129
 old contracting ulcer of, 124
superior duodeni, contents of, 67
- Passive exercise, 219
- Pea flour as substitute for milk, 341
- Pea-soup stool, 105
- Pecuniary loss from hookworm disease, 568
- Pegnin, 447
- Pellagra, ameba in stools of, 82, 536
 associated with amebic dysentery, 82
 diagnosis of, 10, 536
 diagnosticated from amebiasis, 536
 diarrhea of, 72, 518
 effluvia from, 304
 kerosene oil injections in, 533
- Pelletierine for tapeworm, 371, 560
- Pelvis, inflammation in, 247
- Pendulous abdomen, malign influence of, 222
- Penetrating gastric ulcer, 139
- Penzoldt's tables, 330
- Pepsin in stomach contents, 48
 test for, 55
 value of, 356, 359

- Pepsinia, normal, 56
 Peptic ulcer, 440
 Peptone in gastric contents, 55
 preparations, 328
 Peptones significant of cancer, 472
 Percussion, auscultatory, 19
 douche to spine, 276
 in gastric cancer, 468
 of stomach, 17
 sounds, 18
 value of, 13
 Perforation of duodenum, acute and
 subacute, 490
 chronic, 491
 diagnosis of, 490
 of stomach, 443, 444, 456
 Peripancreatic cysts, 34
 Periproctitis, 497
 diagnosis of, 498
 Peri-rectal spaces, mucous channels
 in, 499, 503
 Peristalsis, and the emotions, 294
 exaggerated, 303
 in dilated stomach, 17
 in gastric cancer, 467
 increased by faradic current,
 206
 intestinal, produced by cathar-
 tics, 360
 promotion of, 554, 556
 reversed, 186, 345
 stimulation of, 246, 249
 electrical, 205
 visible, 12, 17, 152, 427
 Peristaltic unrest, 12, 381
 hydrotherapy in, 280
 Peristole, disturbance of, 429
 Peritonitis, acute, 165
 from pus tubes, 546
 general, from infection, 409
 tubercular, 33
 Personal equation, 306
 relations between physician and
 patient, 4
 Personality of patient, 1
 of physician, 306
 sub-conscious, 294, 295
 Perspiration about anus, 498
 production of, 274
 Pertussis belt, 223
 Pessimism from dyspepsia, 2
 Petroleum, liquid preparation of, 555
 Pharynx, clonic spasm of, 301
 obstructed, feeding in, 348
 Phenacetin for neuralgia, 369
 Phenolphthalein as a cathartic, 361,
 555
 Phenomenon, intestinal, 303
 Philippines, amebic dysentery in,
 536
 Phlegmonous gastritis, 408
 mortality in, 409
 Phobias, 288
 Phosphate crystals in feces, 74
 of soda, 363
 Physical bankruptcy, 290
 examination of patients, 10
 wretchedness without known
 cause, 413
 Pile-bearing area, 498
 Pills, inert, profuse catharsis from,
 295
 Pin-worms in the rectum, 371
 Placebo, antacid, 355
 benefits of, 306
 Placenta, elements from, 472
 Plant parasites, 103
 Plaster jacket as cause of gastric
 dilatation, 435
 Poison, corrosive, effects of, 407
 Poisoning, emesis in, 366
 food, 516
 from thymol, 371, 569
 gastric lavage in, 185
 ptomaine, 406
 Politzer bag, 180
 Polynuclear cells, percentage of, 164
 Pomegranate root for tapeworm, 370,
 560
 Pork, raw, eating of, 93
 tapeworm, 89
 Post-nasal catarrh, 63, 417
 Posture of patient, 438
 Potato remains in stools, 73
 Pouches in stomach, 145
 Poultices for relief of pain, 216
 Powder-blower, 243
 Pratt's speculum, 240
 Precision of diagnosis, danger in, 313
 Predigested foods, 337
 value of, 338
 Pregnancy and the stomach-tube,
 170
 test for, 472
 vomiting of, 223
 Pressure changes in stomach, 261
 intra-abdominal, 433
 significance of, 8
 of overloaded stomach, 435
 on epigastrium, 388
 -point in stomach, 124
 movement of, 124
 spots, 39
 Priessnitz applications, 450, 451
 Primiparae, abdomen of, 427
 Privy for rural locality, 568
 tub system, 566
 Proctitis, 494
 acute catarrhal, 241
 diagnosis of, 495

- Proctitis, atrophic, 242
 chronic, 498
 exacerbations in, due to catching cold, 497
 mucus exudate in, 497
 treatment of, 496
- Proctoclysis, 247, 256, 438
 drop method of, 257
- Proctoscope, pneumatic, 236
 Tuttle's, 242
- Proglottides of tapeworm, 88, 561
- Prognosis, gloomy, 305
- Prolapse of organs, 224
 rectum, 495
- Propeptone in gastric filtrate, 55
- Prophylaxis of chronic gastritis, 417
- Proprietary foods, 336, 339
 nutritive material in, 338
- Prostate, palpation of, 235
- Prostration in gastritis, 406
- Protective barrier, formation of, in
 ulcer, 490, 491
- Protein catabolism, 265
 daily intake, 318, 320
 diet, 421
 digestion, 262, 267
 -fat diet, 428
 putrefaction, 304, 364
 ration, low, 321
- Proteins, foreign, disintegration of,
 472
 value of, to the body, 316
- Protozoa as cause of dysentery, 79
 in intestines, 557
 in sputum, 80
 in stools, 74
- Pruritus ani, 507
- Pseudo gall-stones, 77
 -health-teachers, 298
 -invalids, 229
- Psoas abscess, 39
- Psychic diarrhea, 520
 difficulty in swallowing, 6
 effect of bizarre treatment, 203
 of exploratory operation, 168
 impulses, digestive, 335
 indigestion, 6, 276, 377
 in literature, 284
 treatment of, 291
 influence, 209, 270
 of electrovibration, 213
 over motor functions, 292
 stimulant, 219
- Psychoanalysis, 313
- Psychotherapy, 218 353
 applied to indigestion, 305
 in cancer, 481
 in cardiospasm, 382
 in constipation, 553
 in digestive neuroses, 402
- Psychotherapy, in gastro-intestinal
 diseases, 282
 in regard to diet, 307
 in rest cure, 312
- Ptomaine poisoning, 406
- Ptyalin, action of, 58, 261, 335, 359
- Pulmonary tuberculosis, advanced,
 171
- Pumpkin seed for tapeworm, 560
- Purgation, reaction from, 554
- Purgatives, active, 554
 unwise use of, 497
- Pus in stools, 494
- Putrefaction, intestinal, 266, 321
- Pyloric dilator, 383, 434
 obstruction from ulcer, 456
 stenosis, 131, 137
 acquired, 431
 congenital, 431
 treatment of, 432
 from gall-bladder adhesions,
 135
- Pylorus, carcinoma of, 117
 diagnosis of, 118
 constriction of, 478
 displacement of, 123
 elevation of, by corset, 226
 obstruction of, 427
 palpation of, in a child, 33
 paralysis of, 129
 patency of, 430
 patulous, 183
 relaxed, 342
 resection of, 476
- Pylorospasm, 15, 118, 124, 127, 383,
 431
 a cause of long food retention,
 127
 and lesion of stomach wall, 124
 with hyperacidity, 118
 with organic stenosis, 394
- Pyorrhea alveolaris a cause of
 catarrhal gastritis, 410
 in catarrhal gastritis, 417
- Pyrosis, 276
- Q
- Quassia for worms, 562
- Quinine enemas, 558
- R
- Racial immunity to effects of disease,
 564
- Radio-diagnosis, difficulties in, 151
 of biliary calculi, 146
- Radiograph, rectal, 499, 503, 505
- Radiographs of tumors, 474
- Radium therapy, 211
 treatment of cancer, 479

- Raisins and rice test-meal, 442
 Rats and mice as food, 287
 Reading as aid to defecation, 297
 Rectal ampulla, 235
 examination, advisability of, 233
 feeding, 446
 in antiquity, 344
 foods utilized in, 345
 time limit of, 345
 mucosa, erosions and ulcers of, 242
 inspection of, 241
 local applications to, 243
 sinus, local treatment of, 508
 tube, double-current, 247
 Rectoscope, 511
 Rectum, burrowing of channels in, 498
 caloric absorption by, 345
 examination of, digital, 234
 instrumental, 235
 impacted, 275
 inflation of, 236, 240
 irrigation of, 507
 irritable, 347, 348, 495
 lavage of, 74
 pathologic changes in, 498
 sensitiveness of, 348
 ulceration of, 243, 511
 worms in, 562
 Recuperative power, 305
 Red meat, prohibition of, 452
 Reflex diarrhea, 521
 intestinal disturbance, 495
 "Regulin" for constipation, 362, 552
 Regurgitation of food, 7
 Reichmann's disease, 393, 395. See also *Gastrosuccorhea*.
 Relish of food under necessity, 286
 Remissions in digestive diseases, 6
 Rennin, absence of, 57
 deficiency of, 57
 normal content of, 57
 Resection of intestines, 168
 Residue, diet leaving little, 329
 seven-hour, 162
 Resistance to disease, 315
 Rest cure, 311
 for anorexia nervosa, 386
 peristaltic unrest, 381
 Retching in alcoholic gastritis, 424
 Retention enema, 450
 of food in stomach, 127, 145
 Rhabdomena strongyloides, 95
 Rhubarb, effects of, 554
 Rice and raisins supper, 431
 Rieder test-meal, 118, 152, 443
 Riegel's test-dinner, 44
 Rigg's disease, 417
 Roentgen ray in diagnosing hour-glass stomach, 140
 in examination of abdomen, 13
 of esophagus, 110
 of stomach, 117
 Rose abdominal belt, 228, 230, 231, 232
 in gastric cancer, 478
 in mucous colic, 399
 in pyloric stenosis, 433
 Round worms, infection by, 561
 Rubbing, abdominal, 221
 Rubner's experiments with foods, 322
 Rugæ, distortion of, 444
 Ruhrah's diet in gastritis, 421
 Rumbling, intestinal, 303
 Rumination, 383
 Russo-Japanese War, sanitary precautions in, 526

 S
 Saline enema, 251, 257
 infusions, 349
 laxatives, 363
 Saliva, lack of, 6
 mucin constituents of, 63
 Salivary digestion, 261, 335
 glands, disease of, 359
 Sanatorium, rest in, 311
 treatment of diarrhea in, 523
 Sand, concretions resembling, 77
 intestinal, 78
 Santonin for worms, 88, 371, 562
 Sarcinæ in benign stenosis, 466
 in dilated stomach, 104
 Sarcoma, inoperable, 480
 of stomach, diagnosis of, 463
 Satiety, sense of, in cancer, 465
 Scalding, gastric sensation of, 487
 Scar tissue, 244
 Schmidt and Strasburger's test-diet, 70
 Scirrhus carcinoma, 462
 Scirrhus, deep circumscribed, 118
 Sclerosis of stomach, 476
 Scotch douche, 268, 270
 Scratching percussion, 19, 468
 Scybala in colon, 524
 Scybalæ, pressure of, 492
 prevention of, 552
 Seasickness relieved by belt, 223
 relieved by medinal, 368
 Secondary, stomach, 67
 Secretagogues, 283
 Secretin in gastritis, 422
 Secretion, inhibition of, 370
 psychic, 282
 stimulation of, 422

- Secretory glands, gastric, stimulation of, 392
 neuroses, 387
 Sedatives, gastric, 366, 367, 380
 intestinal, 366
 Senile achylia, 357
 Sensory neuroses, 384
 Sepsis, proctoclysis in, 256
 Serum in hematemesis, 369
 rabbit or horse, 369
 test for cancer, 472
 transuded into bowel, 520
 Sexes, frequency of cancer in, 460
 Shadow from stomach, 139
 Shambles, thought of, as cause of
 nausea, 284
 "Sham meals" in case of dog, 293
 Shell-fish, idiosyncrasy to, 287
 Shiga's bacillus, 108, 526
 Shock, influence of, 380
 post-operative, 256
 Sigmoid flexure, cancer in region of,
 39
 Sigmoid, kinking of, 155
 lavage of, 74
 stenosis of, 512
 Sigmoiditis, 241, 497
 Sigmoidoscope, 238, 511
 Tuttle's pneumatic, 239
 Simple life, 446
 Sinking spells, 11
 Sinus irrigator, Albright's, 244
 Sinuses, rectal, 501
 burrowing of, 498
 irrigation of, 508
 Sitophobia, 11, 307, 380, 388
 in dysentery, 533
 study of, 287
 Sitz-bath before sinus irrigation,
 508
 in chronic dysentery, 278
 in nervous dyspepsia, 277
 Sizzling sounds, 145
 Skiagram showing bismuth, 139
 Skin, appearance of, as a symptom,
 10
 carcinoma from X-rays, 461
 dry and scaly, as cause of
 diarrhea, 518
 jaundiced, relief of, 279
 Sloughs in dysenteric stools, 528, 536
 Smell, offensive, a cause of nausea,
 284
 Smoking as cause of gastritis, 410
 moderate, 418
 "Snail stomach," 444
 soup in Italy, 286
 Soap suppository as aid to defeca-
 tion, 297
 Sodium as intestinal antiseptic, 365
- Soldiers, nervous diarrhea among,
 396, 520
 Solid food, intolerance of, 308
 Sounds, deglutition, 22
 gurgling, 21, 23
 splashing, 21, 145, 412
 Soups, chemie composition of, 327
 Spanish-American War, dysentery
 in, 525
 typhoid fever in, 525
 Spasm, pyloric, 342
 Spastic constipation, 545
 Speech, slow, in hookworm disease,
 566
 Spice plaster, 217
 Spices and condiments, 410, 420
 Spinal douche, 272
 Spine, duodenum to right of, 545
 faradization of, 272
 ice-bag to, 270
 percussion douche to, 276
 Spirillum cholerae Asiaticæ, 106
 Splanchnoptosis, 231
 Splashing sound in atonic stomach,
 427
 Spleen, enlargement of, 35, 38
 palpation of, 31
 Splenic flexure of sigmoid, kinking
 of, 155
 "Spoiled stomach," 304
 Spray for stomach, 203
 Sputum, protozoa in, 80
 swallowed, tubercle bacilli in,
 105
 S. S. enema, 250, 451
 Stagnation, fermentation from, 354
 Starch and opium enema, 347
 digestion, 57, 359
 a factor in a murder case, 57
 Starvation, chronic, 290
 diet, 337, 446
 from a "diet," 380
 slow, mistaken for indigestion,
 307
 Static electricity, 209
 Steapsin, test for, 66
 Stenosis of esophagus, 112
 of intestines, 511, 544
 of pylorus, 117, 245, 465
 old, 129
 Stenotic dilatation of the stomach,
 15, 17
 non-malignant, 434
 surgery in, 434
 Stercoral diarrhea, treatment of, 522
 Sterilization of food, water, etc., 538
 Stomach, absorption of, 414
 acidity of, 200, 411
 with constipation, 200
 adhesions in, 140

- Stomach, aspiration of, 45, 413
 atony of, 129, 201, 205
 auscultatory percussion of, 19
 auto-lavage of, 365
 bleeding into, 145
 bucket, 211, 479
 cancer of, 460
 carcinoma of, 115
 catarrh of, 411
 conditions of, indicating lavage, 199
 concentration of thoughts on, 290
 contents, aspiration of, 413
 chemical examination of, 44, 48, 470
 examination of, after hemorrhage, 442
 expression of, 180
 in duodenal ulcer, 488
 microscopic inspection of, 46
 reaction of, 49
 strata of food in, 262
 delicate, 404
 diffuse contraction of, 130
 dilatation of, 15, 127, 137, 272
 distention of, 145, 300
 distorted, 475
 douche, 203
 examination of, by artificial distention, 17
 fasting, examination of, 389
 fermentation in, 199, 200
 foreign bodies in, 481
 gaseous distention of, 16
 gummatous masses in, 475
 hook form of, 123
 horn-shaped, 123
 contracted, 121
 hour-glass contraction of, 140
 hypertonicity of, 123
 illumination of, 41
 inflation of, by carbonic acid gas, 20, 21
 irrigation of, 188
 irritable, use of nutrient enemata in, 348
 lavage of, 190, 199, 200
 local treatment of, 203
 malignancy of, feeding in, 348
 motility of, 117, 414, 444
 motor functions of, 205
 visible, 292
 normal, 130
 obstruction of, 146
 of irregular form, 183
 outlining of, by the use of water, 20
 overloading of, 435
 percussion of, 145
 Stomach, perfect rest for, 343, 348
 peristaltic unrest of, 381
 powder-blower, 204, 459
 ptosed, 162
 puncture of, 408
 redilation of, 437, 438
 residue, six-hour, 131
 rest, diet for, 448
 secretion of, 26
 secretory functions of, 205
 sensory disturbance of, 333
 shortening of, 130
 shrinkage of, 123
 sickle-shaped residue in, 129
 snail-shaped, 123, 124
 sounding of, 21
 suspension of, 163
 time of food retention in, 127, 331
 -tube, buckling of, 174
 choice of, 173
 contraindications for, 170
 habit, 11
 horror of, 184
 idiosyncrasy against, 172
 openings in, 174
 passage of, 27, 176
 swallowing of, 481
 use of, 170, 190
 Einhorn's method, 176
 in anorexia nervosa, 386
 tumors of, 33
 ulcer of, 129, 139, 439, 440
 vibration of, 213
 visible hemorrhage from, 451
 walls, massaging of, 206
 washing out of, 11
 whistle, 21
 withdrawal of, 183
 worms in, 88, 561
 Stomachics, 358
 Stomatitis, painful, 529
 Stones, pancreatic, 77
 Stools, ameba in, 494
 bloody, 79, 105
 disinfection of, 538
 in Asiatic cholera, 107
 in diarrhea, 520
 microscopical examination of, 74
 of small caliber, 512
 ova of hookworm in, 565
 parasites in, 557
 pencil-shaped, 545
 scant, in tumor, 544
 shape of, 549
 straining of, 559
 Straining at stool, 496
 Strata of food in stomach, 262
 Strawberry hairs in feces, 565

- Streptococcus of erysipelas, 480
infection in stomach, 409
- Stricture of esophagus, 308
dilation of, 309
of intestines, 168
of small intestine, 362
- Strictures, multiple, over several feet
of intestines, 514
- Strongyloides intestinalis, 95
detection of, in stools, 96
stercoralis, 565
- Styptics, 369
- Succussion sound, 23, 437
- Sufferers, unhappy class of, 402
- Sugar, chemic composition of, 327
- Supporters, abdominal, 223, 227
- Suppository, belladonna, 367
food, 349
glycerin, 297, 552
- Suprarenal capsules, growths in, 35
tumor of, 35
gland extract, 459
- Surgery, cases requiring, 159
in cancer of stomach, 464
in gastric ulcer, 456
in mucous colic, 400
- Swallowing of mucus, 63
- Symptoms, general, significance of, 9
misleading, 68
- Syphilis simulating cancer, 475
- Syphilitic ulcers, 494
- T
- Table for rectal therapeutics, 234
good cheer at, 310
- Tachyphagia, 334
- Tact, exercise of, 307
- Tænia echinococcus, 92
mediocanellata, 88
nana, 92
saginata, 90
solium, 88, 89
growth of, 90
- Taka-Diastase, 359
- Tannates, preparations of, 369
- Tannigen for diarrhea, 524
in dysentery, 532
- Tapeworm, 88
anthelmintics for, 370, 558
beef, 90
diagnosis of, 561
from eating fish, 92
head of, expulsion of, 558, 560
in America, 89, 90, 91
male fern as specific for, 558
pork, 89
segments of, in feces, 88, 89, 561
- Tartar emetic, 366
- Tea as an irritant, 46
overindulgence in, 410
- Teeth and mastication, 336
good condition of, 417
- Temperament, study of, 3
- Tenderness, areas of, in gastric ulcer,
40
epigastric, 31
- Tenesmus, rectal, relief of, 277, 532
- Test, Boas' resorcin-sugar, 50
-breakfast, settling into layers,
389
-diet, difficulties of, 71
modified, 71
of Schmidt and Strasburger,
70
requirements, 69
for acetic acid, 55
for bile, 63
for lactic acid, 53
for occult blood, 59
for pepsin, 55, 56
for pregnancy, 472
free hydrochloric acid, 49
Gunsburg's phloroglucin vanil-
lin, 49
-meal, 22
as aid to diagnosis, 68, 175
double, 112, 117
extraction of, 175
Riegel's, 44, 46
serum, for cancer, 472
-stool, recognition of, 71
therapeutic, in gastric neuroses,
368, 380
Toepfer's quantitative, 50
- Thirst, relief of, 450
severe, 437
- Thread-test, 491
- Throat, insensitiveness of, 175
- Thymol, danger in absorption of,
371, 569
in hookworm treatment, 568,
569
poisoning, 371
- Tissue formation in proctitis, 497
- Toast and tea diet, 290
- Tobacco, black, chewing of, 418
- Toepfer's quantitative test, 50
- Tongue, appearance of, in disease, 12
cleansing of, 343
sensitiveness of, 172
- Tonic prescriptions, 372
- Tonics, bitter, 358
local and general, 371
- Topography of stomach, 15, 19
- Toxemia, intestinal, 480
gastric analysis in, 413
- Toxic gastritis, 403, 407
treatment of, 408
- Toxin produced by hookworm, 564
by parasites, 557

- Toxins, effect of, on gastric wall, 436
 intestinal, flushing out of, 246
 Toxogenic decomposition, 330
 Transillumination of stomach, 41
 in gastric cancer, 468
 Transverse colon, ptosis of, 544
 tumors of, 37
 Traumatism as cause of cancer, 461
 tumor, 461
 Treatment, importance of early
 institution of, 307, 400
 Trematodes, 97
 Tremor, alcoholic, 425
 Trichina spiralis, 93
 Trichinella spiralis, 94
 Trichiniasis, 93, 563
 treatment of, 563
 Trichiura, intestinal, 94
 Tricocephalus dispar, 93, 563
 enormous multiplication of,
 563
 treatment for, 564
 "Trifid stomach," 140
 Triturating power of stomach, 261
 Tropical dysentery, 526
 Trunk pack, 270
 Trypsin, test for, 66
 treatment of cancer, 479
 Tryptophan, 470, 471
 Tube, irrigating, removal of, 250
 Tubercle bacilli in stools, 105
 Tubercular ulcers, 493
 Tuberculosis in children, 105
 intestinal, 105
 of stomach, 493
 pulmonary, 171
 Tumor as a symptom, 145
 diagnosed from gas, 18
 duodenal, 34
 fatty, 464
 fragments in feces, 79
 gastric, differentiated from sple-
 nic, 36
 in epigastrium, 33, 467
 in left lumbar region, 38
 of cecum, 493
 of pancreas, 34
 of right kidney, 37
 of stomach, 460
 apparent, 475
 benign, 464
 conditions mistaken for, 475
 Turck's gyromele, 214, 215
 Turnip greens in dysenteric diet, 538
 Turpentine for tapeworm, 560
 ozonized, 60
 stupes, 216
 Tuttle's operating proctoscope, 242
 Tympanites, 165
 excessive, 247
 Tympany of stomach, 18, 19
 Typhoid fever in warfare, 525, 526
 simulated by trichiniasis, 563
 stool, pus in, 105
- U
- Uffelmann's test, 53
 Ulcer, bleeding from, 243
 callous, 123, 124, 129
 complicated by Reichmann's
 disease, 395
 cure, 491
 duodenal, diagnosis of, 485
 dyspeptic, 13
 esophageal, 25
 intestinal, 492
 near pylorus, 474
 of bowel, treatment of, 243
 of lesser curvature, contracting,
 124
 of stomach, 25, 129, 439, 440
 chronic, 456
 diagnosis of, 441
 flat, 139
 Lockwood's treatment of, 450
 medical or surgical treatment
 of, 444
 mortality of, 444
 penetrating, 139
 perforation of, 455
 surgery in, 456
 X-ray therapy in, 456
 perforation of, 219, 455
 radiographic diagnosis of, 443
 rectal, 235
 syphilitic, 494
 tubercular, 493
 Ulceration, catarrhal, 492
 of rectum, 511
 Ulcer-stenosis, 129
 Umbilical region, examination of, 37
 Umbilicus, irritation of, 230
 Uncinaria Americana, 100, 101
 specific against, 371
 duodenalis, 97, 100
 Uncinariasis, 564. See also *Hook-
 worm Disease*.
 Underfeeding, depression from, 420
 indigestion from, 307
 Uremia, diarrhea in, 519
 enemas in, 247
 proctoclysis in, 256
 Uremic coma, saline infusion in, 349
 Urine, fluorescent, 43
 orange-yellow, 371, 562
 Uterus, cancer of, 460
 reflexed, a cause of diarrhea, 521
 worms in, 88

V

- Vacation, benefits from, 380
 Vaccines, mixed, injection of, 410
 Vacuum bottle for irrigation, 257
 Vagina, worms in, 562
 Vegetable astringents in diarrhea, 524
 Vegetables, chemic composition of, 326
 green, in hyperchlorhydria, 392
 Vermes in intestines, 557, 558
 Vertigo on arising, 412
 Vibration, 212
 Vibrators, Vedee and Eureka, 212
 Vichy water, 454
 Vicious circle in digestive diseases, 314
 Vinegar enema, 562
 Viscera, abdominal, support of, 222
 Visceroptosis, 9, 163
 Vomit, coffee-ground, 172, 431
 round worm in, 85
 Vomiting, abdominal support for, 223
 acute, 185
 as a symptom, 9
 due to carcinoma, 129
 duodenal tube, 344
 mental images, 284
 in gastric cancer, 466
 in gastric ulcer, 454
 in peritonitis, 187
 in robust man, from grief, 285
 in the early morning, 9
 in acute gastritis, 270, 404
 of blood, 145, 439
 of slimy mucus, 412
 periodic, 186
 post-operative, 186
 projectile, 431, 437
 psychic causes of, 285
 relief of, 366
 Vomitus, coffee-ground, 465
 feculent odor to, 436
 foul odor to, 415, 469
 greenish, 436
 in acute gastritis, 404
 in gastrosuccorhea, 394
 with occult blood, 431

W

- Warfare, dysentery the bane of, 525
 Wassermann test, 476
 Water as preventive of constipation, 550
 fourteen glasses of, to produce emesis, 365

- Water-drinking, copious, benefits of, 261, 264, 266, 423
 contraindicated, 272
 hot, for relief of nausea, 268
 in food, 316
 with meals, 260
 experiments concerning, 263, 266
 when contraindicated, 262
 Waterlogging with soup, 340
 -trap stomach, 143, 430
 Waters, alkaline, 355
 Wave of improvement, 209
 Weight increase in rest cure, 313
 loss of, from too limited diet, 393
 in gastric cancer, 467
 Whip-worm, 93, 563. See also *Tricocephalus Dispar.*
 Whiskey, cheap, 423
 craving for, 424
 rye, as cause of gastritis, 411
 Whites, poor, hookworm disease in, 564
 Worms, hermaphroditic, 98
 nematode, 95, 561
 pin, 88, 102, 562
 round, 85, 370, 561
 eggs of, 87, 561
 in children, 561
 vomiting of, 85, 561
 seat, 88
 thread, 88, 370, 562
 trematode, 97. See also *Fluke Worms.*

X

- X-ray examination for gastric cancer, 473
 of stomach, 15, 19, 22, 146, 231
 phenomena, gastric, 292
 therapy, 210
 in gastric ulcer, 456
 X-rays, anodyne effect of, 210
 as diagnostic aid, 110, 158
 in cardiospasm, 382
 in inoperable cancer, 479
 in liver abscess, 542
 in treatment of ulcers, 211
 on excised stomach, 261

Y

- Yeasts in stools, 103
 Yellow urine, 371, 562
 vision, 562

Z

- Zinc oxid plaster, 228
 Zone, gall-bladder, 39
 pyloric, 39







RC801

N59

Niles

DEC 24 1926

